

GLENWOOD HIGH SCHOOL UPGRADE

CIVIL ENGINEERING DESIGN REPORT



Prepared for: Schools Infrastructure
New South Wales
Prepared by: enstruct Pty Ltd

GLENWOOD HIGH SCHOOL UPGRADE

CIVIL ENGINEERING DESIGN REPORT

ISSUE AUTHORISATION

PROJECT: Glenwood High School Upgrade
Project No: 6393

Rev	Date	Purpose of Issue / Nature of Revision	Prepared by	Reviewed by	Issue Authorise by
A	28/09/21	DRAFT	NKK	KEH	KEH
B	01/11/21	DRAFT	NKK	KEH	KEH
C	09/11/21	FOR APPROVAL	NKK	KEH	KEH

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Executive Summary

This Civil Engineering Design Report accompanies an Environmental Impact Statement (EIS) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) in support of a State Significant Development Application (SSD - 23512960).

The development is for upgrading works comprising alterations and additions to Glenwood High School at 85 Forman Avenue, Glenwood. The site is legally described as Lot 5227 DP 868693.

The site is roughly rectangular in shape, with a total area of 60,790m² and street frontages to Forman Avenue to the south and Glenwood Drive to the east. Glenwood Reserve adjoins the northern and western boundaries of the school.

This report addresses the relevant Secretary's Environmental Assessment Requirements (SEARs), specifically:

Items 15 and 17 of the SEARs advice is as follows:

15. Stormwater Drainage

- Provide:
 - a preliminary stormwater management plan for the development that:
 - is prepared by a suitably qualified person in consultation with Council and any other relevant drainage authority.
 - details the proposed drainage design for the site including on-site detention facilities, water quality measures and the nominated discharge point.
 - demonstrates compliance with Council or other drainage authority requirements.
 - stormwater plans detailing the proposed methods of drainage without impacting on the downstream properties.
- Where drainage infrastructure works are required that would be handed over to Council, provide full hydraulic details and detailed plans and specifications of proposed works that have been prepared in consultation with Council and comply with Council's relevant standards.

Refer to **Section 6.1** for Onsite Stormwater Detention and stormwater management details. Refer to **Section 7.1** for water quality details.

17. Soil and Water

- Provide:
 - an assessment of potential impacts on surface and groundwater (quality and quantity), soil, related infrastructure and watercourse(s) where relevant.
 - details of measures and procedures to minimise and manage the generation and off-site transmission of sediment, dust and fine particles.
 - an assessment of salinity and acid sulphate soil impacts, including a Salinity Management Plan and/or Acid Sulphate Soils Management Plan, where relevant.

Relevant Policies and Guidelines:

- Managing Urban Stormwater - Soils and Construction Volume 1 (Landcom, 2004).
- Acid Sulfate Soil Manual, (NSW Acid Sulfate Soil Management Advisory Committee, 1998).
- Acid Sulfate Soils Assessment Guidelines (DoP, 2008).
- Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004) and Volume 2 (A. Installation of Services; B. Waste Landfills; C. Unsealed Roads; D. Main Roads; E. Mines and Quarries) (DECC, 2008).

Refer to **Section 7.3** for erosion and sediment control details. This report does not cover acid sulphate soil or ground water management.

Refer to the flood study report which addresses SEARs Item 16.

This report covers:

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

Contents

1 Introduction..... 5

2 The Proposal..... 5

3 The Site 6

4 Development on the existing site 7

 4.1 Existing Stormwater 8

 4.2 Geotechnical Assessment 8

 4.3 Soil Contamination 8

5 Stormwater Design 8

 5.1 Onsite Stormwater Detention (OSD)..... 9

6 Flooding 9

 6.1 Stormwater Quality..... 10

 6.1.1 MUSIC Model 10

 6.1.2 Ocean Guard Pit Inserts 11

 6.1.3 StormFilter Cartridges 11

 6.2 Overland Flow 11

 6.3 Erosion and Sediment Control 11

7 Conclusion 11

APPENDIX A 12

APPENDIX B 14

APPENDIX C 15

APPENDIX D 16

APPENDIX E..... 17

1 Introduction

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This report addresses the relevant Secretary's Environmental Assessment Requirements (SEARs).

2 The Proposal

The proposed development seeks to upgrade Glenwood High School. The upgrade consists of the following alterations and additions:

- Construction of a new three-storey building at the north-eastern portion of the site facing Glenwood Park Drive which will accommodate new learning spaces (**Figure 1**);
- Construction of one storey performance pavilion;
- Refurbishment of existing Building Block A (ground floor only) to provide one new support unit within the space of an existing general learning space;
- Refurbishment of Building Block D (ground floor only) to provide an additional office space and storeroom;
- Refurbishment of Building Block E to re-purpose it on the ground floor for computer learning spaces, staff and administration spaces as well as upgrades to the library on the first floor;
- Refurbishment of Building Block J to re-purpose it from visual arts and performing arts to learning spaces and workshops for food tech and woods/metal unit;
- Demolition of existing botany room and construction of a new single storey pavilion comprising of interview rooms and end-of trip facilities;
- The proposed development will also involve ancillary works at the site associated with the proposed upgrades; and
- An End of Trip Facility will be built (replacing the existing Botany Room) to the north of the existing Building DE.



Figure 1: Design Plan L3 (Source: PTW Architects)



Figure 2: Southwest Axonometric View (Source: PTW Architects)

3 The Site

Glenwood High School is located at 85 Forman Avenue, Glenwood. An existing childcare centre is also located within the site. The site is located in the Blacktown Local Government Area (LGA) in the suburb of Glenwood. It is situated within a well-established residential area approximately 4.7km northeast of Blacktown Train Station.

The site is bound by residential development and Forman Avenue to the south; Glenwood Reserve to the north and west with residential development beyond; and Glenwood Park Drive to the east, with a drainage channel and residential development beyond. Refer to **Figure 3** and **Figure 4** overleaf.

Bus stops are located on Forman Avenue and Glenwood Park Drive for public bus services. A dedicated school bus pull-in loop road is provided on the school's frontage to Glenwood Park Drive. Bella Vista Metro station is approximately 600m to the east of the site.

A dedicated school student car drop off/pick up facility is provided along Forman Avenue. This takes the form of a slip lane and kerbside lane parking. The combined pick up / drop off facility is approximately 180 metres long.

Glenwood High School is located approximately 520m south of Parklea Public School, 1.5km to the southwest of Bella Vista Public School, and 3.5km to the east of Quakers Hill High School.

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 60,790m². The site is legally described as Lot 5227 in Deposited Plan 868693.



Figure 3: Local Context Map (Source: Metromaps 2021 with Architectus overlay)



Figure 4: Site Context Map (Source: Metromaps with Architectus overlay)

4 Development on the existing site

Glenwood High School is a co-educational high school and includes the following existing buildings and facilities:

- Ten (10) existing buildings comprising:
 - Building A and B: double storey classroom building;
 - Building C: double storey classroom building with a fitness laboratory on the ground floor;
 - Building D: double storey building with administration and staff facilities on the ground floor and classrooms on the first floor;
 - Building E: double storey building with classrooms and science laboratories on the ground floor and main library on the first floor;
 - Building F: staff building;
 - Building G, H and J: single storey classroom buildings (Block J contains school canteen); o Building K: single storey gymnasium; and
- There is an existing single storey childcare centre (known as Building L) at the southwestern corner of the site;

- Nineteen (19) single-storey demountable buildings, seventeen (17) of which comprise general learning spaces and two (2) which comprise of staff rooms;
- At-grade carpark accessed from two separate vehicular access points on Forman Avenue for high school staff. Refer to traffic engineer for detail;
- Three (3) support learning units.
- Existing on site bicycle parking racks are provided in the south east corner of the school near the staff parking facility;
- Outdoor spaces comprising:
 - Quadrangle space between Buildings C, B and E;
 - Playing Field at the north-western corner of the site;
 - Games Court to the east of the playing field;
 - Covered outdoor space adjacent to the canteen, and
 - Grassed open play area in the centre of the site.
- There are three (3) pedestrian access points to the school, including:
 - One access point from Glenwood Park Drive; and
 - Two access points from Forman Avenue.
- The primary drop-off and pick-up area is located at Forman Avenue.

Existing services have been investigated through site drawings and survey. Where services clash with the proposed development they will need to be relocated, diverted, or removed. Redundant services will be capped off and/or removed.

Whilst attempts have been made to identify all services which will be impacted, there is still the possibility that unknown services are encountered during any future demolition or construction. This is due to some services being untraceable due their type, such as optical fibres in plastic pipes without a tracer wire or ceramic pipes; not being able to see the service due to depth of cover (outside the range of the service detector).

4.1 Existing Stormwater

Existing stormwater throughout the site consists of stormwater lines connecting to downpipes for most of the buildings, and surface pits to collect stormwater overland flow in impervious areas. Council stormwater infrastructure is located in Glenwood Park Drive and Forman Avenue (Refer **Figure 5**).

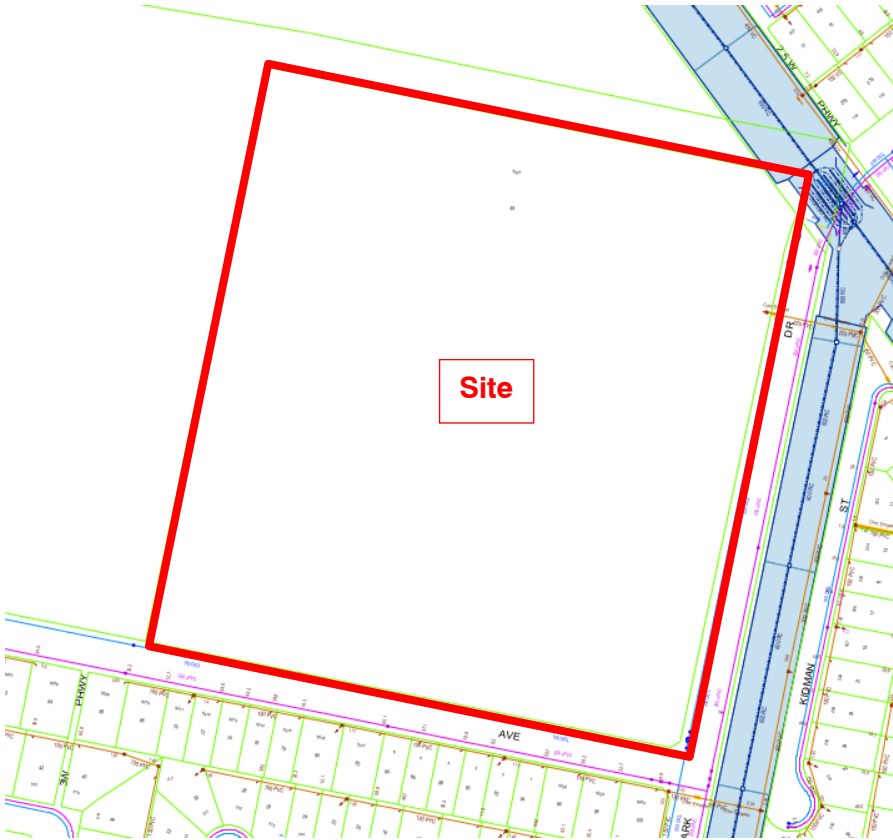


Figure 5: Stormwater Infrastructure (Source: Dial Before You Dig)

4.2 Geotechnical Assessment

A Geotechnical Investigation has been undertaken by Douglas Partners (94626.00 R.001.Rev0). The report identifies the following soil profile on the site as shown in **Table 1**.

A bulk earthworks plan, showing extent of batters, and depth of cut and fill is provided in **Appendix F**.

Table 1: Site Soil Profile

Type	Depth
Silty Clay Topsoil	To 0.1m - 0.2m
Silty Clay or Sandy Silt Fill	To 0.1m – 0.9m
Natural Soil	To 0.5m – 4.6m
Very low and low strength, moderated weathered siltstone	To 1.8m
Low and medium strength, moderately to highly weathered siltstone	To 3.0m
High strength, unbroken siltstone	To 4.9m – 5.1m

4.3 Soil Contamination

The site is not identified as being contaminated by Acid Sulphate Soils as per NSW Government SEED Mapping. Douglas Partners Detailed Site Investigation (R.002.Rev0) report for contamination outlined that the potential for contamination exists at the site. These locations are identified in **Figure 6**.

PAEC#	Identified from	Description
1	Site Inspection	Refurbished Demountable Structures may contain remnant asbestos
2	1947 – Present Aerials and Site History Review	Fill placed across the site for the formation of site levels and the backfilling of the creek in the north-east corner of the site
3	1947 – Present Aerials Site History Review	Previous Agricultural Activities

Figure 6: Potential Areas of Environmental Concern on site

5 Stormwater Design

The stormwater design must be in accordance with Australian Standards, Blacktown City Council's Engineering Guide 2005 for Development Chapter 4 Drainage Design, Australian Rainfall and Runoff (2019), 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 the in-ground pipe system. A reticulated primary in-ground piped stormwater and subsoil drainage system will collect and dispose of stormwater running onto and off the developed site. Surface stormwater will be collected in pits. A secondary stormwater drainage overland flow system will safely and effectively dispose of stormwater in the event of partial or complete blockage of the primary system.

Pipes and pits will need to be designed to satisfy the minimum provisions of AS 3500.2. The in-ground piped drainage system will 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 velocity x depth product to be less than 0.4m²/s, in accordance with NSW Floodplain Management Manual (2001). Scour protection will be provided for pipe outlets and overflows. Refer to **Appendix C** for the stormwater management plan.

5.1 Onsite Stormwater Detention (OSD)

As per the Blacktown City Council Engineering Guide for Development, the High School is located in a Hawkesbury River sub-catchment area that requires permanent OSD (Refer **Figure 7** overleaf).

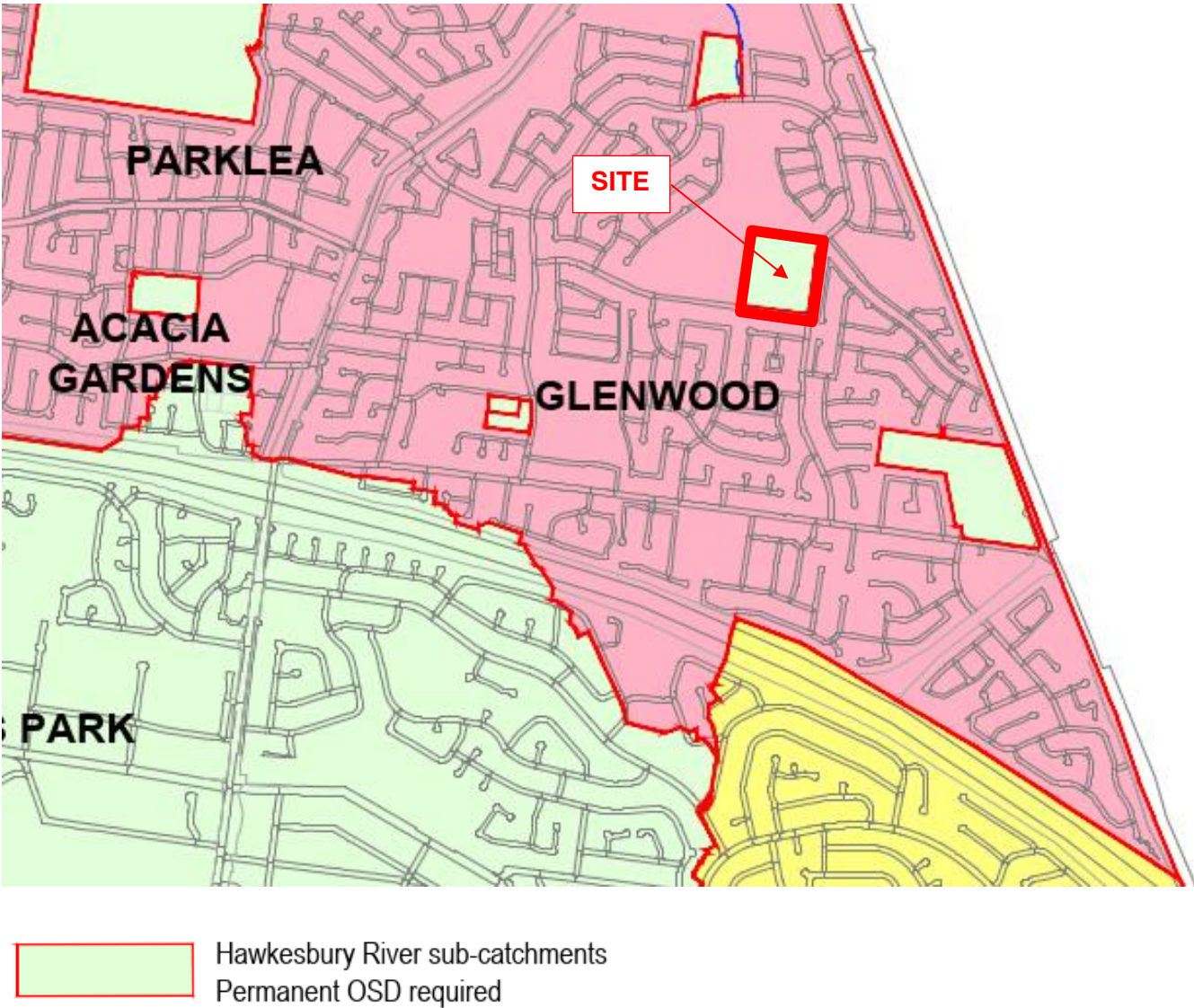


Figure 7: Blacktown OSD Catchment Areas (Source: Blacktown City Council Engineering Guide for Development)

OSD calculations indicate that a total OSD storage area of **210m²** is required to adequately manage the stormwater runoff from the site. The onsite detention calculation sheet in **Appendix B** demonstrates the sizing calculations undertaken in accordance with Blacktown City Council requirements.

The OSD systems are to be located at the lowest point of their catchment area to ensure all surface flows will be directed to the OSD, even in the event of a pipe system failure. OSD is to be located away from any natural watercourses and Overland Flow Paths (OLFP) from catchments external to the site and are not to be inundated by a natural watercourse or externally sourced OLFP in any events up to and including the 1% AEP storm event.

The Blacktown City Council notes the preference of above ground, open, absorption OSD systems. Ponding water level height for an open OSD area above ground is to be a maximum of 200mm to prevent the risk of drowning, as required by NSW School's Infrastructure requirements. An approximately area required for an open basin would be 6000m². Consequently, an underground OSD tank system has been chosen in the design to allow for a larger depth of water to be captured in the detention method. The underground detention tank will be in an area where it can be readily accessed for inspections and maintenance. As much as possible of the development site area will drain through the OSD system(s), with an absolute minimum of 85% directed into the OSD. All systems shall use a minimum of two orifice plates to control flows. The 1.5 year ARI orifice shall be designed to convey a maximum of 40 L/s. The 1 in 100 year ARI orifice shall be designed to convey a maximum of 190 L/s. The minimum volume up to the 1.5 year ARI weir level must equal 300m³/ha. The minimum volume up to the 1 in 100 year ARI weir level must equal 455 m³/ha. Refer to **Appendix D** for the stormwater management plan.

6 Flooding

As per the Blacktown City Council Engineering Guide for Development 2005, the site is not identified as flood prone (**Figure 8**). However, in consultation with Council, a flood study is required to be undertake to determine any flood impacts. As a consequence, a flood study has been undertaken separately to this report with results presented in the Civil Engineering Flood Study Report by enstruct.

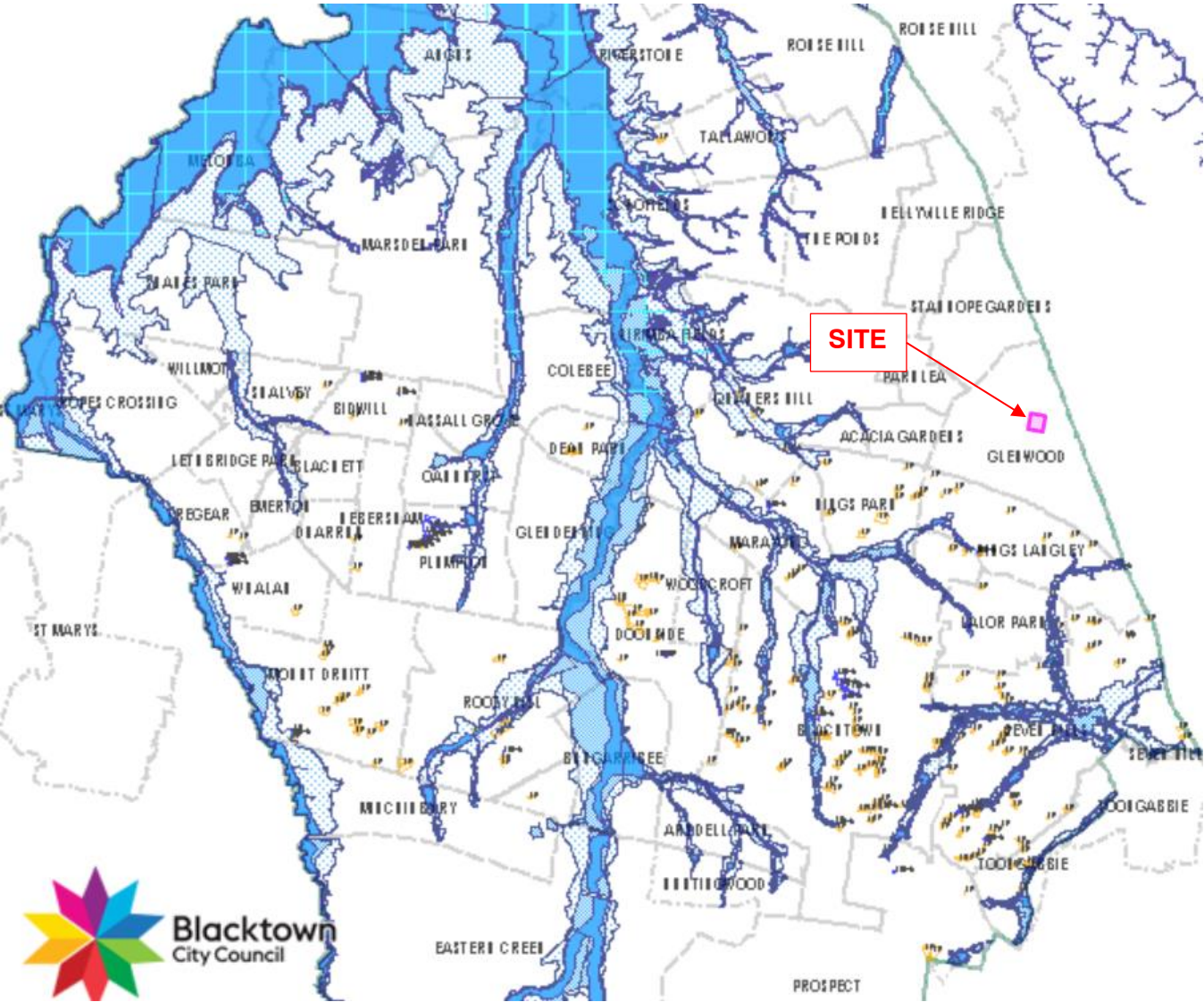


Figure 8: Blacktown Flood Extents (Source: Blacktown City Council Engineering Guide for Development)

6.1 Stormwater Quality

Stormwater quality will be managed through the use of various Water Sensitive Urban Design (WSUD) strategies which will treat the water to meet pollutant reduction targets set out in the Blacktown City Council’s Stormwater Management report (Table 2). Refer to Appendix D for the stormwater management plan.

Table 2: Required Pollutant Reduction Targets

Pollutant	Stormwater Reduction Target
Total Suspended Solids	85% reduction in the post development mean annual load
Total Phosphorous	65% reduction in the post development mean annual load
Total Nitrogen	45% reduction in the post development mean annual load
Gross Pollutants	90% reduction in the post development mean annual load

The safety to the school population needs to be considered when designing WSUD measures. As a consequence, physical (in lieu of natural removal) pollutant removal devices will be incorporated to remove gross pollutants, suspended solids, and reduce nutrient runoff including nitrogen and phosphorous. The pollution control devices will require ongoing maintenance and at least a yearly inspection and maintenance.

It is proposed that a series of pollution control devices will need to be provided so as to remove contamination from stormwater runoff to the required level prior to discharge. The devices will include:

- Litter screens in all stormwater pits
- Trash screen in detention tank
- End of line treatment device (Ocean Protect StormFilter Cartridges) to remove nitrogen and phosphorus contaminants etc. prior to discharge to the Council stormwater system.

A physical removal treatment train system is preferred to an above ground system as it will be able to achieve pollutant reductions required, is easily maintained, and does not pose a safety risk to the school population.

Pollutant removal rates as required by Council are to be in accordance with best practice. WSUD is also to be designed 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.

6.1.1 MUSIC Model

A water quality analysis has been undertaken by enstruct to develop the WSUD strategy for the proposed development, and to assess its ability at meeting Blacktown City Council water quality targets. The water quality modelling for this study was undertaken using the industry standard software model MUSIC (Model for Urban Stormwater Improvement Conceptualisation) Version 6.3.0. The MUSIC model layout representing the proposed WSUD strategy for the development and results are shown in Figure 9.

The analysis indicates that eight (8) 690mm StormFilter cartridges, with a treatment flow rate of 0.9L/s each, and two (2) Ocean Guard litter pit inserts, incorporated into the in-ground stormwater system will treat the stormwater to meet Council requirements, prior to site discharge.

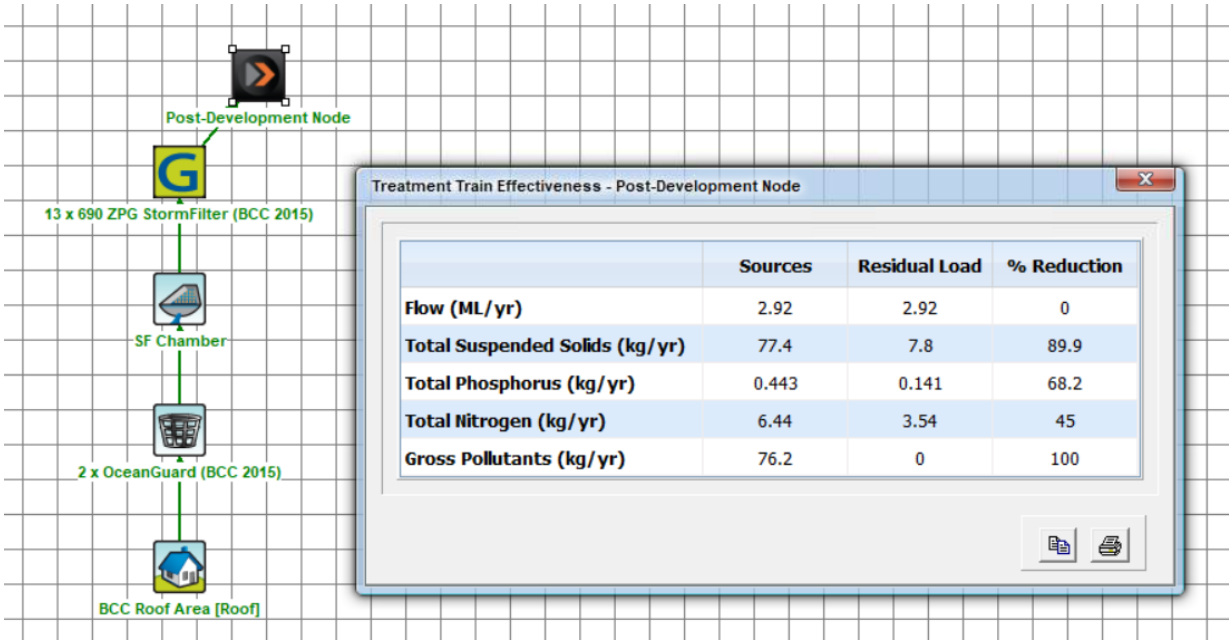


Figure 9: MUSIC Model and Pollutant Reduction Loads

6.1.2 Ocean Guard Pit Inserts

Pit inserts, also known as litter baskets, are considered as an at-source primary treatment solution. Litter baskets are an efficient and cost-effective pre-screening primary treatment system that captures and retains gross pollutants at drainage entry points. Pit inserts, consisting of a capture basket and a filter mesh liner, are usually fitted below the road invert or surface of the pit and hence are visually unobtrusive.

Cleaning of the pit inserts is undertaken either manually or using a small vacuum truck.

6.1.3 StormFilter Cartridges

StormFilter Cartridges are an effective method of removing contamination from stormwater before site discharge. The stormwater passes through the filtration media in the cartridge centre tube. As the water rises, a check valve will engage and allow the filtered water to exit the cartridge and move towards discharge from the tank. **Figure 10** shows the general detail of a StormFilter cartridge.

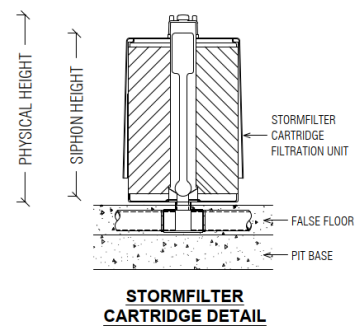


Figure 10: StormFilter Cartridge Detail

6.2 Overland Flow

In the event that the piped in-ground stormwater system fails due to blockage or other obstruction, stormwater flows will be required to be conveyed as overland flow. The overland flow is to be directed away from buildings and towards the sites’ northern and eastern boundaries. Overland flow paths will be sized to accommodate the 1% AEP storm flows.

6.3 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 incorporated in the design include siltation fences, hay bales, grass lined swales, and 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]. Refer to **Appendix E** for the erosion and sediment control plan.

7 Conclusion

A total OSD storage area of 210m² is required to adequately manage the stormwater runoff from the site to below the required PSD.

All systems shall use a minimum of two orifice plates to control flows. The 1.5 year ARI orifice shall be designed to convey a maximum of 40 L/s. The 1 in 100 year ARI orifice shall be designed to convey a maximum of 190 L/s. The minimum volume up to the 1.5 year ARI weir level must equal 300m³/ha. The minimum volume up to the 1 in 100 year ARI weir level must equal 455 m³/ha.

A flood study has been undertaken separately to this report with results presented in the Civil Engineering Flood Study Report by enstruct. Overland flow paths will be sized to accommodate the 1% AEP storm flows and direct stormwater to the northern and eastern site boundaries.

MUSIC analysis indicates that eight (8) 690mm StormFilter cartridges, with a treatment flow rate of 0.9L/s each, and with Ocean Guard litter pit inserts, incorporated into the in-ground stormwater system will treat the stormwater to meet Council requirements, prior to site discharge.

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APPENDIX A

COUNCIL OSD CORRESPONDENCE

RE: Issue with S3QM tool



Tony Merrilees <Tony.Merrilees@blacktown.nsw.gov.au>

To Prawal Adhikari

Cc Mark Liebman

↩ Reply

↩ Reply All

➡ Forward

⋮

Tue 1/06/2021 11:38 AM

Cc: Mark Liebman <Mark.Liebman@blacktown.nsw.gov.au>

Subject: RE: Issue with S3QM tool

Hi Prawal

The issue here is the complex relationship between the State Government (who operate the public schools) and Local Government. This relationship changes over time and consequently S3QM cannot provide a definite response at this time.

This site will require permanent OSD, water conservation and water quality for the extent of new works. Please refer to Council's WSUD developer handbook available on-line to assist.

I have attached the latest OSD spreadsheet in lieu of S3QM. Please ensure you press ENTER after every line including drop downs.

Water quality will be assessed using MUSIC. The Blacktown nodes can be found on MUSIC-Link

I am unsure of the extent of works but if they include new toilet blocks or landscape areas they will have a water conservation target of 80% reuse.

Hope that helps.



APPENDIX B

BLACKTOWN CITY COUNCIL ONSITE
STORMWATER DETENTION CALCULATION
SPREADSHEET

On-Site Detention Calculation Sheet for
Catchments outside Upper Parramatta River Catchment
Non-HED Secondary Outlet
(Due to Elevated Downstream 100 yr ARI Flood Level)

Project:	Glenwood High School				
Site Address	Glenwood Park Drive and Forman Avenue				
Job No:	6393				
Designer:	PA				
Telephone:	(02) 89041444				
Site Data					
OSD Area:	Hawkesbury River Catchment				
L.G.A	Blacktown City Council				
Site Area	0.4	ha	4,000	m ²	
Total Roof Area	0.39	ha	3,900	m ²	
Area of Site draining to OSD Storage	0.3999	ha	3,999	m ²	Satisfactory
Residual Site Area (Lot Area - Roof Area)	0.010	ha			
Area Bypassing Storage	0.0001	ha			
Area Bypassing / Residual Site Area	1.0%				Satisfactory 30% Max
No. of Dwellings on Site	1				Satisfactory
Site Area per Dwelling	0.400	ha			
Roof Area per Dwelling	0.390	ha			
Basic OSD Parameters					
	Extended Detention			Detention	
Basic SSR Vols	Ext Detention Storage	300	m ³ /ha	Total Storage (1.14 x SSR _{100yr})	520 m ³ /ha
Basic SRDs	Primary Outlet	40	L/s/ha	Secondary Outlet	190 L/s/ha
OSD Tank Bypass					
Residual Lot Capture in OSD Tank	99%				
Adjusted SRDs	40	L/s/ha		148	L/s/ha
OSD Calculations					
	Extended Detention			Detention	
Basic SSR Volume	Ext Detention Storage	120.00	m ³	Total Storage	208.00 m ³
Total Rainwater Tank Credits		0.00	m ³		0.00 m ³
Storage Volume				Total	208.00 m ³
Storage Volume	Ext Detention Storage	120.00	m ³	Flood Detention Storage	88.00 m ³
OSD Discharges	Primary Outlet	15.88	L/s	Secondary Outlet	59.20 L/s
RL of Top Water Level of Storage	58.520	m		58.820	m
RL of Orifice Centre-line	57.470	m		57.370	m
Number of Orifices	1			1	
Estimated Downstream Flood Level	57.13	1.5 yr ARI		57.65	100 yr ARI
Downstream FL - RL of Orifice Centre-line	-0.34	Satisfactory	Raise Orifice Level	0.28	
Design Head to Orifice Centre	1.050	m	TWL Detn Storage - RL Orifice	1.450	m
Calculated Orifice Diameter	86	mm	Satisfactory	Satisfactory	153 mm
Overflow Weir & Freeboard Calculation					
RL of Minimum Habitable Floor Level				60.100	m
RL of Minimum Garage Floor Level				60.100	m
Length of Overflow Weir				1.00	m
Site Runoff Coefficient			Blacktown City Council	0.72	
Storm Intensity (5 min 100 yr ARI)				219	mm/h
Peak Flow over Weir				175.2	L/s
Depth of Flow over Weir				226	mm
Freeboard to Habitable Floor			Satisfactory	1054	mm
Freeboard to Garage Floor			Satisfactory	1054	mm

Rainwater Tank Calculations (per Dwelling)					
Only Complete this Section if a Rainwater Tank Airspace Credit is Claimed					
The calculations assume that the same size rainwater tank is installed on each dwelling					
				Min	Max
% of Roof draining to Rainwater Tank	80.0%		Satisfactory	1.7%	100%
Total Rainwater Tank Volume	5.00	kL	Tank Volume OK		
Min Volume that triggers Top-up	0.00	kL	Note - Min Vol in Tank < 10% Total Tank Vol		
Total Tank Vol - Min Top-up Vol	5.00	kL			
Dedicated Airspace					
Dedicated Airspace	0.00	kL	Satisfactory		
	Extended Detention			Detention	
Dedicated Airspace Credit	0.00	kL		0.00	kL
Maximum Tank PSD	40	L/s/ha			
Maximum Tank Discharge	0.0	L/s			
Maximum Head to Centre of Tank Orifice	0.000	m	No Dedicated Airspace		
Calculated Orifice Diameter	0	mm	No Dedicated Airspace		
Dynamic Airspace					
Maximum Dynamic Storage (Nett Vol)	5.00	kL	Controls minimum % Roof to Rainwater Tank		
Daily Demand on Rainwater Tank	0.657	kL/d	Satisfactory		
Dynamic Airspace at start of Storm	0.73	kL			
	Extended Detention			Detention	
Dynamic Airspace Credit	0.00	kL		0.00	kL
Combined Rainwater Tank Credit	0.00	kL		0.00	kL
Maximum Rainwater Tank Credit	5.00	kL		5.00	kL
Rainwater Tank Credit per Dwelling	0.00	kL		0.00	kL
Rainwater Tank Credit for the Site	0.00	m ³		0.00	m ³

APPENDIX C

BLACKTOWN CITY COUNCIL S3QM RESULTS

Glenwood High

Ref: 1/06/2021

Site:

Address	Glenwood Park Drive and Forman Avenue
Site Area	4000 m ²
Site Area NOT Draining to OSD	0 m ²
Bypass	0%

Reduced Levels (AHD):

② RL of soffit (top) of tank	59.020
① Average RL of the base of the OSD Tank	57.570
③ RL of Emergency Overflow Weir	58.726
RL of 50% AEP Overflow Weir	58.333
⑤ RL of 50% AEP Orifice Center Line	57.470
⑥ RL of 1% AEP Orifice Center Line	57.370
⑦ RL of Invert of Discharge to Downstream Pit	57.130
⑧ RL of Obvert of pit outlet pipe	57.500
Minimum RL of Garage Floor	59.120
Minimum RL of Habitable Floor	59.220

OSD Volume:

Required Storage BELOW the 50% AEP Overflow Weir	129.387
Required Storage BELOW Emergency Overflow Weir	196.237

Discharge Details:

Using Filter Cartridges to manage Water Quality	Yes
Discharge Location	Drainage Pit
Length of Emergency Overflow Weir	1.000
Maximum 50% AEP Site Discharge	16.000
Maximum 50% AEP Orifice Discharge	13.770
Maximum 1% AEP Site Discharge	76.000
Maximum 1% AEP Orifice Discharge	46.960
Total Filter Cartridges Design Flows	2.230
Total Filter Cartridges 1% AEP Flows	29.040

Orifice Details:

Number of 50% AEP Orifices	1.000
Number of 1% AEP Orifices	1.000
50% AEP Orifice Diameter (mm)	84.000
1% AEP Orifice Diameter (mm)	138.000

Notifications:

Due to the 1% AEP orifice being drowned by 20.64%, 7.82% of storage volume has been added. Access grates to be provided such that the maximum reach from any point in the tank to the nearest grate is 3m.

Deemed to Comply pre screening tool

Blacktown City Council offers some Development Applicants the opportunity to use this on-line deemed to comply tool.

If you have any suggestions or questions about the tool we welcome them.

In the first instance please contact Tony Merrilees at Council by email at tony.merrilees@blacktown.nsw.gov.au or Mark Liebman by email at mark.liebman@blacktown.nsw.gov.au

Initial Questions

Locate your site in the map by zooming and panning. Once your development site has been located, click on the location to mark it on the map.

Alternatively, enter in the site coordinates (Latitude and Longitude) in the space provided, below.



Latitude

-33.7328

Longitude

150.9373

Address

Glenwood High School NSW

Mouse Over:

Selected: Voluntary Contribution Plan Area, BCC OSD Requirement

Development Zoning and Footprint

Development footprint means the area of new work which is the subject of the development application. It refers only to new external work. It includes new paved areas and new buildings and new for old building replacements. The use of this tool is restricted to sites with a development footprint of 40,000m² or less.

Zone of land

Residential



What is the footprint of the development (m²)?

4000

Development Type

Type of Development

Non-residential development



OSD Calculations

This development requires an OSD system.

The questions that follow will establish the requirements for the On Site Stormwater Detention system. These questions refer to OSD terminology as per the following diagram

Area of Site Draining to OSD (m²)

4000

OSD Location

Below Ground



OSD Discharge Location

Drainage Pit



Will filter cartridges be used to manage water quality?

Yes



The preliminary storage requirements below the 50% AEP Weir is 120m³ and the storage below the 1% AEP weir is 182m³.

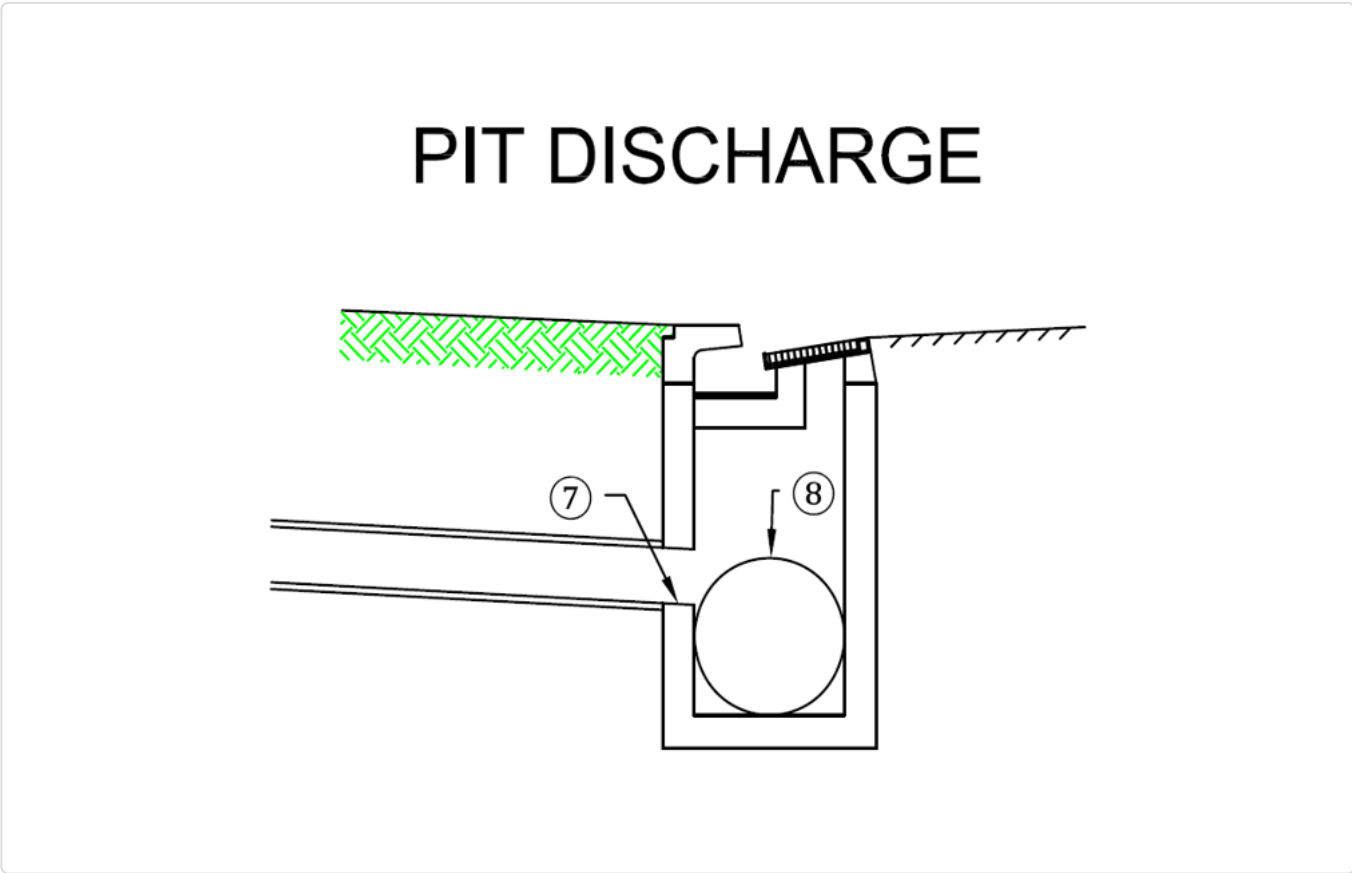
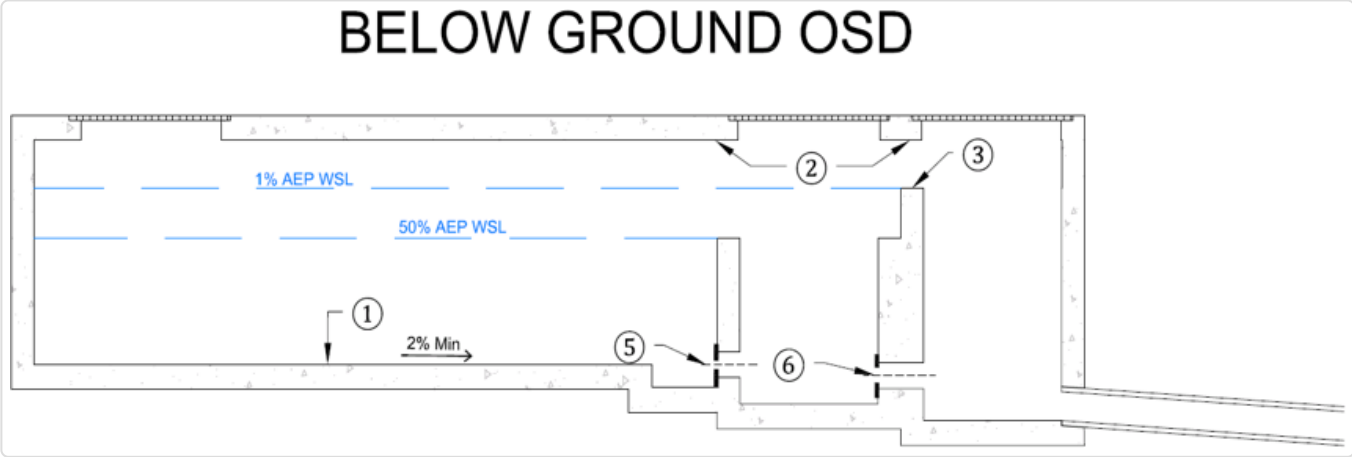
This requirement will differ if there is a drowned orifice.

Design Filter Cartridges flow (L/s)

2.23

Filter Cartridges flow with 1% AEP Head (L/s)

29.04



Discharge Location Data

(5) RL of 50% AEP Orifice Centreline	57.47
Number of 50% AEP Orifices	1
(6) RL of 1% AEP Orifice Centreline	57.37
Number of 1% AEP Orifices	1
(7) RL of invert to discharge to the next pit downstream	57.32

OSD Data

(1) Average RL of Base of OSD Tank	57.57
(3) Length of Emergency Overflow Weir (m)	1
(2) RL of soffit (top) of the OSD Storage Tank	59.02

OSD Summary Table

Site	
Site Area (m²)	4000
Site Area NOT draining to OSD (m²)	0
Bypass (%)	0
Reduced Levels (mAHD)	
(2) RL of soffit (top) of tank	59.02
(1) Average RL of the base of the OSD Tank	57.57
(3) RL of Emergency Overflow Weir	58.726
RL of 50% AEP Overflow Weir	58.33
(5) RL of 50% AEP Orifice Centre Line	57.47
(6) RL of 1% AEP Orifice Centre Line	57.37
(7) RL of Invert of Discharge to Downstream Pit	57.32
(8) RL of Obvert of pit outlet pipe	57.13
Minimum RL of Garage Floor	59.12
Minimum RL of Habitable Floor	59.22

OSD Volume

Required Storage BELOW the 50% AEP Overflow Weir (m³)	120
Required Storage BELOW Emergency Overflow Weir (m³)	182

Discharge Details

Using Filter Cartridges to manage Water Quality	Yes
Discharge Location	Drainage Pit
Length of Emergency Overflow Weir (m)	1
Maximum 50% AEP Site Discharge (l/s)	16
Maximum 50% AEP Orifice Discharge (l/s)	13.77
Maximum 1% AEP Site Discharge (l/s)	76
Maximum 1% AEP Orifice Discharge (l/s)	46.96
Total Filter Cartridges Design Flows (l/s)	2.23
Total Filter Cartridges 1% AEP Flows (l/s)	29.04

Orifice Details

Number of 50% AEP Orifices	1
Number of 1% AEP Orifices	1
50% AEP Orifice Diameter (mm)	84
1% AEP Orifice Diameter (mm)	138

Access grates to be provided such that the maximum reach from any point in the tank to the nearest grate is 3m.

Voluntary Planning Area

The proposed development is located within a voluntary planning area. The proponent must either:

- construct approved treatment measures on site or
- enter into a voluntary planning agreement, agreeing to pay a financial contribution toward the construction of precinct scale stormwater treatment measures in lieu of on-site water quality treatment measures

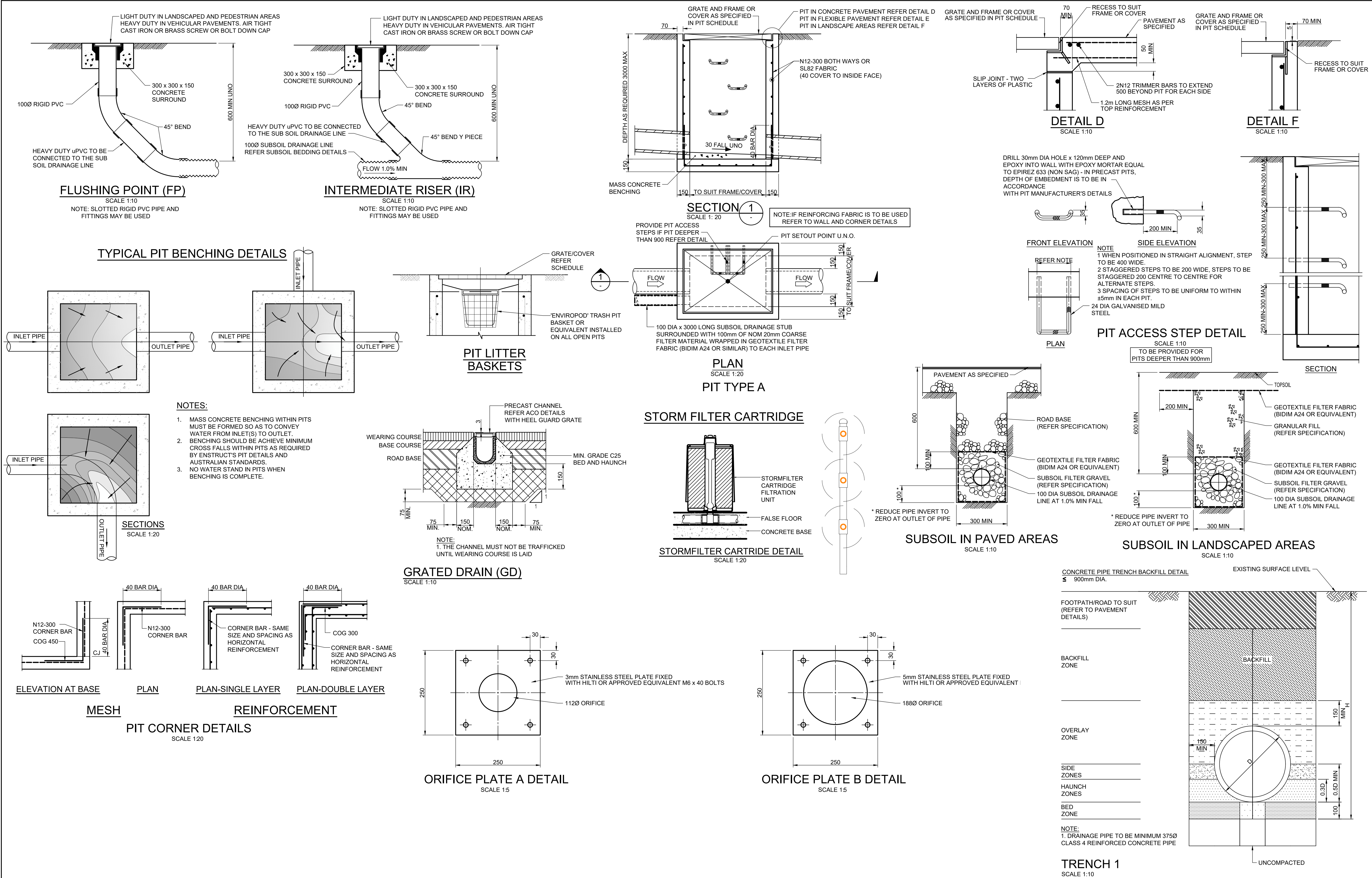
For further information on the voluntary planning arrangement please see Council's website (<https://www.blacktown.nsw.gov.au/Plan-build/Stage-2-plans-and-guidelines/Developers-toolkit-for-water-sensitive-urban-design-WSUD/Developer-planning-controls-relating-to-water-sensitive-urban-design/Precinct-scale-water-quality-offset-scheme>)

How will you address the water quality requirements for this development?

▼

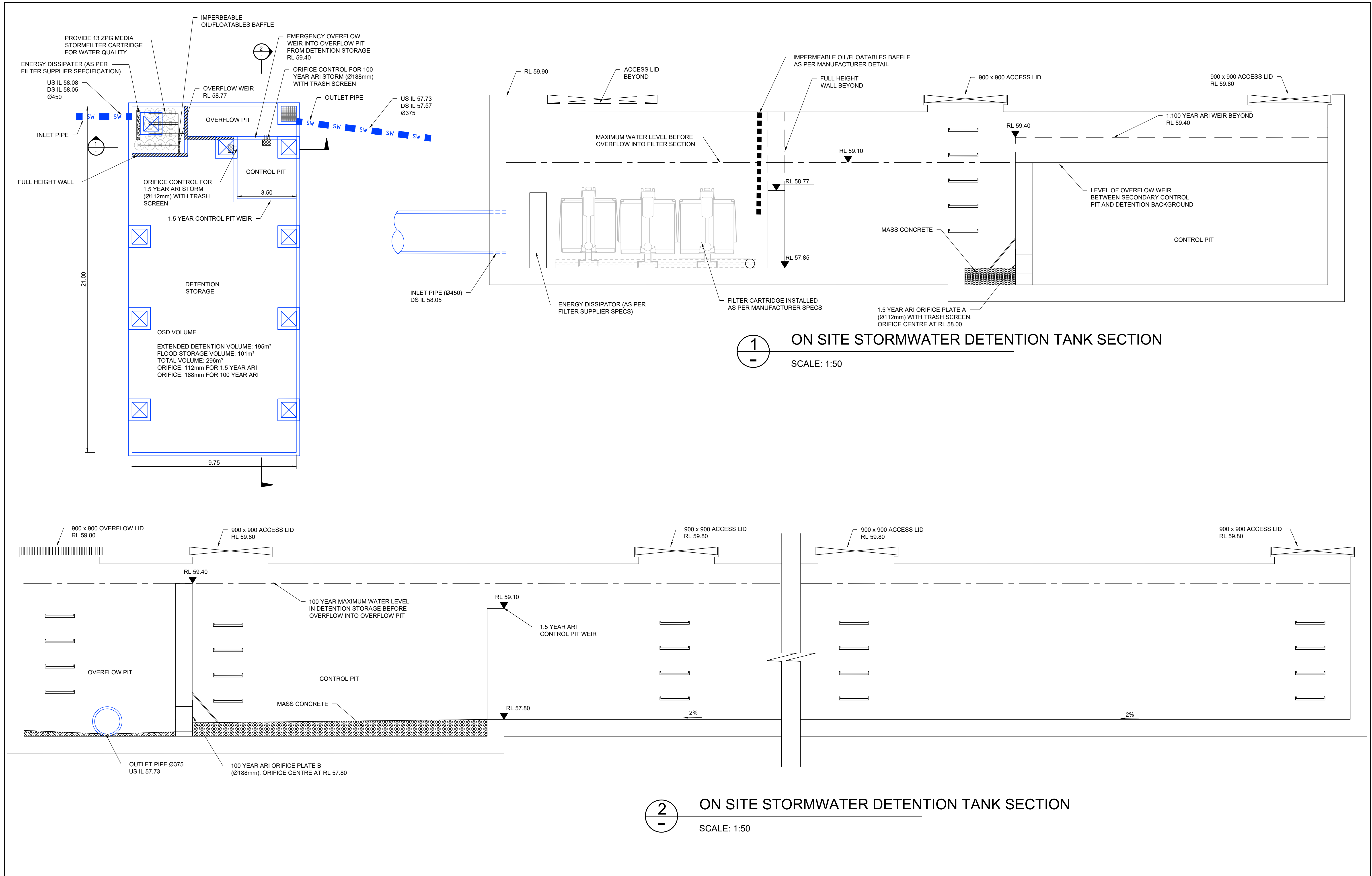
APPENDIX D

STORMWATER MANAGEMENT PLANS



A	09/11/21	ISSUE FOR APPROVAL			BEJ KEH
rev	date	description			drn ch'k

rev	date	description		drn ch'k



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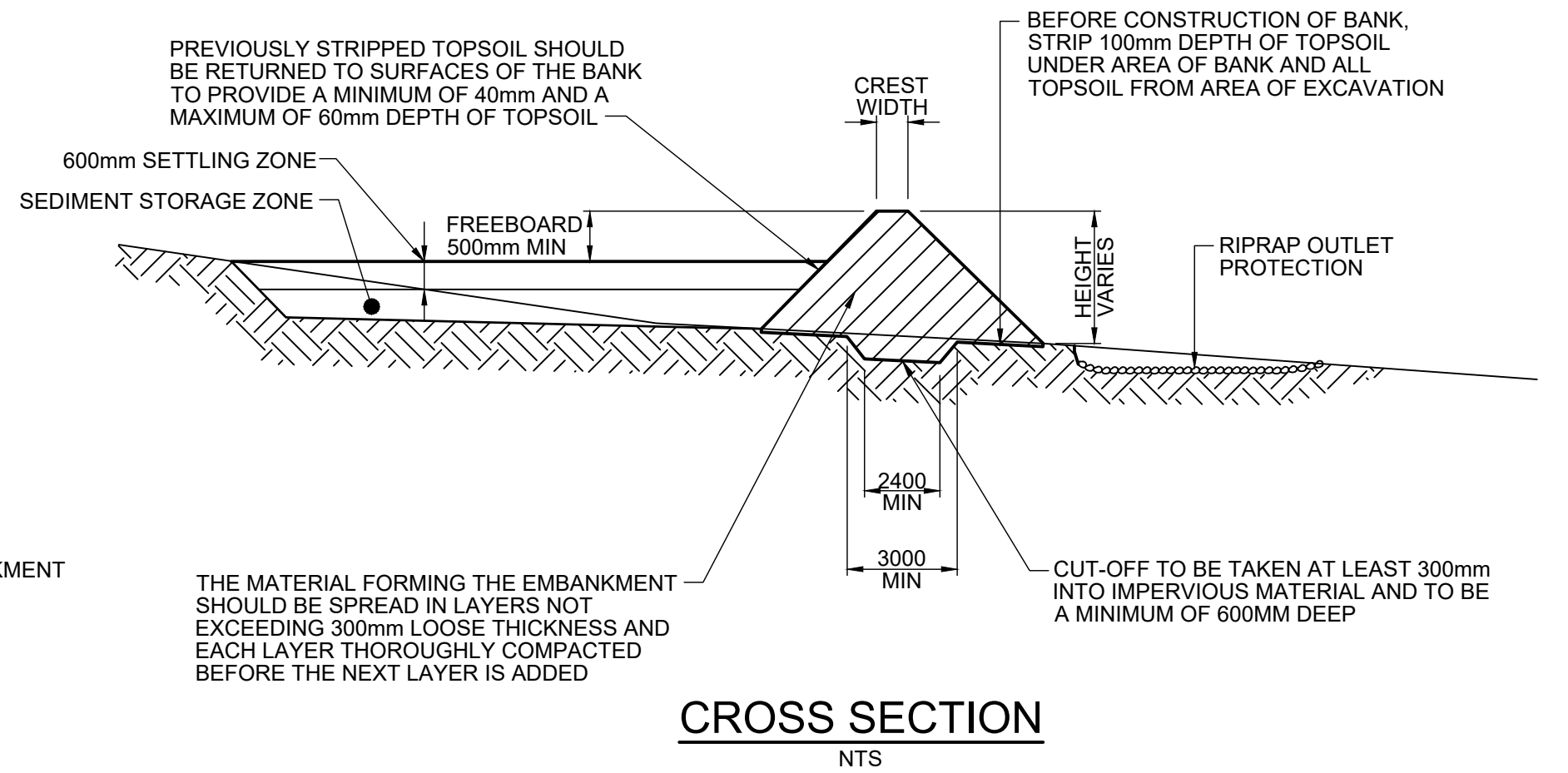
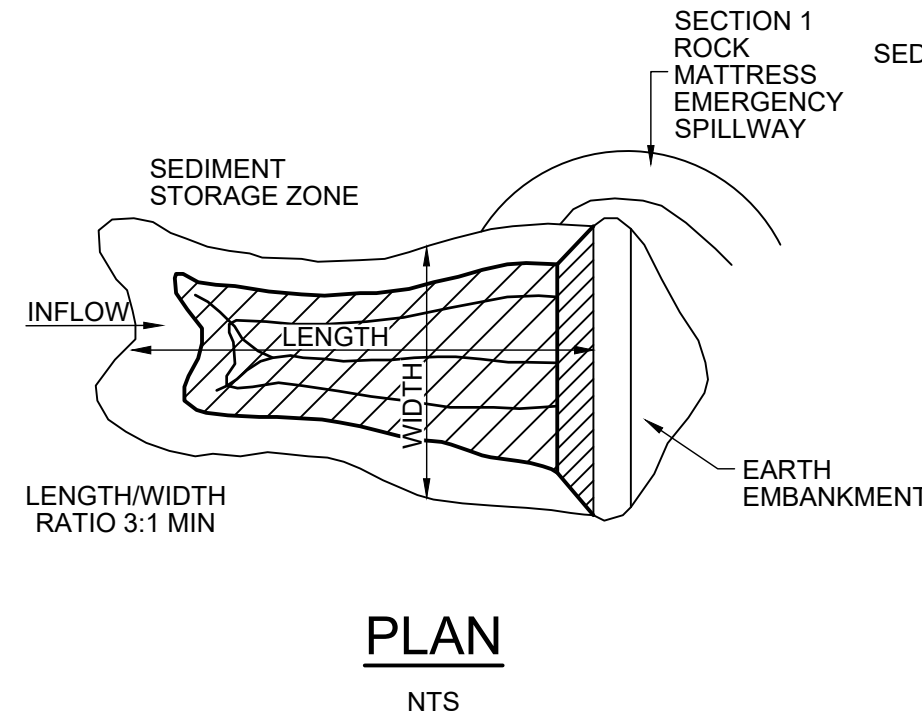
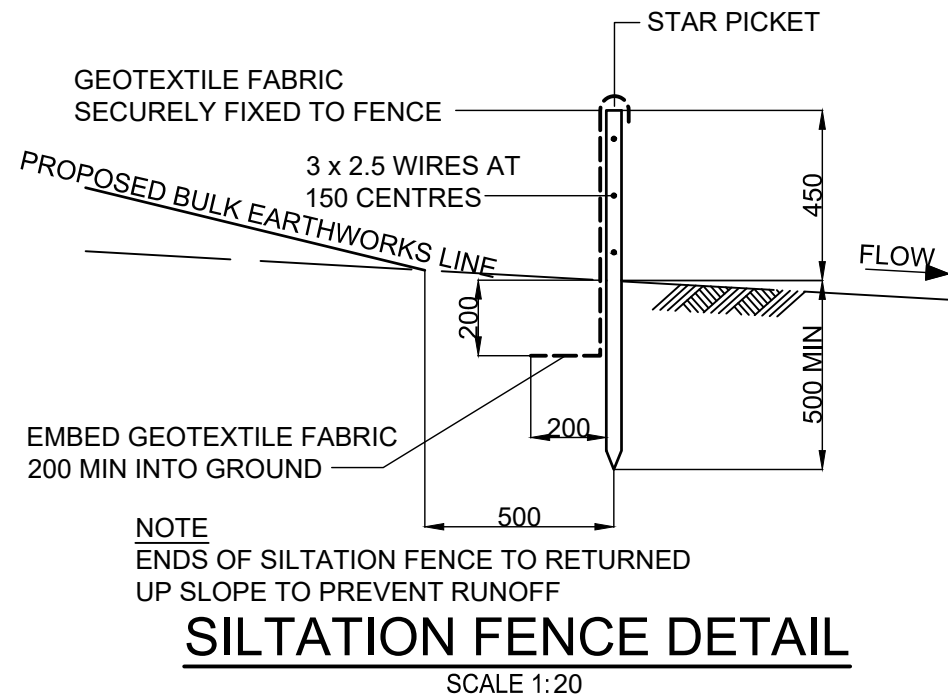
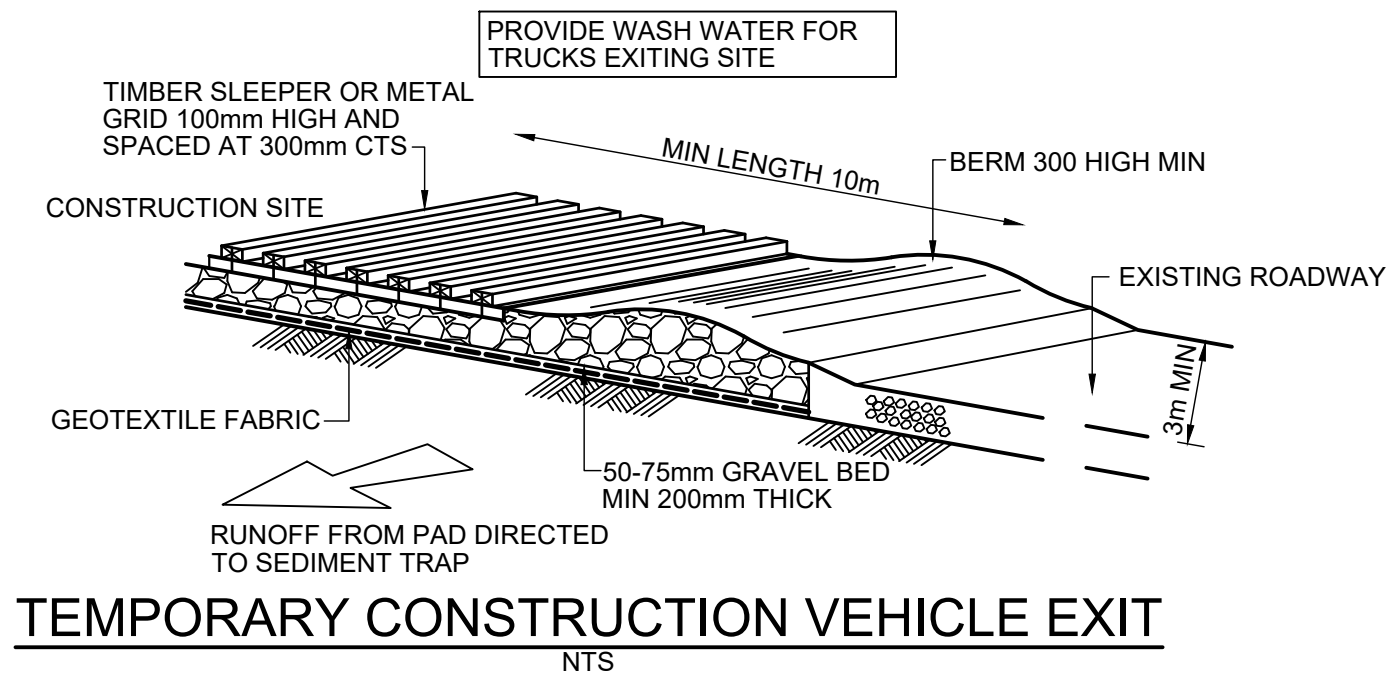
project
GLENWOOD HIGH SCHOOL

drawing title
OSD SECTIONS SHEET

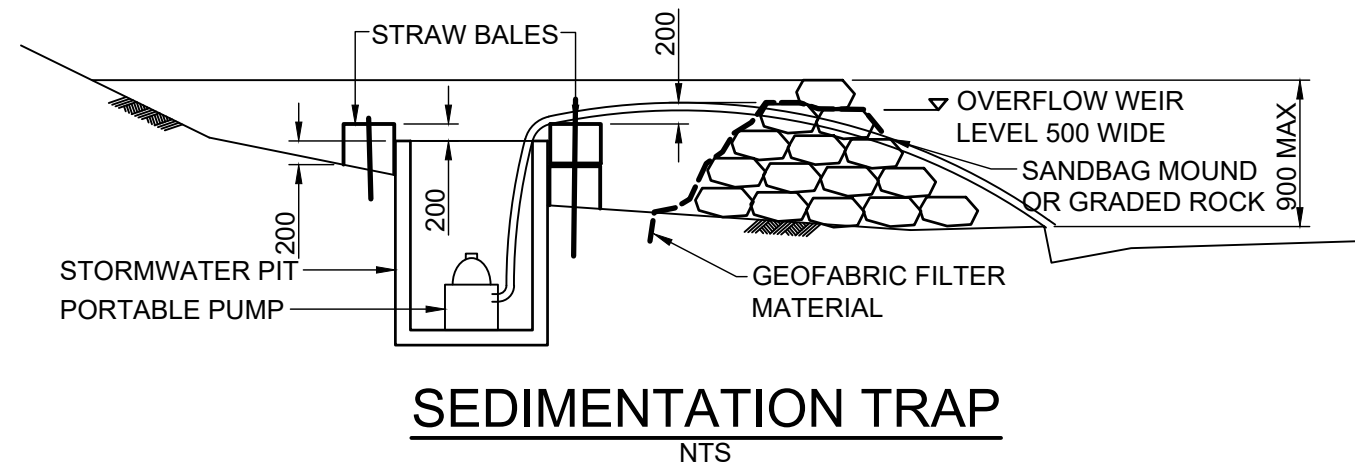
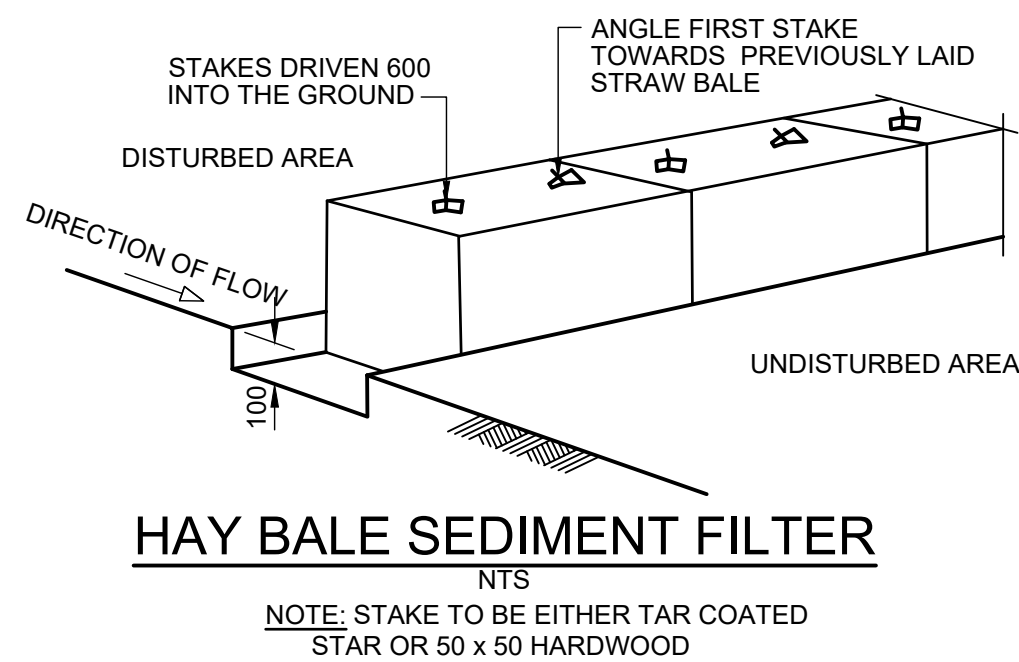
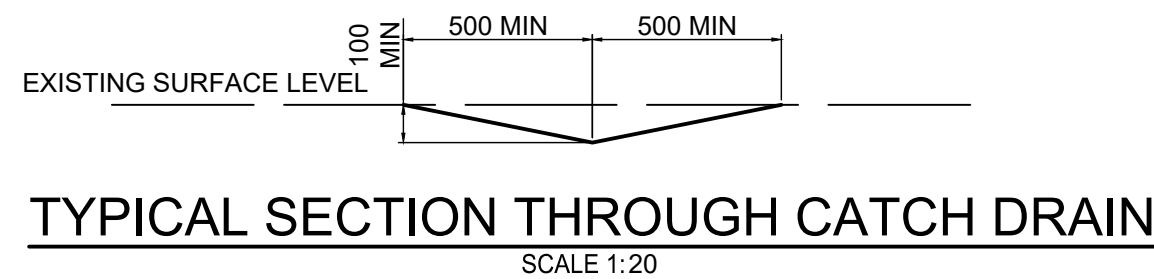
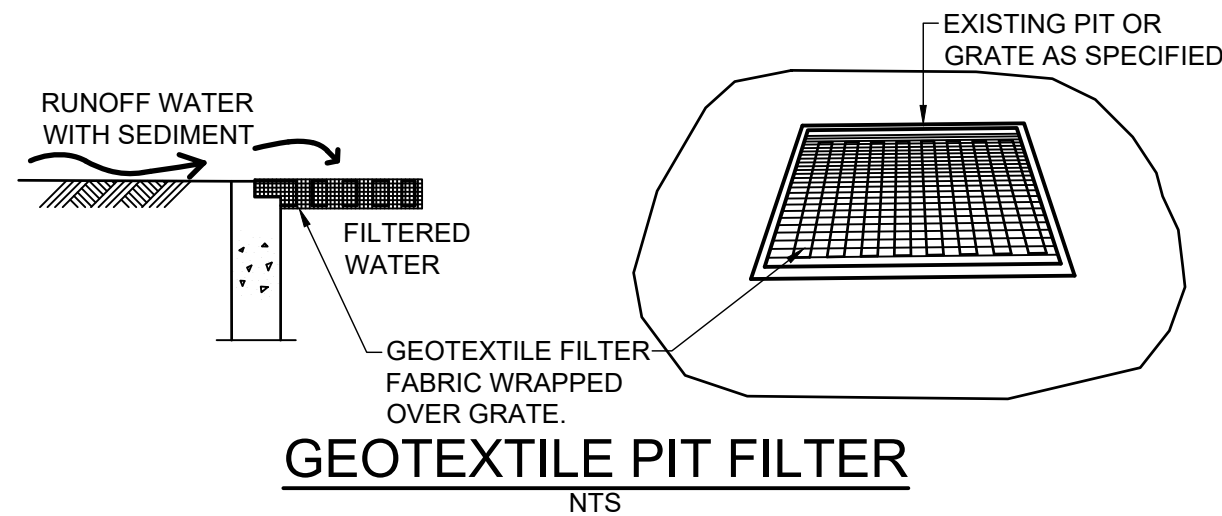
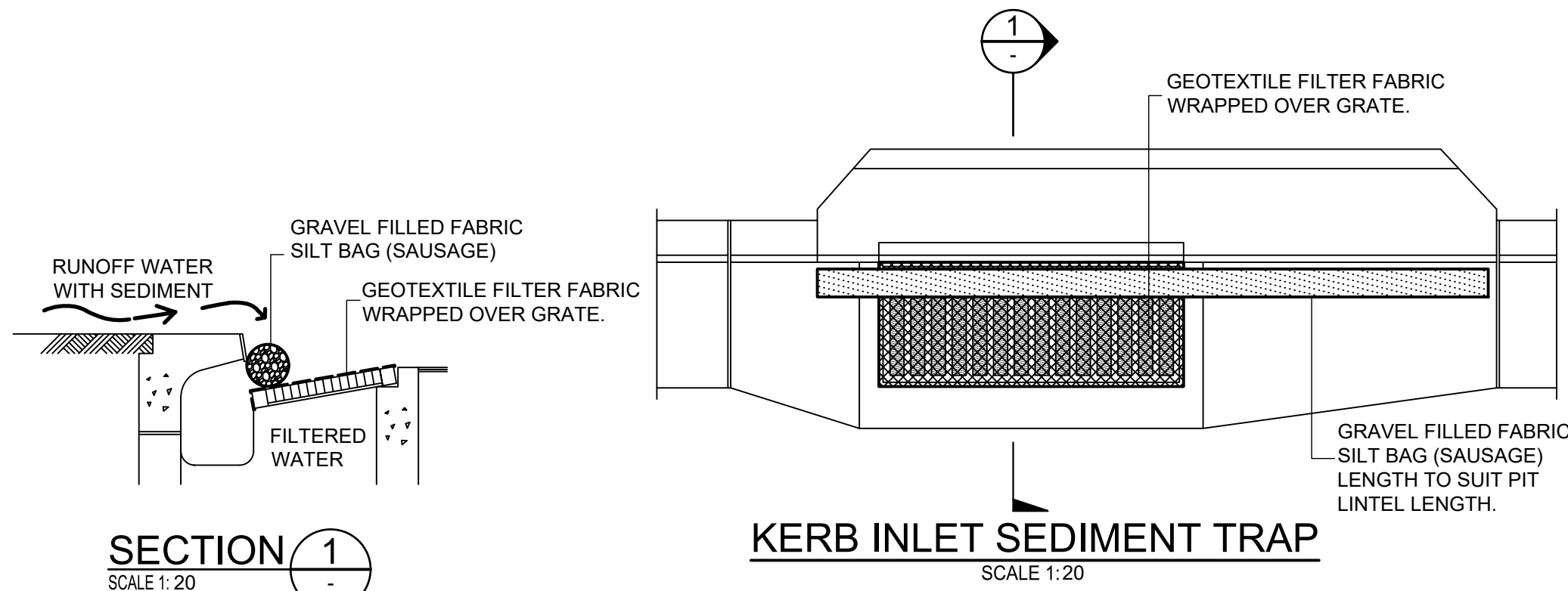
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scale at A1	drawn by BEJ	checked KEH	
project no. 6393	drawing no. SSDA-CV-0213	rev. A	

APPENDIX E

EROSION AND SEDIMENT CONTROL PLAN



SEDIMENT BASIN (TYPICAL) CROSS SECTION - TYPE D AND F SOILS



A	09/11/21	ISSUE FOR APPROVAL			BEJ KEH
rev	date	description			dwn ch/k

rev	date	description			dwn ch/k



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project	GLENWOOD HIGH SCHOOL
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drawing title	EROSION AND SEDIMENT CONTROL DETAILS
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status			
scale at A1	drawn by	checked	
AS SHOWN	BEJ	KEH	
project no.	drawing no.	rev.	
6393	SSDA-CV-0105	A	

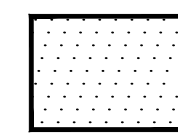
APPENDIX F

BULK EARTHWORKS PLAN

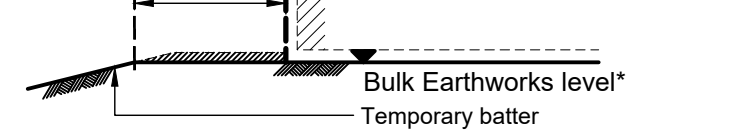
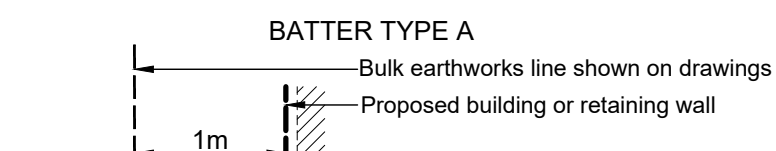
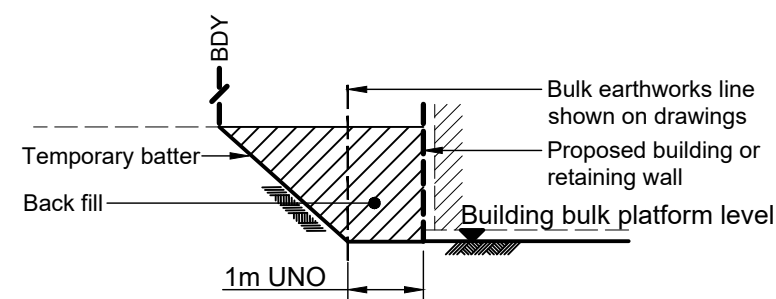
SITWORKS LEGEND

- | | |
|---|----------------------------------|
|  | Site Boundary |
|  | ExSEW Existing sewer line |
|  | ExE=ExE Existing electrical line |
|  | ExSW Existing stormwater line |
|  | ExT Existing telstra line |
|  | ExCOM Existing comms line |

BULK EARTHWORKS LEGEND



Flat platforms shown with dots



NOTE

1. * Bulk Earthwork level = Finish surface - (Slab thickness + Void former)
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, footpaths, landscaping 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 NOTES

1. All bulk earthworks setout from grid lines U.N.O.
2. All temporary batters at a slope of 1.0(H) : 1(V) U.N.O.
3. All permanent batters at a slope of 3(H) : 1(V) U.N.O.
4. 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 Engineered fill U.O.O.
6. Contractor shall place safety barriers around excavations in accordance with relevant safety regulations.
7. For interpretation of bulk earthworks foot print line shown on the bulk earthworks drawings refer to the bulk earthworks construction legend.
8. Bulk earthwork drawings are not to be used for detailed excavation.
9. Refer to Geotechnical Report prepared by - Douglas Partners, Report No. 94626.00.R.001 Rev'd, dated 17 September 2021.

PRELIMINARY

BULK VOLUMES: 40m³ CUT
2270m³ FILL

Bulk Earthworks volume does not include stripping of top soil, trenching and backfill, excavation for tanks, piling or other foundation works

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rev	date	description	drm	ch/k



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project

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drawing title

BULK EARTHWORKS PLAN

status

scale at A1
1:250

drawn by
RE I

checked
KEH

project no.

6393

drawing no.

SSDA-CV-0120

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