

Civil Engineering Report

Loreto Normanhurst Concept Plan and Stage 1

Prepared for Allen Jack and Cottier / 17 January 2019

181202 CAAA + CMWE

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1.0 Introduction

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 application is SSD by way of Clause 8 and 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.

Specifically, this application relates to a staged SSDA within the meaning of Section 4.12 of the EP&A Act, with this application being the Concept Proposal for a new site wide masterplan for the existing Loreto Normanhurst School at 91 – 93 Pennant Hills Road, Normanhurst. In addition, consent is also sought for the Stage 1 detailed design works for a new on campus student boarding facility, landscaping works, and some demolition works to the buildings between Mary Ward and existing dining room building and associated works to make good existing.

This report has been prepared having regard to the Secretary's Environmental Assessment Requirements issued for the project by DPE, ref no SEAR 8996 issued on 12 January 2018.

- **16. Drainage**

Detail drainage associated with the proposal, including stormwater and drainage infrastructure.

- **17. Flooding**

Assess any 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.

1.1 Background

1.1.1 Need for a Campus Masterplan

Loreto Normanhurst is an independent, Catholic day and boarding school for girls from Years 5 to 12. The existing school campus was established in 1897 and has evolved in an organic and ad-hoc manner across the span of a 120 years.

A new campus wide planning approach offers the opportunity to strategically review and plan for the campus' future in a sustainable and efficient manner such that the campus' unique aesthetic and ecological values are best preserved. The preparation of a campus wide masterplan is also consistent with the School's 'Loreto Normanhurst 2016 - 2020 Strategic Plan' which identified the need for a broader strategic plan to coordinate renewal and orderly development in a feasible and staged manner.

1.1.2 Early Learning Centre

A separate DA (D/1227/2018) has been submitted to Hornsby Shire Council on 23 November 2018 for an 80 place Early Learning Centre (ELC) building and the DA is currently under assessment. The ELC building is consistent with the overall concept masterplan, and was prepared concurrently with the final preferred campus masterplan. However, to meet the School's operational timeframe requirements for the ELC, a separate application was seen to be best pathway to allow the building to be built, fitout and operational by 2021.

1.2 Relevant Documents

The following documents have been reviewed in preparing this document:

- Hornsby Shire Council (HSC) Development Control Plan (DCP) 2013
- HSC Local Environment Plan (LEP) 2013
- HSC Development Design Specification 0074 – Stormwater Drainage July 2016
- Blue Book – Managing Urban Stormwater: Soils and Construction (Landcom NSW)

2.0 The Site

Loreto Normanhurst is located within the suburb of Normanhurst on Sydney's Upper North Shore approximately 3km south of Hornsby and 25km north of Sydney CBD. The school is located in the local government area of Hornsby Shire Council, approximately 750m south of the Normanhurst Railway Station. The locational context of the site is illustrated at Figure 2.1.

The site comprises the existing campus grounds of the Loreto Normanhurst school at 91 – 93 Pennant Hills Road, Normanhurst. The northern part of the site accommodates much of the school's existing built form, while the rear extent consists of the school's sporting fields, and a portion of largely undeveloped land covered in remnant vegetation.

The campus itself is bound by Pennant Hills Road (to the north), Osborn Road (to the west) and Mount Pleasant Avenue (to the east). Detached dwellings on individual residential lots abut the southern boundary of the site. An aerial photograph of the site is provided at

The site is located in Normanhurst within Hornsby Shire Council's Local Government Area. The site contains existing School buildings and falls to the south into an existing forested area in the south portion of the site. The location of the School is as shown in Figure 2.1.

The campus itself is bound by Pennant Hills Road (to the north), Osborn Road (to the west) and Mount Pleasant Avenue (to the east). Detached dwellings on individual residential lots abut the southern boundary of the site. An aerial photograph of the site is provided at Figure 2.2.

Figure 2.2 provides an aerial map of the site and its immediate surrounds.

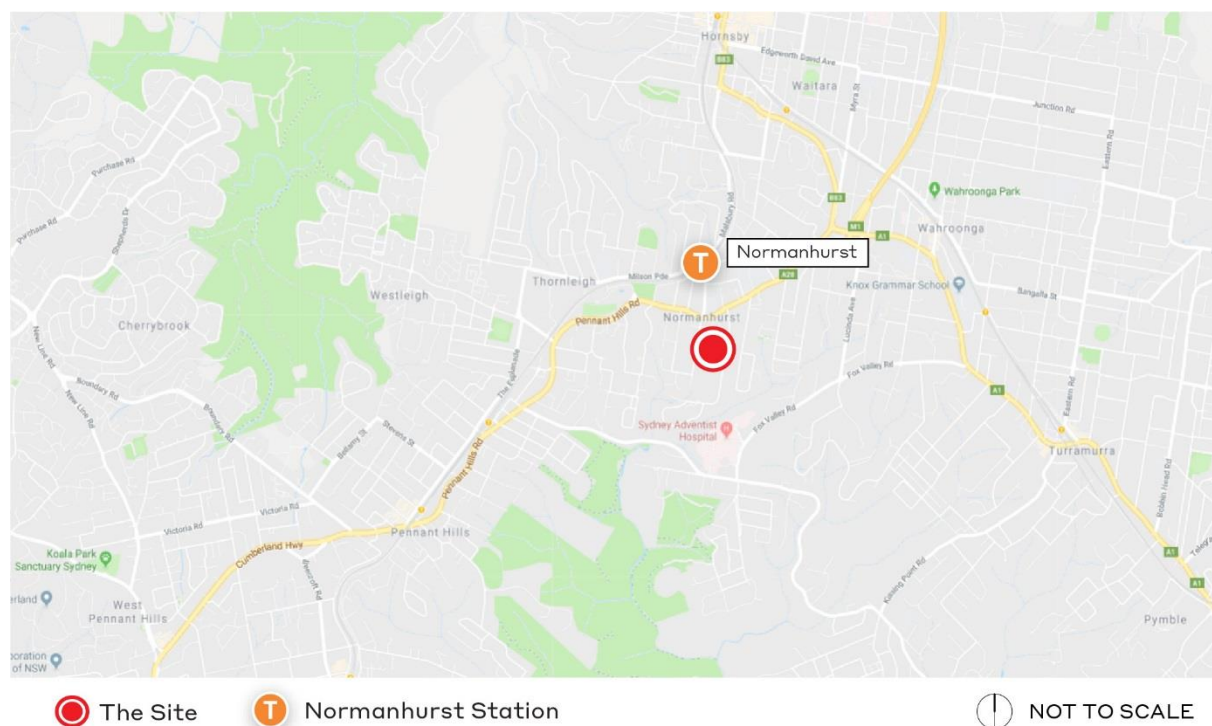


Figure 2.1: Loreto Normanhurst Campus Location Context Plan
Source: Ethos Urban



Figure 2.2: Aerial Map of the Loreto Normanhurst Campus
Source: AJ+C Architects

2.1 Legal Description and Ownership

The campus comprises several allotments, the legal descriptions of which are provided in Table 2.1 below. The existing campus has a site area of approximately 13.02ha. The site in its entirety is owned by the Trustees of the Loreto Property Association.

Table 2.1: Legal Description

Address	Lot	Plan
16 Mount Pleasant Avenue	Lot 5	DP 1218765
	Lot 16	DP 6612
30 – 62 Mount Pleasant Avenue	Lots 20 – 23 and 25 – 36	DP 6612
	Lot 1	DP 34834
91 – 93 Pennant Hills Road	Lot 1	DP 114580
	Lot 3	DP 1217496
	Lot 1 – Lot 3	DP 1218765
	Lot B	DP327538
24 – 28 Mount Pleasant Avenue	Lot 1	DP 809066
6 Mount Pleasant Avenue	Lot C	DP 366271
14 Mount Pleasant Avenue	Lot 4	DP1218765
89 Pennant Hills Road	Lot 1	DP136156

3.0 Overview of Proposed Development

This application sets out a new campus masterplan for the existing school campus that will guide and shape the development of the school campus for the next 30 years. This SSDA also includes detailed plans for the first stage of the concept proposal (Stage 1 works). Accordingly, consent is sought for the following:

- The concept masterplan, including:
 - Establishment of 10 new building envelopes across the site for education and ancillary uses including student accommodation;
 - Increase of the student number cap by 850 students from 1150 to 2000 students;
 - The open space and landscape design;
 - Pedestrian and circulation arrangements, and
 - Associated car parking provision.
- Detailed consent for Stage 1 works, being:
 - Construction of a new 3 to 6-storey boarding house to accommodate up to 216 boarders.
 - Excavation works to accommodate partially underground carpark and dock facilities within the proposed footprint of the new boarding house facility;
 - Demolition works to buildings between Mary Ward and existing dining room building and associated works to make good existing;
 - Landscaping works and removal and replacement of approximately 50 trees of varying significance; and
 - Augmentation of connection of services and utilities infrastructure.

4.0 Concept Design

4.1 Stormwater Quantity

In general, all new roof stormwater will be collected in roof gutters and downpipes and conveyed to the in-ground pipe system. Surface stormwater will be collected through site grading and collected in surface inlet pits. This in-ground stormwater will be connected to water quality treatment measures and onsite stormwater detention (OSD).

Proposed OSD will meet the requirements of Hornsby Shire Council's Development Control Plan (DCP) which requires OSD to ensure that the post-development peak flows up to and including the 1 in 20 year Average Recurrence Interval (ARI) do not exceed the maximum flow rate generated during a 1 in 5 year ARI storm event pre-development.

4.2 Stormwater Quality

Hornsby Shire Council's DCP requires that developments meet the following stormwater quality targets:

- 90% reduction in the post development mean annual load of total gross pollutants.
- 80% reduction in the post development mean annual load of total suspended solids.
- 60% reduction in the post development mean annual load of total phosphorus.
- 45% reduction in the post development mean annual load of total nitrogen.

As the site is developed, water quality modelling will be conducted using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) to determine that the site has been designed in accordance with Council's water quality requirements.

It is likely that water quality treatment will include a combination of Water Sensitive Urban Design practices (such as grassed swales and rainwater re-use) and proprietary products (such as pit inserts and gross pollutant trap units).

4.2.1 Stormwater Quality During Construction

During the construction stage of the project, sediment and erosion control measures will be installed and maintained until construction is completed. The proposed sedimentation and erosion control measures will prevent sediment laden stormwater from flowing into adjoining properties, bushland, roadways or receiving water bodies. Stormwater controls onsite are detailed in an erosion and sediment control plan which is in accordance with relevant regulatory authority guidelines including Hornsby Shire Council's DCP and Landcom NSW's Managing Urban Stormwater, Soils and Construction ("Blue Book").

Erosion and sediment control plans will be prepared for each site as part of the schematic design process.

4.3 Flooding

In accordance with Hornsby Shire Council's DCP, the site is not subject to flood planning controls according the flood planning map within the LEP (refer to Figure 4.1 for the location of the site within the Flood Planning Map) and Council's DCP (Section 1C.3.2 Flooding). This is likely due to the steep level difference between the site and Coups Creek.

The proposed concept design does not appear to propose any obstruction to natural overland flow paths through the site. Should this occur, overland flows will be diverted around any proposed buildings.

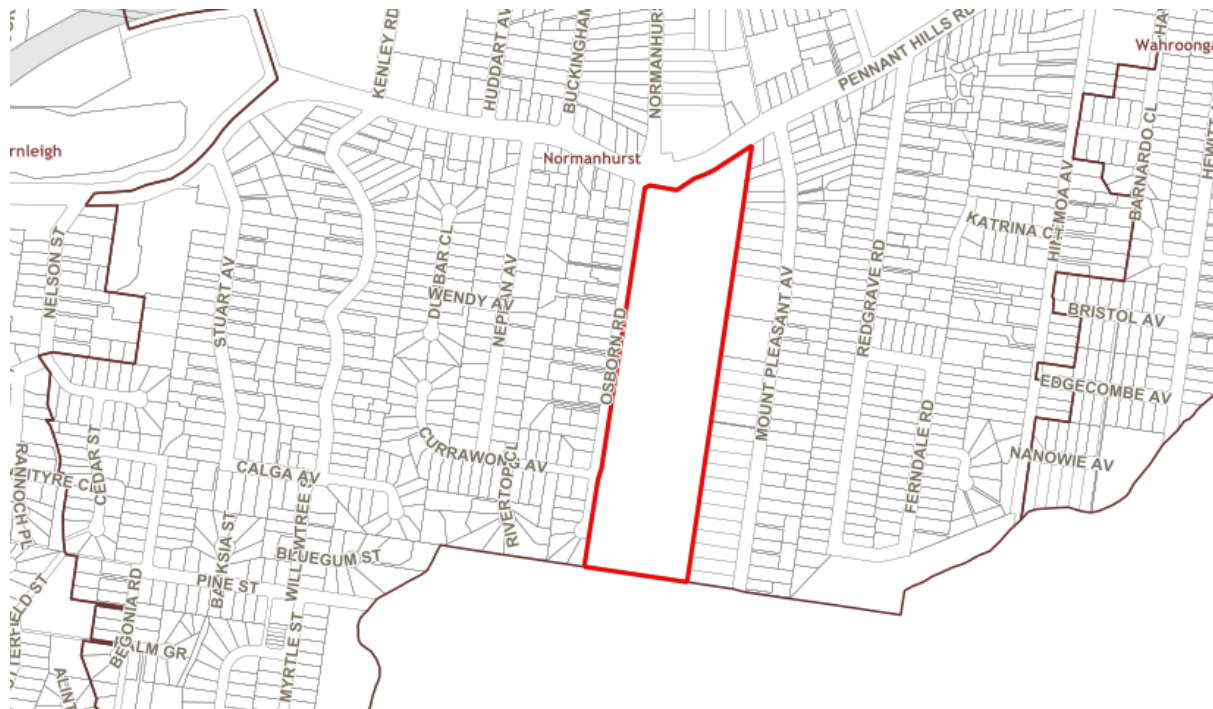


Figure 4.1: Flood Planning Map

Source: Hornsby Shire Council Local Environmental Plan 2013

4.3.1 Sea Level Rise

The CSIRO has undertaken coastal inundation modelling of those areas that would be affected by future sea level rise including the Hornsby Shire Council area. The Sea Level Rise Map that was prepared following the study indicates that the site will not be impacted due to its distance from the coastline.

4.4 Pavement

The proposed pavement areas will be designed to withstand proposed loads, suit structural demands, geotechnical conditions, and accessibility. It is expected that the majority of pavements proposed will be concrete.

5.0 Building A: Boarding House Development and Garden Plaza

5.1 Development Site

The Boarding House and Garden Plaza site is located within Hornsby Shire Council's (HSC) Local Government Area and covers an area of approximately 7,000 square metres.

The site comprises of 24 Mount Pleasant Avenue, and an existing small building, on grade carpark and roadway within the grounds of Loreto Normanhurst (91-93 Pennant Hills Road, Normanhurst). The site is bounded by Mount Pleasant Ave to the east; and school grounds to the north, west and south. Refer to Figure 5.1 for the location of the site.

The existing site generally falls towards the south into existing stormwater pits within the site and the school oval.



Figure 5.1: Site Location (Source: Nearmap)

5.2 Proposed Development

The proposed works include (refer to Figure 5.2):

- Construction of basement carparking;
- Construction of a multi-level, tiered boarding house (including kitchen, dining hall, gym and communal areas);

- Construction of new driveways to Mount Pleasant Avenue; and
- Construction of associated landscaping works.

The civil works involved include the installation of a new in-ground pit and pipe system, the provision of onsite stormwater detention (OSD) and stormwater quality measures. Refer to the civil engineering drawings in Appendix A for the concept civil engineering plans.



Figure 5.2 Architectural Level 3 Floor Plan
(Prepared by AJ+C dated 16 January 2019)

5.3 Stormwater Quantity

5.3.1 Onsite Stormwater Detention (OSD)

Hornsby Shire Council requires OSD to ensure that the post-development peak flows up to and including the 1 in 20 year Average Recurrence Interval (ARI) do not exceed the maximum flow rate generated during a 1 in 5 year ARI storm event pre-development.

The restricted flow from the OSD system is to be conveyed by the proposed inground drainage system and connected to the existing stormwater system within the School. The total OSD volume is equal to 100 m³ with an orifice diameter of 245mm. The OSD storage has been sized to cater for the minor storm event with an allowance for some 2,500m² of potential bypass given the constraints of the site and the existing stormwater network. Its capacity has been modelled and analysed in DRAINS modelling software to ensure the proposed OSD system complies with Council's stormwater related requirements. A comparison of the pre and post development flows has been shown in Table 5.1. Note that the methodology for calculating stormwater flows has been based on the methods detailed in Australian Rainfall and Runoff 2016.

Table 5.1: Comparison of Pre and Post Development Flows

Storm Event (ARI)	Greenfield Flow (m ³ /s)	Post Development Flow (m ³ /s)	Post Development Flow with OSD including bypass (m ³ /s)
1 in 5 Year	0.142	0.113	0.096
1 in 20 Year	0.229	0.158	0.141
1 in 100 Year	0.304	0.217	0.180

5.4 Flooding

As discussed in Section 4.3, the site is not identified as being flood affected according to flood studies conducted by Hornsby Shire Council. The site is also not identified as being impacted by sea level rise.

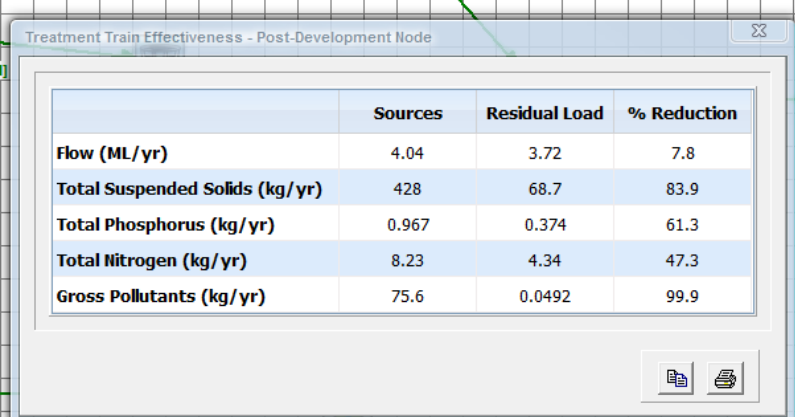
5.5 Stormwater Quality

Hornsby Shire Council's Development Control Plan requires the following stormwater quality targets to be met:

- 90% reduction in the post development mean annual load of total gross pollutants.
- 80% reduction in the post development mean annual load of total suspended solids.
- 60% reduction in the post development mean annual load of total phosphorus.
- 45% reduction in the post development mean annual load of total nitrogen.

Stormwater quality measures were modelled using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC). The treatment train proposed for the site consists of Stormwater 360's Enviropods in multiple grated surface inlet pits, Stormfilter cartridges, a vegetated swale within the landscaped area to the east and a 120kL rainwater tank for rainwater capture and re-use. Refer to Appendix A for the location of these stormwater quality control measures.

Pollution removal rates are per the results shown in Figure 5.3 and demonstrate compliance with the pollution removal targets within Hornsby Shire Council's Development Control Plan.



	Sources	Residual Load	% Reduction
Flow (ML/yr)	4.04	3.72	7.8
Total Suspended Solids (kg/yr)	428	68.7	83.9
Total Phosphorus (kg/yr)	0.967	0.374	61.3
Total Nitrogen (kg/yr)	8.23	4.34	47.3
Gross Pollutants (kg/yr)	75.6	0.0492	99.9

Figure 5.3: MUSIC Modelling Results

5.5.1 Rainwater Reuse

A 120kL rainwater tank is proposed to provide an alternative source for non-potable uses for the proposed development. In general, all roof water will be collected in roof gutters and downpipes and conveyed to the rainwater tank, the overflow from the rainwater tank will be collected by the OSD tank.

Refer to Appendix A for indicative rainwater tank size and location, further detailing is to be undertaken in later stage by the hydraulic engineer.

5.5.2 Stormwater Quality During Construction

During the construction stage of the project, sediment and erosion control measures will be installed and maintained until construction is completed. The proposed sedimentation and erosion control measures will prevent sediment laden stormwater from flowing into adjoining properties, bushland, roadways or receiving water bodies. Stormwater controls onsite are detailed in an erosion and sediment control plan which is in accordance with relevant regulatory authority guidelines including Hornsby Shire Council's DCP and Landcom NSW's Managing Urban Stormwater, Soils and Construction ("Blue Book"). Refer to the attached civil engineering plans in Appendix A for the proposed concept sediment and erosion control plan.

5.6 Summary

The Loreto Normanhurst Boarding House Development includes collection of stormwater onsite using a pit and pipe stormwater system, with flowrates controlled using an in-ground OSD. The total proposed onsite detention volume is equal to 100 m³. Captured stormwater will be treated using water quality measures including a 120kL rainwater tank, vegetated swale, Stormwater 360's Enviropods and Stormfilter cartridges. An erosion and sediment control plan has been prepared for the site detailing the management of stormwater during construction.

6.0 Building B: Mary Ward Wing

6.1 Development Site

The Mary Ward Wing is located within Hornsby Shire Council's (HSC) Local Government Area and covers an area of approximately 1,500 square metres.

The site comprises of an existing loading dock and the existing Mary Ward Wing within the grounds of Loreto Normanhurst (91-93 Pennant Hills Road, Normanhurst). The site is bounded by school grounds to the north, east, west and south. Refer to Figure 6.1 for the location of the site.

The existing site generally falls towards the south into existing stormwater pits within the site and the school oval.



Figure 6.1: Site Location (Source: Nearmap)

6.2 Proposed Development

The Mary Ward Wing includes reconfiguration and some associated landscaping works to replace an existing loading dock with a new courtyard. The Boarding House and Garden Plaza works are to the east of the Mary Ward Wing development.

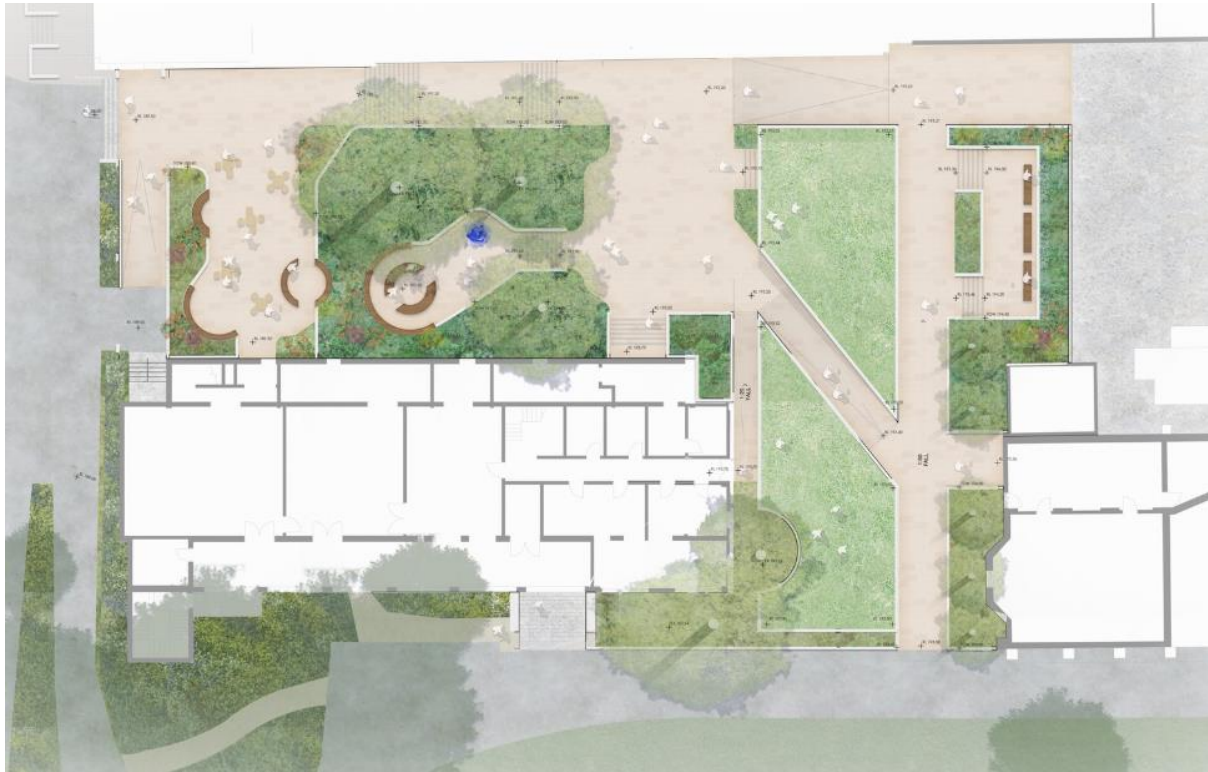


Figure 6.2: Mary Ward Courtyard

Source: Landscape Architectural Drawings prepared by Oculus

6.3 Stormwater Quantity

The total site area is equal to 1,494 m² and currently consists of 72% impervious area due to the existing loading dock. As the proposed development intends to reduce hardstand and introduce over 200 m² of additional landscaped areas, the site impervious area will decrease to 56% of the total area. Pre and post catchment plans are included within Appendix B.

As a result of the increased pervious area, onsite stormwater detention is not proposed as site run off will be reduced by the development (refer to Table 6.1). We have been advised by Council that this is acceptable approach.

Table 6.1: Pre and Post Development Flows from DRAINS

Storm Event (ARI)	Pre Development Flow (m ³ /s)	Post Development Flow (m ³ /s)
1 in 5 Year	0.042	0.033
1 in 20 Year	0.058	0.052
1 in 100 Year	0.076	0.071

Stormwater onsite will discharge through the existing in-ground pit and pipe system within the school grounds.

6.4 Flooding

As discussed in Section 4.3, the site is not identified as being flood affected according to flood studies conducted by Hornsby Shire Council. The site is also not identified as being impacted by sea level rise.

6.5 Stormwater Quality

As discussed in Section 6.3, the development will increase pervious area at the site and reduce the amount of hardstand. This is in line with Council's approach to Water Sensitive Urban Design. It has been advised by Council that as the pervious area is increasing and less pollutants are expected; no additional water quality treatment measures will be required.

6.5.1 Stormwater Quality During Construction

During the construction stage of the project, sediment and erosion control measures will be installed and maintained until construction is completed. The proposed sedimentation and erosion control measures will prevent sediment laden stormwater from flowing into adjoining properties, bushland, roadways or receiving water bodies. Stormwater controls onsite are detailed in an erosion and sediment control plan which is in accordance with relevant regulatory authority guidelines including Hornsby Shire Council's DCP and Landcom NSW's Managing Urban Stormwater, Soils and Construction ("Blue Book"). Refer to the attached civil engineering plans in Appendix B for the proposed concept sediment and erosion control plan

6.6 Summary

The Loreto Normanhurst Mary Ward Development includes collection of stormwater onsite using a pit and pipe stormwater system. No additional onsite detention or permanent water quality measures have been proposed as the development will increase pervious area within the site by developing an existing loading dock into a courtyard. An erosion and sediment control plan has been prepared for the site detailing the management of stormwater during construction.

7.0 Conclusion

This report provides a summary of the proposed concept civil engineering and stormwater management for the Loreto Normanhurst Concept Plan and Stage 1 Development. Stormwater is proposed to comply with Hornsby Shire Council's requirements including the provision of onsite stormwater detention, erosion and sediment control, and stormwater quality treatment. Concept engineering plans for the Boarding House/Garden Plaza and Mary Ward Wing developments have been prepared and are attached in Appendix A and B respectively.

Prepared by
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PAUL YANNOULATOS
Technical Director

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Appendix A

Concept Boarding House and Garden Plaza Civil Engineering Drawings

BOARDING HOUSE

LORETO NORMANHURST, 91-93 PENNANT HILLS ROAD, NORMANHURST

GENERAL NOTES

- Contractor must verify all dimensions and existing levels on site prior to commencement of works. Any discrepancies to be reported to the Engineer
- Strip all topsoil from the construction area. All stripped topsoil shall be disposed of off-site unless directed otherwise.
- Make smooth connection with all existing works.
- 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.
- 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.
- 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.
- For all temporary batters refer to geotechnical recommendations.

REFERENCE DRAWINGS

- These drawings have been based from, and to be read in conjunction with the following Consultants drawings. Any conflict to the drawings must be notified immediately to the Engineer.

Consultant	Dwg Title	Dwg No	Rev	Date
AJ+C	BASEMENT 2	DA2001	2	10.12.18
AJ+C	BASEMENT 1	DA2002	2	10.12.18
AJ+C	LEVEL 01	DA2003	2	10.12.18
AJ+C	LEVEL 02	DA2004	2	10.12.18
AJ+C	LEVEL 03	DA2005	2	10.12.18

SURVEY AND SERVICES INFORMATION SURVEY

Origin of levels : SSM46458, RL189.789
Datum of levels : A.H.D. AUSTRALIAN HEIGHT DATUM
Coordinate system : MGA
Survey prepared by : LTS LOCKLEY
Setout Points : CONTACT THE SURVEYOR

Taylor Thomson Whitting 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 Taylor Thomson Whittings 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.

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

SAFETY IN DESIGN

Contractor to refer to Appendix B of the Civil Specification for the Civil Risk and Solutions Register.

EXISTING SERVICES

Contractor to be aware existing services are located within the site. Location of all services to be verified by the Contractor prior to commencing works. Contractor to confirm with relevant authority regarding measures to be taken to ensure services are protected or procedures are in place to demolish and/or relocate.

EXISTING STRUCTURES

Contractor to be aware existing structures may exist within the site. To prevent damage to existing structure(s) and/or personnel, site works to be carried out as far as practicable possible from existing structure(s).

EXISTING TREES

Contractor to be aware existing trees exist within the site which need to be protected. To prevent damage to trees and/or personnel, site works to be carried out as far as practicable possible from existing trees. Advice needs to be sought from Arborist and/or Landscape Architect on measures required to protect trees.

GROUNDWATER

Contractor to be aware ground water levels are close to existing surface level. Temporary de-watering may be required during construction works.

EXCAVATIONS

Deep excavations due to stormwater drainage works is required. Contractor to ensure safe working procedures are in place for works. All excavations to be fenced off and batters adequately supported to approval of Geotechnical Engineer.

GROUND CONDITIONS

Contractor to be aware of the site geotechnical conditions. Refer to geotechnical report by (insert report details) for details.

HAZARDOUS MATERIALS

Existing asbestos products & contaminated material may be present on site. Contractor to ensure all hazardous materials are identified prior to commencing works. Safe working practices as per relevant authority to be adopted and appropriate PPE to be used when handling all hazardous materials. Refer to geotechnical/environmental report by (insert report details) for details.

CONFINED SPACES

Contractor to be aware of potential hazards due to working in confined spaces such as stormwater pits, trenches and/or tanks. Contractor to provide safe working methods and use appropriate PPE when entering confined spaces.

MANUAL HANDLING

Contractor to be aware manual handling may be required during construction. Contractor to take appropriate measures to ensure manual handling procedures and assessments are in place prior to commencing works.

WATER POLLUTION

Contractor to ensure appropriate measures are taken to prevent pollutants from construction works contaminating the surrounding environment.

SITE ACCESS/EGRESS

Contractor to be aware site works occur in close proximity to footpaths and roadways. Contractor to erect appropriate barriers and signage to protect site personnel and public.

VEHICLE MOVEMENT

Contractor to supply and comply with traffic management plan and provide adequate site traffic control including a certified traffic marshal to supervise vehicle movements where necessary.

BOUNDARY AND EASEMENT NOTE

The property boundary and easement locations shown on Taylor Thomson Whitting drawing's have been based from information received from : **No boundary information received.**

Refer architect for boundary information and locations

Taylor Thomson Whitting makes no guarantees that the boundary or easement information shown is correct.

Taylor Thomson Whitting 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.

KERBING NOTES

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

- 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.
- 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.
- 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.
- Broomed finished to all ramped and vehicular crossings, all other kerbing or dish drains to be steel float finished.
- In the replacement of kerbs – Existing road pavement is to be sawcut 900mm from lip of gutter. Upon completion of new kerbs, new basecourse and surface is to be laid 900mm wide to match existing materials and thicknesses. Existing allotment drainage pipes are to be built into the new kerb with a 100mm dia hole. Existing kerbs are to be completely removed where new kerbs are shown.

SURVEY LEGEND

+18.48	Surface level
19	Contour
	Kerb line
	Batter
	Retaining wall
	Stormwater drainage line
	Telecommunications line
	Gas line
	Water main
	Sewer line
	Electrical line
	Easement
	Fence
	Tree to be removed/be retained
	Boundary
	Sign
	Hydrant
	Manhole
	Gas
	Stop Valve
	Water
	Telecommunications
	Trap
	Gully
	Grate
	Sewer Manhole
	Electricity
	Electric Light Pole
	Traffic Light
	Traffic Light Lid
	Traffic Light Box
	Telephone Box
	Parking Meter
	Permanent Mark
	Bench Mark
	Borehole
	Test Pit

STORMWATER DRAINAGE NOTES

- Stormwater Design Criteria :
 - Average exceedance probability –
1% AEP for roof drainage to first external pit
5% AEP for paved and landscaped areas
 - Rainfall intensities –
Time of concentration: 5 minutes
1% AEP = 21.7 mm
5% AEP = 16.1 mm
 - Rainfall losses –
Impervious areas: IL = 1.5 mm , CL = 0 mm/hr
Pervious areas: IL =26.6 mm , CL = 2 mm/hr
- Pipes 300 dia and larger to be reinforced concrete Class "2" approved spigot and socket with rubber ring joints U.N.O.
- Pipes up to 300 dia may be sewer grade uPVC with solvent welded joints, subject to approval by the engineer
- Equivalent strength VCP or FRP pipes may be used subject to approval.
- Precast pits may be used external to the building subject to approval by Engineer
- Enlargers, connections and junctions to be manufactured fittings where pipes are less than 300 dia.
- Where subsoil drains pass under floor slabs and vehicular pavements, unslotted uPVC sewer grade pipe is to be used.
- Grates and covers shall conform with AS 3996–2006, and AS 1428.1 for access requirements.
- Pipes are to be installed in accordance with AS 3725. All bedding to be type H2 U.N.O.
- Care is to be taken with invert levels of stormwater lines. Grades shown are not to be reduced without approval.
- All stormwater pipes to be 150 dia at 1.0% min fall U.N.O.
- Subsoil drains to be slotted flexible uPVC U.N.O.
- Adopt invert levels for pipe installation (grades shown are only nominal).

RETAINING WALLS

- Drainage shall be provided as shown on the drainage drawings.
- Backfilling shall be carried out after grout or concrete has reached a minimum strength of 0.85 f_c. Backfilling shall be approved granular material compacted in layers not exceeding 200mm to 95% Standard compaction unless noted otherwise.
- Provide waterproofing to back of walls as specified or noted.
- Where retaining walls rely on connecting structural elements for stability, do not backfill against the wall unless it is adequately propped or the elements have been constructed and have sufficient strength to withstand the loads.
- For all temporary batters obtain geotechnical engineers recommendations.

EXISTING SERVICES LEGEND

— S — S —	Existing sewer
— W — W —	Existing water
— EU — EU —	Existing underground electrical
— EA — EA —	Existing aerial electrical
— T — T —	Existing communications
— G — G —	Existing gas
— SW — SW —	Existing stormwater



SITE LOCALITY PLAN
NOT TO SCALE – IMAGE COURTESY OF NSW SPATIAL INFORMATION EXCHANGE

DRAWING SCHEDULE

Drawing No	Drawing Title
SKC000	NOTES AND LEGENDS SHEET
SKC101	EROSION & SEDIMENT PLAN AND DETAILS
SKC102	OVERALL SITEWORKS PLAN
SKC103	SITEWORKS PLAN SHEET 1 (BASEMENT 1&2 AND LEVEL 01)
SKC104	SITEWORKS PLAN SHEET 2 (LEVEL 02 AND 03)
SKC105	SITEWORKS PLAN SHEET 3 (LEVEL 02 AND 03)
SKC110	OSD TANK DETAILS SHEET

P4 ISSUE FOR APPROVAL GC JH 11.01.19								Architect				Civil Engineer				Project				Sheet Subject				Scale : A1				Drawn				Authorised			
P3 ISSUE FOR APPROVAL GC JH 20.11.18																				NOTES AND LEGEND SHEET				-				JH							
P2 ISSUE FOR REVIEW GC JH 26.10.18																								Job No				Drawing No				Revision			
P1 ISSUE FOR DEVELOPMENT APPROVAL GC JH 09.10.18																								181202				SKC000				P4			
Rev Description				Eng Draft Date				Rev Description				Eng Draft Date				Rev Description				Eng Draft Date				Plot File Created: Jan 11, 2019 - 9:35am											

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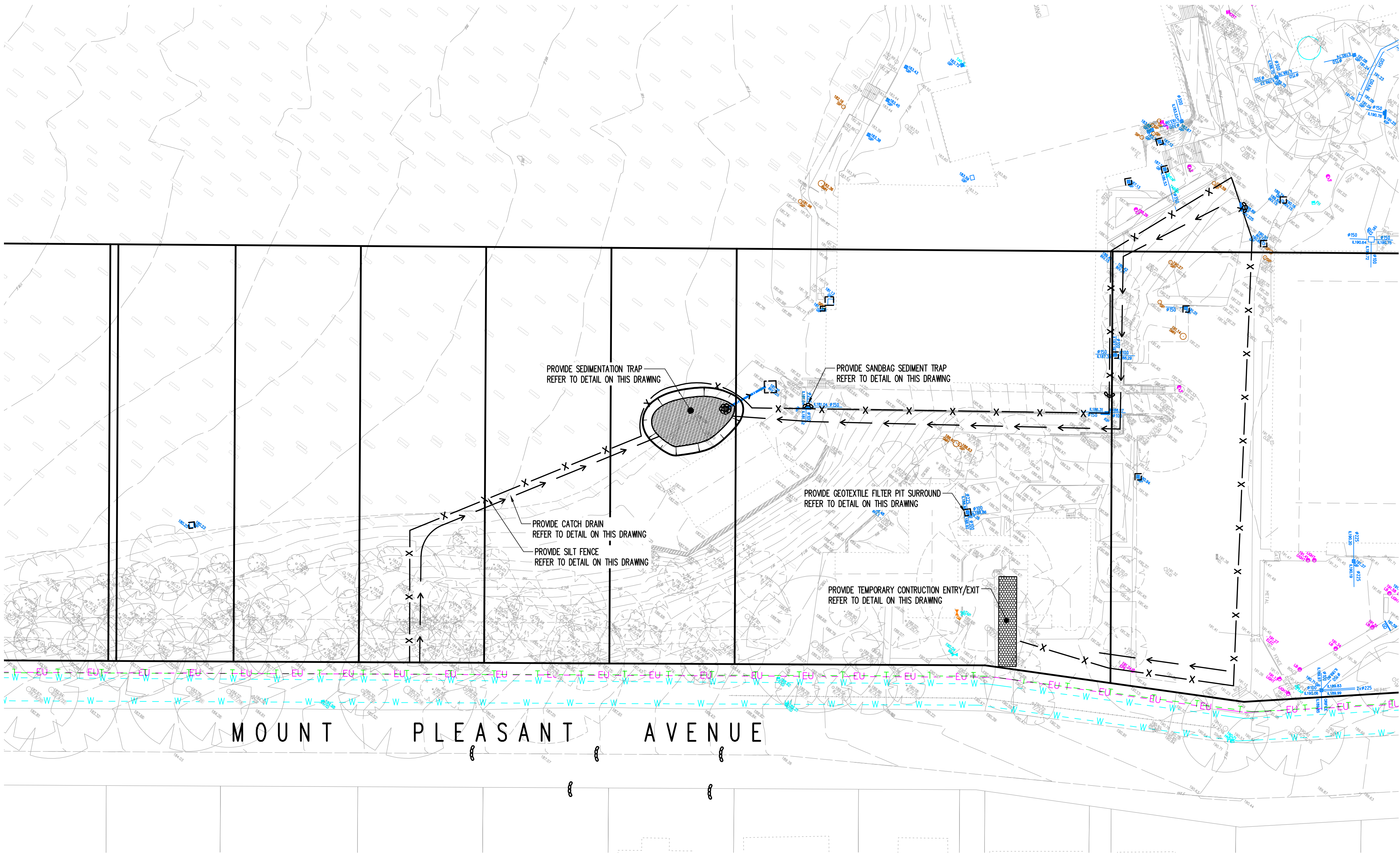
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Project
LORETO NORMANHURST,
91-93 PENNANT HILLS ROAD
SITE A, BOARDING HOUSE

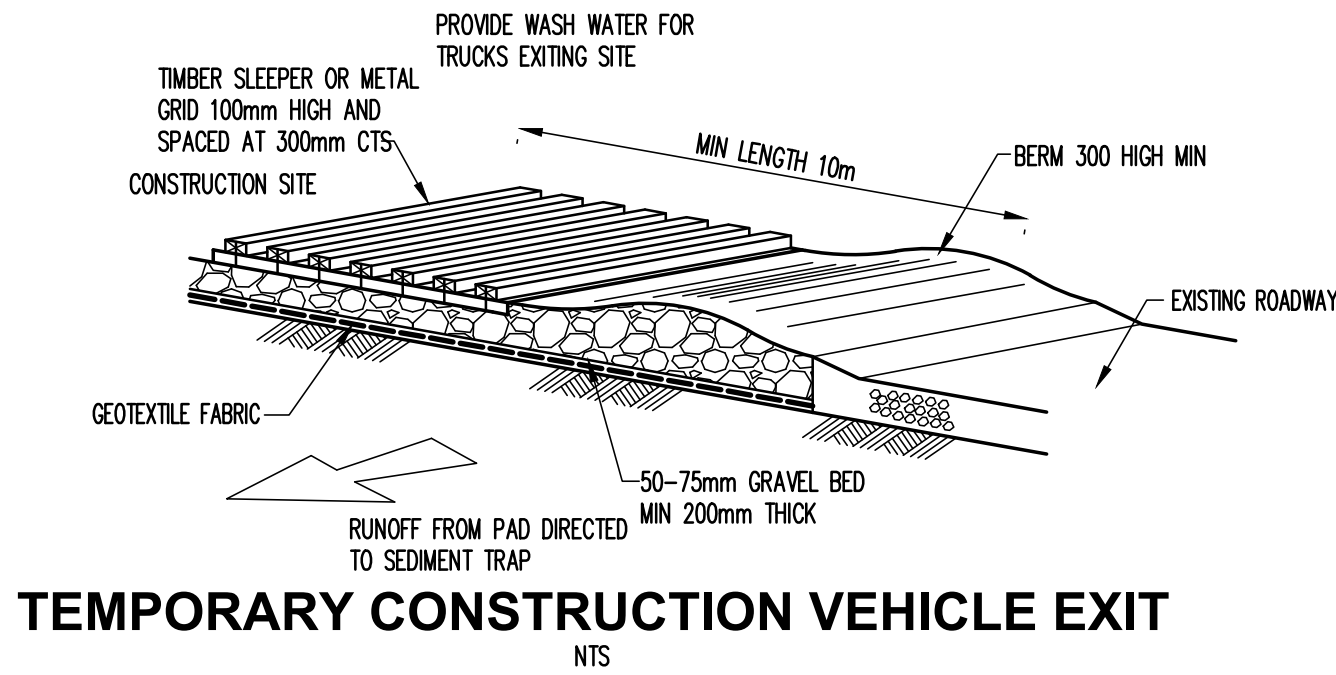
Sheet Subject
NOTES AND LEGEND SHEET

Scale : A1
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Drawing No
SKC000
Revision
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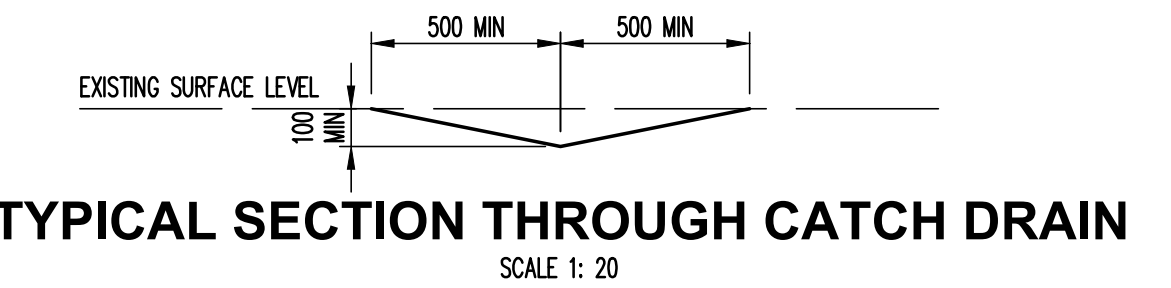
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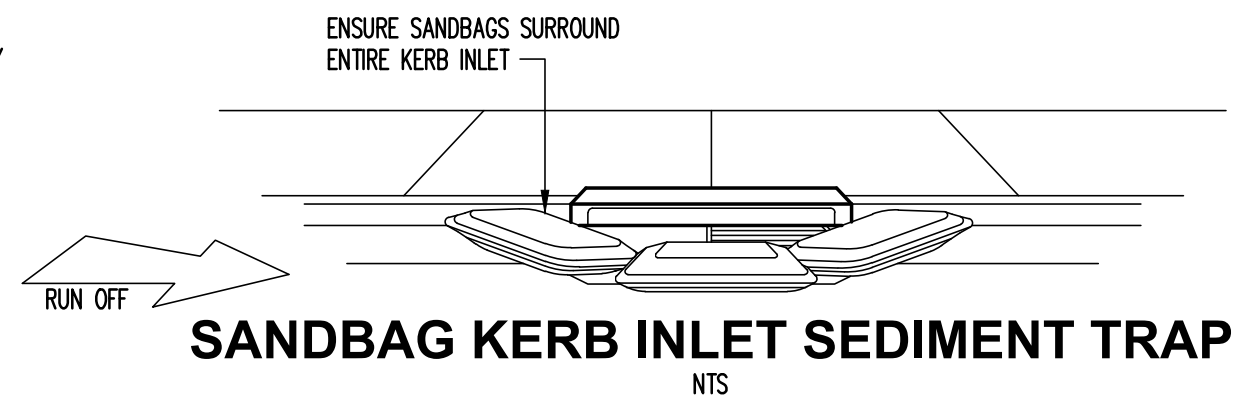
PLAN
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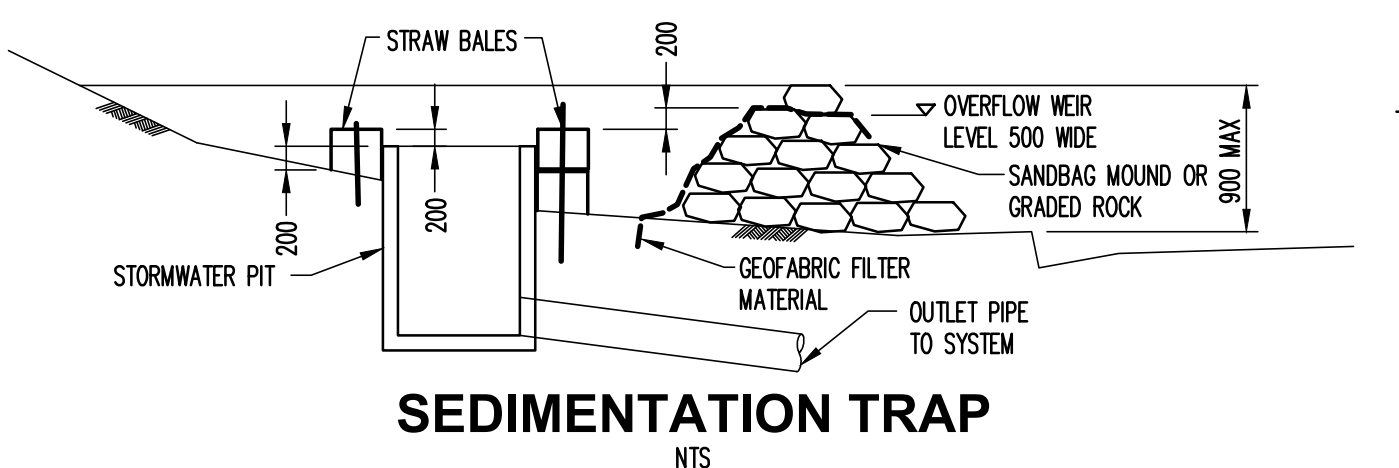
TEMPORARY CONSTRUCTION VEHICLE EXIT
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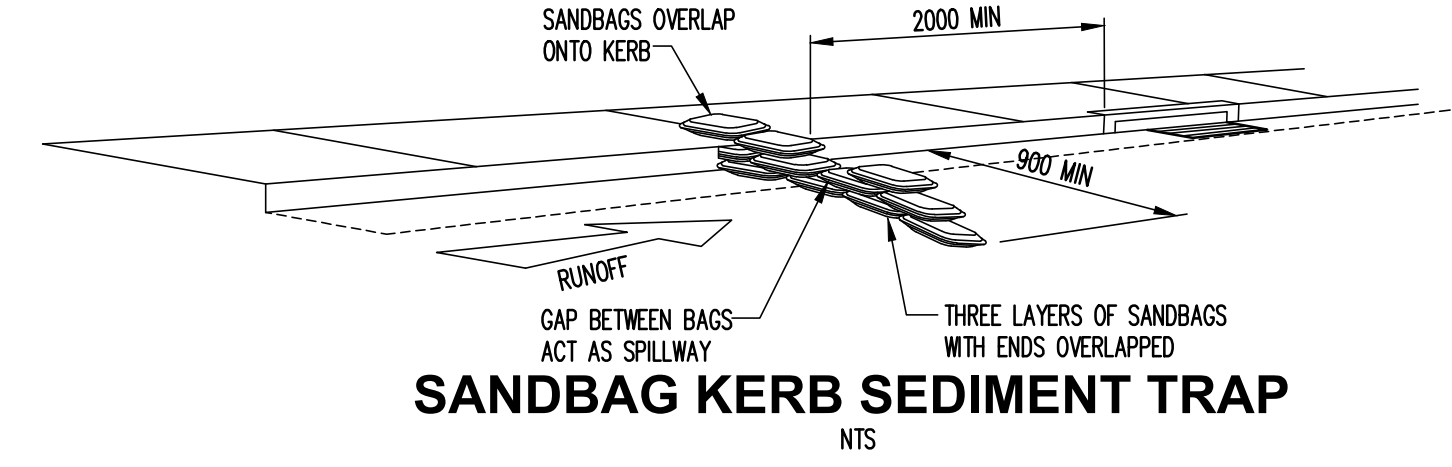
TYPICAL SECTION THROUGH CATCH DRAIN
SCALE 1: 20



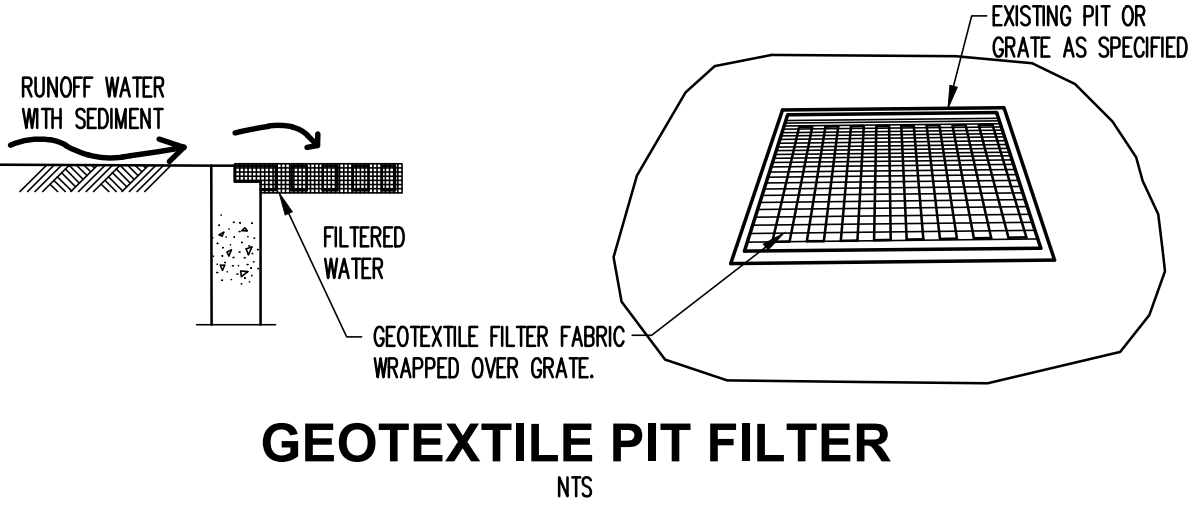
SANDBAG KERB INLET SEDIMENT TRAP
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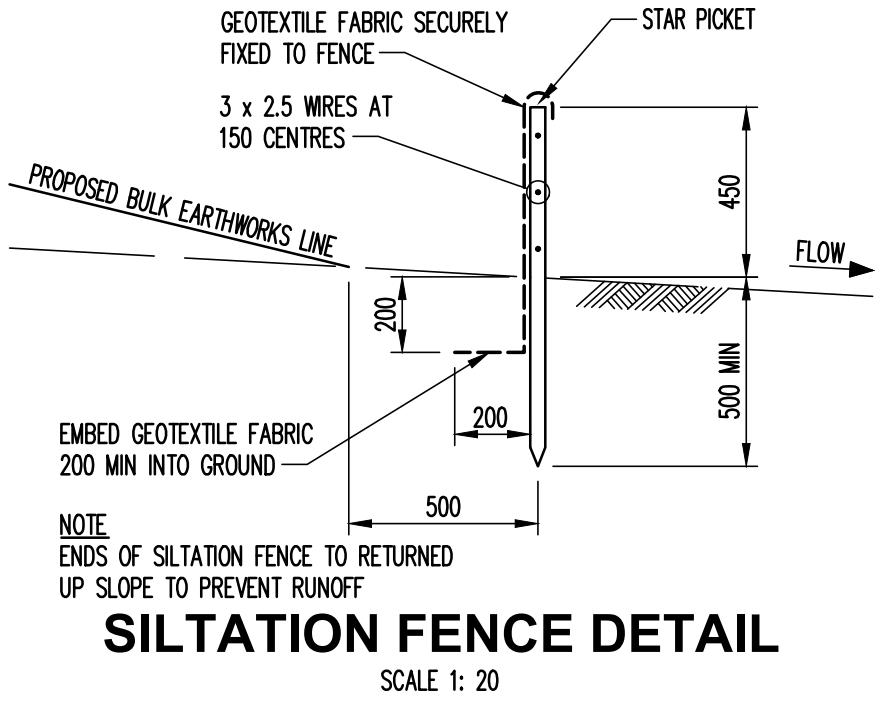
SEDIMENTATION TRAP
NTS



SANDBAG KERB SEDIMENT TRAP
NTS



GEOTEXTILE PIT FILTER
NTS



SILTATION FENCE DETAIL
SCALE 1: 20

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EROSION AND SEDIMENT CONTROL NOTES

- All work shall be generally carried out in accordance with:
 - Local authority requirements,
 - EPA - Pollution control manual for urban stormwater,
 - 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.

EROSION AND SEDIMENT CONTROL PUMP OUT NOTES

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

EROSION AND SEDIMENT CONTROL LEGEND

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

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

Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date
P3	ISSUE FOR APPROVAL	GC	JH	20.12.18					
P2	ISSUE FOR COORDINATION	GC	JH	12.12.18					
P1	ISSUE FOR DEVELOPMENT APPROVAL	KH	JH	31.08.18					

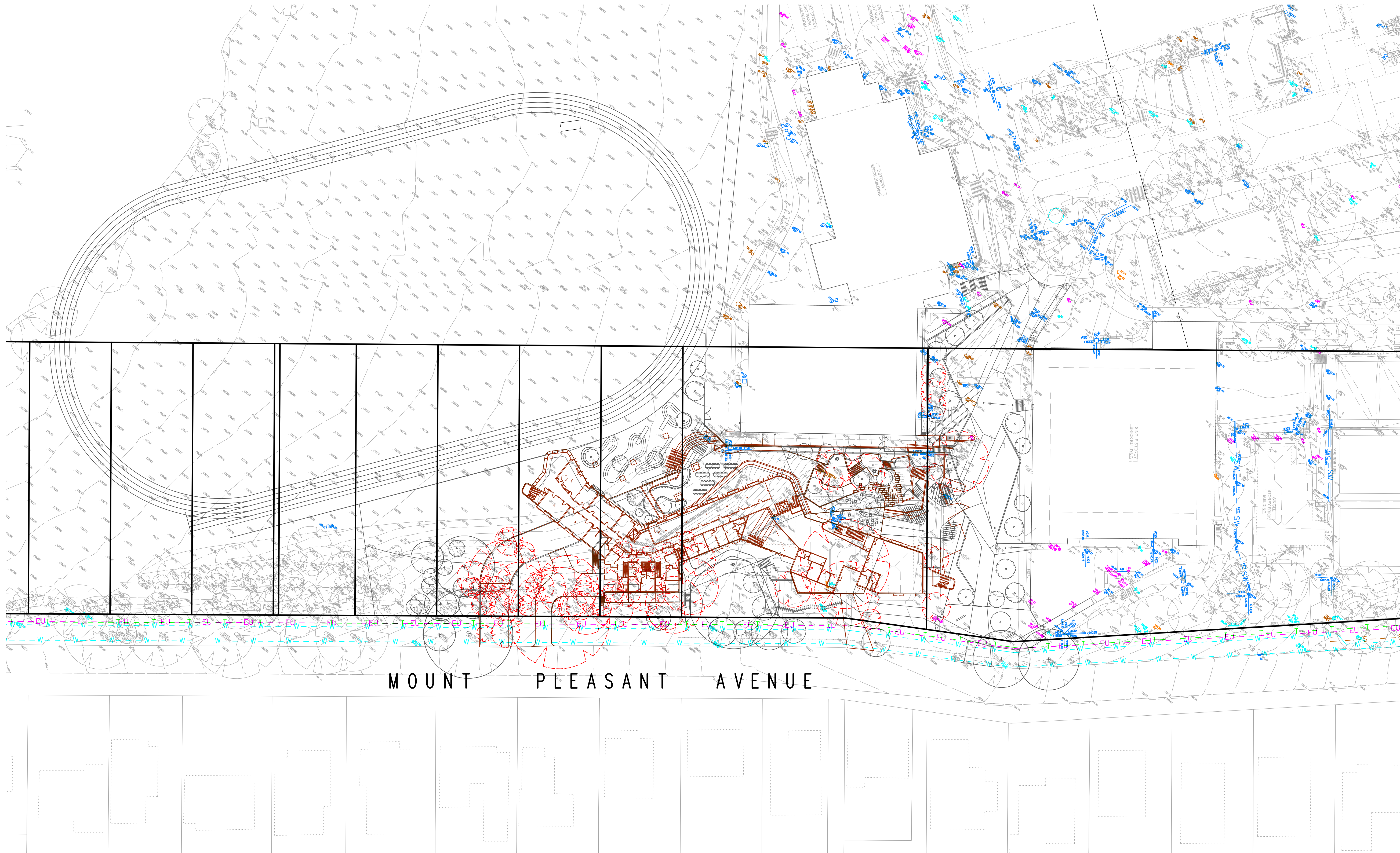
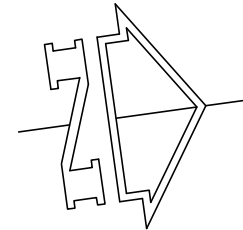
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SITE A, BOARDING HOUSE

Sheet Subject
EROSION & SEDIMENT CONTROL PLAN AND DETAILS

Scale : A1
1:400 U.N.O.
Job No
181202
Drawing No
SKC101
Revision
P3
Plot File Created: Dec 20, 2018 - 4:24pm



MOUNT PLEASANT AVENUE

Filename: SKC102.dwg - User: gmac - Plot File Created: Dec 20, 2018 - 4:24pm

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

P2 ISSUE FOR APPROVAL				GC	JH	20.12.18					
P1 ISSUE FOR DA				KH	RG	31.08.18					
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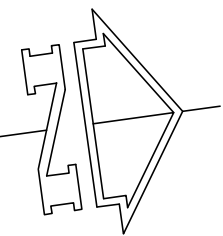
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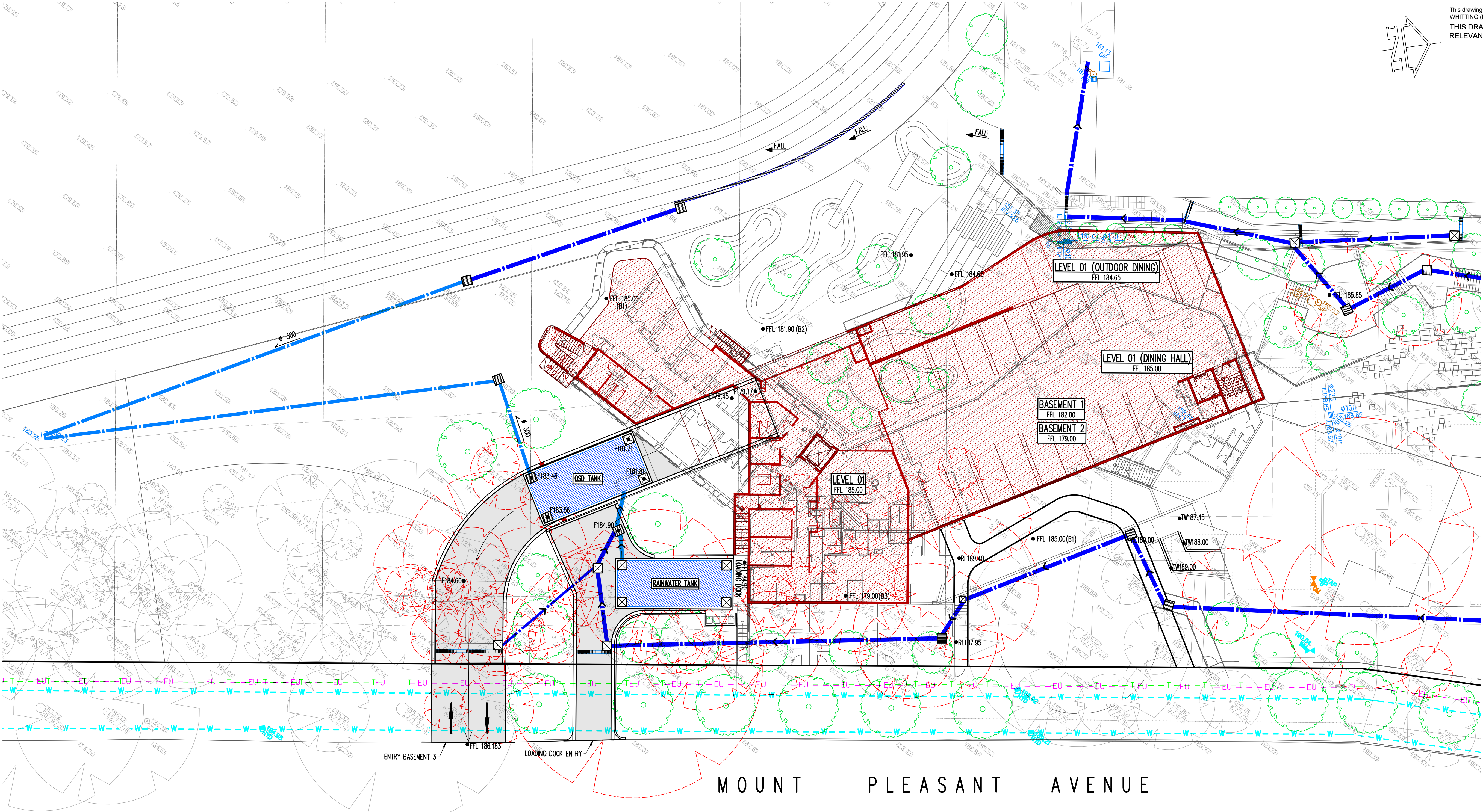
Project
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SITE A, BOARDING HOUSE**

Sheet Subject
OVERALL SITEWORKS PLAN

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Job No 181202	Drawing No SKC102	Revision P2
Plot File Created: Dec 20, 2018 - 4:24pm		



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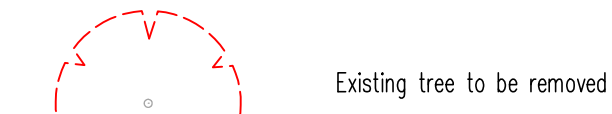


SITWORKS LEGEND

- F22.20 Finished surface level
- F22.00 Finished contour
- K&G Kerb and gutter
- KO Kerb only
- Stormwater pit, flow direction and line with:
 - IL10.00 600 x 750 1.25% Q=345 L/s IL9.65
 - GR Grated drain
 - IR Intermediate riser with subsoil drainage line (100 dia)
 - FP Flushing point with subsoil drainage line (100 dia)
 - DP Down pipe
- RW Blockwork retaining wall
- BRW Brickwork retaining wall

ARCHITECTURAL LEGEND

- LEVEL 01
- Basement 1
- Basement 2



Existing tree to be removed

* NOTE: CONTRACTOR TO CLEAN AND INVESTIGATE VIA CCTV EXISTING STORMWATER INFRASTRUCTURE TO BE CONNECTED INTO.

PathName: SKC103.dwg - User: greece - Plot File Output: Jan 17, 2019 - 2:00pm

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P4	ISSUE FOR APPROVAL	GC	JH	11.01.19
P3	ISSUE FOR APPROVAL	GC	JH	20.12.18
P2	ISSUE FOR COORDINATION	GC	JH	12.12.18
P1	ISSUE FOR DA	KH	RG	31.08.18

Rev	Description	Eng	Draft	Date
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Sheet Subject
SITWORKS PLAN SHEET 1
(BASEMENT 1&2 AND LEVEL 01)

Scale : A1 1:200	Drawn JH	Authorised
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