Education
School Infrastructure

enstruct

ROUSE HILL HIGH SCHOOL UPGRADE

CIVIL ENGINEERING REVIEW OF ENVIRONMENTAL FACTORS REPORT

Prepared for: Department of Education
By: **en**struct group pty ltd

ROUSE HILL HIGH SCHOOL

CIVIL ENGINEERING REVIEW OF ENVIRONMENTAL FACTORS REPORT

ISSUE AUTHORISATION

PROJECT: Rouse Hill High School
Project No: 6746

Rev	Date	Purpose of Issue / Nature of Revision	Prepared by	Reviewed by	Issue Authorised by
A	21/01/25	REF Design Report	MZV	PAL	PAL
B	18/02/25	REF Design Report Updated	PAL	PAL	PAL
C	10/03/25	REF Design Report Updated	PAL	PAL	PAL

Executive Summary

enstruct have been engaged by Department of Education to provide civil engineering advice for the design for upgrades to Rouse Hill High School (hereafter RHHS). This report relates to the civil elements of the works with a specific focus on the Environmental Factors associated with the civil design, such as flooding, erosion and sediment control, and water quality and quantity. The full list of areas this Review of Environmental Factors (REF) report covers is listed below.

This REF report covers:

- Onsite Stormwater Detention (OSD)
- Water Sensitive Urban Design
- Flooding
- Stormwater Overland Flow
- Ground conditions
- Earthworks
- Pavement design
- Erosion and Sediment control

Contents

1 Introduction

This Civil Engineering report has been prepared by enstruct to accompany a Review of Environmental Factors (REF) for the Department of Education (DoE) for upgrades to Rouse Hill High School (the activity) under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act) and State Environmental Planning Policy (Transport and Infrastructure) 2021 (SEPP TI).

This document has been prepared in accordance with the Guidelines for Division 5.1 assessments (the Guidelines) by the Department of Planning, Housing and Infrastructure.

This report examines and takes into account the relevant environmental factors in the Guidelines and Environmental Planning and Assessment Regulations 2021 under Section 170, Section 171 and Section 171A of the EP&A Regulation as outlined in Table 1.

Table 1 – Summary of Relevant Section of the Part 5 Guidelines and EP&A Regulation

Regulation / Guideline Section	Requirement	Response	Report Section
2a	**Any environmental impact on the community**	**The proposed development will have negligible environmental effect on the community during construction and post construction.**	**2-4**
2h	**Any long term effects on the environment**	**The proposed development will have negligible long term impacts on the environment**	**2-4**
2j	**Risk to safety of the environment**	**The proposed development will have negligible impacts to the safety of the environment**	**2-4**
2l	**Any pollution of the environment**	**The proposed development will have negligible pollution impacts**	**2-4**

1.1 Proposed Activity Description

The proposed activity for the alterations and additions to Rouse Hill High School including:

- Demolition of existing footpaths, stairs, and the relocation of an existing seating shelters towards the west of Block F;
- Removal of nine (9) trees;
- Construction of a two (2) storey classroom building (known as Building L), comprising eleven (11) general learning spaces (GLS) and 2 Science Labs;
- Construction of new footpaths and a new covered bicycle parking space;
- New emergency vehicle accessway; and
- Landscaping, including the planting of trees.

1.2 Activity Site

The project site is located on Withers Road in Rouse Hill and is legally described as Lot 105 in Deposited Plan (DP) 1108407. Rouse Hill High School is located on the western side of Withers Road.

Figure 1 provides an aerial photograph of the site.

Figure 1: Aerial Photograph

The school development is aimed at meeting the Educational Facilities Standards and Guidelines (EFSG) and strengthen the curriculum to improve the quality of educational outcomes and improve the efficiency of educational delivery at the school to support student development. The proposed Building L will comprise ten General Learning Spaces (GLS), one enhanced Multi-Purpose Space, and two science laboratories. Additionally, the proposed upgrade will provide a new covered bicycle parking area, a new emergency vehicle accessway, and landscaping. The proposed Site Plan is shown in **Figure 2**.

Figure 2: Proposed Site Plan (Source: djrd architects)

1.3 Significance of Environmental Impacts

Based on the identification of potential issues, and an assessment of the nature and extent of the impacts of the proposed development, it is determined that:

- The extent and nature of potential impacts are low and will not have a significant impact on the locality, community or the environment, and
- Potential impacts can be appropriately mitigated or managed to ensure that there is no significant impact on the environment or community.

1.4 Mitigation Measures

As all the mitigation measures designed to alleviate the environmental impacts are described in future chapters, the following table provides a summary:

Table 1: Environmental Impact Mitigation Measures related to Civil Engineering

Project Stage D – Design C – Construction O - Operation	Mitigation Measures	Relevant section of the report
D, C	Erosion and Sediment control measures	Section 4
D, C, O	Stormwater Quantity Control measures (OSD)	Section 3.2
D, C, O	Stormwater Quality Control measures (WSUD)	Section 3.5
D	Flood analysis and planning measures	Section 3.3

2 Site Description

Rouse Hill High School is located at 240 Withers Road, Rouse Hill, within the Hills Shire Local Government Area (LGA). It is situated within a well-established residential area. The site is bordered by Withers Road to the east and Caballo Street to the west. Kanebridge Oval is located to the north of the school and Ironbark Ridge Public School along the southern boundary. Furthermore, Caddies Creek lies to the west which leads into Caddies Boulevard Lake. Further, there is a dedicated bus zone along Withers Road, which is in the shape of a dedicated slip lane. The built form and land use character surrounding the site is predominantly low scale, 1-2 storey dwelling houses. The site has a total area of approximately 2.2 hectares. The site is legally described as Lot 105 DP 1108407. The site is currently occupied by eleven, one and two storey, brick and timber panelled, buildings which appear to be in good external condition. **Figure 3** shows a typical example of the two-storey building.

Figure 3: Two Storey Building at the Site

2.1 Previous Site Uses

Prior to the RHHS's opening in 2009, the site featured a golf course as can be seen at the school's site, refer to **Figure 4**. The golf course was across Caddies Creek and into now neighbouring plots that have since been redeveloped into Rouse Hill Town Centre and commercial plots. Before the creation of the golf course, the site was farmland.

Figure 4: Golf Course at Site, circa 2005 (Source: Google Earth)

2.2 Existing Stormwater

The site has several existing stormwater pits located between the buildings, draining to the north west and drains into Caddies Creek. The existing drawings received by enstruct are based on the construction drawings from the school's initial construction circa 2007 and are shown in **Figure 5.**

Four above ground tanks exist on the campus. Two tanks on the eastern boundary are understood to collect roof water off the adjacent buildings and COLA and are used for reuse. The existing tanks on the northern boundary are understood to be part of the Rouse Hill recycled water scheme used for the oval irrigation.

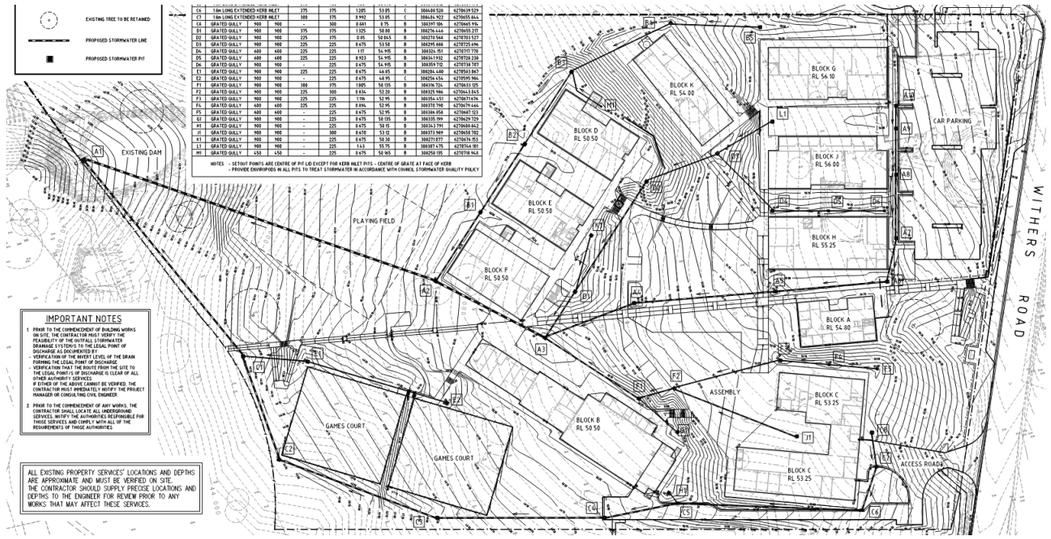

Figure 5: As Built Stormwater System (Bonacci, 2007)

2.3 Existing Geotechnical Conditions and Soil Contamination

A geotechnical investigation has been undertaken by Douglas Partners (ref: Project 215851.00). The soil conditions at the site are typically topsoil/fill, up to 300mm depth, overlying by clay, down to around 1.5m depth. Below the clay lies weathered sandstone rock, down to about 2.3m depth with hard bedrock below. A CBR of 4.5 and 5% was returned for clay samples tested. A CBR of no greater than 3.0% will be adopted for the pavement design. The clay is noted as moderately dispersive. Fill exists in the western portion through the fields and COLA, as well down to the western boundary.

Being constructed in 2007, the school campus is not expected to be contaminated. Advice from Douglas Partners (ref: Project 215851.00, R.003.Rev0, PF:TW) indicates that excavated material can be disposed of as General Solid Waste (GSW). It is noted that PFAS has been detected in soil samples, however the amount detected was less than the NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste and NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste.

3 Stormwater Design

The stormwater design must be in accordance with Australian Standards, Hills Shire Council Standards, Australian Rainfall and Runoff (2016), and School Infrastructure NSW's Educational Facilities Standards & Guidelines (hereafter EFSG) section DG95 Stormwater.

In general, all new roof stormwater will be collected in roof gutters and downpipes and conveyed to a 5kL rainwater tank as designed by the Hydraulic Engineer. Surface stormwater will be collected in stormwater drainage pits. The in-ground stormwater and the rainwater tank overflow will be connected to water quality controls and the Onsite Stormwater Detention (hereafter OSD).

Pipes and pits will need to be designed to satisfy the minimum provisions of AS 3500.2 and EFSG. They must be designed to convey at least the 5% Annual Exceedance Probability (AEP) flows. Where pipe capacity is exceeded i.e., greater than 5% AEP, stormwater will be conveyed as overland flow. Overland flow paths are to be designed to convey at the minimum 1% AEP stormwater flows with a Depth x Velocity to be less than 0.4m^2/s.

3.1 Environmental Flows

Industry standard best practice require water sensitive design principles be incorporated into new developments. All works are to minimise runoff, maximise treatment of stormwater by directing stormwater to landscape-based treatment systems, maximise capture and reuse of runoff and ensure the is no impact on receiving water during construction. Environmental Flows are included as part of Water Sensitive Urban Design system which is discussed in following sections.

3.2 *Onsite Stormwater Detention (OSD)*

The Hills Shire Council Design Guidelines for Subdivisions and Developments, Section 4.22, describes the OSD requirements for the Site. Appendix A identifies Rouse Hill as part of the Hawkesbury River Major River Catchment, and hence, the OSD design is to be in accordance with the respective guidelines for this catchment. The Major River Catchments map is shown in **Figure 6** below.

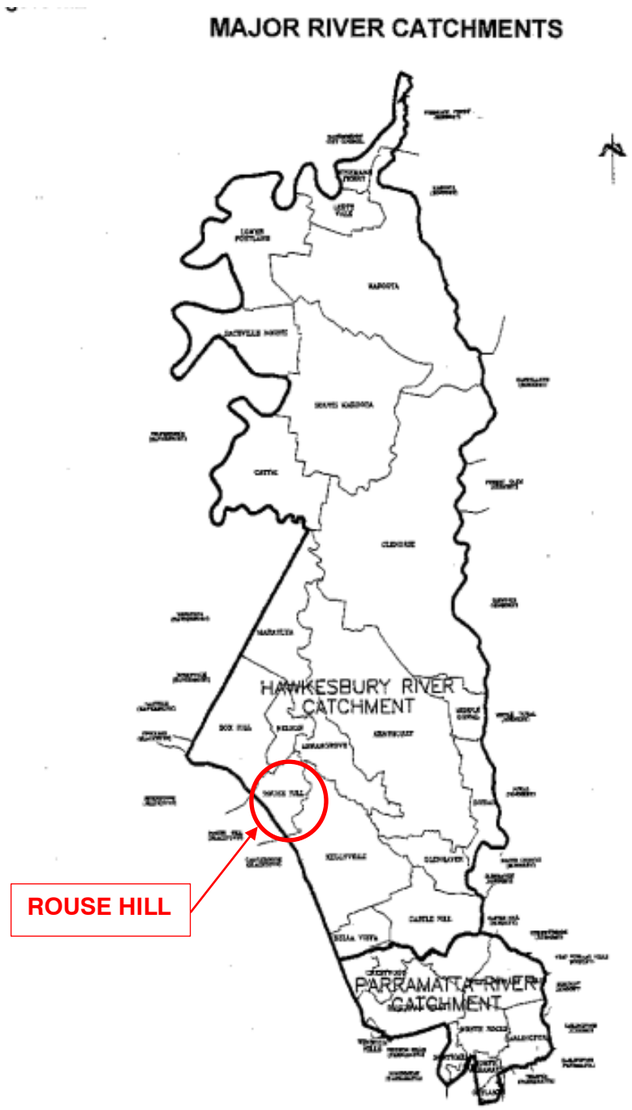

Figure 6: Major River Catchments Map (Source: The Hills Shire Council Design Guidelines for Subdivisions and Developments, Appendix A)

The Permissible Site Discharge (PSD) and Site Storage Volume (SSV) requirements for the Site are dictated in the Hills Shire Council Design Guidelines for Subdivisions and Developments, Section 4.22. The requirements are based on the site slope, as can be seen in **Figure 7**.

Site Slope	PSD (l/s/ha)	SSV (m^3/ha)
Greater than 15%	136	298
Between 10% and 15%	115	336
Between 6% and 10%	104	362
Between 3% and 6%	92	396
Between 0% and 3%	87	412

Figure 7: PSD and SSV Requirements for the Hawkesbury River Catchment (Source: The Hills Shire Council Design Guidelines for Subdivisions and Developments)

The slope across the development area of the site is an average of 5.1%. Hence, the requirements for sites with a slope between 3% and 6% apply. The development area has been highlighted in red and purple in **Figure 8** below, with runoff from the red area bypassing the OSD, and runoff from the purple area being directed to the OSD. The total area is 1,921m^2. The path to the rear entry has not been included in the OSD calculation as it is an existing path. The OSD is therefore designed to a minimum SSV of 76.07m^3 and with a PSD of 17.67L/s (including bypass discharge).

Figure 8: OSD Calculation Development Area

The OSD must be designed and constructed to control stormwater runoff from development sites such that, for all peak stormwater events up to and including 1%AEP discharges from the site does not exceed pre-development stormwater discharges. The ESFG notes the preference for open and absorption storage systems, this is equivalent to a fenced pond. While this might sound effective for a big site, this Site is unsuitable for an open storage system to due to the size of the development and gradient of the surrounding land. Additionally, the fencing and signage can impact the aesthetics of the site. Therefore, an underground OSD is proposed, which also reduces the risks of kids accessing the structure.

3.2.1 *DRAINS Modelling*

A DRAINS Model was created and analysed to ensure the discharge from the Site does not exceed the PSD or the pre-development flow rates, and to confirm the OSD size. The model confirmed the ability of an **88.12m³** OSD tank with a 65mm orifice plate to meet these requirements. A comparison of the post-development flow rates from the site, including the flows bypassing the OSD tank, compared to the pre-development flow rates and PSD across a range of storm events is shown in **Table 2**.

Table 2: Site Discharge Rate Comparison

Storm Event	Pre-development Discharge Rate	Post-development Discharge Rate (PSD = 17.67L/s)
20% AEP	48L/s	12L/s
10% AEP	62L/s	12L/s
5% AEP	76L/s	14L/s
1% AEP	102L/s	17L/s

3.3 *Flooding*

The school site is located east of Caddies Creek. As part of the Kellyville Station development in 2015, Hyder produced a flood study showing the 1% AEP flood extents/heights along Caddies Creek. Below in **Figure 9** is an excerpt from Hyder's report showing the 1% AEP flood extent and the Rouse Hill High School campus indicating that flooding is not a concern for the campus including the proposed works, as the site is elevated and away from Caddies Creek.

Figure 9: Peak 1% AEP flood extent (Source: Kellyville Station Upgrade, Hyder Consulting 2015)

3.4 *Overland Flow Paths*

Any stormwater overflow from the gutters of proposed buildings shall be collected by inlet pits on the ground and/or drained via overland flows paths into the existing stormwater system. Where this is not possible, the gutter and stormwater system shall be designed to convey the 1% AEP storm event to the detention system.

3.5 *Stormwater Quality*

Stormwater discharged from the development will be treated in accordance with Hills Shire Council's Stormwater Management, Water Sensitive Urban Design (WSUD) and Environmental Flows. The site stormwater will pass through suitable pollution control devices to achieve the required water quality removal rates noted in **Table 3**.

Table 3: General Stormwater quality requirements (Source: Hills Shire City Council DCP 2011)

Pollutant	Hills Shire Annual Reduction Requirement
Total Suspended Solids (TSS.)	85%
Total Phosphorous (TP)	65%
Total Nitrogen (TN)	45%
Gross Pollutants (GP)	90%

As site constraints permit, Water Sensitive Urban Design practices can be easily accommodated into the campus. However, the safety to the school population needs to be considered. Therefore, mechanical (in lieu of natural removal) pollutant removal devices are to be incorporated to remove gross pollutants, suspended solids, reduce nutrient runoff including nitrogen and phosphorous. The pollution control devices will require on-going maintenance, with at least yearly inspection and maintenance. Further advice should be sought from the manufacturer.

It is proposed that a series of pollution control devices will need to be provided to remove contamination from stormwater runoff to the required level prior to discharge. It is expected that the devices will include, litter screens in all pits, detention tank trash screen and an end of line treatment device to remove nitrogen and phosphorus contaminants etc., prior to discharge to the Authority's stormwater system. This system is preferred as it will be able to achieve pollutant reductions required, is easily maintained, and does not require large open areas or pose safety risk to the school population. The ESFG notes the preference for open and absorption storage systems.

Pollutant removal rates as required by Council are to be in accordance with best practice. The removal rates will be in accordance with:

- The EPA's manual on Managing Urban Stormwater (Treatment Techniques)
- Stormwater Treatment Devices User Guide (NSW Supply) – Government Contract No.019, July 1999, Department of Public Works and Services
- The relevant Australian Standards for pollution control devices

The ESFG notes that stormwater is to be treated to remove foreign matter and ensure minimal impact.

3.5.1 MUSIC Modelling

A MUSIC Model has been developed in accordance with Hills Shire Council requirements to indicate the suitability of the proposed pollution removal measures for the site. The proposed water quality control devices for the site are:

- One 5kL rainwater tank collecting run-off from Building L roof,
- At least 7 OceanProtect OceanGuard pit inserts across the pits on the driveway and footpaths, and
- 4 690mm Psorb OceanProtect Stormfilter cartridges within the OSD tank.

The results of the MUSIC model confirmed the ability of the above devices to reduce the pollutants discharged from the site to below the requirements described by council, as can be seen in**Table** 4.

Table 4: MUSIC Modelling Results

Pollutant	Reduction Requirement	Annual Pollutant Reduction Results
Total Suspended Solids (TSS.)	85%	86%
Total Phosphorous (TP)	65%	79%
Total Nitrogen (TN)	45%	54%
Gross Pollutants (GP)	90%	96%

3.6 Integrated Water Management Plan

The integrated water management plan is a holistic and collaborative approach of the water cycle and consider elements such as: Potable water, Rainwater reuse, Recycled water, Surface stormwater, Groundwater, Stormwater detention, Water quality, among others.

In this report, civil has covered the elements related to surface stormwater, stormwater quality and stormwater detention. For potable water, and rainwater storage and reuse, refer to the Hydraulics engineering drawing which is included with the civil plans.

4 Erosion and Sediment Control

During construction and while the site is disturbed, erosion prevention and sediment control measures will be required. Erosion prevention generally involves managing stormwater by diverting overland flow around construction areas as well as collecting stormwater within the construction zone and directing to sediment control devices. Devices likely to be incorporated are silt capture fences, hay bales, and grass lined swales; water flow dissipation and discharge control devices such as sand bags, pollution mattresses, and basins.

Erosion prevention and sediment removal strategies need to be inspected regularly during service and construction works, cleaned, and maintained after storm events, and modified to suit construction work progress, decanting, and demolition.

Erosion and sediment control is to be provided in accordance with the “Blue Book” Part 1 [Landcom (2004) Managing Urban Stormwater: Soils and Construction, 4th edition].

5 Civil Design

5.1 Earthworks

Careful consideration should be given to the floor level for the proposed building to reduce excavation or filling.

The location of the proposed buildings and the impact buildings being retained need to be considered. Therefore, the importance of a detail geotechnical investigation is needed to assess the existing ground conditions.

Earthworks volumes will be confirmed as the design progresses. Due to the significant level difference across all sites, cut/fill with retaining walls may be required.

5.2 Pavements

Pavements are to meet the requirements of the geotechnical investigation and the ESFG. The following items are applicable:

- All pavements to be designed for a 25-year life.
- All pavements trafficked by buses and trucks to be designed for a minimum 5 x 10^5 repetitions of a standard axle load, as defined by AUSTROADS.
- For other vehicular traffic areas design for 1.0 x 10^5 repetitions of a standard axle load, as defined by AUSTROADS.
- Allow for movements in the foundations caused by moisture variations and mine subsidence.
- Design rigid pavements so there is no vertical differential movement between panels at joints.
- For truck turning areas pavements shall be rigid in construction and finished with a reinforced concrete surface.
- For other areas pavements may be either flexible or rigid in construction. For flexible construction finish with a surface coat of asphaltic concrete.
- Breccia or dolerite is not to be used in road base or concrete mix.
- Non-skid finish for vehicular trafficked pavements and non-slip finish for pedestrian trafficked pavements.
- AC for the emergency accessway to be AC10 and have minimum thickness of 40mm or greater as the design requires.
- Limit fly ash content to 20% of cementitious content of mix by weight.
- For the emergency accessway, concrete shall have minimum 32 MPa characteristic compressive strength.
- For rigid method of construction finish with a reinforced concrete surface.
- Concrete pavements for vehicles shall be a minimum 150mm thick and reinforced with not less than SL92 mesh at top and 100 mm thick road base.
- Other concrete pavements shall be a minimum 100mm thick and reinforced with not less than SL72 mesh at top.
- Provide a thicker pavement and heavier mesh as the design requires and to meet durability requirements for minimum cover to reinforcement.
- For flexible construction finish with a surface coat of asphaltic concrete.

6 *Conclusion*

The civil works associated with the design and construction of the upgrade at RHHS will be carried out in accordance with normal engineering practice and will meet the requirements of relevant standards.

After consideration of the Council requirements for the site and the existing conditions, an 88.12m^3 OSD tank will be required at the site to ensure the downstream stormwater drainage system will not be over capacity post-development. A combination of a rainwater tank, pit inserts, and stormfilter cartridges will work in tandem to remove pollutants from the stormwater collected from the upgrade to below the requirements outlined by Council.

Erosion and sediment control measures are to be in place during construction to prevent contamination of the downstream stormwater system and tracking of grit and sediment onto the roadway.

Subject to implementing the recommendations/mitigation measures such as erosion control, water quantity management and water quality management of this report, the conclusion of this assessment is that the proposed Activity is not likely to significantly affect the environment in relation to stormwater and soil matters.

Supporting Information and External References

Bonacci Group Rouse Hill Secondary School Drawing Set, for construction 07/11/07
Project code: 8029

Hyder Kellyville Station Precinct Flooding and Drainage Precinct Planning, Rev1 14/08/15
https://www.planning.nsw.gov.au/sites/default/files/2023-03/kellyville-station-precinct-appendix-k-flooding-and-drainage.pdf

Douglas Partners Report on Geotechnical Investigation, Rev0 16/11/2022
215851.00.R.001.Rev0

Project Surveyors Detail Survey Revision B, 07/05/2024
Job reference: 5289

Before You Dig Australia
https://www.byda.com.au/

ESFG
https://efsg.det.nsw.edu.au/design
https://efsg.det.nsw.edu.au/spec
https://education.nsw.gov.au/about-us/efsg/design-framework

NSW LGA boundaries map
https://portal.spatial.nsw.gov.au/portal/home/webmap/viewer.html

APPENDIX A – Civil Drawings

enstruct

CIVIL ENGINEERING WORKS

ROUSE HILL HIGH SCHOOL

240 WITHERS ROAD, ROUSE HILL, NSW 2155

LOCALITY PLAN
SCALE: 1:2000

TO BE PRINTED IN FULL COLOUR

CIVIL ENGINEERING WORKS DRAWING LIST:

NOT FOR CONSTRUCTION

Date generated 08/03/2025 1:29:34 am \\CORP.PRIVAN.NET\ANZ\TRANSITION\ENSTRUCT\CAD\1-6700\6746\CIVIL\DRAWINGS\6746-CV-0000

rev	date	description	drn	ch'k
06	04/03/25	ISSUE FOR CONTRACT DOCUMENTS	NTV	PAL
05	21/01/25	ISSUE FOR REF	MZV	PAL
04	14/01/25	ISSUE FOR 100% SCHEMATIC DESIGN	MZV	PAL
03	13/12/24	ISSUE FOR 50% SCHEMATIC DESIGN	MZV	PAL
02	08/05/23	FOR 100% SCHEMATIC DESIGN	BEJ	KEH
01	04/04/23	ISSUE FOR 50% SD TENDER	BEJ	KEH

rev	date	description	drn	ch'k
07	10/03/25	REISSUE FOR REF	NTV	PAL

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project
ROUSE HILL HIGH SCHOOL UPGRADE

240 WITHERS ROAD, ROUSE HILL
NSW 2155

drawing title
COVER SHEET AND LOCALITY PLAN

status
FOR REVIEW

scale at A1	drawn	checked	approved
AS SHOWN	BEJ	KEH	KEH

project no.	sheet	rev.
6746	6746-CV-0000	07

DESIGN & CONSTRUCT DOCUMENTATION

1. The level of detail / design reflected in these documents is based on the understanding this will be built as part of a design & construct contract.
2. The contractor shall retain the responsibility to undertake detailed design, confirm compliance with relevent standards, concent conditions & the specification.
3. The contractor shall be responsible for ensuring the final design is co-ordinated fully with other consultants.
4. No variation will be accepted for design amendments required to meet the functional objective of this documentation.

CIVIL SAFETY IN DESIGN

enstruct (NSW) Pty Ltd operates under Safe Work Australia's code of Conduct for the Safe Design of Structures.
These drawings shall be read in conjunction with the enstruct Civil risk and Solutions Register.
Under the Code of Conduct it is the Client's responsibility to provide a copy of the Civil Risk and Solutions Register to the Principal Contractor.
It is the Principal Contractor's responsibility to review the hazards and risks identified during the design process to ensure a safe workplace is maintained for the construction, maintenance and eventual demolition of the civil infrastructure.

DBYD SERVICES NOTE

"Public Service Utility information shown on plan has been complied from information received from Dial Before You Dig inquiry, reference Number 31056628, which was obtained on 10/12/21.
Unless specifically shown otherwise, this location and depth of services shown on this plan have not been verified.

The location of services shown on this drawing have been plotted as accurately as possible from diagrams provided by service authorities and should be confirmed by site inspection."

SURVEY AND SERVICES INFORMATION

SURVEY

Origin of levels	: GNSS RTK OBSERVATIONS
Datum of levels	: A.H.D. AUSTRALIAN HEIGHT DATUM
Coordinate system	: GDA2020
Survey prepared by	: PROJECT SURVEYORS
Setout Points	: CONTACT THE SURVEYOR

enstruct does not guarantee that the survey information shown on these drawings is accurate and will accept no liability for any inaccuracies in the survey information provided to us from any cause whatsoever.

UNDERGROUND SERVICES - WARNING

The locations of underground services shown on enstruct drawings have been plotted from diagrams provided by service authorities. This information has been prepared solely for the authorities own use and may not necessarily be updated or accurate.

The position of services as recorded by the authority at the time of installation may not reflect changes in the physical environment subsequent to installation.

enstruct does not guarantee that the services information shown on these drawings shows more than the presence or absence of services, and will accept no liability for inaccuracies in the services information shown from any cause whatsoever.

The Contractor must confirm the exact location and extent of services prior to construction and notify any conflict with the drawings immediately to the Engineer/Superintendent.

The contractor is to get approval from the relevant state survey department, to remove/adjust any survey mark. This includes but is not limited to; State Survey Marks (SSM), Permanent Marks (PM), cadastral reference marks or any other survey mark which is to be removed or adjusted in any way.

enstruct plans do not indicate the presence of any survey mark. The contractor is to undertake their own search.

BOUNDARY AND EASEMENT NOTE

The property boundary and easement locations shown on enstruct drawing's have been based from information received from: No boundary information received. Refer architect for boundary information and locations
enstruct makes no guarantees that the boundary or easement information shown is correct. enstruct will accept no liabilities for boundary inaccuracies. The contractor/builder is advised to check/confirm all boundaries in relation to all proposed work prior to the commencement of construction. Boundary inaccuracies found are to be reported to the superintendent prior to construction starting.

SITEWORKS NOTES

1. All basecourse material to comply with RMS specification No 3051 and compacted to minimum 98% modified dry density in accordance with AS 1289 5.2.1.
2. All trench backfill material shall be compacted to the same density as the adjacent material.
3. All service trenches under vehicular pavements shall be backfilled with an approved select material and compacted to a minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1

GENERAL NOTES

1. Contractor must verify all dimensions and existing levels on site prior to commencement of works. Any discrepancies to be reported to the Engineer
2. Strip all topsoil from the construction area. All stripped topsoil shall be disposed of off-site unless directed otherwise.
3. Make smooth connection with all existing works.
4. Compact subgrade under buildings and pavements to minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1. Compaction under buildings to extend 2m minimum beyond building footprint.
5. All work on public property, property which is to become public property, or any work which is to come under the control of the Statutory Authority; the Contractor is to ensure that the drawings used for construction have been approved by all relevant authorities prior to commencement site.
6. All work on public property, property which is to become public property, or any work which is to come under the control of the Statutory Authority is to be carried out in accordance with the requirements of the relevant Authority. The Contractor shall obtain these requirements from the Authority. Where the requirements of the Authority are different to the drawings and specifications, the requirements of the Authority shall be applicable.
7. For all temporary batters refer to geotechnical recommendations.
8. The approval of a substation shall be sought from the superintendant but is not an authorisation of a cost variation. The superintendant must approve any cost variation before any work starts

STORMWATER DRAINAGE NOTES

1. Stormwater Design Criteria :
(A) Average exceedance probability -
1% AEP for roof drainage to first external pit
5% AEP for paved and landscaped areas
(B) Rainfall intensities -
Time of concentration: 5 minutes
1% AEP = 235 mm/hr
5% AEP = 177 mm/hr
(C) Rainfall losses -
Impervious areas: IL= 1.0 mm , CL = 0 mm/hr
Pervious areas: IL= 29mm , CL = 1.0 mm/hr
2. Pipes 300 dia and larger to be reinforced concrete Class "2" approved spigot and socket with rubber ring joints U.N.O. Pipes in public roadways (including public domain) to be class 4 reinforced concrete.
3. Pipes up to 300 dia may be sewer grade uPVC with solvent welded joints, subject to approval by the engineer
4. Equivalent strength VCP or FRP pipes may be used subject to approval.
5. Pits in roadways (including public domain) are to be insitu to council details.
6. Enlargers, connections and junctions to be manufactured fittings where pipes are less than 300 dia.
7. Where subsoil drains pass under floor slabs and vehicular pavements, unslotted uPVC sewer grade pipe is to be used.
8. Grates and covers shall conform with AS 3996-2006, and AS 1428.1 for access requirements.
9. Pipes are to be installed in accordance with AS 3725. All bedding to be type H2 U.N.O.
10. Care is to be taken with invert levels of stormwater lines. Grades shown are not to be reduced without approval.
11. All downpipe connections are to be 150mm DIA or the same size as the downpipe (whichever is larger) laid at 1% minimum fall connection to the nearest pit. Minimum cover 450mm in landscaped areas.
12. Subsoil drains to be slotted flexible uPVC U.N.O.
13. Adopt invert levels for pipe installation (grades shown are only nominal).

CONCRETE NOTES

EXPOSURE CLASSIFICATION : External :B1

CONCRETE

Place concrete of the following characteristic compressive strength f'c as defined in AS 1379.

Location	AS 1379 f'c MPa at 28 days	Specified Slump	Nominal Agg. Size
Kerbs	S20	80	20
Pavements	S32	80	20
Retaining wall footing	S40	80	20

1. Use Type 'GP' cement, unless otherwise specified.
2. All concrete shall be subject to project assessment and testing to AS 1379.
3. Consolidate by mechanical vibration. Cure all concrete surfaces as directed in the Specification.
4. For all falls in slab, drip grooves, reglets, chamfers etc. refer to Architects drawings and specifications.
5. The location of all construction joints shall be submitted to Engineer for review.
6. No holes or chases shall be made in the slab without the approval of the Engineer.
7. Slurry used to lubricate concrete pump lines is not to be used in any concrete members.
8. All building slabs cast on ground require sand blinding with a Concrete Underlay. Refer to structural drawings.

FORMWORK

1. The design, certification, construction and performance of the formwork, falsework and backpropping shall be the responsibility of the contractor. Proposed method of installation and removal of formwork is to be submitted to the superintendent for comment prior to work being carried out.

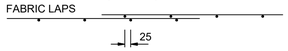
CONCRETE FINISHING NOTES

1. All exposed concrete pavements are to be broomed finished.
2. All edges of the concrete pavement including keyed and dowelled joints are to be finished with an edging tool.
3. Concrete pavements with grades greater than 10 % shall be heavily broomed finished.
4. Carborundum to be added to all stair treads and ramped crossings U.N.O.

CONCRETE REINFORCEMENT NOTES

1. Fix reinforcement as shown on drawings. The type and grade is indicated by a symbol as shown below. On the drawings this is followed by a numeral which indicates the size in millimetres of the reinforcement.
N. Hot rolled ribbed bar grade D500N
R. Plain round bar grade R250N
SL. Square mesh grade 500L
RL. Rectangular mesh grade 500L
2. Provide bar supports or spacers to give the following concrete cover to all reinforcement unless otherwise noted on drawings.
Footings - 50 top, 50 bottom, 50 sides.
Walls - 30 generally.
- 30 when cast in forms but later exposed to weather or ground.
- 50 when cast directly in contact with ground.
3. Cover to reinforcement ends to be 50 mm u.n.o.
4. Provide N12-450 support bars to top reinforcement as required, Lap 500 U.N.O.
5. Maintain cover to all pipes, conduits, reglets, drip grooves etc
6. All cogs to be standard cogs unless noted otherwise.
7. Fabric end and side laps are to be placed strictly in accordance with the manufacturers requirements to achieve a full tensile lap. Fabric shall be laid so that there is a maximum of 3 layers at any location.

FABRIC LAPS



8. Laps in reinforcement shall be made only where shown on the drawings unless otherwise approved. Lap lengths as per table below.

KERBING NOTES

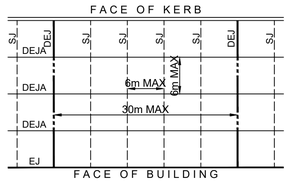
Includes all kerbs, gutters, dish drains, crossings and edges.

1. All kerbs, gutters, dish drains and crossings to be constructed on minimum 75mm granular basecourse compacted to minimum 98% modified maximum dry density in accordance with AS 1289 5.2.1.
2. Expansion joints (EJ) to be formed from 10mm compressible cork filler board for the full depth of the section and cut to profile. Expansion joints to be located at drainage pits, on tangent points of curves and elsewhere at 12m centres except for integral kerbs where the expansion joints are to match the joint locations in slabs.
3. Weakened plane joints to be min 3mm wide and located at 3m centres except for integral kerbs where weakened plane joints are to match the joint locations in slabs.
4. Broomed finished to all ramped and vehicular crossings, all other kerbing or dish drains to be steel float finished.
5. In the replacement of kerbs - Existing road pavement is to be sawcut 900mm from: Lip of gutter, invert of kerb, or edge of dish drain. Upon completion of new kerbs, new basecourse and surface is to be laid 900mm wide to match existing materials and thicknesses.
6. Existing allotment drainage pipes are to be built into the new kerb with a 100mm dia hole.
7. Existing kerbs are to be completely removed where new kerbs are shown.

JOINTING NOTES

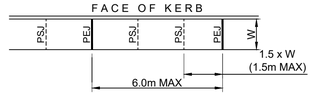
VEHICULAR PAVEMENT JOINTING

1. ALL VEHICULAR PAVEMENTS TO BE JOINTED AS SHOWN ON DRAWINGS.
2. KEYED CONSTRUCTION JOINTS SHOULD GENERALLY BE LOCATED AT A MAXIMUM OF 6M CENTRES.
3. SAWN JOINTS SHOULD GENERALLY BE LOCATED AT A MAXIMUM OF 6M CENTRES OR 1.5 X THE SPACING OF KEYED JOINTS, WHERE KEY JOINT SPACING IS LESS THAN 4M, WITH DOWELLED EXPANSION JOINTS AT MAXIMUM OF 30M CENTRES.
4. PROVIDE 10MM WIDE FULL DEPTH EXPANSION JOINTS BETWEEN BUILDINGS AND ALL CONCRETE OR UNIT PAVERS.
5. THE TIMING OF THE SAW CUT IS TO BE CONFIRMED BY THE CONTRACTOR ON SITE. SITE CONDITIONS WILL DETERMINE HOW MANY HOURS AFTER THE CONCRETE POUR BEFORE THE SAW CUTS ARE COMMENCED. REFER TO THE SPECIFICATION FOR WEATHER CONDITIONS AND TEMPERATURES REQUIRED.
6. VEHICULAR PAVEMENT JOINTING AS FOLLOWS.

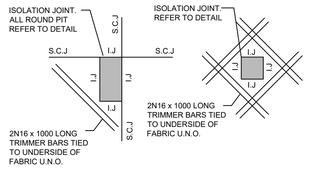


PEDESTRIAN FOOTPATH JOINTING

1. EXPANSION JOINTS ARE TO BE LOCATED WHERE POSSIBLE AT TANGENT POINTS OF CURVES AND ELSEWHERE AT MAX 6.0M CENTRES.
2. WEAKENED PLANE/SAWCUT JOINTS ARE TO BE LOCATED AT A MAX 1.5 X WIDTH OF THE PAVEMENT.
3. WHERE POSSIBLE JOINTS SHOULD BE LOCATED TO MATCH KERBING AND / OR ADJACENT PAVEMENT JOINTS.
4. ALL PEDESTRIAN FOOTPATH JOINTINGS AS FOLLOWS (UNO).



SLAB ADDITIONAL REINFORCEMENT



CATCHMENT NOTES

The site is within the Hawkesbury River Major River Catchment as noted in the Hills Shire Council Design Guidelines for Subdivisions and Developments, Appendix A, resulting in the on-site detention design being based on these guidelines.

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project no.	sheet	rev.
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EROSION AND SEDIMENT CONTROL NOTES

1. 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").
2. 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.
3. Maintain all erosion and sediment control devices to the satisfaction of the superintendent and the local authority.
4. When stormwater pits are constructed prevent site runoff entering the pits unless silt fences are erected around pits.
5. Minimise the area of site being disturbed at any one time.
6. Protect all stockpiles of materials from scour and erosion. Do not stockpile loose material in roadways, near drainage pits or in watercourses.
7. 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.
8. Control water from upstream of the site such that it does not enter the disturbed site.
9. All construction vehicles shall enter and exit the site via the temporary construction entry/exit.
10. All vehicles leaving the site shall be cleaned and inspected before leaving.
11. Maintain all stormwater pipes and pits clear of debris and sediment. Inspect stormwater system and clean out after each storm event.
12. Clean out all erosion and sediment control devices after each storm event.

Sequence Of Works

1. Prior to commencement of excavation the following soil management devices must be installed:
1.1. Construct silt fences below the site and across all potential runoff sites.
1.2. Construct temporary construction entry/exit and divert runoff to suitable control systems.
1.3. Construct measures to divert upstream clean flows into existing stormwater system.
1.4. Construct sedimentation traps/basin (if any) including outlet control and overflow; otherwise allocate a place for the runoff and temporary sediment storage.
1.5. Construct turf lined swales.
1.6. Provide sandbag sediment traps upstream of existing pits.
2. Construct geotextile filter pit surround around all existing pits and proposed pits as they are constructed.
3. On completion of pavement provide sand bag kerb inlet sediment traps around pits.
4. 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 LEGEND

Batter
Siltation fence, with star pickets at max 2.5m centres (typ)
Catch drain
Overland flow path
Tree to be removed
Stockpile
Stormwater pit, with Geotextile filter
Hay bale barriers
Sandbag sediment trap
Disturbed surface area

SCALE 1:200
0 1 2 5 10m

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SEDIMENT AND EROSION CONTROL PLAN

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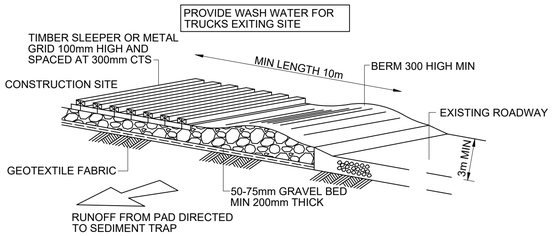
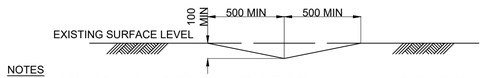
project no.	sheet	rev.
6746	6746-CV-0101	08



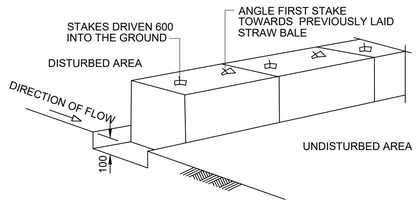
TEMPORARY CONSTRUCTION VEHICLE EXIT
NTS



NOTES
1. CATCH DRAIN TO HAVE A LONGITUDINAL GRADIENT OF 1% MINIMUM, AND 5% MAXIMUM.
2. RUNOFF FROM CATCH DRAIN TO BE DIRECTED TO SUITABLE SEDIMENT FILTER OR SEDIMENT TRAP.

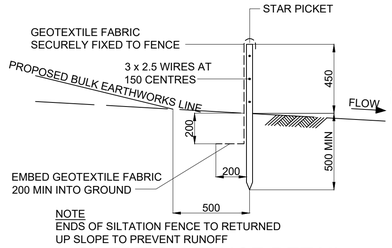
CATCH DRAIN ON FLAT TERRAIN - TYPICAL SECTION
SCALE 1:20

SANDBAG SEDIMENT TRAP
NTS



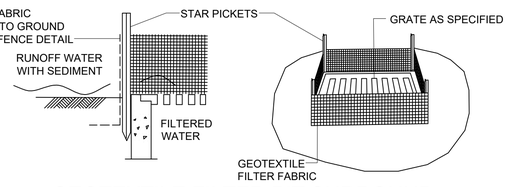
HAY BALE SEDIMENT FILTER
NTS

NOTE: STAKE TO BE EITHER TAR COATED STAR OR 50 x 50 HARDWOOD

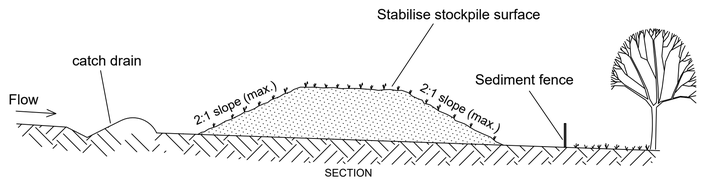


NOTE
ENDS OF SILTATION FENCE TO RETURNED UP SLOPE TO PREVENT RUNOFF

SILTATION FENCE DETAIL
SCALE 1:20



GEOTEXTILE FILTER PIT SURROUND
NTS



Construction Notes
1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS. COORDINATE WITH ARBORIST IF REQUIRED.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METRES IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP
5. CONSTRUCT EARTH BANKS (TYP) ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (TYP) 1 TO 2 METRES DOWNSLOPE. REFER TO TYPICAL DETAILS

STOCKPILES
NTS

SCALE 1:20

0 200 400 600 800 1000mm

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project no.	sheet	rev.
6746	6746-CV-0151	07

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Volume Bulk	**1.000**	**1.000**	1158.769sq.m	47.467 Cu. M.	696.212 Cu. M.	648.744 Cu. M.<Fill>
Totals			1158.769sq.m	47.467 Cu. M.	696.212 Cu. M.	648.744 Cu. M.<Fill>

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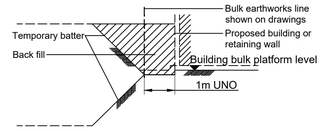
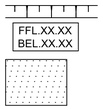
BULK EARTHWORKS CONSTRUCTION LEGEND



NOTE
1. * Bulk Earthworks level = Finish surface - Pavement/slab thickness
2. Refer architects drawings for building setout
3. Bulk Earthwork drawings are for bulk excavation only. They are not to be used for detailed excavation such as: lift shafts, footings, pits etc.
4. Bulk Earthwork setout refers to bulk excavation only. They are not to be used for building, kerb or any other setout.

BULK EARTHWORKS LEGEND



Batter

Finished floor level
Bulk earthworks platform level

Flat platforms shown with dots

BULK EARTHWORKS GENERAL NOTES

1. All bulk earthworks setout from grid lines U.N.O.
2. (i) All permanent batter at slope of 4(H) :1(V) U.N.O.
   (ii) All temporary batter at slope of 2(H) :1(V) U.N.O.
3. Excavated material may be used as structural fill provided,
   (i) it complies with the specification requirements for fill material,
   (ii) the placement moisture content complies with the Geotechnical Consultants requirements, and allows filling to be placed and proofrolled in accordance with the specification. Where necessary the Contractor must moisture condition the excavated material to meet these requirements.
4. Compact fill areas and subgrade to not less than:

Location	Standard dry density (AS 1289 5.1.1.)	Moisture (OMC)
Under building slabs on ground:	98%	±2%
Under roads and carparks:	98%	±2%
Landscaped areas:	95%	±2%

5. Before placing fill, proof roll exposed subgrade with a 10 tonne minimum roller to test subgrade and then remove soft spots (areas with more than 3mm movement under roller). Soft spots to be replaced with select fill U.N.O.
6. Contractor to provide proof roll compaction evidence for signoff.
7. Contractor shall place safety barriers around excavations in accordance with relevant safety regulations.
8. For interpretation of bulk earthworks foot print line shown on the bulk earthworks drawings refer to the bulk earthworks construction legend.
9. Bulk earthwork drawings are not to be used for detailed excavation.
10. Refer to Geotechnical Report prepared by -
    Douglas Partners
    215851.00 | R.001.Rev0

BULK EARTHWORKS MODEL NOTES

1. THIS DRAWING IS AN ESTIMATE FOR INFORMATION ONLY WHICH SHOULD NOT BE TAKEN AS AN ACCURATE MEASUREMENT AND SHOULD NOT BE USED FOR CONSTRUCTION.
2. THIS MODEL REPRESENTS A LEVEL COMPARISON BETWEEN:
   A) THE EXISTING SURFACE LEVELS MINUS AN AVERAGED TOPSOIL 200mm STRIP, AND
   B) THE FORMATION LEVELS OF THE PROPOSED DEVELOPMENT.
3. THE FORMATION LEVELS ARE BASED ON 330 TBC INCLUDING 100mm VOID FORMER. THE EXISTING SURFACE LEVELS ARE BASED ON THE TIN MODEL FROM THE SURVEY FILE. REFER TO SURVEY NOTES.
4. THIS ESTIMATE DOES NOT INCLUDE EXCAVATION FOR ANY BELOW GROUND SERVICES INCLUDING STORMWATER INFRASTRUCTURE.
5. NO ALLOWANCE HAS BEEN CONSIDERED FOR SERVICE TRENCHES, IN GROUND TANKS, STRUCTURAL FOOTINGS, PILING, FLOOR SLABS OR LIFT PITS.
6. NO BULKING FACTOR HAVE BEEN APPLIED TO THE BULK EXCAVATION VOLUMES.
7. IT HAS BEEN ASSUMED THAT ALL EXCAVATED MATERIAL IS NOT CONTAMINATED AND CAN BE USED AS FILL MATERIAL ON SITE (NOT INCLUDING TOPSOIL). IF CONTAMINATION IS PRESENT, A SEPARATE ASSESSMENT SHOULD TAKE PLACE.
8. ANY DAMAGE TO EXISTING ROADS OR EXISTING BUILDINGS WILL BE RECTIFIED BY THE CONTRACTOR AT HIS EXPENSE.
9. ALL ENVIRONMENTAL MEASURES INCLUDING VEGETATION PROTECTION AND EROSION AND SEDIMENT CONTROLS SHALL BE PLACE PRIOR TO THE COMMENCEMENT OF ANY WORK.
10. EROSION PLANS AND BUILDING REPRESENTATIVE FAMILIAR WITH THE PLAN MUST BE ON SITE AT ALL TIMES DURING CONSTRUCTION.
11. ALL ARCHITECTURAL FINISHED SURFACE LEVELS SUPERSEDE THOSE INDICATED ON THE BULK EARTHWORKS PLAN. THE CONTRACTOR SHALL CONFIRM THE FINAL BUILDING PAD LEVEL REQUIRED TO SUIT THE STRUCTURAL DESIGN WITH THE STRUCTURAL DRAWINGS PRIOR TO COMMENCEMENT OF WORK.
12. REFER GEOTECHNICAL REPORT / ENGINEER FOR SUITABILITY OF MATERIAL WON FROM EXCAVATION BACKFILL.
13. NOT TO BE USED FOR DETAILED EXCAVATION, WHICH INCLUDES: LIFT PITS, TRENCHING, FOOTINGS AND OTHER EXCAVATION OF SIMILAR NATURE

SCALE 1:200

0 1 2 5 10m

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drawing title
BULK EARTHWORKS PLAN

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A1

EXISTING STORMWATER DRAINAGE LINE TO BE INTERCEPTED AND REDIRECTED AROUND PROPOSED BUILDING L.
EXISTING STORMWATER DRAINAGE LINE INVERT LEVELS AND SIZE TO BE CONFIRMED ON SITE.

IL 47.59
Ø650 RCP
7.31%
IL 46.20
TBC

IL 46.18
Ø650 RCP
7.31%
IL 45.58
TBC

RL 48.697 KO
RL 49.022
RL 49.511
KO
RL 50.000
RL 50.250
KO
RL 48.390
RL 50.125 KO
RL 50.000
KO
RL 48.133
RL 48.864
RL 48.929
RL 49.660
KO
RL 49.660

BUILDING L
FFL 50.00m

BUSH FIRE APZ LINE

IL 47.84
Ø225 uPVC
3.44%
IL 46.81

IL 47.32
Ø300 RCP
4.39%
IL 46.81

IL 47.80
Ø300 RCP
2.83%
IL 47.34

RL 48.730

5kL RAINWATER TANK BY HYDRAULIC ENGINEER.

RAINWATER TANK OVERFLOW TO PIT A9.

RL 48.270

88.30m³ OSD TANK.
1.06m AVE. DEPTH.
REFER TO DETAIL ON 6746-CV-0503.

IL 45.53
Ø225 uPVC
1.0%
IL 45.43

DOWNPIPES FROM COVERED BIKE AREA TO BE CONNECTED DIRECTLY TO OSD TANK.

IL 45.45
Ø225 uPVC
1.0%
IL 45.44

RL 46.390
RL 46.940
RL 47.540
RL 46.365
RL 47.460
RL 47.540
RL 46.300
RL 45.864

IL 46.79
Ø300 RCP
2.51%
IL 46.53

IL 46.51
Ø300 RCP
5.57%
IL 45.63

IL 44.52
Ø300 RCP
13.5%
IL 43.448

IL 44.63
Ø300 RCP
1.0%
IL 44.54

RL 45.00

EXISTING STORMWATER PIT GRATED LID TO BE REPLACED WITH CLOSED LID.

IL 45.75
Ø150 uPVC
1.0%
IL 45.52

EX IL 44.22
EX Ø525 RCP
EX FALL 6.9% (TBC)
IL 42.70

RL 45.500

PROPOSED DRIVEWAY TO TIE IN TO EXISTING LEVELS.

SUBSOIL TO DISCHARGE TO HEADWALL

REAR PEDESTRIAN ENTRY

RL 46.530

EXISTING TREES TO BE REMOVED. REFER TO ARCHITECTURAL PLAN FOR DETAILS

PROPOSED EMERGENCY ACCESSWAY

PROPOSED DRIVEWAY LAYBACK TO HILLS SHIRE COUNCIL STANDARD DRAWING SD.15.

BLOCK B
1 STOREY
BRICK
BUILDING

COVERED SPORTS COURTS

SPORTS COURTS

GRASS

SITEWORKS LEGEND

- Property boundary
- RL XX.XXX — Finished surface level
- KO — Kerb only
- SW — Stormwater line with
- IL10.00 / Ø600 RCP / 1.25% / IL9.65 — Invert level upstream / Pipe size and material / Pipe grade / Invert level downstream
- ExSW — Existing stormwater line
- RW — Stormwater line by hydraulic engineer
- X — Redundant utility
- Stormwater pits
- GD — Grated drain
- SS — subsoil drainage line (100 dia)
- IR — Intermediate riser with subsoil drainage line (100 dia)
- FP — Flushing point with subsoil drainage line (100 dia)
- DP — Down pipe
- RW1 — Blockwork retaining wall
- Trees to be removed

STORMWATER PIT SCHEDULE

Note: Grate size does not necessarily reflect pit size.
Refer pit type details, shown on detail sheets
Final internal pit dimensions are to comply with AS3500

Pit Type	Pit Size	Lid Type	Water Quality	Number
Surface inlet pit	600x 600	Class D, galvanised mild steel grate hinged to frame U.N.O.	OceanProtect OceanGuard	A11, B1, B2, C1, D1
	600x 900		OceanProtect OceanGuard	A8, A9, A10,
OSD surcharge lid	900x 900			A3
Junction pit	900x 900	Class D, Cast iron cover with concrete infill U.N.O		A1, A2, E1, E2, E3, F1
OSD access lid	900x 900			A4, A5, A6, A7

SCALE 1:200
0 1 2 5 10m

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06	14/01/25	ISSUE FOR 100% SCHEMATIC DESIGN	MZV	PAL
05	13/12/24	ISSUE FOR 50% SCHEMATIC DESIGN	MZV	PAL
04	08/05/23	FOR 100% SCHEMATIC DESIGN	BEJ	KEH
03	04/04/23	ISSUE FOR 50% SD TENDER	BEJ	KEH
02	10/03/23	ISSUE FOR INFORMATION	BEJ	KEH
01	02/03/23	ISSUE FOR INFORMATION	BEJ	KEH

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project: ROUSE HILL HIGH SCHOOL UPGRADE
240 WITHERS ROAD, ROUSE HILL NSW 2155

drawing title: SITEWORKS PLAN

status: FOR REVIEW

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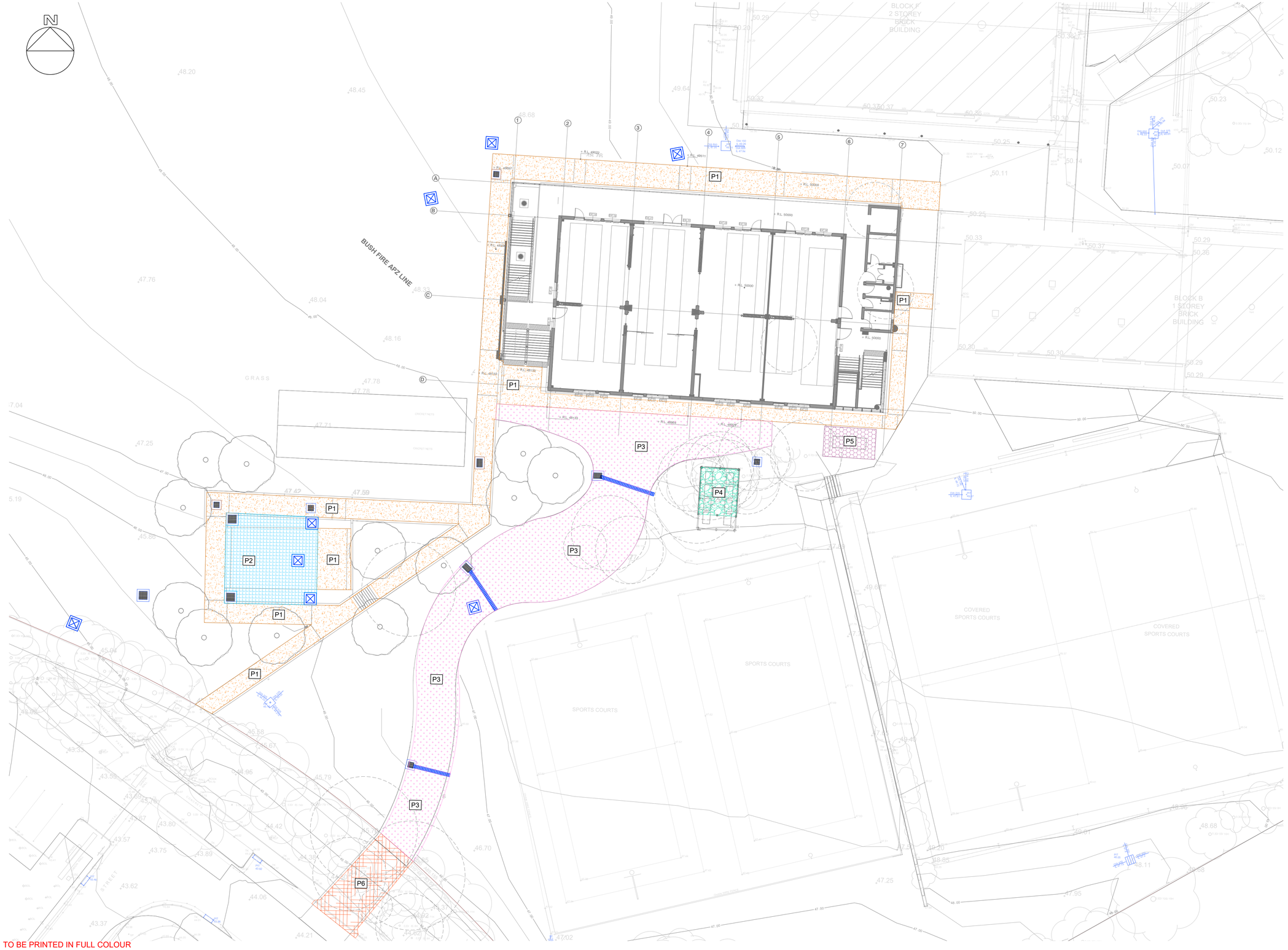
1:200	BEJ	KEH	KEH

project no.	sheet	rev.
6746	6746-CV-0301	09

A1



PAVEMENT LEGEND

NOTES

1. Asphaltic concrete shall conform to AS2150 and the specification
2. Pavement based on geotechnical report by Douglas Partners Project 215851.00 (16/11/22)

P1 — FOOTPATH
100mm Thickness concrete (f'c=25MPa) with SL72 fabric (40 top cover) on 100mm Compacted thickness fine crushed rock (DGB 20)

P2 — OSD TANK SLAB
Refer to detail on 6746-CV-0503

P3 — EMERGENCY ACCESSWAY
~~100mm Thickness concrete (f'c=32MPa)~~ with SL82 fabric (40 top cover) on 100mm Compacted thickness fine crushed rock (DGB 20)

P4 — CONDENSER UNIT SLAB
Refer to structural engineer's design

P5 — GENERATOR SLAB
Refer to structural engineer's design

P6 — DRIVEWAY
To The Hills Shire Council specification
Refer to detail SD.15 on 6746-CV-0502

JOINTING TO REFER TO DRAWING 6746-CV-0001 FOR SPECIFICATIONS

SCALE 1:200

0 1 2 5 10m

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03	03/04/25	ISSUE FOR CONTRACT DOCUMENTS	NTV	PAL
02	21/01/25	ISSUE FOR REF	MZV	PAL
01	14/01/25	ISSUE FOR 100% SCHEMATIC DESIGN	MZV	PAL

rev	date	description	drn	ch'k

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drawing title
PAVEMENT PLAN

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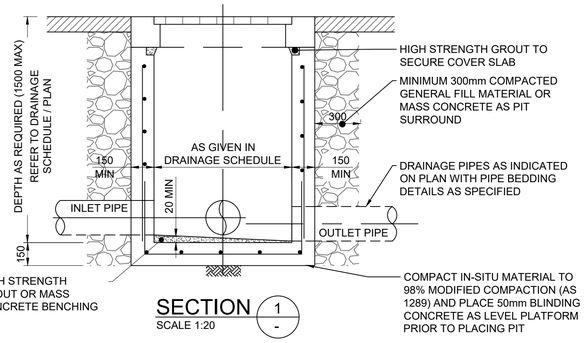
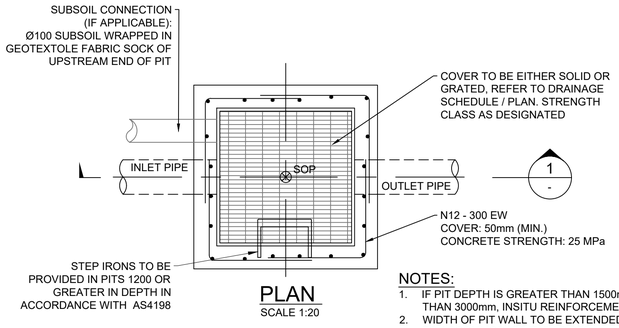
project no.	sheet	rev.
6746	6746-CV-0401	04



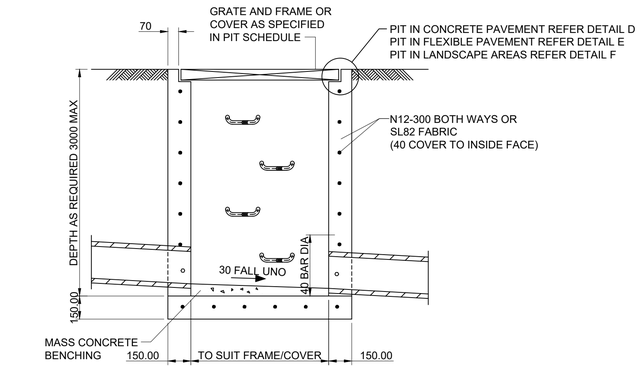
SECTION 1 / -
SCALE 1:20



PLAN
SCALE 1:20

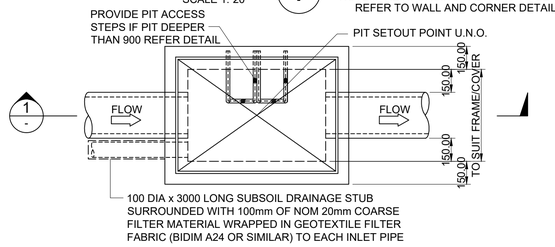
NOTES:
1. IF PIT DEPTH IS GREATER THAN 1500mm BUT LESS THAN 3000mm, INSITU REINFORCEMENT IS N16-150 EW.
2. WIDTH OF PIT WALL TO BE EXTENDED ACCORDINGLY TO ACCOMMODATE TWIN PIPES.

IN-SITU GRATED PIT TYPICAL DETAIL
SCALE 1:20



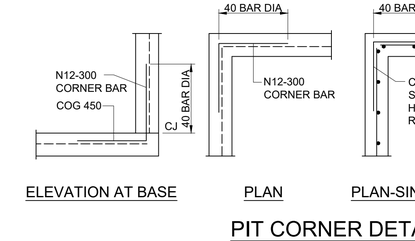
SECTION 1 / -
SCALE 1: 20

NOTE:IF REINFORCING FABRIC IS TO BE USED REFER TO WALL AND CORNER DETAILS



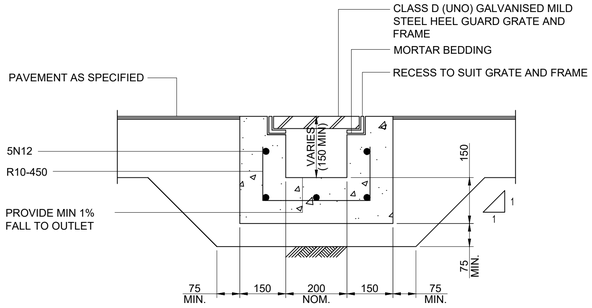
PLAN
SCALE 1:20

IN-SITU REGULAR JUNCTION PIT

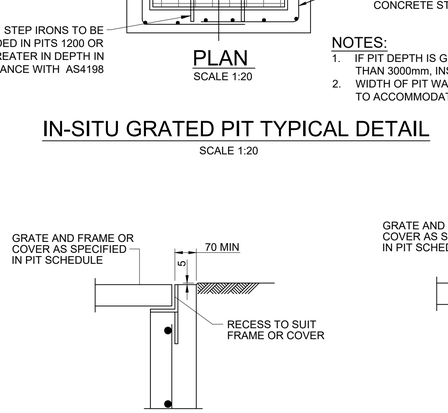


ELEVATION AT BASE | PLAN | PLAN-SINGLE LAYER | PLAN-DOUBLE LAYER

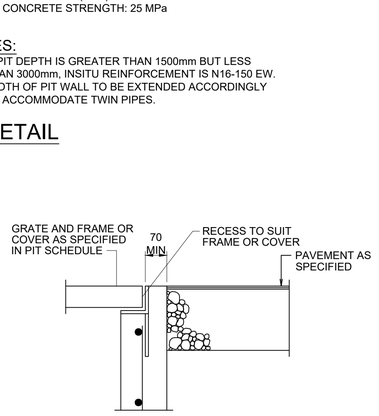
PIT CORNER DETAILS MESH REINFORCEMENT
SCALE 1:20



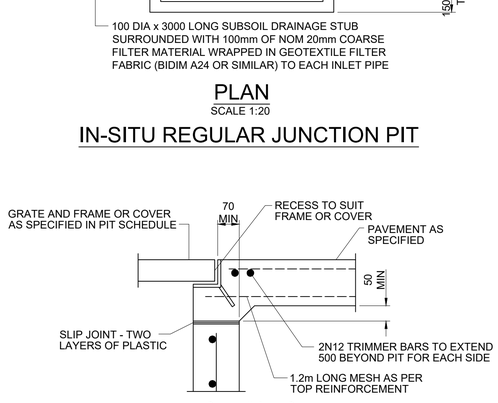
GRATED DRAIN
SCALE 1:10



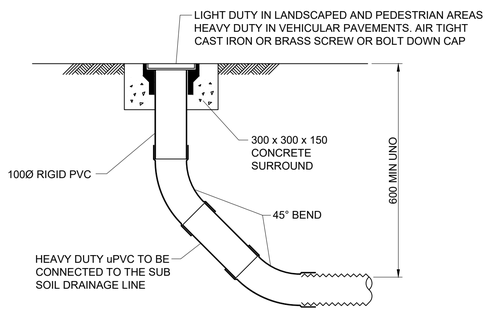
DETAIL F
SCALE 1:10



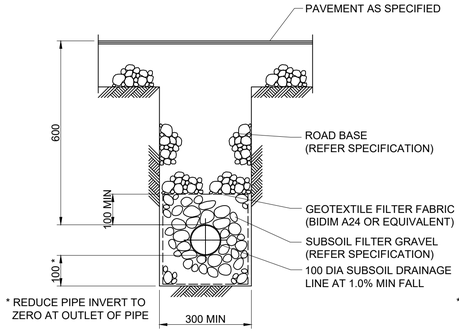
DETAIL E
SCALE 1:10



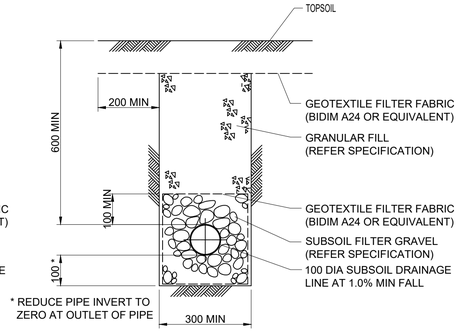
DETAIL D
SCALE 1:10



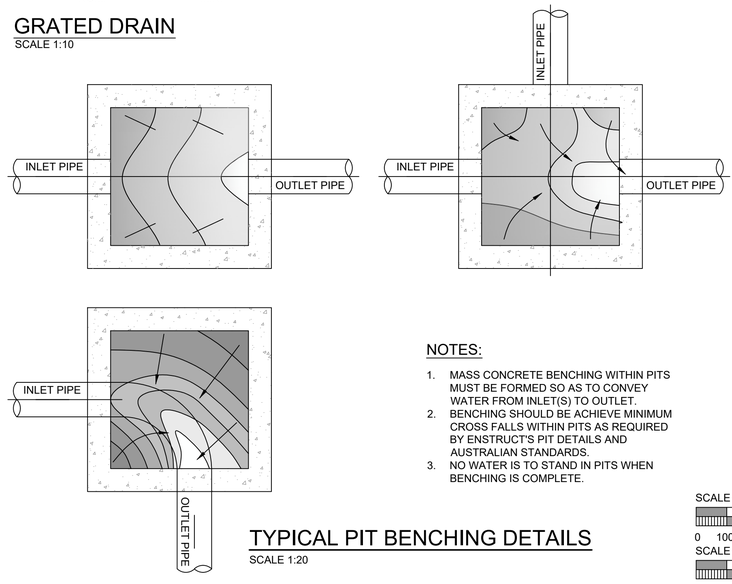
FLUSHING POINT (FP)
SCALE 1:10
NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



SUBSOIL IN PAVED AREAS
SCALE 1:10



SUBSOIL IN LANDSCAPED AREAS
SCALE 1:10



NOTES:
1. MASS CONCRETE BENCHING WITHIN PITS MUST BE FORMED SO AS TO CONVEY WATER FROM INLET(S) TO OUTLET.
2. BENCHING SHOULD BE ACHIEVE MINIMUM CROSS FALLS WITHIN PITS AS REQUIRED BY ENSTRUCT'S PIT DETAILS AND AUSTRALIAN STANDARDS.
3. NO WATER IS TO STAND IN PITS WHEN BENCHING IS COMPLETE.

TYPICAL PIT BENCHING DETAILS
SCALE 1:20

SCALE 1:10
0 100 200 300 400 500mm
SCALE 1:20
0 200 400 600 800 1000mm

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06	21/01/25	ISSUE FOR REF	MZV	PAL
05	14/01/25	ISSUE FOR 100% SCHEMATIC DESIGN	MZV	PAL
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03	08/05/23	FOR 100% SCHEMATIC DESIGN	BEJ	KEH
02	04/04/23	ISSUE FOR 50% SD TENDER	BEJ	KEH
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240 WITHERS ROAD, ROUSE HILL NSW 2155

drawing title
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status
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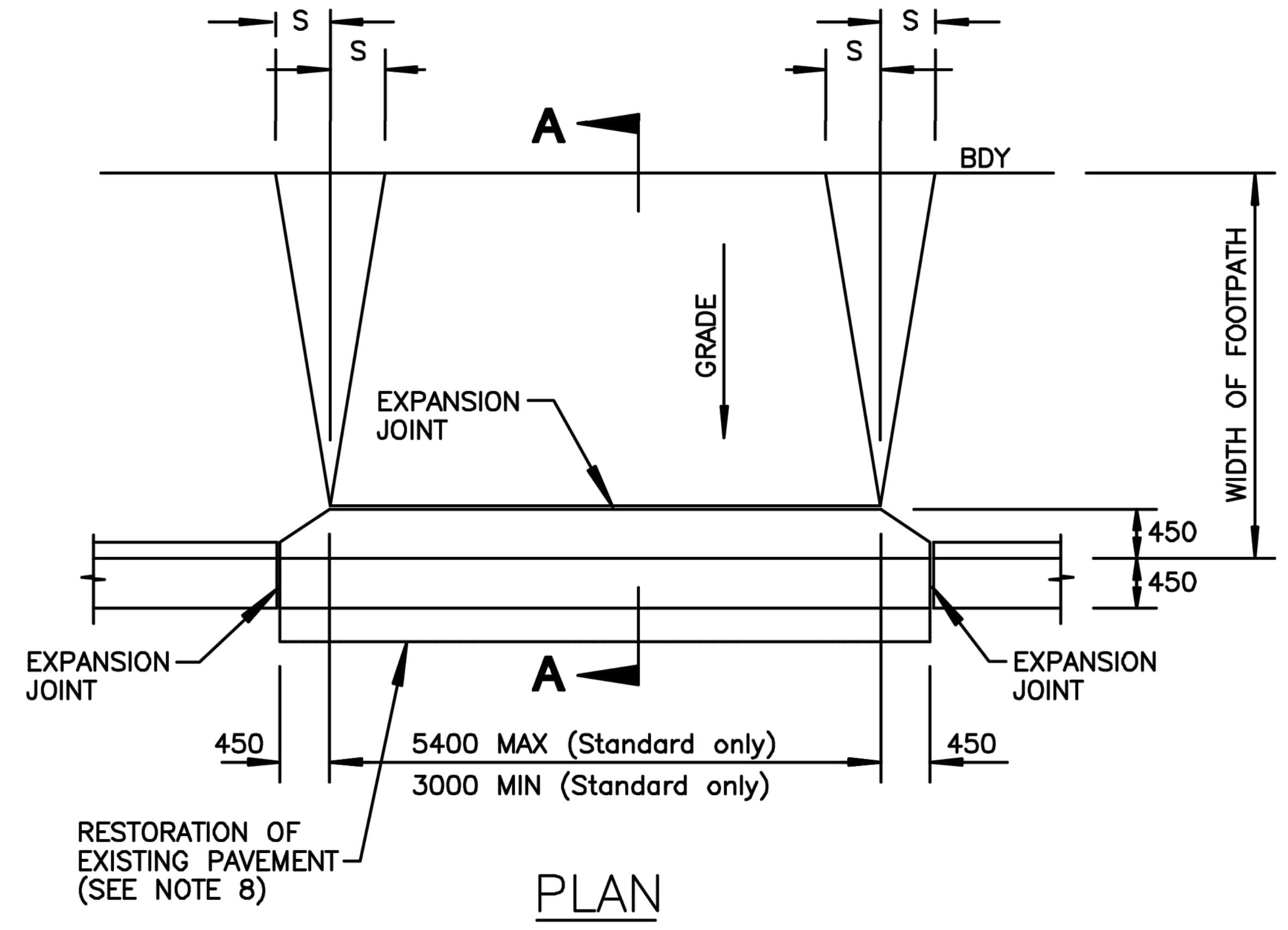
project no.	sheet	rev.
6746	6746-CV-0501	08

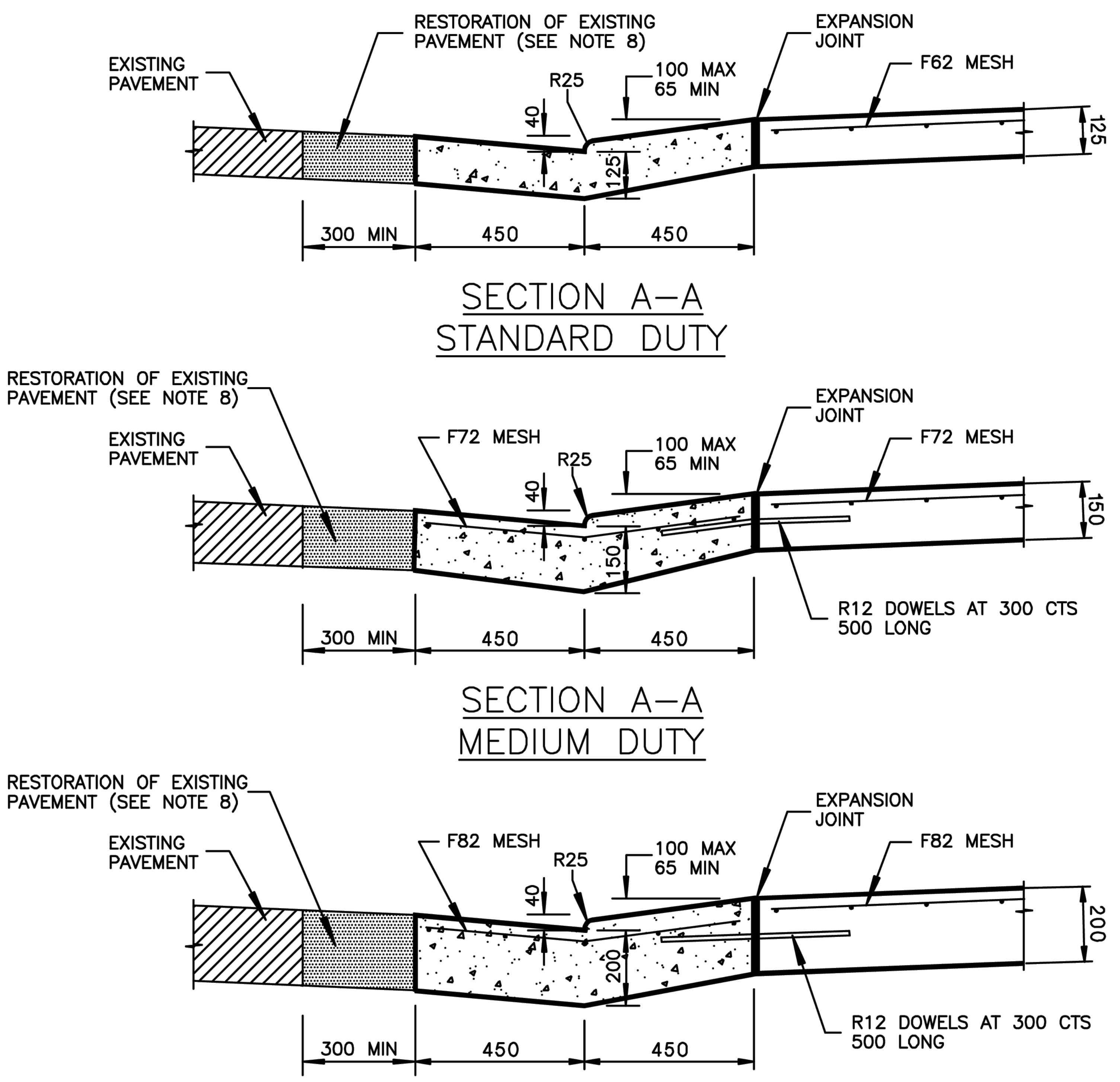
NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. STEEL FABRIC TO BE PLACED A MINIMUM OF 40mm AND A MAXIMUM 60mm BELOW THE CONCRETE SURFACE LEVEL.
3. CONCRETE USED IN THE WORK SHALL DEVELOP A MINIMUM CRUSHING STRENGTH OF 25 MPa AFTER 28 DAYS.
4. GUTTER CROSSING TO BE POURED BEFORE AND SEPARATELY FROM FOOTPATH CROSSING.
5. EXPOSED LENGTH OF DOWEL FROM GUTTER CROSSING POUR TO BE COATED WITH "BRUSHDALE DURASEAL" OR EQUIVALENT PRIOR TO POURING FOOTPATH SLAB.
6. REFER TO ELECTRICITY SUPPLIER FOR LOCATION OF CABLE DUCTS.
7. TELECOMUNICATIONS SUPPLIER REQUIRES THAT CONDUITS BE PROVIDED UNDER FOOTPATH CROSSING. THREE WORKING DAYS NOTICE REQUIRED TO ARRANGE INSTALLATION.
8. PROVIDE SAWCUT TO EDGE OF DAMAGED PAVEMENT PRIOR TO RESTORATION WITH FULL DEPTH ASPHALTIC CONCRETE (AC 10)

CROSSING TYPE	S
STANDARD DUTY	1000 mm MAXIMUM
MEDIUM DUTY	500 mm MINIMUM
HEAVY DUTY	500 mm MINIMUM



PLAN



SECTION A–A STANDARD DUTY

SECTION A–A MEDIUM DUTY

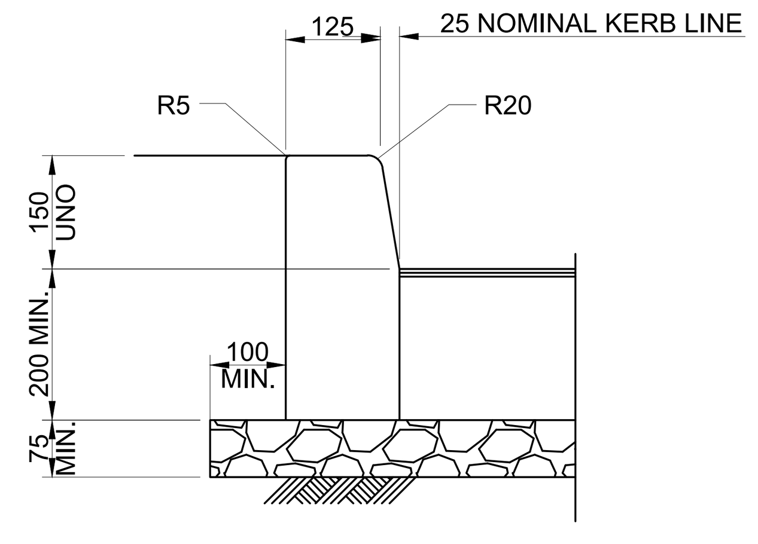
SECTION A–A HEAVY DUTY

THE HILLS SHIRE COUNCIL

GUTTER & FOOTPATH CROSSING

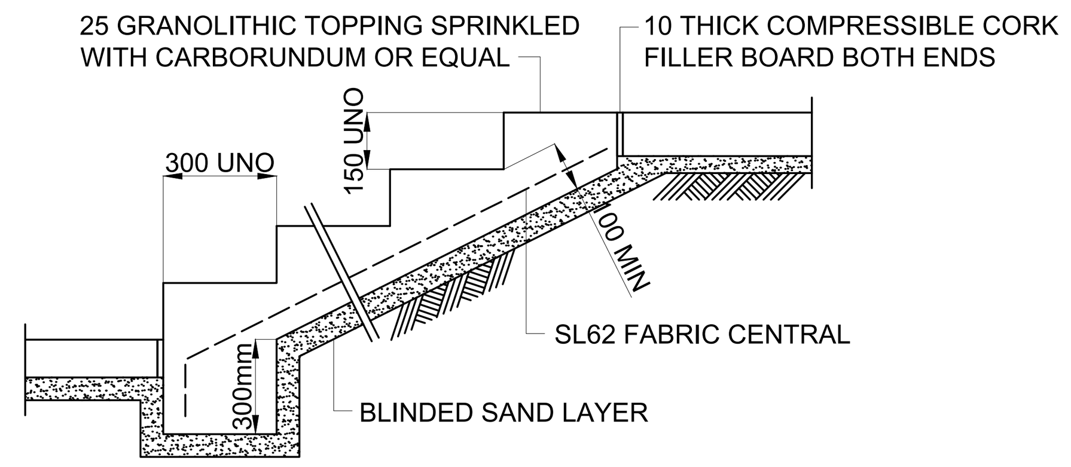
DATE: MAY 2009

DRAWING No.: SD.15



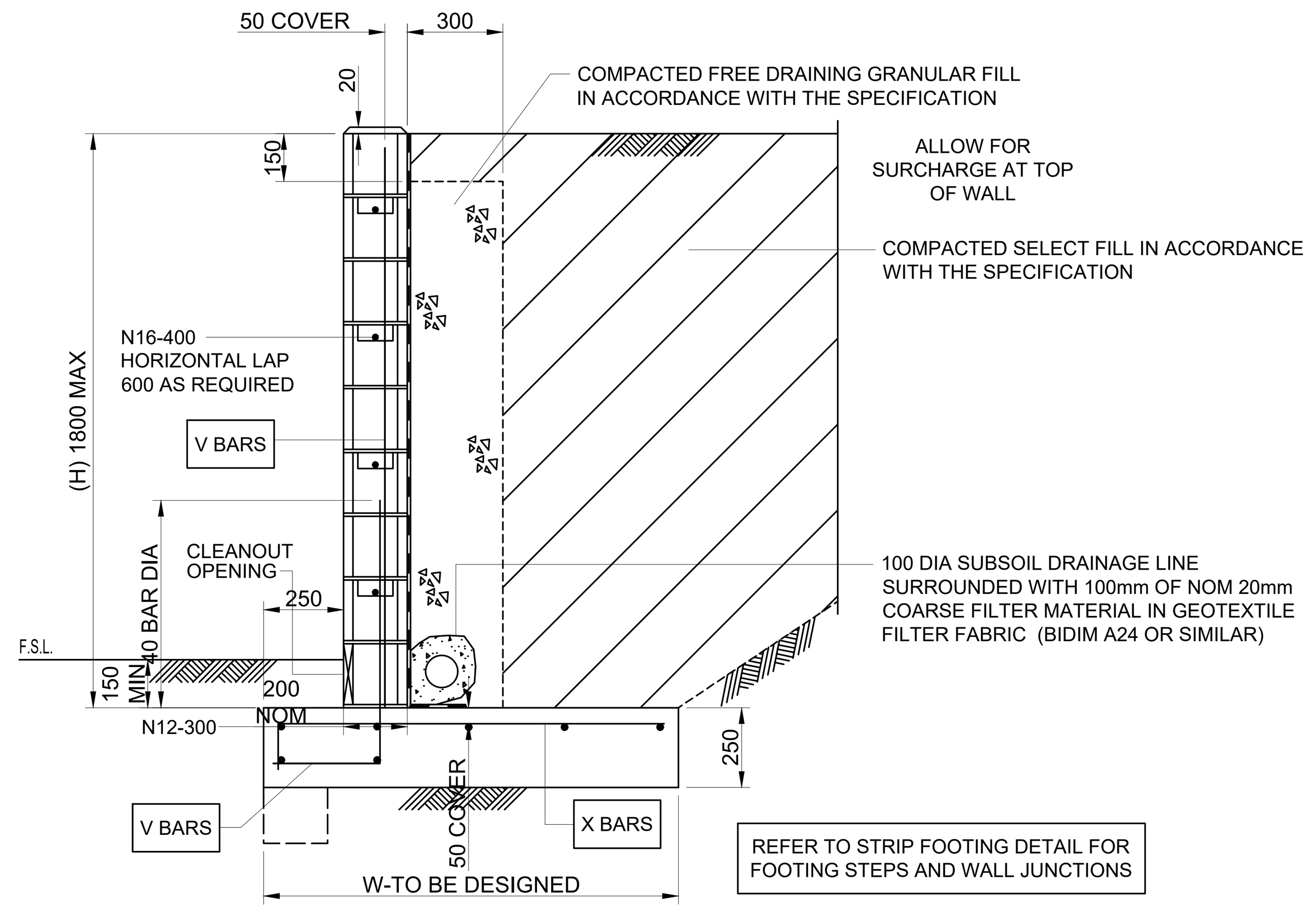
KERB ONLY (KO)

SCALE 1:10



CONCRETE STAIRS WITH KEY

SCALE 1:20



RETAINING WALL (RW1)

SCALE 1:20

Type	Height (H)	Width (W)	V Bars	X Bars
A	1000	1150	N12-400	N12-400
A	1400	1450	N16-400	N16-400
A	1800	1750	N24-400	N20-400
A	2200	2050	N24-200	N20-400

SCALE 1:10

0 100 200 300 400 500mm

SCALE 1:20

0 200 400 600 800 1000mm

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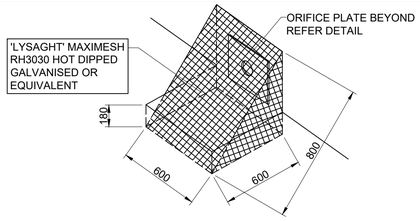
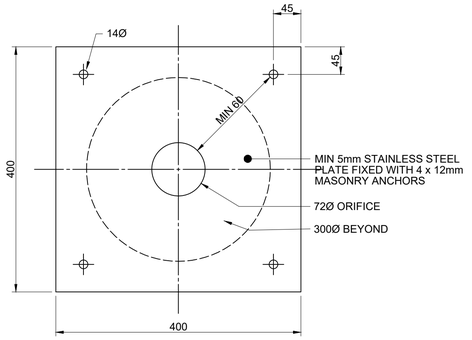
project no.	sheet	rev.
6746	6746-CV-0502	08



TRASH SCREEN DETAIL

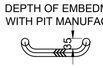
NTS



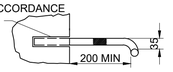
400SQ ORIFICE PLATE DETAIL

SCALE 1:5

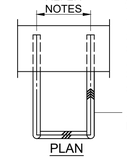
IN EXISTING PITS:
DRILL 30mm DIA HOLE x 120mm DEEP AND EPOXY INTO WALL WITH EPOXY MORTAR EQUAL TO EPIREZ 633 (NON SAG)
IN PRECAST PITS:
DEPTH OF EMBEDMENT IS TO BE IN ACCORDANCE WITH PIT MANUFACTURER'S DETAILS



FRONT ELEVATION



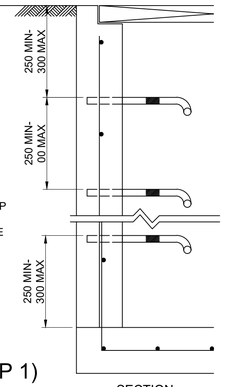
SIDE ELEVATION



PLAN

NOTES
1 WHEN POSITIONED IN STRAIGHT ALIGNMENT, STEP TO BE 400 WIDE.
2 STAGGERED STEPS TO BE 200 WIDE, STEPS TO BE STAGGERED 200 CENTRE TO CENTRE FOR ALTERNATE STEPS.
3 SPACING OF STEPS TO BE UNIFORM TO WITHIN ±5mm IN EACH PIT.

24 DIA GALVANISED MILD STEEL

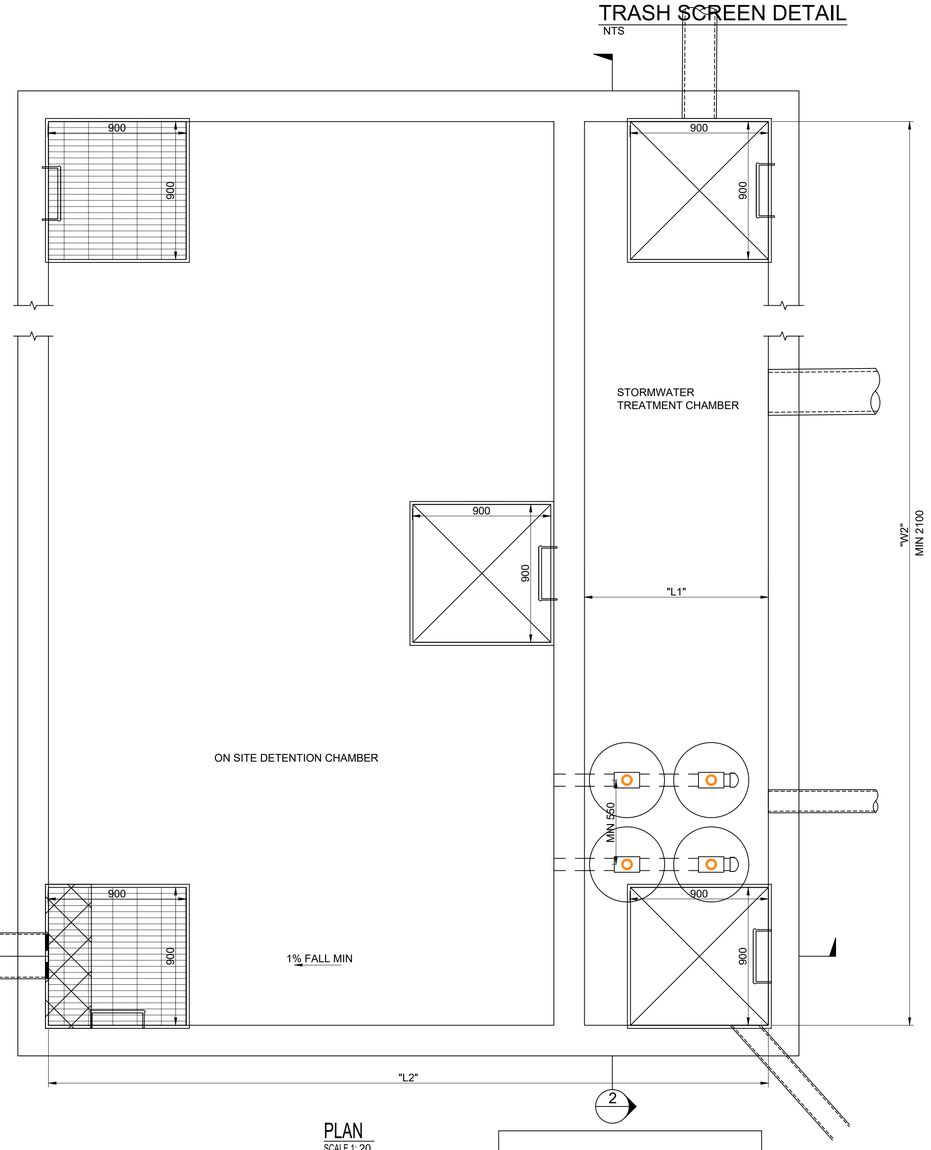


SECTION

ACCESS STEP DETAIL (STEP 1)

SCALE 1:10

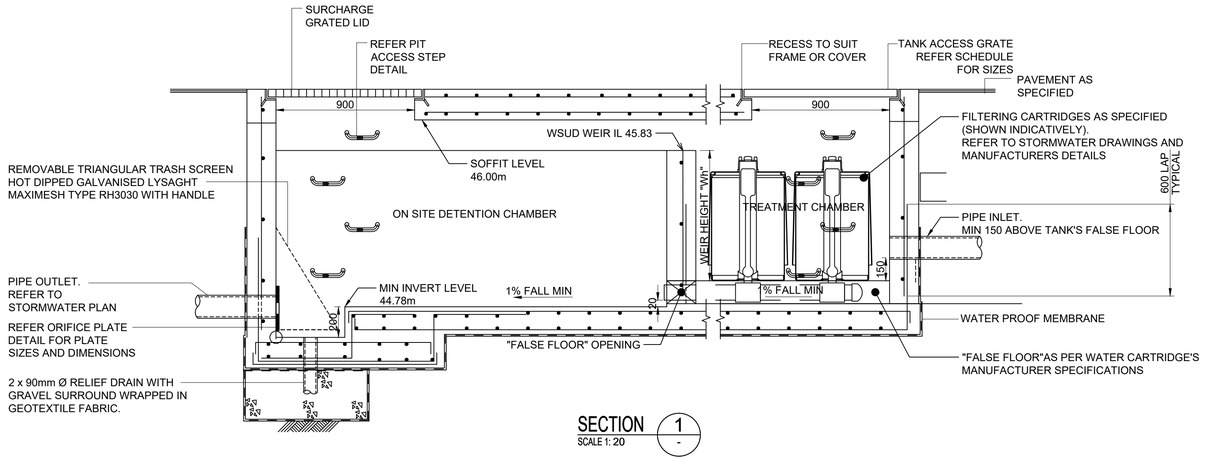
TO BE PROVIDED FOR PITS DEEPER THAN 900mm



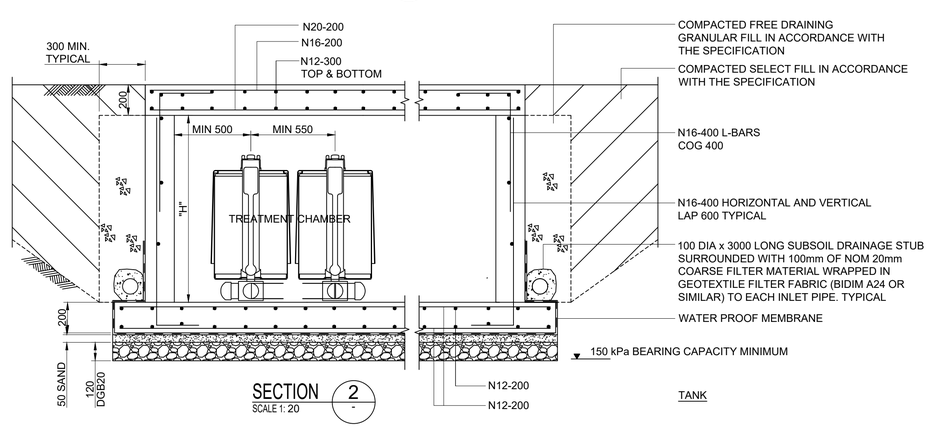
PLAN
SCALE 1: 20

AVERAGE HEIGHT "H" = 1.06 m
TOTAL WIDTH "W2" = 8.98 m
TOTAL LENGTH "L2" = 9.39 m
TREATMENT LENGTH "L1" = 1.2m
WEIR HEIGHT Wh = 0.91m
TREATMENT VOLUME = 11.43 m^3
TOTAL VOLUME = 88.30 m^3

WATER QUALITY CARTRIDGES
CARTRIDGES SIPHON HEIGHT = 0.690m
CARTRIDGES PHYSICAL HEIGHT = 0.840m
CARTRIDGES AMOUNT = 4 UNITS



SECTION 1 / SCALE 1: 20



SECTION 2 / SCALE 1: 20

TANK

UNDERGROUND ON SITE DETENTION TANK WITH WATER QUALITY CHAMBER

SCALE 1:20

SCALE 1:10
0 100 200 300 400 500mm

SCALE 1:20
0 200 400 600 800 1000mm

TO BE PRINTED IN FULL COLOUR

NOT FOR CONSTRUCTION

Date generated 04/03/2025 2:08:05 pm \\CORP-PBWAN.NET\ANZ\TRANSITION\ENSTRUCT\CADU1-6706\6746\CIVIL\DRAWINGS\6746-CV-0603

rev	date	description	drn	ch'k
05	10/03/25	REISSUE FOR REF	NTV	PAL
04	04/03/25	ISSUE FOR CONTRACT DOCUMENTS	NTV	PAL
03	21/01/25	ISSUE FOR REF	MZV	PAL
02	14/01/25	ISSUE FOR 100% SCHEMATIC DESIGN	MZV	PAL
01	13/12/24	FOR 50% SCHEMATIC DESIGN	MZV	PAL

rev	date	description	drn	ch'k

NSW GOVERNMENT Education School Infrastructure

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project
ROUSE HILL HIGH SCHOOL UPGRADE
240 WITHERS ROAD, ROUSE HILL NSW 2155

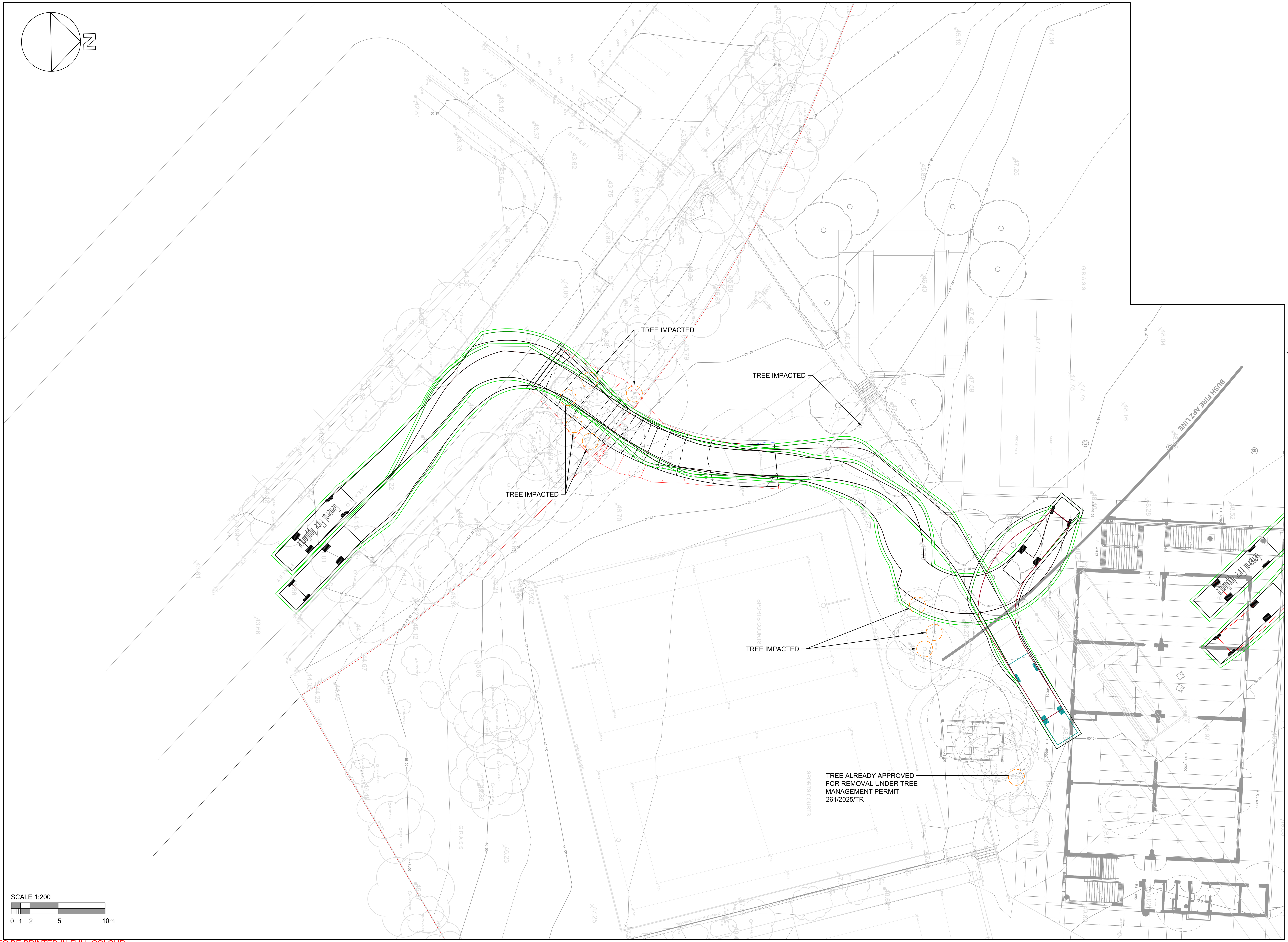
drawing title
DETAILS SHEET 3

status
FOR REVIEW

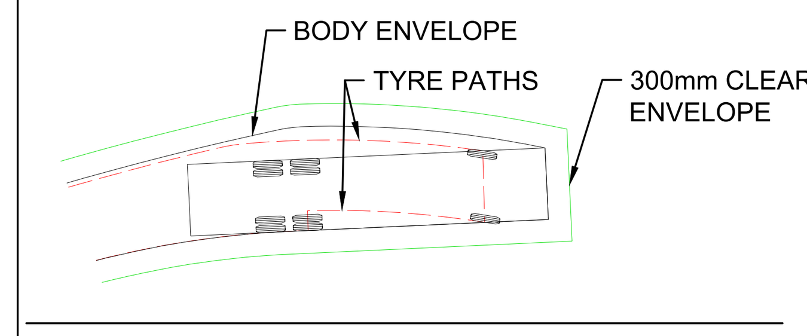
scale at A1	drawn	checked	approved
AS SHOWN	MZV	PAL	DEC-24

project no.	sheet	rev.
6746	6746-CV-0503	05

A1



SWEPT PATH LEGEND



TO BE PRINTED IN FULL COLOUR

NOT FOR CONSTRUCTION

Date generated 12/03/2025 3:53:53 PM U:\TRANSITION\ENSTRUCT\CAD\J1-6700\6746\CIVIL\SKETCHES\C3D-DRIVEWAY SKETCH

rev	date	description	drn	ch'k
06	02/09/24	ISSUE FOR INFORMATION	MZV	PAL
05	30/08/24	ISSUE FOR INFORMATION	MZV	PAL
04	09/07/24	ISSUE FOR INFORMATION	MZV	PAL
03	18/06/24	ISSUE FOR INFORMATION	MZV	PAL
02	28/05/24	ISSUE FOR INFORMATION	MZV	PAL
01	14/03/24	ISSUE FOR INFORMATION	MZV	PAL

rev	date	description	drn	ch'k
08	12/03/25	ISSUE FOR REF	NTV	PAL
07	27/02/25	ISSUE FOR INFORMATION	SCO	PAL

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ROUSE HILL HIGH SCHOOL UPGRADE

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drawing title
CONSTRUCTION DRIVEWAY SKETCH 2

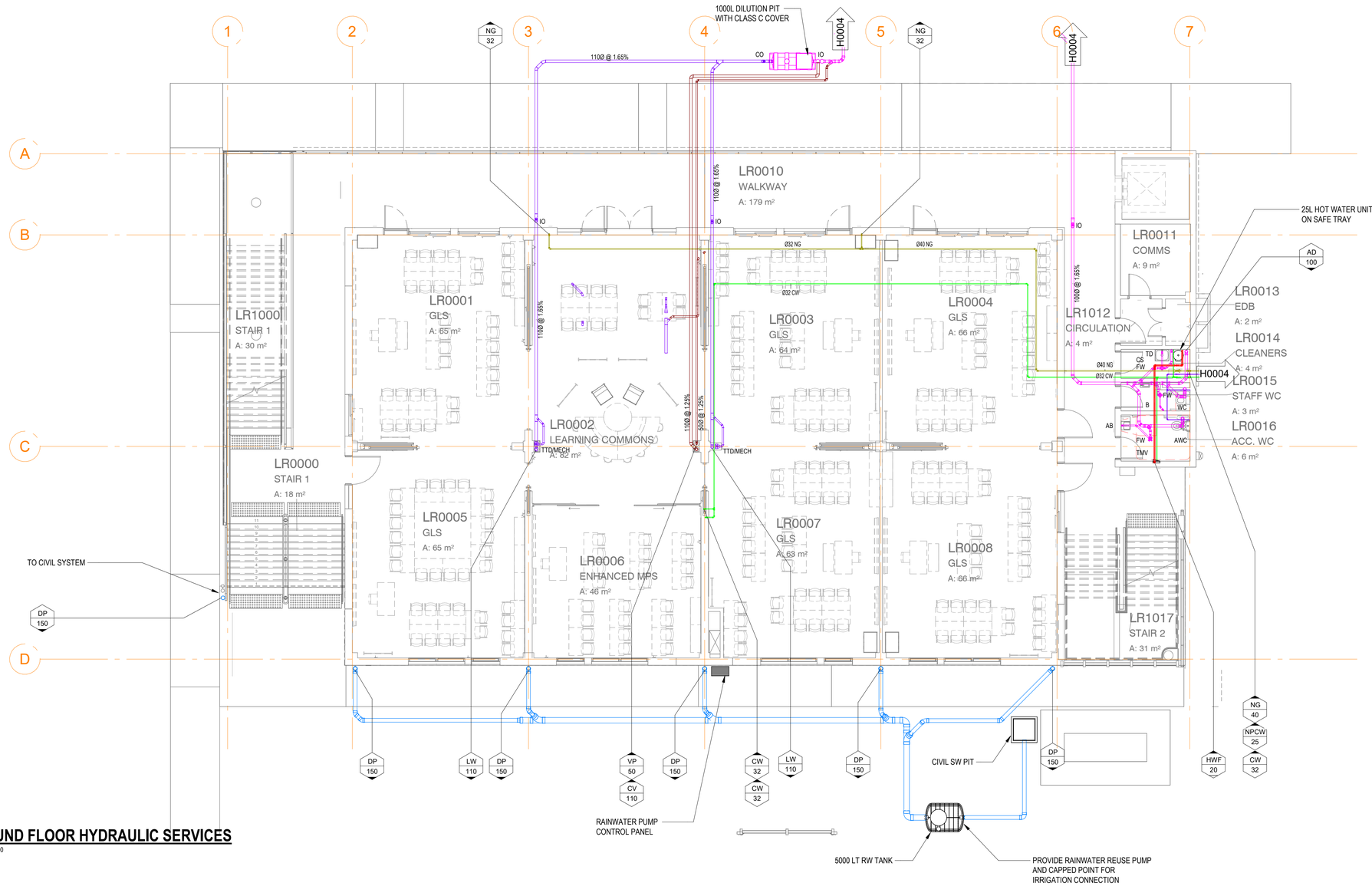
status
FOR INFORMATION ONLY

scale at A1	drawn	checked	approved
1:200	MZV	PAL	MAR-24

project no.	sheet	rev.
6746	CV-SK-002	08

GENERAL NOTES

1. CLEAR OUT TO BE PROVIDED TO ALL WC's
2. THE TUNDISHES FOR MECHANICAL CONDENSATE SHOWN ARE INDICATIVE ONLY. HYDRAULIC CONTRACTOR TO COORDINATE REQUIRED NUMBER AND LOCATION OF TUNDISHES WITH MECHANICAL CONTRACTOR PRIOR TO COMMENCING ANY WORK.
3. TMV's IN STAINLESS STEEL BOXES TO BE PROVIDED TO STAFF AMENITIES, SHOWERS AND ACCESSIBLE BASINS. TMV's TO BE MOUNTED AT 1500mm ABOVE FLOOR LEVEL.
4. COLD WATER ONLY TO BE PROVIDED TO STUDENT AMENITIES, CLEANERS SINK, WASH TROUGHS ETC.



GROUND FLOOR HYDRAULIC SERVICES

SCALE 1 : 100

2 1 0 2 4 6 8 m

1 : 100-A1 1 : 200-A3

REVISIONS / AMENDMENTS

Rev	Date	Description	Verified
P1	13.12.24	50% SCHEMATIC DESIGN	G.K.
A	10.01.25	100% SCHEMATIC DESIGN	G.K.

CLIENT
NSW GOVERNMENT Education School Infrastructure

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PROJECT
ROUSE HILL HIGH SCHOOL

240 WITHERS ROAD, ROUSE HILL
NSW 2155

TITLE
HYDRAULIC SERVICES
BUILDING L - GROUND FLOOR LAYOUT

100% SCHEMATIC DESIGN
NOT TO BE USED FOR CONSTRUCTION

DRAWN	J.B.	SCALE @ A1
CHECKED	G.K.	**1 : 100**
APPROVED	G.K.	
CREATED	MAR 2023	
JOB No.	**220210**	

DRAWING No. **RHHS-JHA-11-GF-DR-H-001000** REV **A**