

Civil Engineering Report

Saint Ignatius' College Riverview, Stage 2

State Significant Development Application

Prepared for epm Projects / 16.10.2020

191740 CAAA

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PREPARED BY	APPROVED BY	STATUS	ISSUE	DATE
Duncan Marshall	Stephen Brain	Draft Approval	A	30.07.20
Duncan Marshall	Stephen Brain	Issue for SSDA	B	16.10.20

1.0 Introduction

1.1 Executive Summary

Taylor Thomson Whitting Pty Ltd (TTW) has been engaged to provide civil engineering consulting services for the proposed developments across the three Meriden School campuses.

This report supports a State Significant Development Application (SSDA) submitted to the Department of Planning and Environment (DPE) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This proposed development is identified as a State Significant Development by way of Clause 15(2) of Schedule 1 under *State Environmental Planning Policy (State and Regional Development) 2011* on the basis that the development is for the purpose of an existing school and has a Capital Investment Value of more than \$20 million.

1.2 Secretary's Environmental Assessment Requirements (SEARs)

Under application number SSD-10424, we have been provided with Secretary's Environmental Assessment Requirements (SEARs) issued on the 5th of February 2020. This report provides a response (in part or full where relevant) to the following SEARs:

Condition	Description	Reference within this report
16	Drainage: <ul style="list-style-type: none">Detail measures to minimise operational water quality impacts on surface waters and groundwater.Stormwater plans detailing the proposed methods of drainage without impacting on the downstream properties.	Refer to Section 3.0
17	Flooding: <ul style="list-style-type: none">Identify flood risk on-site (detailing the most recent flood studies for the project area) and consideration of any relevant provisions of the NSW Floodplain Development Manual (2005), including the potential effects of climate change, sea level rise and an increase in rainfall intensity. If there is a material flood risk, include design solutions for mitigation.	Refer to Section 4.0
19	Sediment, Erosion and Dust Controls: <ul style="list-style-type: none">Detail measures and procedures to minimise and manage the generation and off-site transmission of sediment, dust and fine particles.	Refer to Section 5.0

Relevant Documents

- ANZECC (2000) Guidelines for Fresh and Marine Water Quality
- Lane Cove Local Environmental Plan 2009
- Lane Cove Council DCP – Part O Stormwater Management (2010)
- Lane Cove River Coastal Zone Management Plan Draft Report (2012)
- Managing Urban Stormwater: Soils and Construction (Landcom NSW)
- NSW Floodplain Development Manual (2005)
- Australian Rainfall and Runoff 2019 Guidelines

The details of this report are preliminary and based on current available information and correspondence undertaken at the time of writing.

2.0 Overview of Proposed Development

2.1 Development Description

Client: St Ignatius' College, Riverview

Client Acronym: SICR

State Significant Development Number: SSD 7140

Project Name: Senior School Redevelopment

Project Address: Tambourine Bay Road, Lane Cove NSW 2066

The St Ignatius' College Redevelopment – Ignis Stage 2 project proposes a significant expansion of the current facilities on site (Refer to Site Concept in Figure 1). The proposed works are as follows:

- Construction of new five (5) storey building with a maximum RL52.00 at the heart of the Campus to accommodate modern, flexible teaching and learning spaces;
- Provide improved learning opportunities for Science, Technology, Engineering, Mathematics and PDHPE as a STEMP facility, along with six (6) Pastoral Care House areas, and staff rooms;
- The ground floor will accommodate a C.O.L.A, multi-purpose Hall and Canteen (Food and Beverage) with servicing by a loading area on basement level;
- Refurbishment of existing O'Neil Building to allow integration of New Ignis Stage 2 STEMP Building to connect to existing fabric;
- New North Landscaped Area;
- New Landscaped Area between the existing Wallace Building and the New Ignis Stage 2 STEMP Building; and
- Upgrade courtyard to improve the integration of the learning space and create a sense of place.

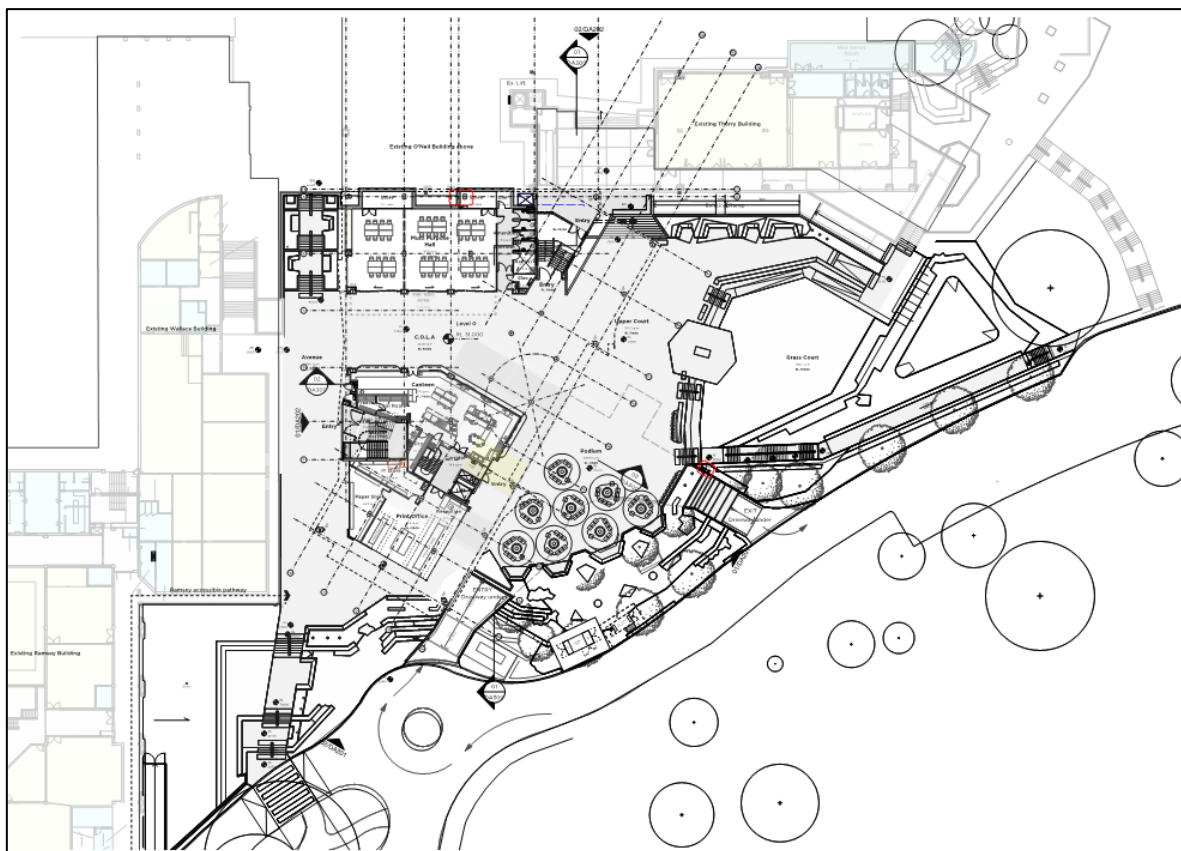


Figure 1 - Concept Layout Plan (Source: PMDL)

2.2 Site Background

The site is located at 2-60 Riverview Street, Riverview (Lot 10 DP 1142773) at the Saint Ignatius' College Riverview campus. The college was established in 1880 and sits elevated above the Lane Cove River between Tambourine Bay and Burns Bay. The site falls within the Lane Cove Council local government area with primary access to the site via Riverview Street and Tambourine Bay Road from the north. A ferry service is also operated for students to arrive at Riverview College Wharf on the Lane Cove River.

The campus includes several classroom and education buildings, several large playing fields, circulating access road (Loyola Drive) and surrounding bushland along the south embankment.



Figure 2 - Locality plan of existing site

The natural topography divides the campus site into three catchments. The western and southern catchments outside the proposed development area drains via surface flow or localised piped networks into Burns Bay and the Lane Cove River. Roof and surface runoff in the eastern catchment is collected via a network of grated pits, swales which discharges into Tambourine Bay via a 1200mm outlet pipe.

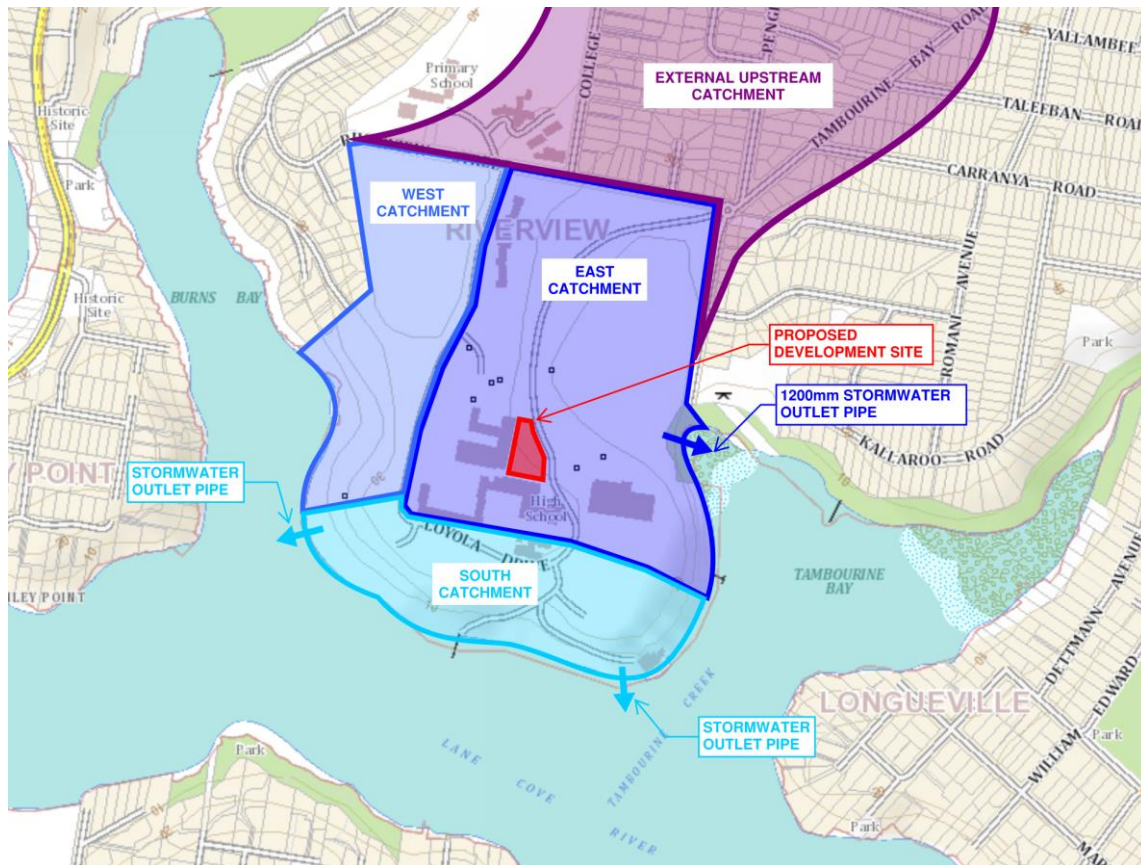


Figure 3 - Catchment areas and existing stormwater discharge locations

3.0 Drainage

The purpose of this section is to address the following items relating to SEARs Condition 16 - Drainage;

- Detail measures to minimise operational water quality impacts on surface waters and groundwater.
- Stormwater plans detailing the proposed methods of drainage without impacting on the downstream properties.

3.1 Pre-Development Stormwater Management Approach

Much of the proposed development area is covered by existing hardstand playing courts and surrounded by grassed or landscaped areas. Surveying works carried out in 2016 and 2020 reveals an extensive network of stormwater pits and pipes servicing the area around the proposed development. Surface drainage from the playing courts and road pavement is collected via grated inlet pits and drains into a 375mm diameter pipe running along the western edge of Loyola Drive. This runoff passes through an existing gross pollutant trap (GPT) adjacent to existing pavilion to remove trash and other pollutants. Runoff then exits the GPT via a 600mm pipe and runs to downstream junction pit at the edge of the playing fields, from here the runoff discharges freely into Tambourine Bay via a 1200mm diameter pipe.

Roof and surface drainage from the Wallace, Vaughan and Therry buildings is collected via pits and pipes and passes underneath the existing playing courts. A steep 375mm diameter pipe then conveys this upstream runoff to the stormwater receiving point at Tambourine Bay.

3.2 Proposed Stormwater Management Approach

Lane Cove Council DCP Part O requires the proposed piped flow conveyance for up to a 50 year Annual Recurrence Interval (ARI), equivalent to a 2% Annual Exceedance Probability (AEP) under Australian Rainfall Runoff 2016. Overland flowpaths are to be designed for the 100 year ARI, equivalent to 1% AEP. Roof water is collected in roof gutters and downpipes and conveyed via a separate pipe system into the 10kL rainwater tank located in the basement for re-use. Surface stormwater runoff will be collected through site grading, overland flowpaths and inlet pits and conveyed by in-ground pipe system into the trunk main discharging to Tamborine Bay.

3.1 Design Average Recurrence Intervals	
Drainage systems shall be designed to provide both minor and major flow conveyance systems as detailed in Australian Rainfall and Runoff (AR&R).	
Element of Stormwater System	Design ARI
All pipes and associated components for:	
single occupancy developments	20 Year
Residential flat buildings, commercial and industrial developments	50 Year
Overland flowpaths	100 Year

Figure 4 - Design Average Recurrence Intervals (Source: LCC DCP. 2010)

The existing 375mm pipe from the Vaughan and Therry Buildings and the 300mm pipe from the Wallace Building will be reconstructed to a new alignment to allow for the basement structure. Both pipes will reconnect into the downstream 375mm pipe.

In order to reduce the risk of flooding the basement in the event of a blockage downstream, a surcharge pit with an top of grate level 150mm below the basement finished floor level will be provided adjacent to Loyola Drive. This will allow any stormwater surcharging in the system to safely discharge across the oval towards Tamborine Bay instead of inundating the basement.

Refer to Stormwater Management Plans in Appendix A.

3.3 Stormwater Quantity

Appendix 12 of the Lane Cove Council DCP Part O identifies the site of the proposed development as exempt from on-site detention requirements due to proximity to the Lane Cove River foreshore. This has also been confirmed directly with Lane Cove Council's stormwater development engineer.

Although the new building structure will utilise the footprint of the hardstand playing courts, the additional paved areas shown in proposed landscaping plans will result in an overall reduction in the pervious area compared the existing site condition. One of the key issues for the development was ensuring that all minor storm events up to the 50-year storm can still be conveyed by the piped system.

As there are no downstream developments from the project site, there is no risk of flooding to other buildings, habitable or otherwise. However, in major storm events up to the 100-year storm, overland flows paths will need to be designed to safely discharge any excess runoff into Tamborine Bay.

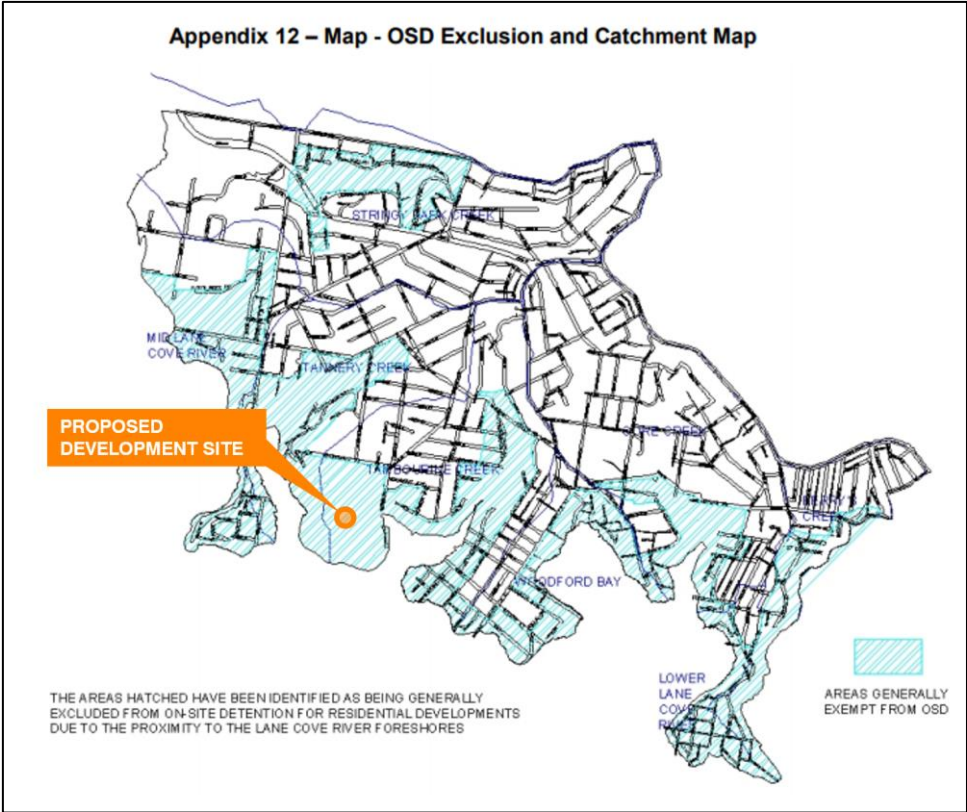


Figure 5 - OSD Exemption Areas (Source: LCC DCP, 2010)

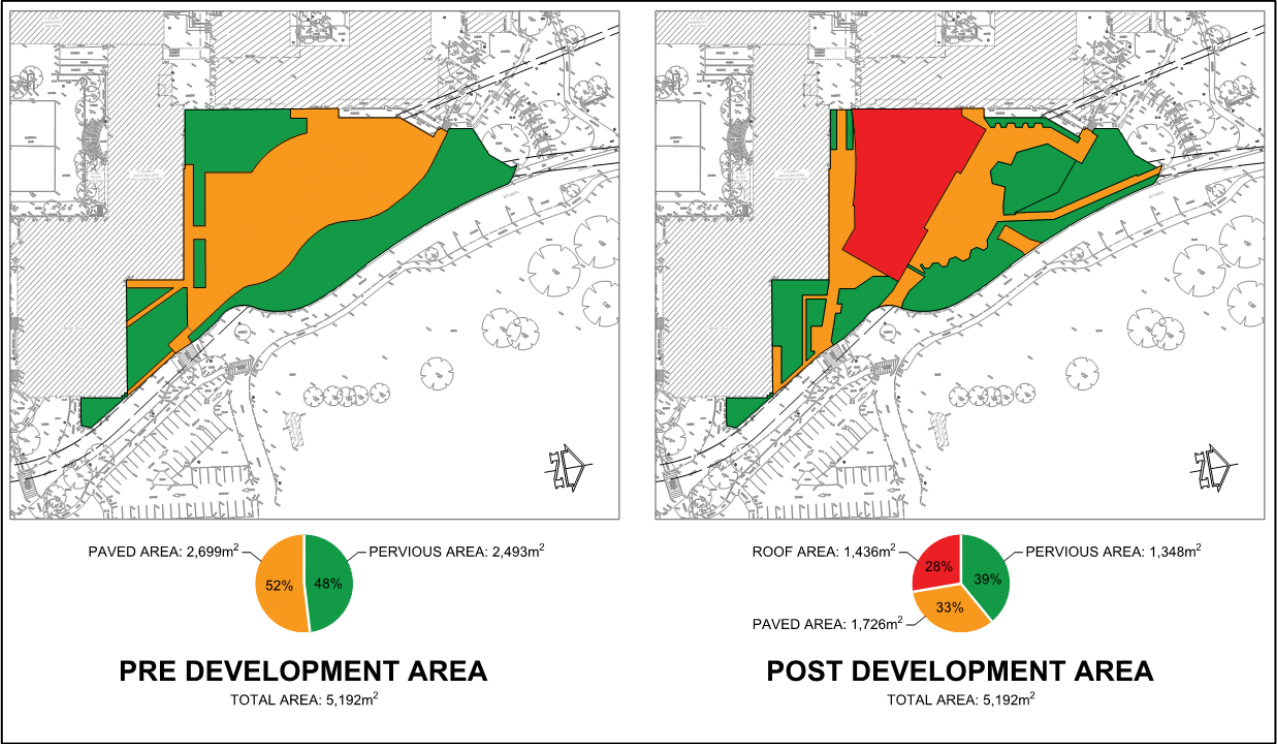


Figure 6 - Comparison of Pre and Post Development Catchment Areas

3.4 Stormwater Quality

As a requirement stated in Lane Cove Council DCP Part O, a gross pollutant trap (GPT) is to be installed downstream on the development site. One existing GPT is currently located north of the development site adjacent to the pavilion structure and will be utilised to filter surface runoff collected from the road pavement and external areas of the development site. An additional GPT will be positioned alongside Loyola Drive at the connection point into the existing 375mm diameter pipe which will filter additional external area runoff and roof water. A suitable proprietary GPT product would be the Ocean Protect OceanSave OS1515 which has the following treatment specifications:

	OceanSave OS1515	Post Development Flows at GPT location
Treatable Flow Rate	290 L/s	247 L/s (1 in 1 year storm event)
Maximum Total Flow Rate	690 L/s	605 L/s (1 in 100 year storm event)

The selected GPT unit will be able to capture all litter, debris and sediment particles greater than 5mm in size. A submerged outlet also allows for grease and oil to remain trapped in the GPT. Where possible in the external catchment areas, surface drainage will be conveyed by grassed swales - this method increases infiltration in pervious areas, reduces runoff entering the roadway and assists in filtering sediment.

3.4.2 Gross Pollutant Traps

GPT's are installed to remove contaminants such as sediment, oil and other pollutants from the stormwater before it discharges into the receiving system.

GPT's must be installed for the following developments:

- Residential developments with more than six dwellings.
- All Commercial Developments that may involve the use, storage or transportation of contaminants.
- Commercial developments on allotments greater than 5,000m².
- All industrial developments.

Figure 7 - Requirements for Gross Pollutant Traps (Source: LCC DCP, 2010)

3.5 DRAINS Modelling

Roof and surface run-off have been modelled using DRAINS modelling software. Blockage factors have been applied as specified in Lane Cove Council DCP Part O.

9.1.3 Pit Inlet Capacities	
The inlet capacity of on grade and sag inlet pits shall be determined using equations given in Australian Rainfall & Runoff. Allowances shall be made for blockage in accordance with the following table.	
Inlet Type	% Capacity Blockage
Side Entry	10%
Grated	+30%
Combination	100% Side Inlet Capacity only
Letterbox	50%

Figure 8 - Blockage Factors (Source: LCC DCP, 2010)

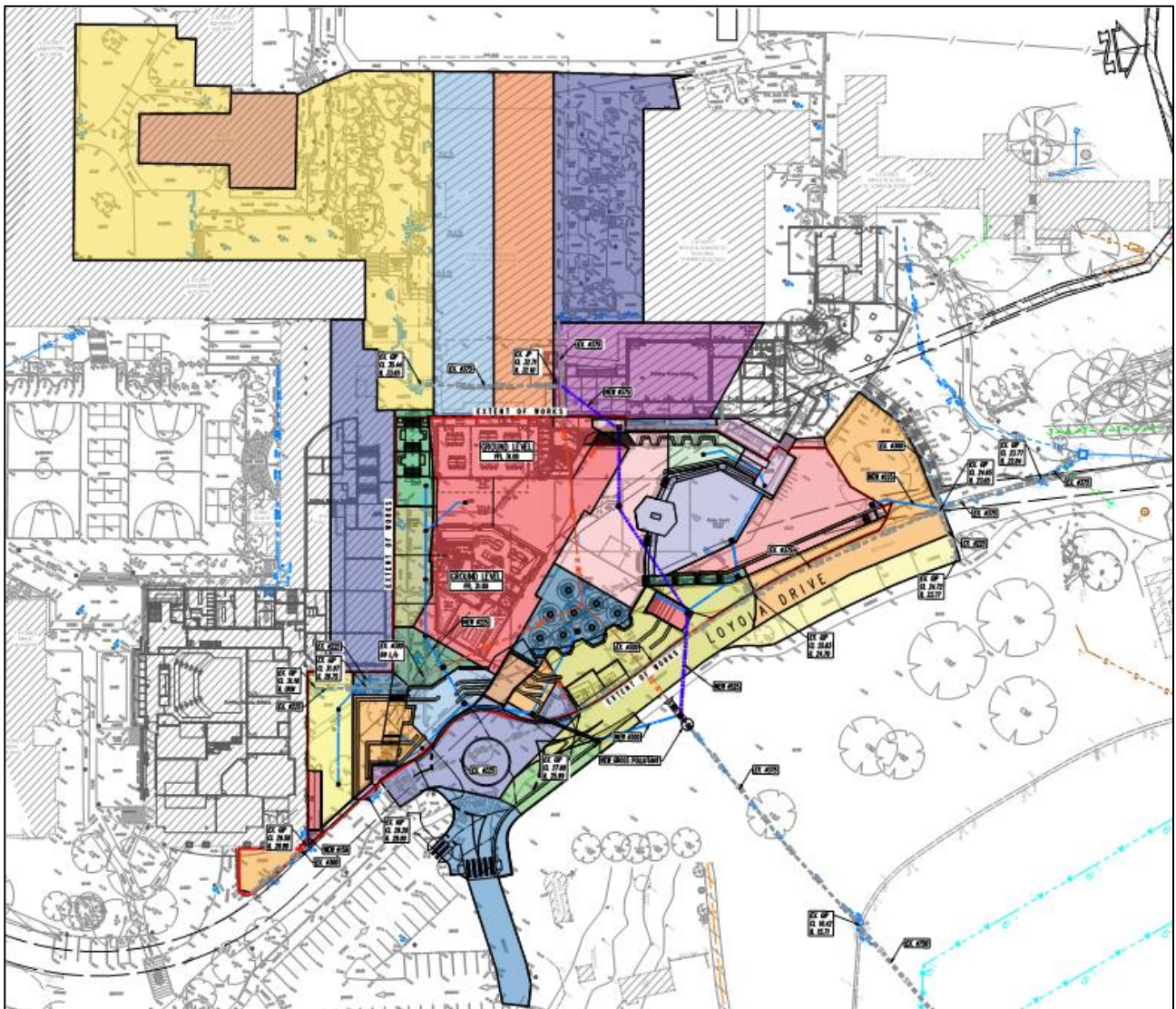


Figure 9 - Plan of Contributing Sub-catchments for DRAINS modelling

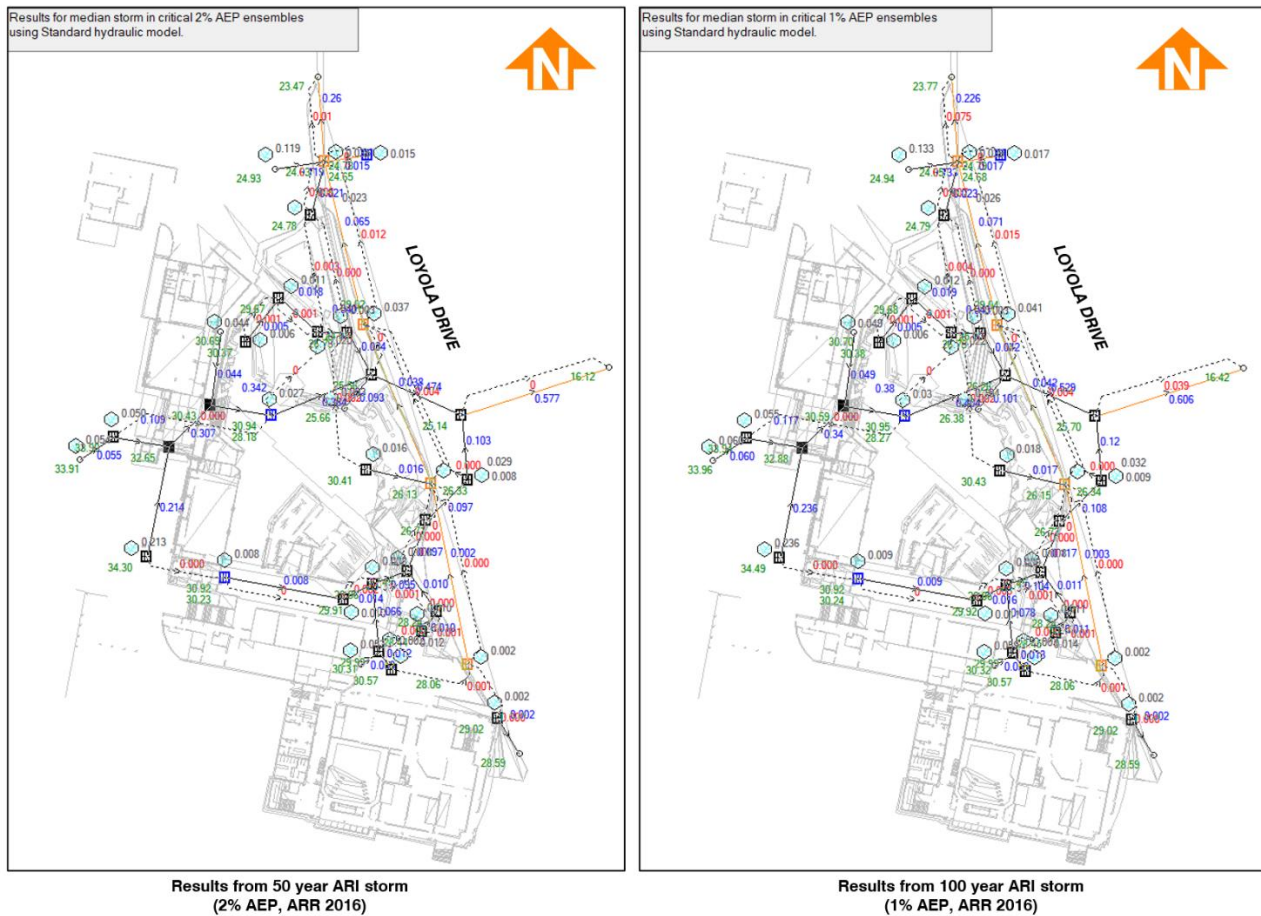


Figure 10 - Results from DRAINS modelling

Results from the DRAINS model demonstrates for the 50 year ARI storm stormwater runoff is fully conveyed by the in-ground system without upwelling. Results for the 100 year storm shows that any surcharging stormwater is safely conveyed via overland flow path towards Tamborine Bay.

4.0 Flooding

The purpose of this section is to address the following items relating to SEARs Condition 17 - Flooding;

- Identify flood risk on-site (detailing the most recent flood studies for the project area) and consideration of any relevant provisions of the NSW Floodplain Development Manual (2005), including the potential effects of climate change, sea level rise and an increase in rainfall intensity. If there is a material flood risk, include design solutions for mitigation.

There is no risk of flooding due to the high elevation of the development site above the Lane Cove River. Lane Cove Council LEP does not identify the project site falling within any flood planning area. As such no additional flood planning controls or mitigation measures will be implemented for the proposed development. This has also been confirmed directly with Lane Cove Council's stormwater development engineer.

Design considerations have been made for any existing overland flow paths to ensure there is no significant water ingress or erosion damage through the development site. As outlined in Lane Cove Council DCP Part O Section 10.5 a minimum of 150mm freeboard will be provided between finished floor levels and adjacent finished surfaces. A minimum of 150mm freeboard will also be provided at the basement loading dock entry and exit ramps to limit the ingress of stormwater runoff into the basement.

5.0 Sediment and Erosion Control

The purpose of this section is to address the following items relating to SEARs Condition 19 - Sediment, Erosion and Dust Controls:

- Detail measures and procedures to minimise and manage the generation and off-site transmission of sediment, dust and fine particles.

5.1 Strategies

Refer to Sediment and Erosion Control Plan in Appendix A. The proposed sedimentation and erosion control measures to manage runoff and ensure no detriment to the receiving environments have been divided into temporary and permanent strategies as summarised below.

STRATEGY	DESCRIPTION
Temporary	<p>Temporary strategies generally refer to the control of sediment erosion and water pollution during the construction phase. The primary risks occur when soil is excavated and exposed to the elements during construction works. It is at this stage that suspended solids and other construction activity associated pollutants can be washed into the receiving stormwater network and subsequently the downstream waterways.</p> <p>The strategies that are implemented to prevent potential soil degradation and pollution of waterways include the adequate provision of sedimentation and erosion control measures. Generally the measures outlined in this report form a minimum basis that should be considered and further documented by the contractor prior to commencement of the works through a Soil and Water Management Plan (SWMP).</p> <p>The temporary controls that are proposed in the concept plans by TTW will limit the displacement of sediment caused by runoff from disturbed areas, and are designed to remove sediment prior to discharging from site.</p>
Permanent	For the permanent water quantity and quality measures refer to Section 3 of this report.

5.2 Installation of Measures

The measures are to be installed as per the requirements outlined below:

- Clearly visible barrier, site fencing and hoarding shall be installed at the discretion of the Superintendent to ensure site security, safety of the public, manage traffic control and prohibit any unnecessary site disturbance. Vehicular access to the site shall be limited to only what is essential for the construction activities and shall enter the site only through the stabilised access points.
- All disturbed areas are to be stabilised within 14 working days of the completion of earthworks. All disturbed areas are to be protected so that the land is permanently stabilised within six months.
- Proprietary silt fencing shall be installed by the Contractor in accordance with the final approved Sedimentation and Erosion Control Plan and elsewhere at the discretion of the site superintendent to contain sedimentation to as near as possible to the original source.
- Sediment removed from any sediment trapping device shall be relocated where further pollution to downslope lands and waterways cannot occur.
- Stockpiles shall be located by the Contractor in accordance with the final approved Sedimentation and Erosion Control Plan and elsewhere at the discretion of the Project Manager and/or Superintendent. Where stockpiles are to be in place longer than 30 days they shall be stabilised.
- Water shall be prevented from entering the permanent drainage system unless it is sediment free. Drainage pits are to be protected in accordance with the final approved Sediment and Erosion Control Plan.
- Temporary sediment traps located at pits shall be retained throughout the early works stage and until the appropriate replacement measures for the subsequent stages are installed.

5.3 Land Disturbance

Where practicable, the soil erosion hazard shall be kept as low as possible. Limitations to access are to be in accordance with the following table:

Land Use	Limitation
Access areas	Access is to be limited to the designated work zones via the stabilised site access.
Truck cleaning areas	Any truck exiting out of the site shall be thoroughly cleaned and limit the exportation of soil and sediment on public roads.
Remaining undisturbed areas.	Access to any undisturbed areas and remaining lands is only permitted with permission from the Project Manager and/or Superintendent.

- Any spilled material shall be immediately removed from areas subject to runoff or concentrated flow;
- Trapped sediment shall be removed where the capacity of the sedimentation trapping device falls below 60%;
- Sedimentation traps are to be inspected after each rainfall event and/or weekly to;
 - Ensure that all sediment is removed once the sediment storage zone is full;
 - Ensure that outlet and emergency spillway works are maintained in a fully operational condition at all times;
 - Ensure rehabilitated lands have effectively reduced the erosion hazard and initiate upgrading or repair as appropriate;
- Additional erosion or sediment control works may be required to be constructed as appropriate to ensure the protection of downslope lands and waterways;
- Erosion and sediment control measures are to be maintained in a fully functioning condition at all times until the site is rehabilitated or secondary stage measures are installed;
- Revegetation schemes are to be adhered to and that any grass coverings are kept healthy, including watering and mowing;
- The removal of the temporary soil conservation and sedimentation control structures is to be the last activity in the rehabilitation program.
-

5.4 Air Quality and Dust Management

Prior to construction, the Contractor shall prepare a Construction Environmental Management Plan (CEMP), which will include a section on Air Quality and/or Dust Management). The CEMP will include but not be limited to:

- Plant and equipment emissions shall be as per the relevant regulations and standards;
- Areas of exposed soil shall be minimised and long term stockpiles shall be stabilized with vegetation or covered;
- A water cart shall be available at all times for surface spraying exposed soil surfaces to reduce dust generation;
- The site compound and haul roads are to be covered with gravel or kept moist (by spraying with water cart) to reduce dust generation;
- Materials transported in open trucks shall be covered to prevent possible dust generation;
- Tailgates of all vehicles transporting soil materials to and from the construction site shall be securely fixed so as to prevent soil spilling which in turn could generate dust;
- The burning of materials is not permitted on site at any time

6.0 Conclusion

To summarise the findings of this civil report, stormwater for the redevelopment can be managed in accordance with Council requirements. The proposed development poses no adverse flooding impacts to downstream developments. The implementation of an additional gross pollutant trap will reduce the amount of common pollutants entering Council's receiving stormwater system. Any risk of flooding or water ingress into the building entry points has been minimised through suitable overland flow path design in accordance with Council requirements. Sedimentation and erosion can be mitigated during the construction and operation of the development to reduce adverse impacts on the receiving Tambourine Bay and Lane Cove River environments.

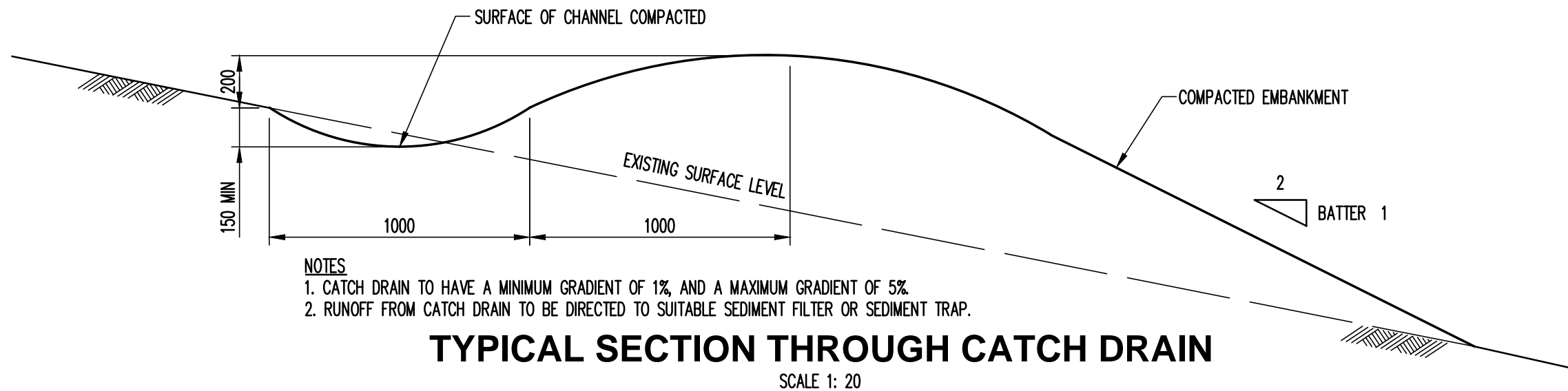
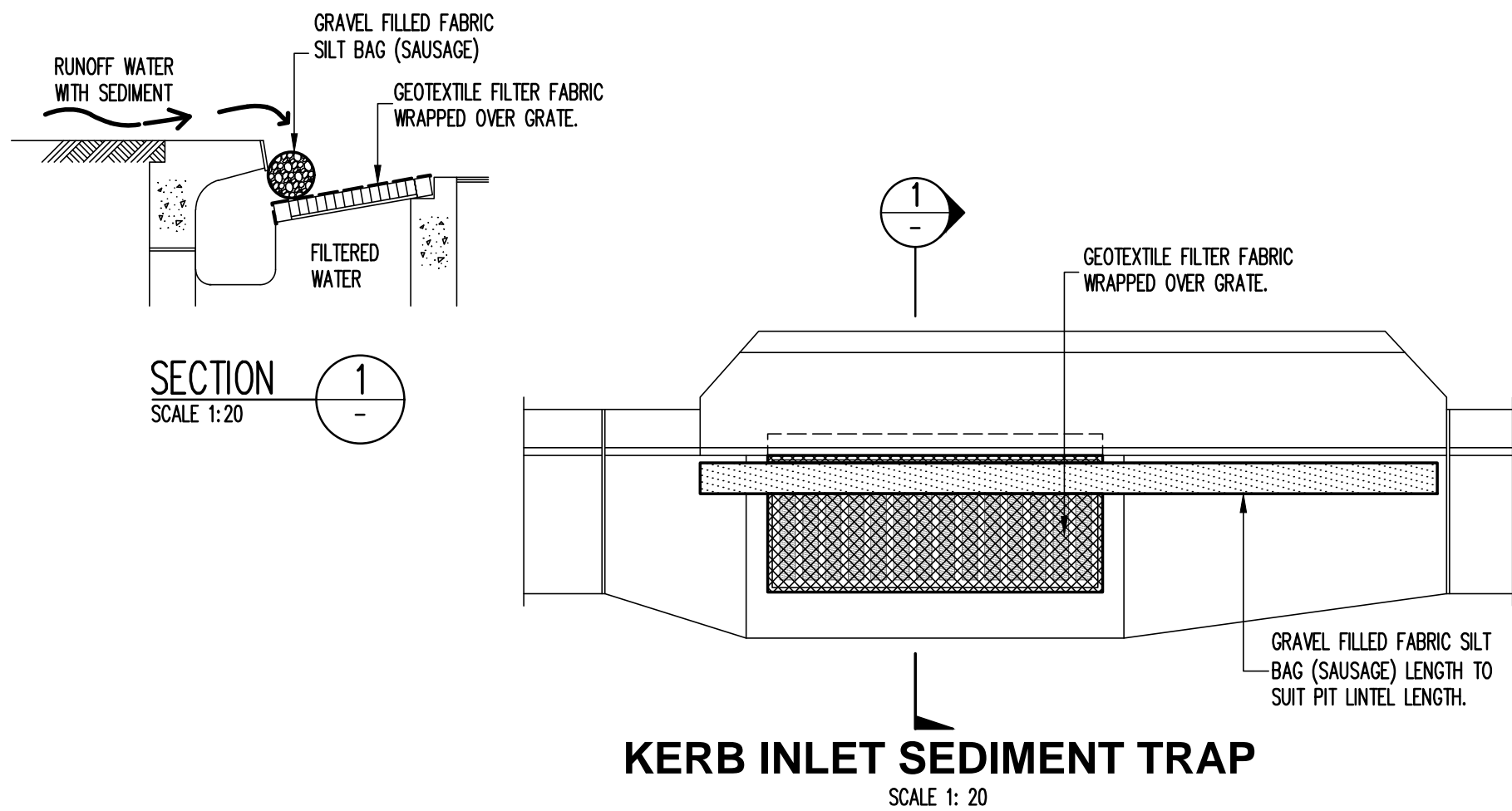
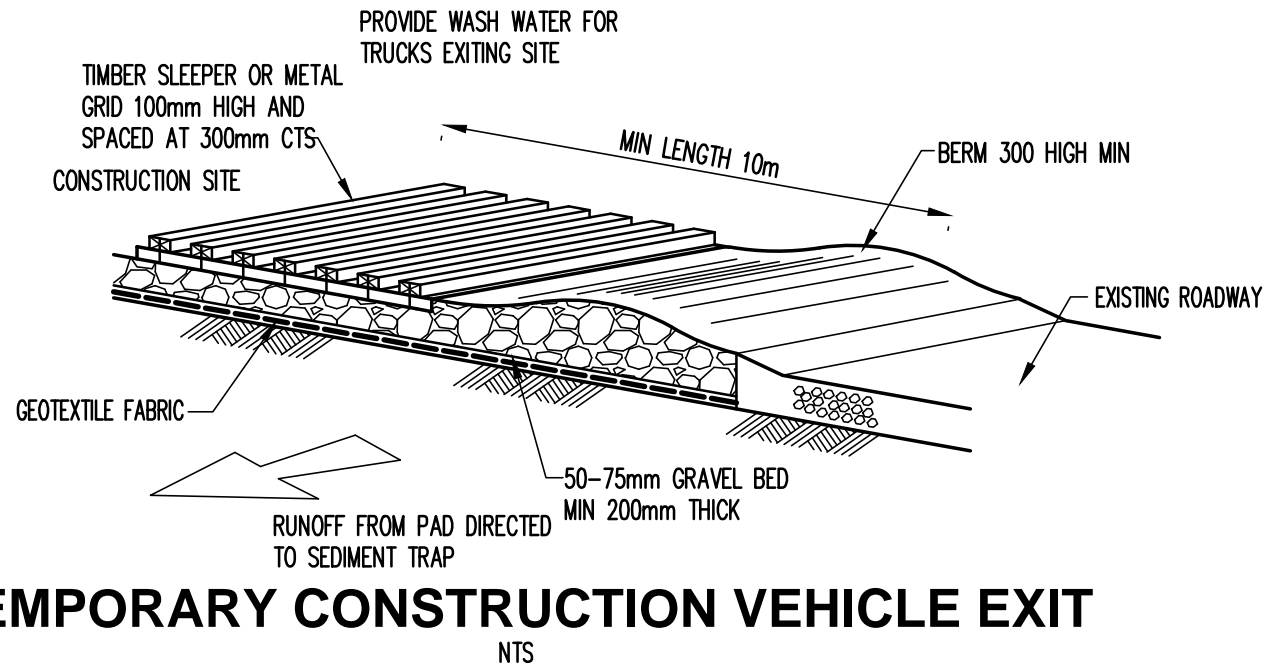
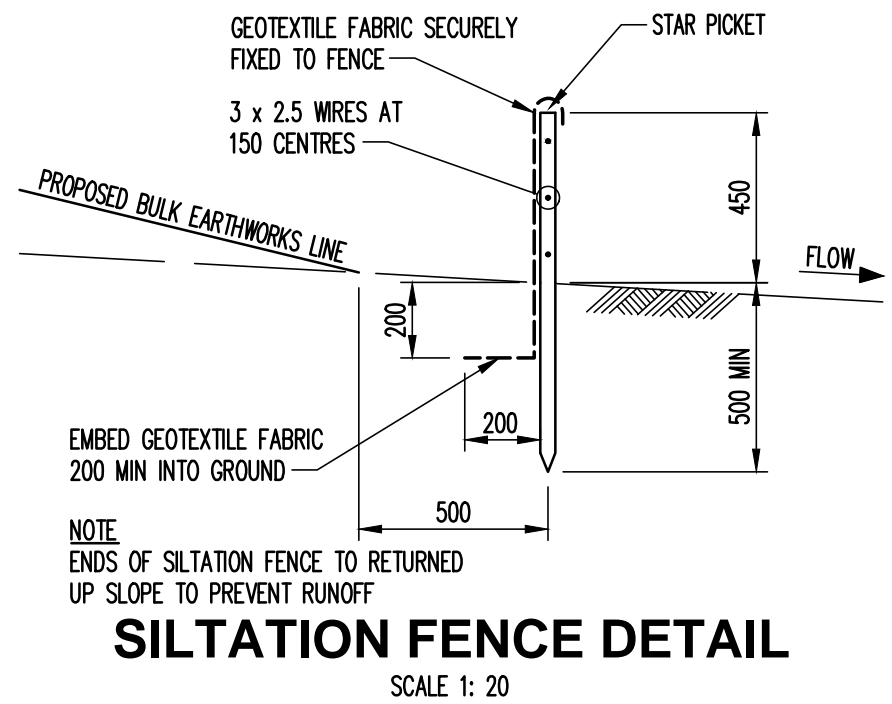
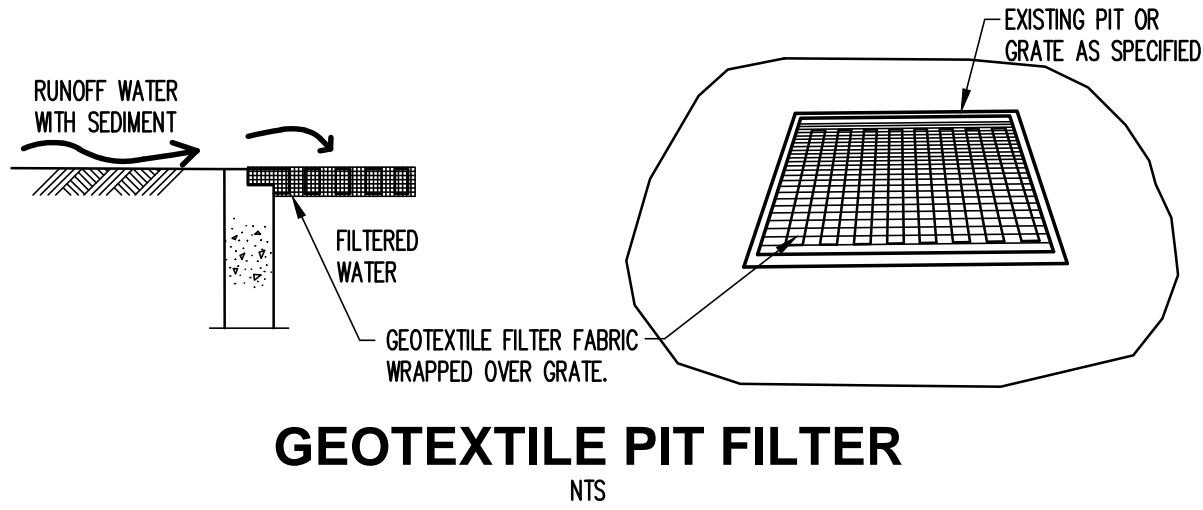
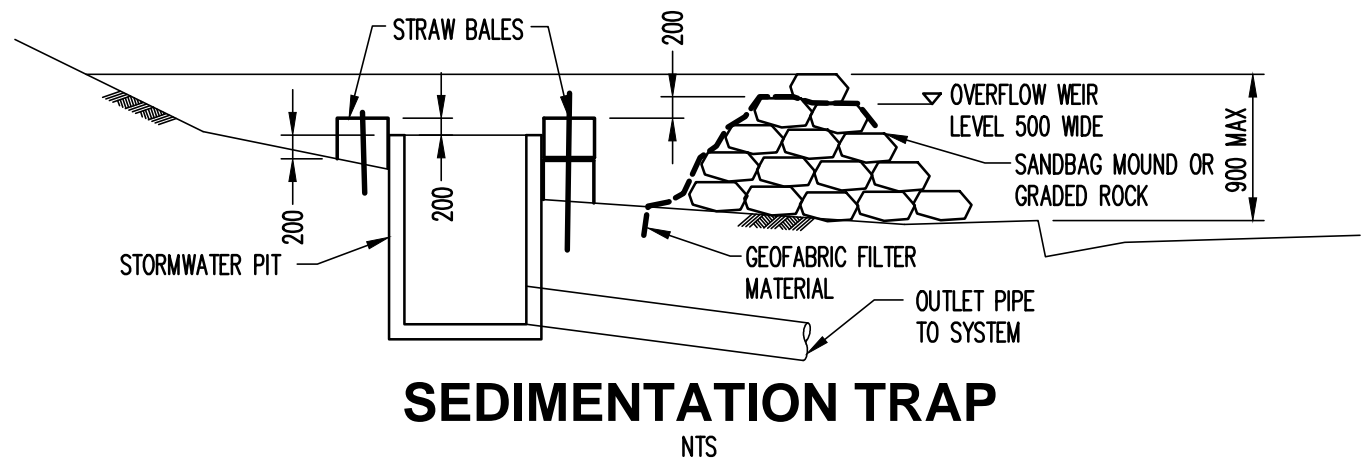
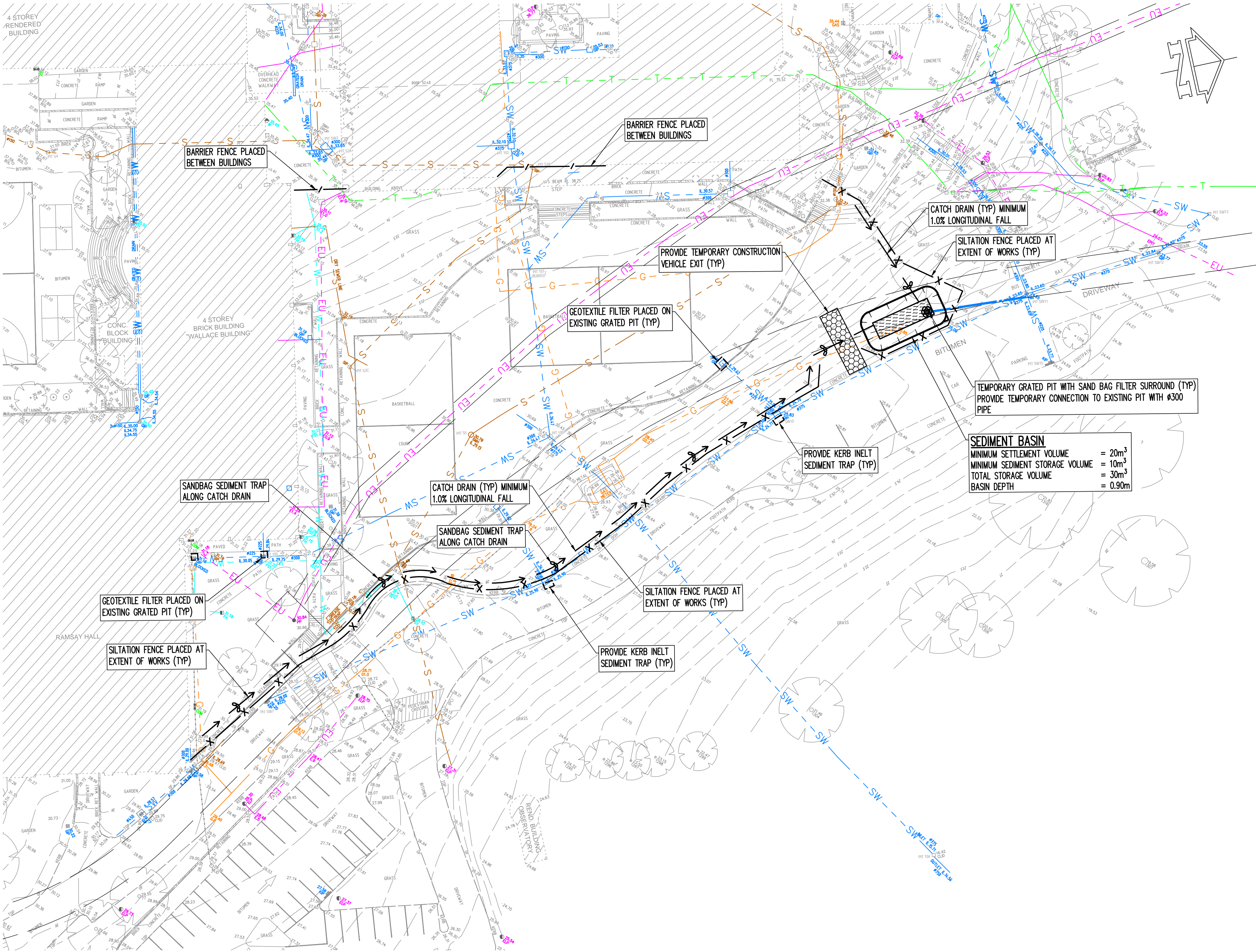
The findings in this report represent a SSDA level assessment based on current available information and correspondence undertaken at the time of writing. As more information on existing drainage infrastructure becomes available and design development continues, a more detailed assessment will be undertaken.

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Appendix A

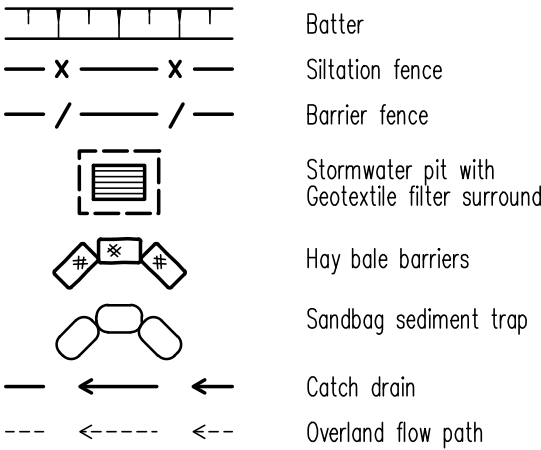
Civil Engineering Drawings

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EROSION AND SEDIMENT CONTROL LEGEND



EROSION AND SEDIMENT CONTROL NOTES

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

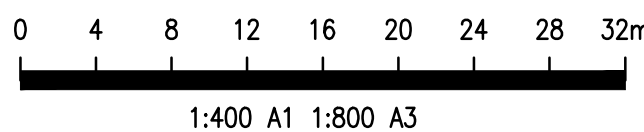
Sequence Of Works

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

WATER QUALITY TESTING REQUIREMENTS

Prior to discharge of site stormwater, groundwater and seepage water into council's stormwater system, contractors must undertake water quality tests in conjunction with a suitably qualified environment consultant outlining the following:

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



PRELIMINARY
NOT TO BE USED
FOR CONSTRUCTION

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Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date
P4	PRELIMINARY	DM	DM	15.10.20										
P3	DRAFT FOR APPROVAL	DM	DM	30.07.20										
P2	ISSUE FOR QS	DM	DM	08.07.20										
P1	PRELIMINARY	DM	DM	26.03.20										

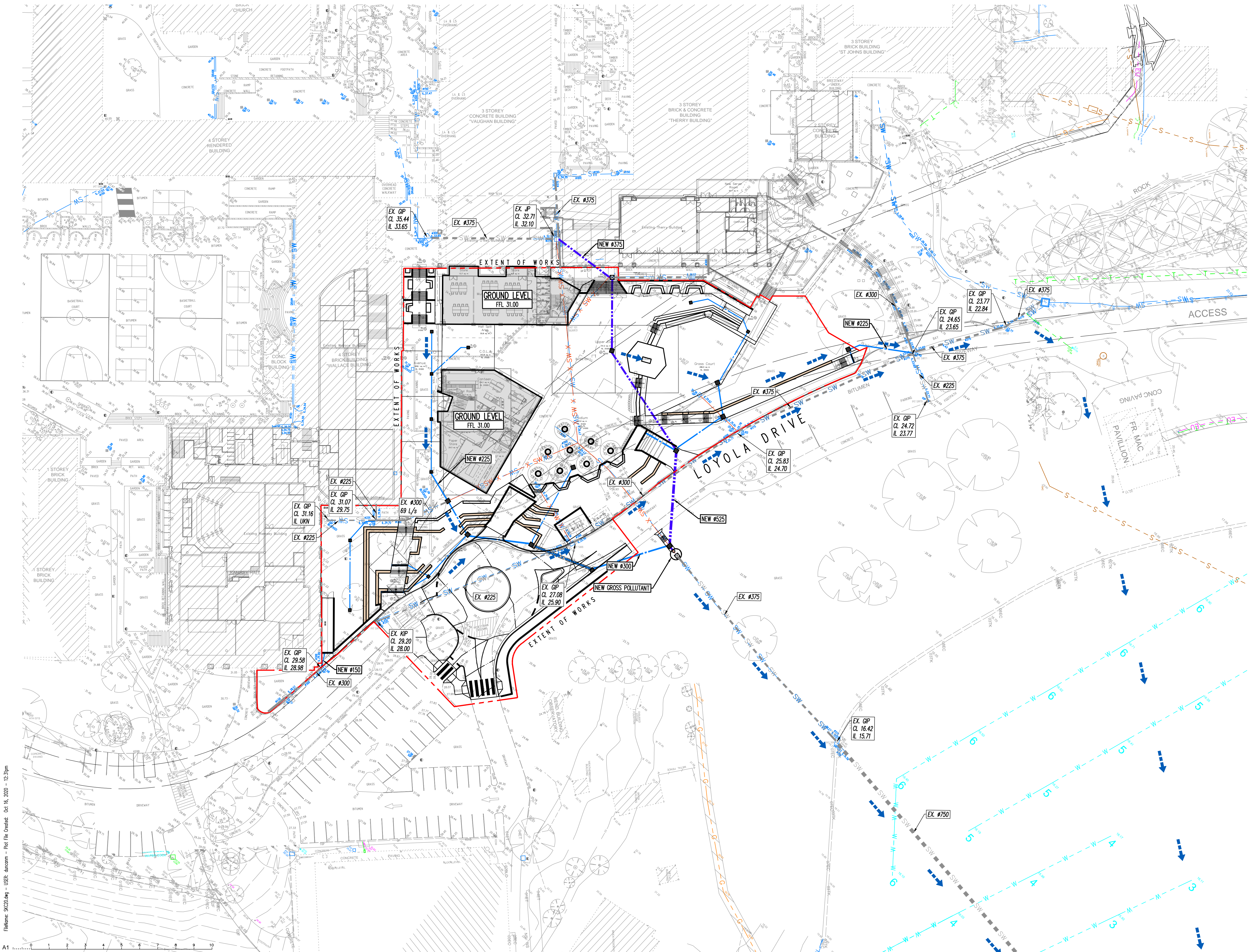
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NORTH SYDNEY, NSW 2060

Engineer
TTW **Structural Civil Traffic Façade**
612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Project
SAINT IGNATIUS' COLLEGE
RIVERVIEW - STAGE 2

Sheet Subject
CONCEPT SEDIMENT AND
EROSION CONTROL
SITE PLAN

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Revision
P4
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P3	ISSUE FOR INFORMATION	DM	DM	06.10.20					
P2	DRAFT FOR APPROVAL	DM	DM	30.07.20					
P1	PRELIMINARY	DM	DM	26.03.20					
Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date

Architect
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Project
SAINT IGNATIUS' COLLEGE
RIVERVIEW - STAGE 2

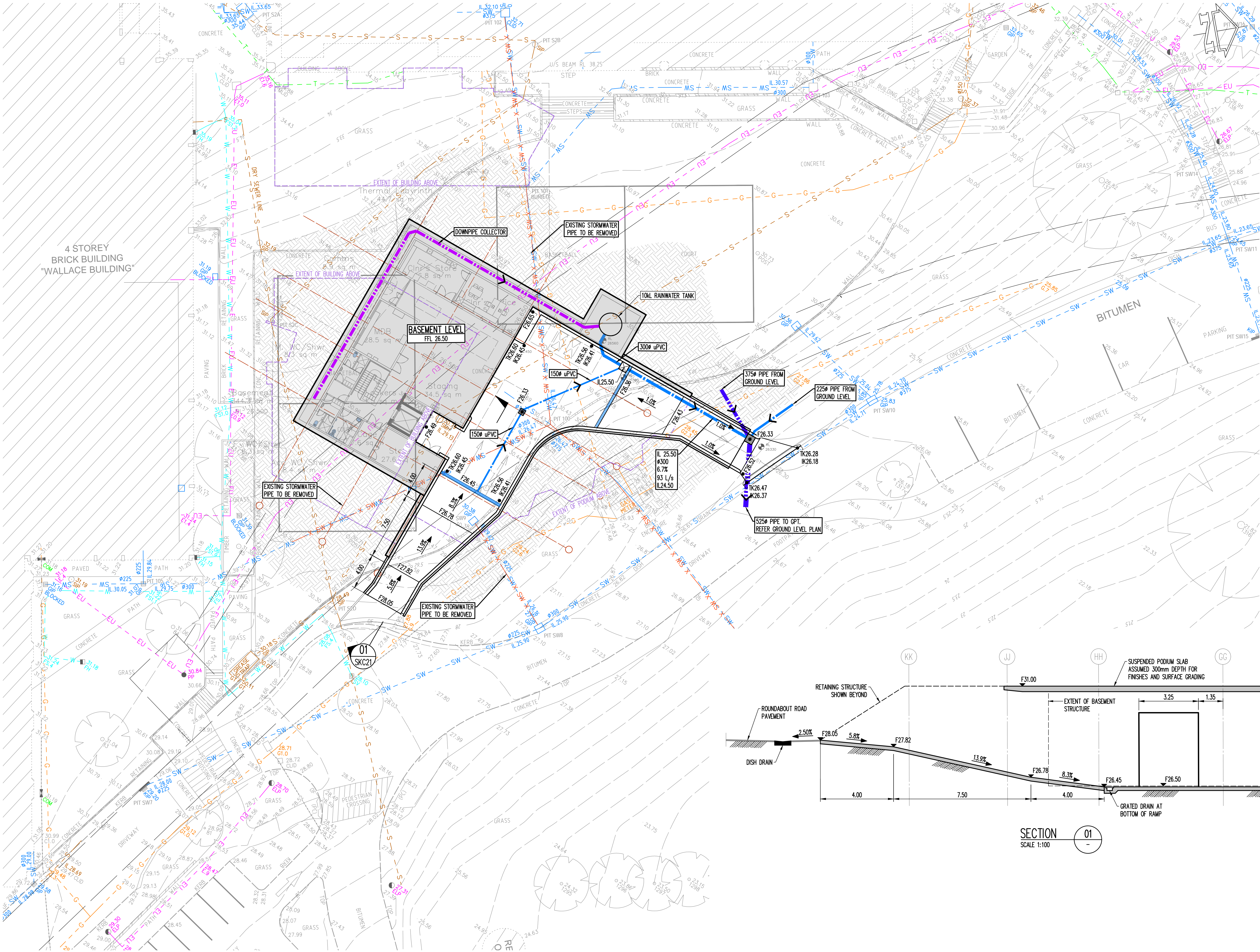
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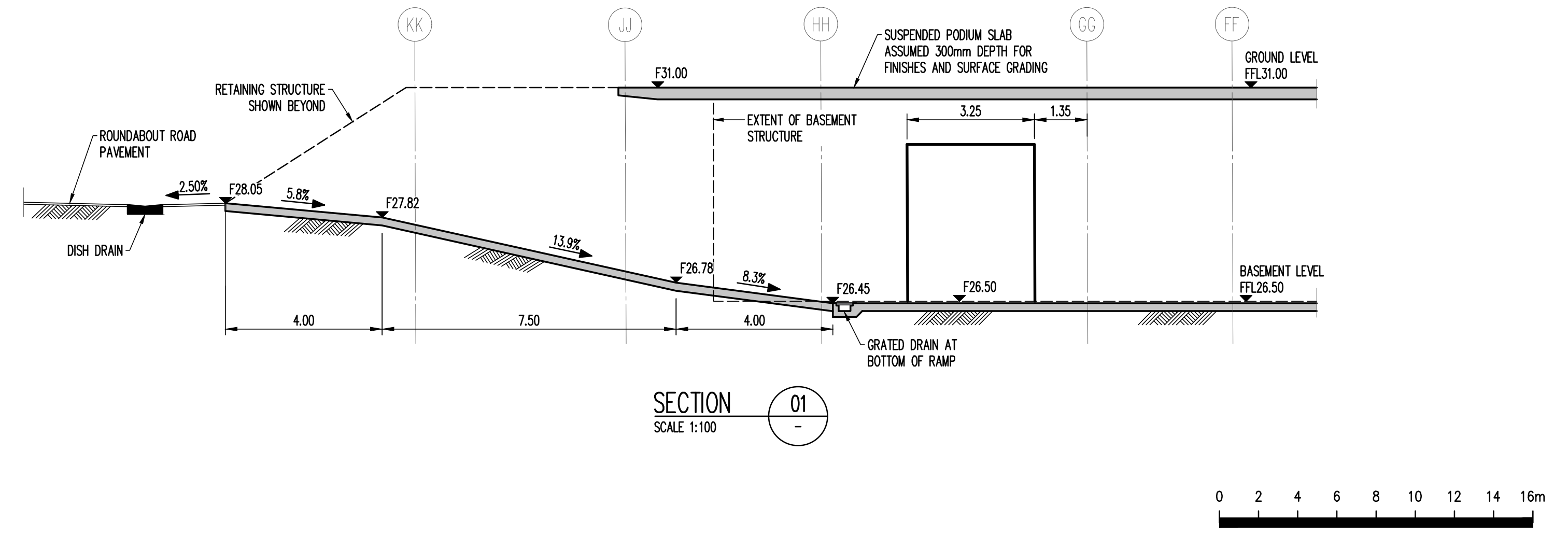
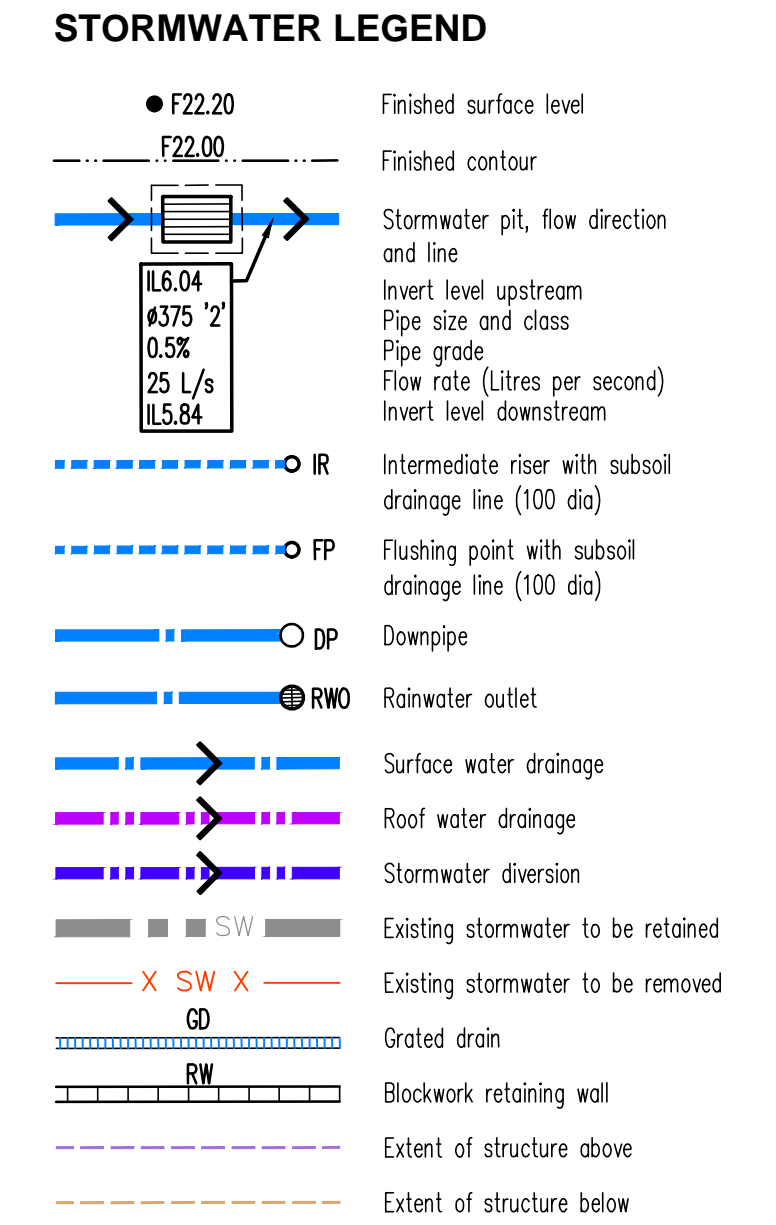
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NOT TO BE USED
FOR CONSTRUCTION

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Drawing No
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Revision
P5
Plot File Created: Oct 16, 2020 - 12:31pm

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A1	2	1	2	3	4	5	6	7	8	9	10
P6	DRAFT FOR APPROVAL	DM	DM	30.07.20							
P5	ISSUE FOR QS	DM	DM	13.07.20							
P4	ISSUE FOR QS	DM	DM	08.07.20	P10	PRELIMINARY			DM	DM	15.10.20
P3	PRELIMINARY	DM	DM	05.06.20	P9	FOR COORDINATION			DM	DM	14.10.20
P2	PRELIMINARY	DM	DM	26.03.20	P8	FOR INFORMATION ONLY			DM	DM	06.10.20
P1	PRELIMINARY	DM	DM	12.03.20	P7	FOR INFORMATION ONLY			DM	DM	29.09.20
Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date	Rev	Description

Architect
PMDL
17 / 124 WALKER STREET,
NORTH SYDNEY, NSW 2060

Engineer
TTW **Structural Civil Traffic Façade**
612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Project
**SAINT IGNATIUS' COLLEGE
RIVERVIEW - STAGE 2**

Sheet Subject
**CONCEPT STORMWATER
MANAGEMENT PLAN
BASEMENT LEVEL**

**PRELIMINARY
NOT TO BE USED
FOR CONSTRUCTION**

Scale : A1
1:200
Job No
191740
Plot File Created: Oct 15, 2020 - 6:35pm
Drawn
DM
Drawing No
SKC21
Revision
P10

● F22.20
F22.00

IL6.04
ø375 '2'
0.5%
25 L/s
IL5.84

○ IR

--- ○ FP

○ DP

⊕ RW

Surface water drainage

Rooftop water drainage

Stormwater diversion

Existing stormwater to be retained

Existing stormwater to be removed

Overland flow path

Grated drain

Blockwork retaining wall

Extent of structure above

Extent of structure below

Finished surface level

Finished contour

Stormwater pit, flow direction and line

Invert level upstream

Pipe size and class

Pipe grade

Pipe flow rate (Litres per second)

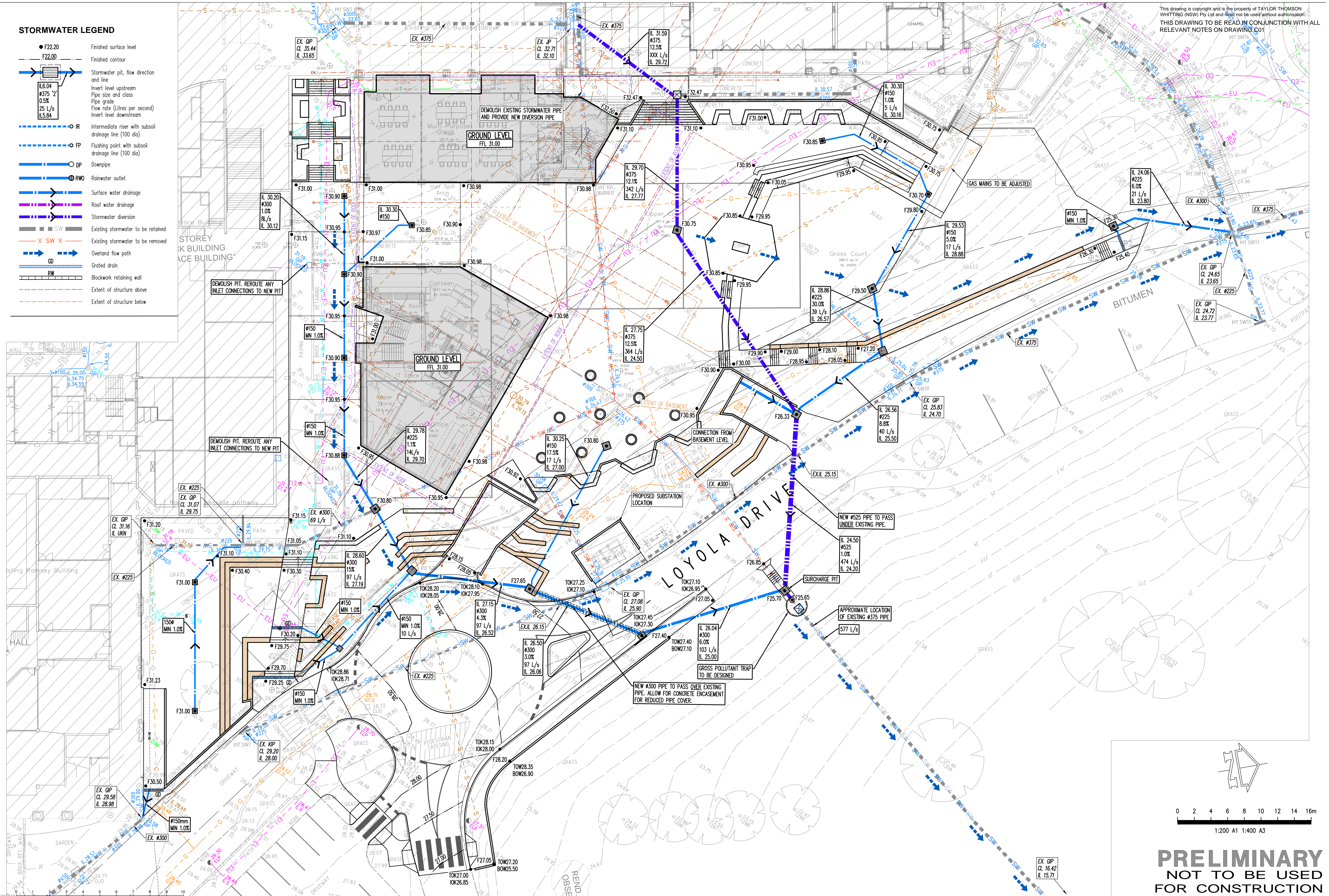
Invert level downstream

Intermediate riser with subsoil drainage line (100 dia)

Flushing point with subsoil drainage line (100 dia)

Downpipe

Rainwater outlet



PRELIMINARY
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[illegible]

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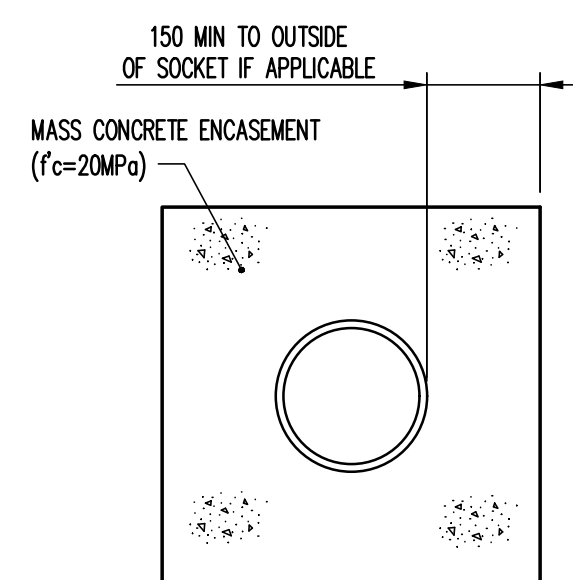
612 9439 7288 | 48 Chandos Street St Leonards NSW 2055

Project	SAINT IGNATIUS' COLLEGE RIVERVIEW - STAGE 2
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Sheet Subject

**CONCEPT STORMWATER
MANAGEMENT PLAN
GROUND LEVEL**

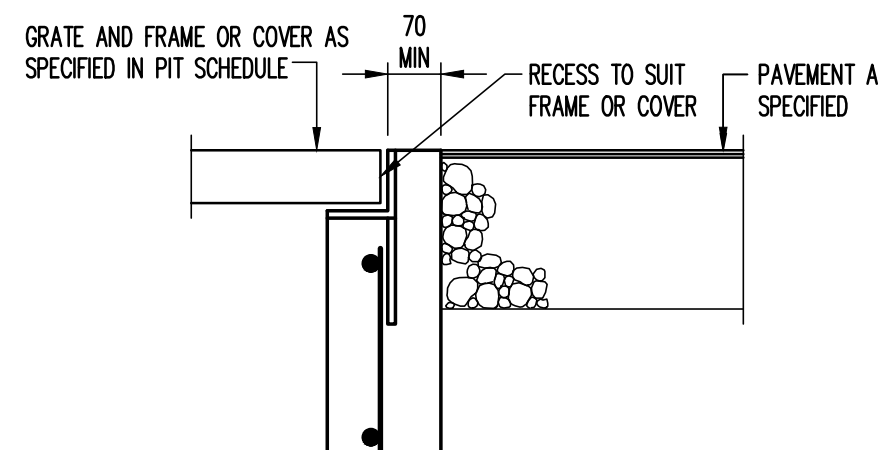
Scale : A1	Drawn	Authorised
1:200	DM	-
Job No	Drawing No	Revision
191740	SKC22	P10
Plot File Created: Oct 16, 2020 - 12:32pm		



CONCRETE ENCASEMENT DETAIL

PIT CORNER DETAILS

SCALE 1: 20

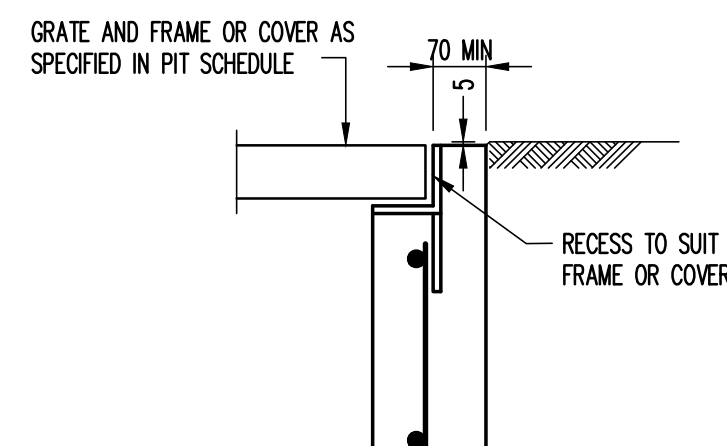


DETAIL D

SCALE 1: 10

DETAIL E

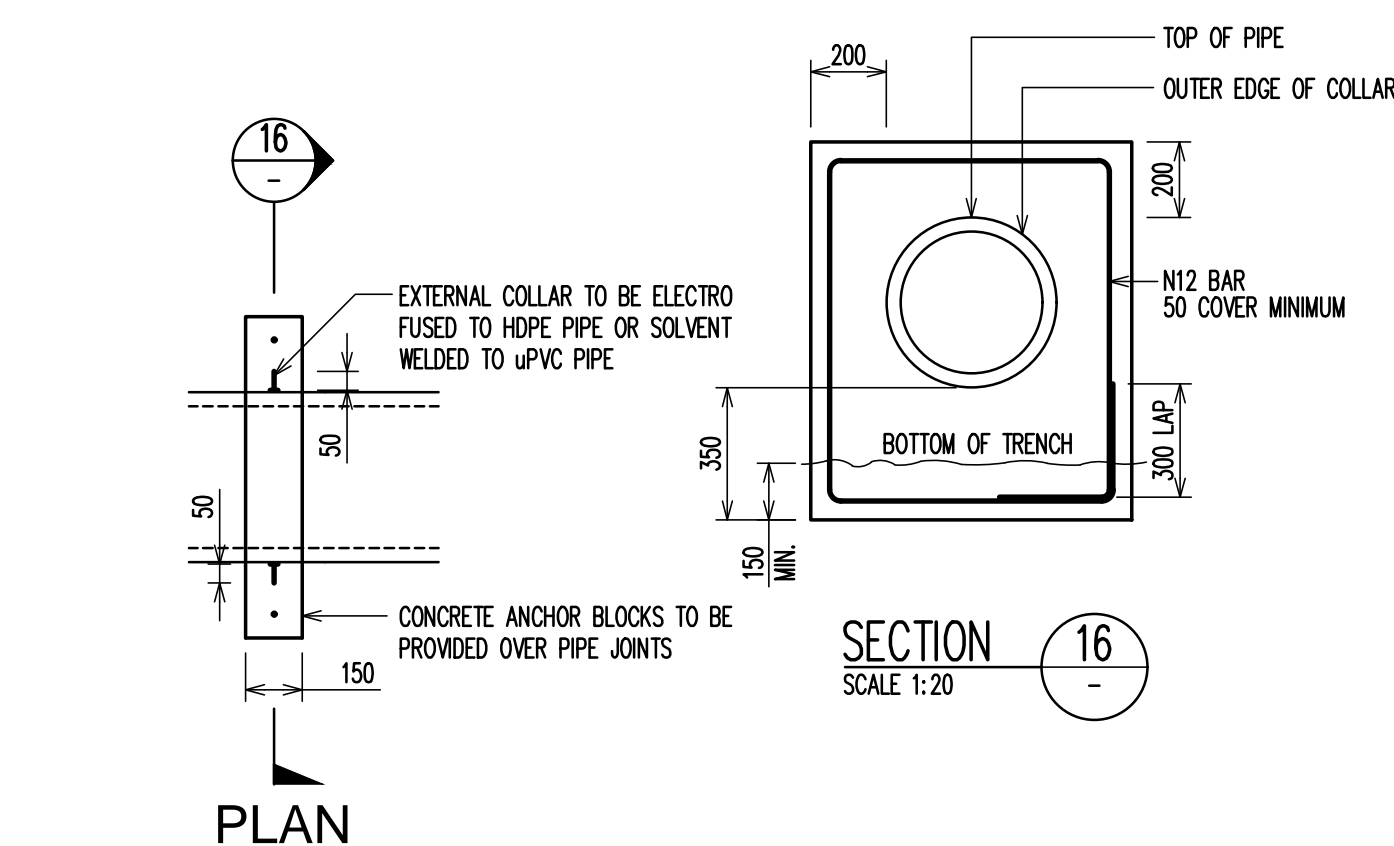
SCALE 1: 10



DETAIL F

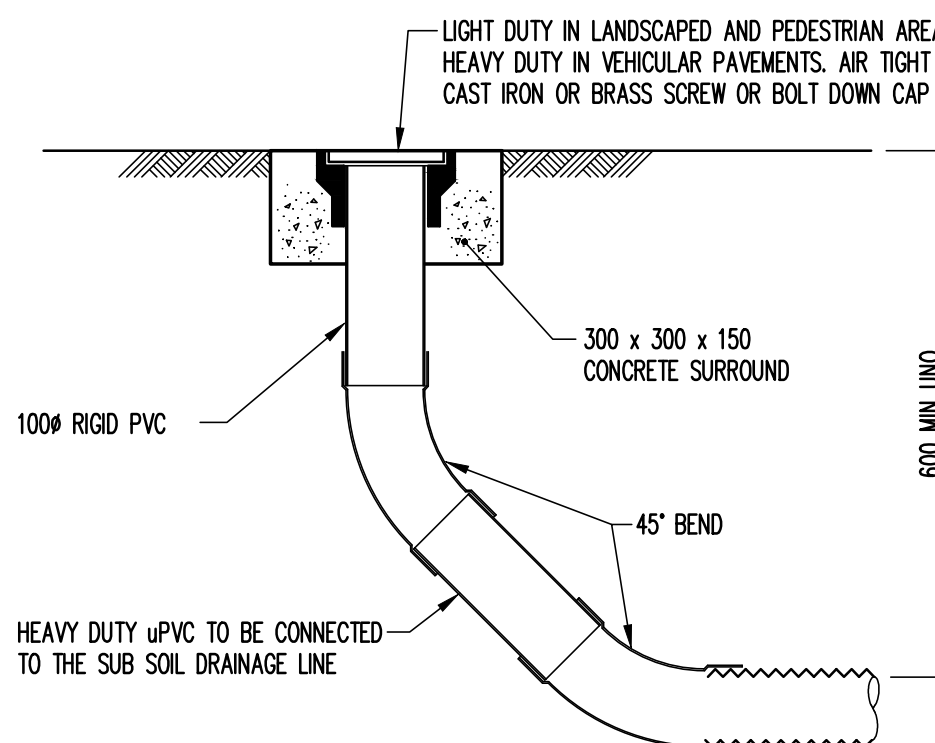
SCALE 1: 10

PIT TYPE A & B



ANCHOR BLOCK DETAIL

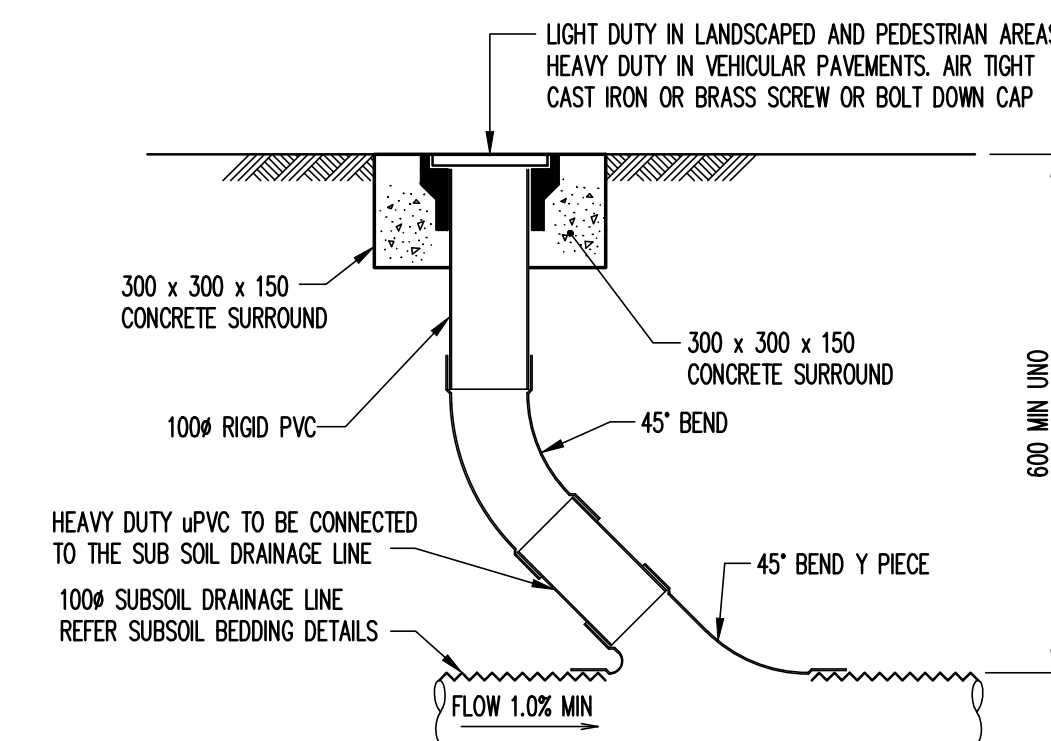
SCALE 1:20



FLUSHING POINT (FP)

SCALE 1: 10

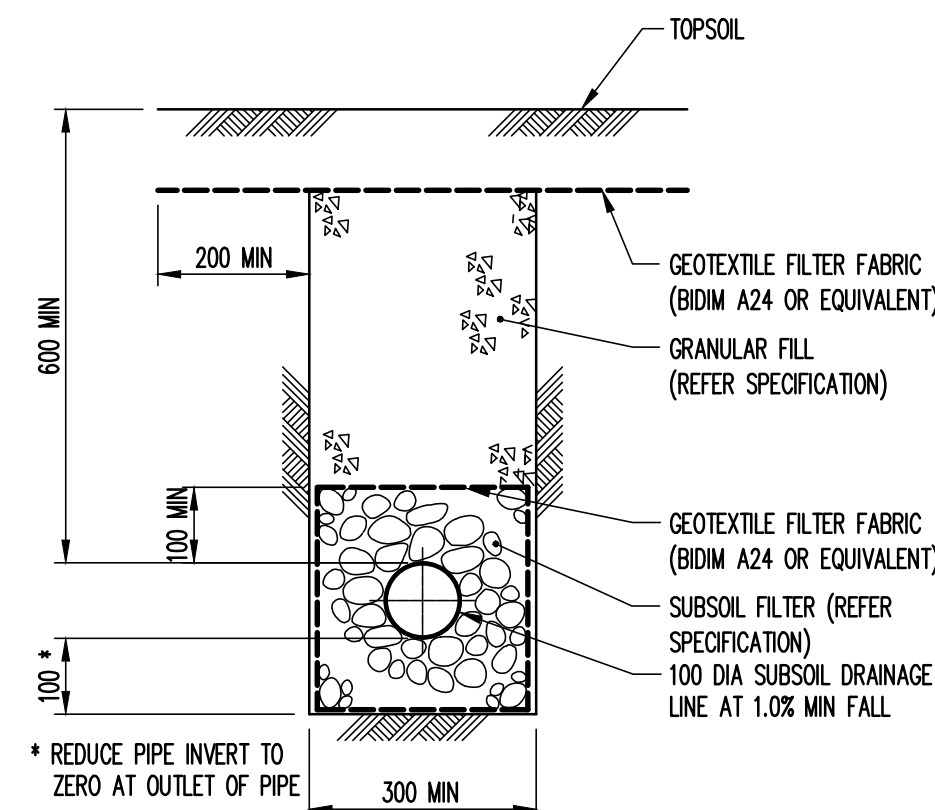
NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



INTERMEDIATE RISER (IR)

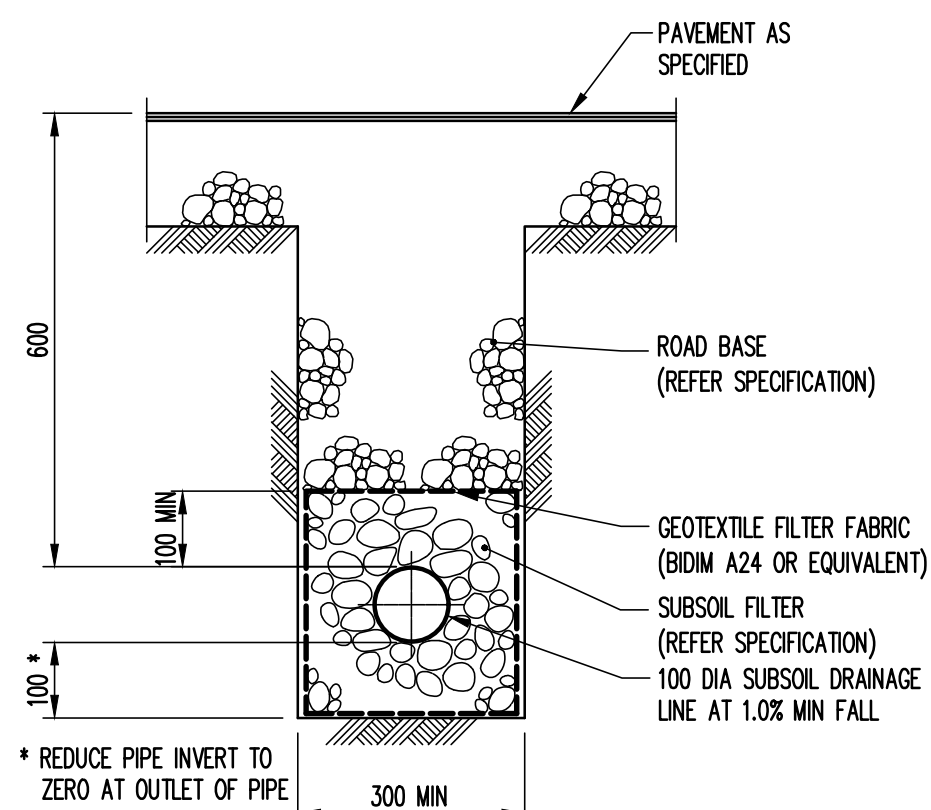
SCALE 1: 10

NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



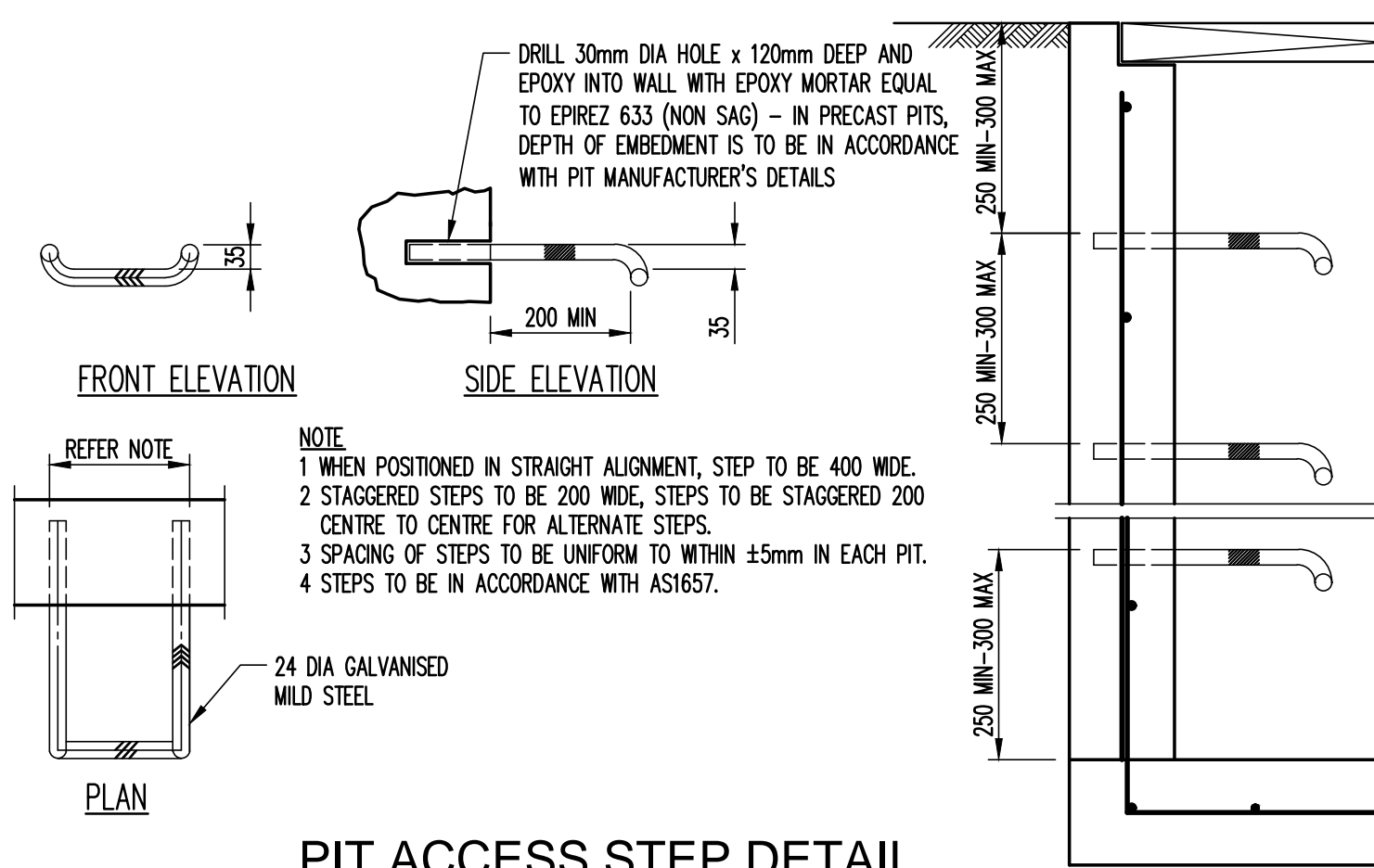
SUBSOIL IN LANDSCAPED AREAS

SCALE 1: 10



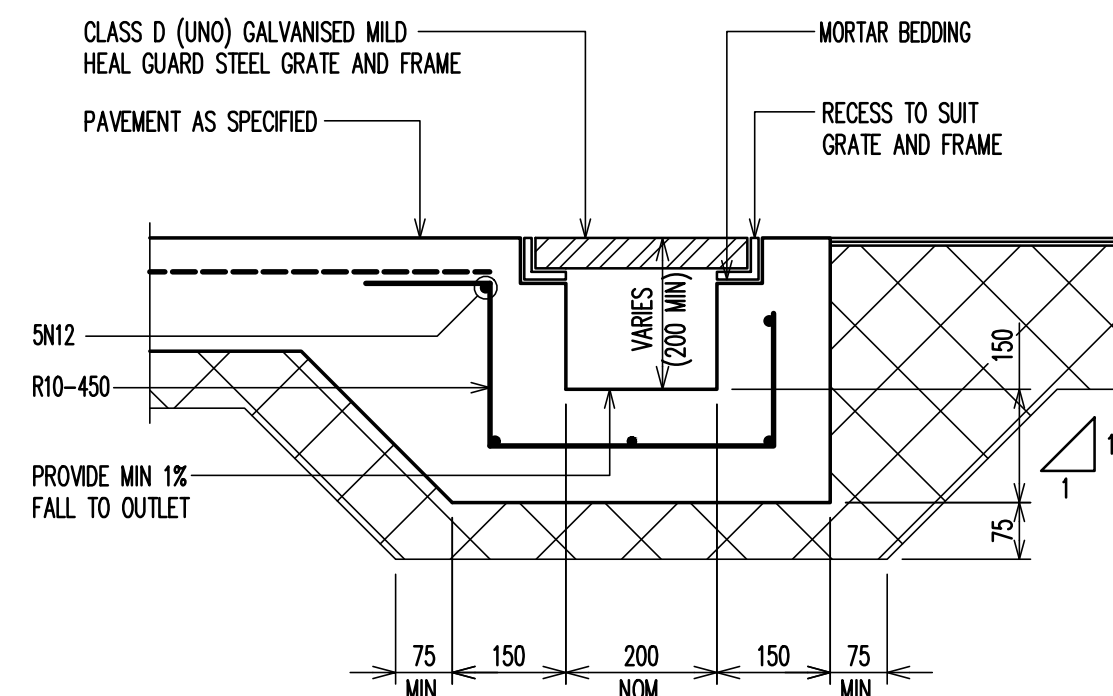
SUBSOIL IN PAVED AREAS

SCALE 1: 10



PIT ACCESS STEP DETAIL

SCALE 1: 10



GRATED DRAIN TYPE C (GDC)

SCALE 1:10

PRELIMINARY
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A1 0 1 2 3 4 5 6 7 8 9 10

P3	PRELIMINARY	DM	SH	15.10.20										
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Sheet Subject
DETAILS SHEET

Scale : A1	Drawn	Authorised
AS SHOWN	SH	-

Job No	Drawing No	Revision
191740	SKC50	P3

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