

Proposed Student Accommodation 4-18 Doncaster Avenue Kensington, NSW

Stormwater Management Plan

FOR: Bluesky Private Real Estate

Report Number: R001-G18196

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Document Control

Author:	Alex Rowlands			
Reviewer	Grant Halcrow			
Approver NER	Grant Halcrow			
Report Title	R001 – G18196 – Stormwater Management Plan			
Revision	02 Date		20 th December 2018	

Revision History

Revision	Date	Author	Approver	Description
A	09/11/2018	AR	GH	Draft Issue for Client Review
В	20/12/2018	AR	GH	Revised with Client Comment

Company Contact Details

• Address: Level 3, 18 Orchid Avenue, Surfers Paradise, 4217

Mail Address: PO BOX 1715, Surfers Paradise, 4217

• Phone: (07) 5538 0431

• Email: <u>reception@michaelbale.com.au</u>

Client Contact Details

• Client: Bluesky Private Real Estate

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1. Introduction

This report has been prepared to support the lodgement of a development application for the development of a new student accommodation building. The proposed development comprises three stories of student accommodation, with a total allowance of 276 beds across various room layouts. The proposed Development Approval application applies to the following parcels of land:

Property Address: 4-18 Doncaster Avenue, Kensington **Property Description:** Lots 2 & 3 / Section 30 / DP5549

Lot 1 / DP1094702 Lot 1 / DP981704 Lot 1 / DP1033442 Lot 1 / DP974821 Lots 51 & 53 / DP2905

Lots 52A & Lot 52B, / DP400051

Client: Bluesky Private Real Estate
Council: Randwick City Council

Registered Site Area: 4,276m²

The purpose of this report is to address the management of stormwater quantity and quality to ensure that the proposed development complies with all necessary state and local government policies.

This report intends to assess the likely impact of the proposed development in relation to stormwater quantity and quality, and the adequacy of the existing stormwater infrastructure to accommodate the proposed development.

1.1 Revision History

This version of the report is the first version and has been prepared for coordination and feedback from the project team.

No relevant previous reports exist for the proposed development site.

1.2 Related Reports

This report is intended to be read in conjunction with the associated development submission documents, current as of the date of this report.

An Engineering Services Report (R002-G18196) has been prepared for the site and should be read in conjunction with this report.

2. Property Description

2.1 Site Locality

The proposed development is situated on the allotments at 4-18 Doncaster Avenue, Kensington. The proposed development is located within the Randwick City Council Local Government Area.

The development site is accessible via several vehicle crossovers to Doncaster Avenue. The site is bounded by Doncaster Avenue to the west, the Australian Turf Club to the east and private allotments to the north and south.

Full details of the site topography and existing features are shown on the detailed site survey included in Appendix A. A general locality plan is presented in Figure 2.1 below:



Figure 2.1 - Site Locality

2.2 Land Usage

The proposed development site covers a number of existing allotments. These allotments currently contain low-density residential dwellings.

2.3 Topography and Drainage

The proposed development site is relatively flat, with levels that range between 28.05m the southwestern corner of the site and 28.83 in the north-eastern corner of the site. Flows are expected to discharge towards Doncaster Avenue via a combination of overland flow and existing kerb adaptors. The average grade of the development site is expected to be 0.5%

3. Proposed Development

The proposed Student accommodation building consists of:

- The construction of a three-storey student accommodation building, containing sufficient bedding for 276 people;
- The construction of a single storey of underground carparking, to comprise a total of 56 carparks, 54 motorcycle parks and 60 bicycle parks;
- The construction of a new driveway and the restoration of the kerb where necessary along Doncaster Avenue;

The impervious areas of the development have been measured from the proposed architectural plans to cover approximately 63% of the site.

Construction works for the site will consist of bulk earthworks, with controlled excavation works to facilitate the construction of the underground carparking area.

Additional works on site shall include the construction of private water reticulation, sewer reticulation, electrical & telecommunications services and stormwater management works (quantity and quality).

No external works are proposed as part of this development beyond the construction of external service connections and vehicle crossovers.

4. Site Specific Hydrology

4.1 Introduction

The proposed development will involve the construction a new student accommodation building, public access roads, footpaths and other associated hardstand surfaces. The construction of these hardstand surfaces will alter the flow characteristics of the development site. This includes the time of concentration and the volume of rainfall converted to runoff.

This section of the report addresses peak stormwater discharge resulting from the site, identifies the Permissible Site Discharge for the proposed development and sizes an appropriate detention system to ensure flows do not exceed the Permissible Site Discharge.

4.2 Permissible Site Discharge

The modified version of the Rational Method is applied to the development site in accordance with Section 3.1 of the Randwick City Council Private Stormwater Code. This modified version of the Rational Method is applied to the development site to determine the maximum allowable site discharge for storm events up to and including the 20-year ARI. The permissible site discharge has been calculated as:

$$PSD = \frac{CIA}{360} = \frac{0.6054 * 63.0 * 4276}{3,600} = 45.3L/s$$

Where:

- C is the coefficient of runoff, adopted as 0.6054 for Randwick City;
- A is the site area (Ha); and
- I is the rainfall intensity (mm/hr), determined from Appendix A to the Randwick City Council Private Stormwater Code.

4.3 **Detention Modelling Catchment Definition**

The proposed development has been modelled in the DRAINS hydrologic software in order to ensure that flows from the development do not exceed the permissible site discharge. Table 5.1 below summarises the parameters input into DRAINS to represent the constructed development:

Table 4.1: DRAINS Modelling Catchment Parameters

Catchment	Catchment Area	Fraction Impervious	Time of Concentration
Developed Catchment	4,276m ²	0.63	6-Minutes

4.4 Detention Design Process

DRAINS Parameters

DRAINS version 2018.06 has been utilised in this assessment.

Modifiable Inputs

The DRAINS software package has several inputs that can be used to manipulate the hydraulic behaviour of the model. The values adopted in this model are all default values, and are presented in Table 4.2 below:

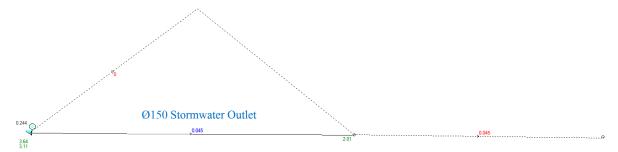
Table 4.2: DRAINS Modifiable Inputs

Input	Modelled Value	
Antecedent Moisture Condition	3	
Paved Depression Storage (mm)	1	
Supplementary Depression Storage (mm)	1	
Grassed (Pervious) Depression Storage (mm)	5	
Soil Type	3	

Depression Storage values of 1mm for paved/supplementary and 5mm for grassed (pervious) areas respectively are recommended values in the DRAINS user manual.

An Antecedent Moisture Condition (AMC) of 3.0 has been adopted as a default value for this site. A soil type classification type of 3 is the default value adopted in DRAINS and is representative of soil with slow infiltration rates (may have layers that impede downward movement of water).

Figure 5.1 below shows a screenshot of the DRAINS model used to represent the southern catchment.



Developed Catchment

Figure 4.1 – DRAINS Model Screenshot – Southern Catchment Example (Q_{20} Storm Event)

Detention Design Parameters

A process of iteration using a combination of detention system height, storage and outlet pipework arrangements has been used to determine the optimal design for the detention system, while ensuring that peak outflows don't exceed the Permissible Site Discharge up to and including the 20-year event.

Table 4.3 below provides the final dimensions of the detention system adopted:

Table 4.3 – Detention System Design Parameters

Detention Location	Detention Tank		
Detention Tank Surface Area	90m²		
Q ₂₀ Water Height	1.64m		
Detention Depth	1.70m		
Detention Volume at Q ₂₀	153.0m ³		
Outlet Pipe Size / Level	Ø150 Outlet @ Base		
Overflow Weir Size / Level	3.6m grated access pit above Q20 water level to		
Overnow wen size / Level	act as surcharge pit in rarer events		
HED Pit Parameters	5.0m Crest Length @ 1.2m Height		

DRAINS Hydrologic Modelling Results

The on-site stormwater detention arrangement described in Table 4.3 has been designed to demonstrate that the proposed on-site detention strategy is effective in reducing developed peak stormwater discharge to a rate that is less than the Permissible Site Discharge.

The results of the assessment and confirmation of the achievement of the on-site detention objectives for are provided in Table 5.4:

Table 4.4 - Summary of DRAINS Hydrologic Modelling (Northern Detention)

ARI	2	5	10	20
Maximum Allowable Discharge		45.3	BL/s	
Q Detention	39L/s	40L/s	40L/s	45L/s

It is demonstrated in Table 5.4 above that the proposed detention arrangement is adequate to ensure peak flowrates to not exceed the Permissible Site Discharge in storm events up to an including the 20-year event.

5. Stormwater Quality

5.1 Introduction

This section of the report aims to identify the requirements for stormwater quality management resulting from the proposed development and identify suitable stormwater treatment devices to comply with relevant requirements set out in part B8-3.1 – Water Quality of the Randwick City Council Development Control Plan.

5.2 Objectives

The Randwick City Council Development Control Plan states several objectives for proposed developments in relation to water quality:

- To prevent the transportation of pollutants and sediments from a site by stormwater runoff
- To ensure that stormwater runoff is of suitable quality to protect the recreational amenity of water bodies and coastlines; aquatic ecosystems and downstream receiving waters
- To prevent pollution spills or contaminants from leaving a site via the stormwater network

5.3 Water Quality Triggers and Acceptable Treatment Devices

All development proposing open car parking or hard stand areas exceeding 200 square metres, or incorporating new roads shall capture sediments and pollutants from the site via:

- a) A minimum of one pollutant trap located between the last downstream stormwater and prior to discharge from the site, or
- b) A system of water sensitive urban design treatments such as vegetated swales, bio-retention systems and buffer strips to achieve the same performance as the pollutant trap(s), and;
- c) Submit a design report with the DA from a suitably qualified environmental consultant demonstrating how sediments and pollutants will be captured.

As the proposed development involves hardstand areas well in excess of 200m², a stormwater quality improvement device in accordance with the above requirements shall be implemented into the drainage system of the proposed development.

5.4 Proposed Treatment Devices

It is proposed to install a Gross Pollutant Trap (GPT) after the detention system at the outlet of the proposed development. The GPT will remove pollutants from stormwater flows before being discharged towards public stormwater infrastructure.

This report recommends the installation of a Rocla CDS Separator system to treat flows from the development site. A CDS Separator Nipper 0506 has an expected treatment flow of 20-22L/s. This flowrate is sufficient to service the development site for events up to the 1-year event, which is in excess of the minimum requirement for treatment of a 3-month event.



The CDS 0506 Nipper system is the most compact system in the Rocla CDS range. The unit is designed to remove gross pollutants, organic waste, silt, sediment and oils from stormwater. The typical performance of the CDS 0506 Nipper system is summarised in Table 6.1 below:

Table 5.1- CDS0506 Nipper Performance

Parameter	Expected Performance		
D: El	25L/s Treatment		
Pipe Flows	150L/s Max Flows		
Gross Pollutant Removal	98% (>3mm)		
Sediments Capture	>80%		
TSS Removal	>70%		
Total Phosphorous Removal	>30%		
Hydrocarbon Capture	80-90%		
Free Oil Storage Capacity	150L		

Alternative GPT systems may also be considered, with the provision that approval must be sought from Michael Bale and Associates prior to installation within the internal drainage system.

6. Conceptual Erosion and Sediment Control Plan

6.1 Introduction

During construction, it shall be the responsibility of the Principal Contractor to ensure that the development complies with the relevant erosion and sediment control objectives, as outlined in the Randwick City Council Development Control Plan.

This section of the report provides suggested inclusions in an erosion and sediment control plan for the proposed development site. This plan includes recommendations for monitoring & reporting responsibilities and the construction of site-specific sedimentation and erosion control measures. Detailed drawings specifying the proposed erosion and sediment control measures are to be provided at the Operational Works stage of the development.

6.2 General Erosion and Sediment Control Measures

It shall be the responsibility of the Principal Contractor to ensure the following erosion and sediment control measures are implemented on site:

- Clean stormwater runoff from upstream allotments is to be directed away from the development site using earth bunds or cut-off drains, as deemed appropriate by a suitable supervisor;
- The prevention of sediment runoff towards other allotments via the effective implementation of silt fences, sediment basins or other mitigation devices as deemed appropriate by a suitable supervisor;
- Sediment runoff shall also be prevented from entering the Council stormwater drainage system via the implementation of control measures such as gully pit sediment barriers;
- Erosion shakedown points shall be established at all vehicular access points, with shakedown areas regularly swept clean and sediment removed;
- Erosion and sediment control measures are not to be removed from the development site until the site is completely rehabilitated and the surface is capable of resisting erosion.

6.3 Spoil and Stockpile Management Measures

It shall be the responsibility of the Principal Contractor to ensure the following spoil and stockpile management measures are implemented on site:

- Where the stockpiling of spoil and excess earthworks is necessary on the development site, stockpiles shall be established as far away as possible from stormwater inlets and pipelines to reduce the likelihood of sediment runoff;
- Stockpiles are to be established within a designated zone of fill material and should be surrounded with appropriate erosion and sediment control measures.

6.4 Further Information

Randwick City Council provides a series of fact sheets titled 'Do It Right On Site' on their website. These provide members of the construction industry with guidelines on how to prevent erosion and sediment pollution of downstream waterways.

A conceptual erosion and sediment control plan is included in the Engineering Drawings attached as Appendix B of this report. This report displays the recommended erosion and sediment control measures to be implemented on the development site during construction.

7. Conclusion

This report has been prepared to support the lodgement of a development application for the development of a new student accommodation building. The proposed development comprises three stories of student accommodation, with a total allowance of 276 beds across various room layouts. The proposed Development Approval application applies to the following parcels of land:

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Client: Bluesky Private Real Estate
Council: Randwick City Council

Registered Site Area: 4,276m²

This report has addressed the management of stormwater quantity and quality to ensure that the proposed development complies with all necessary state and local government policies.

This report describes the design process for specifications of the following key infrastructure elements that will ensure the management of stormwater to achieve necessary standards.

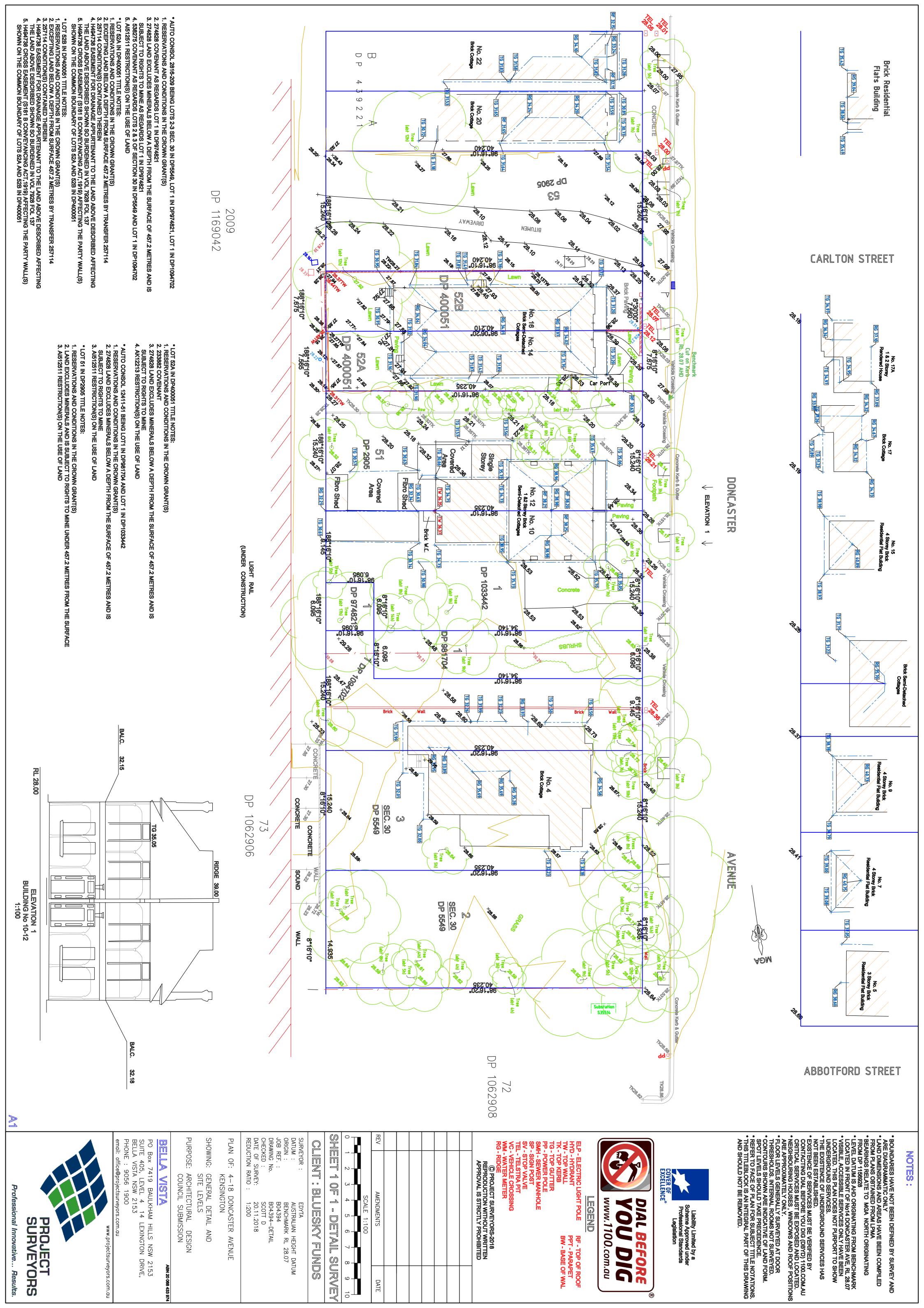
- A 153.0m³ detention tank to receive flows from the proposed development;
- A Rocla CDS 0506 Nipper Gross Pollutant Trap system to treat minor flows from the development site.

This report has addressed the management of stormwater quantity and quality and demonstrated that no additional works are required to ensure that the proposed development complies with all necessary state and local government policies.

It is the opinion of this report that the proposed stormwater quantity and quality management systems are suitable for a development of this scale and potential impacts.



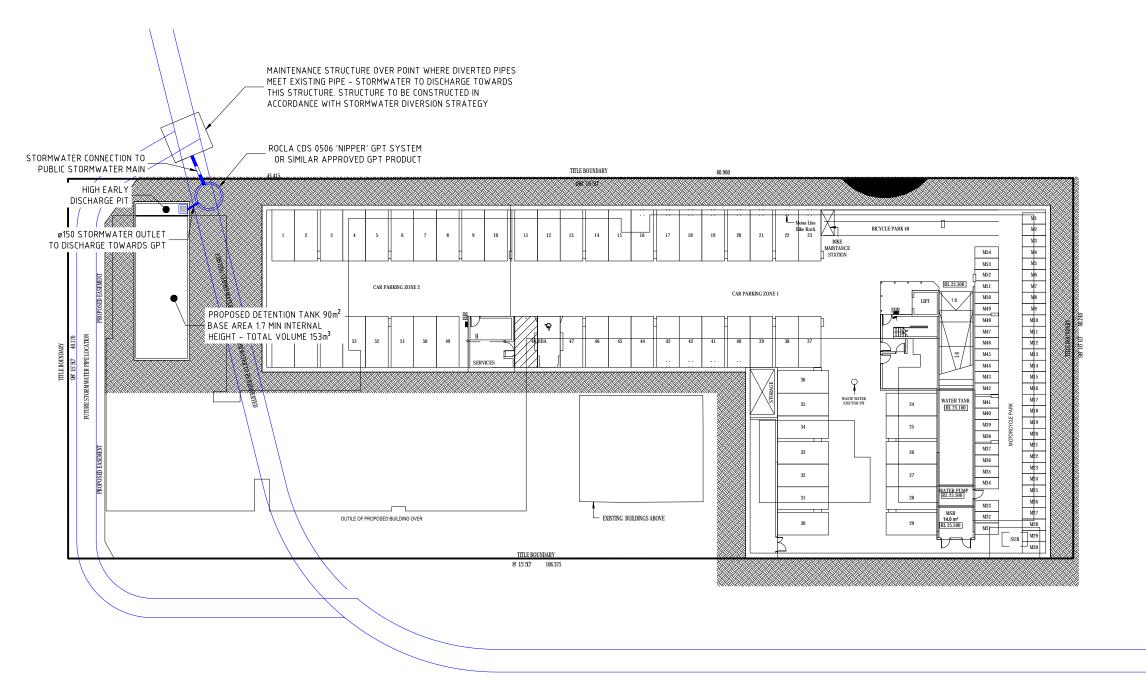
Appendix A Site Survey





Appendix B Engineering Drawings





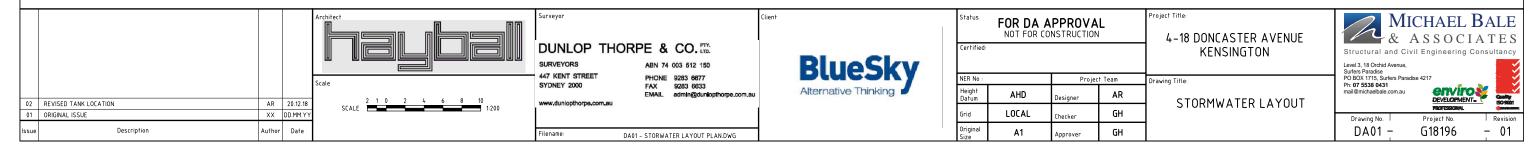
SITE BOUNDARY PROPOSED STORMWATER LINE PROPOSED STORMWATER PIT

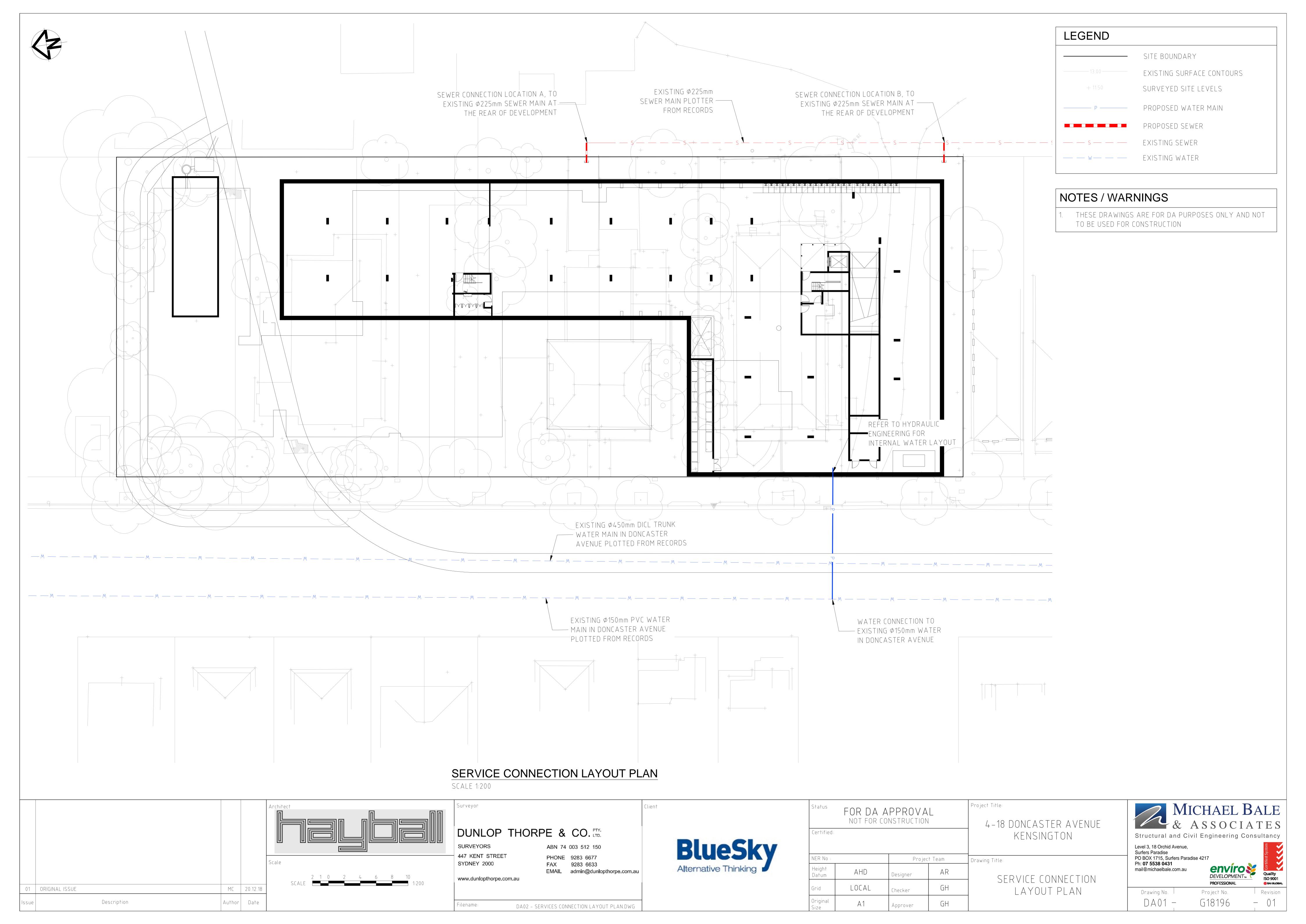
NOTES / WARNINGS

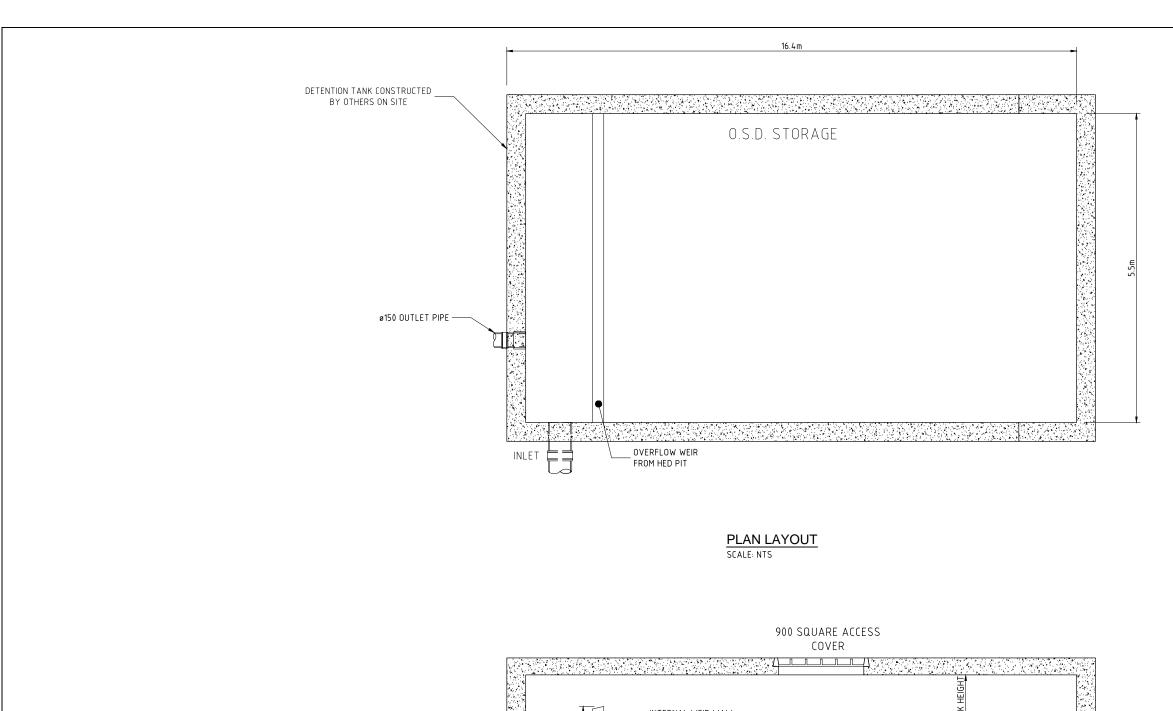
 THESE DRAWINGS ARE FOR DA PURPOSES ONLY AND NOT TO BE USED FOR CONSTRUCTION

STORMWATER LAYOUT PLAN

SCALE 1:200

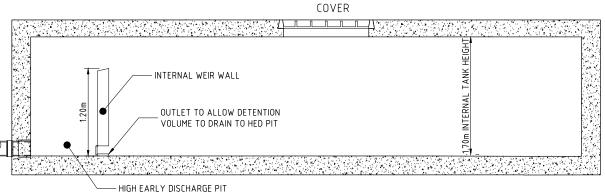




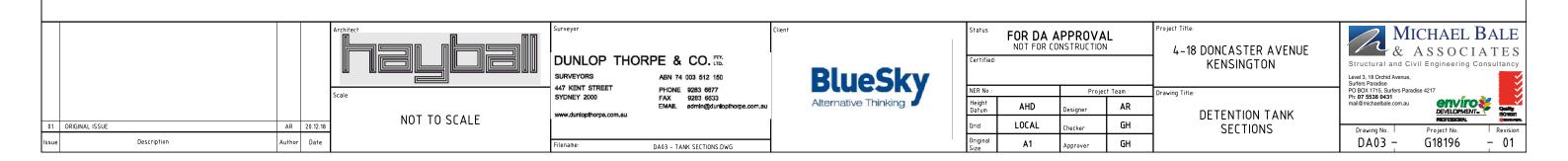


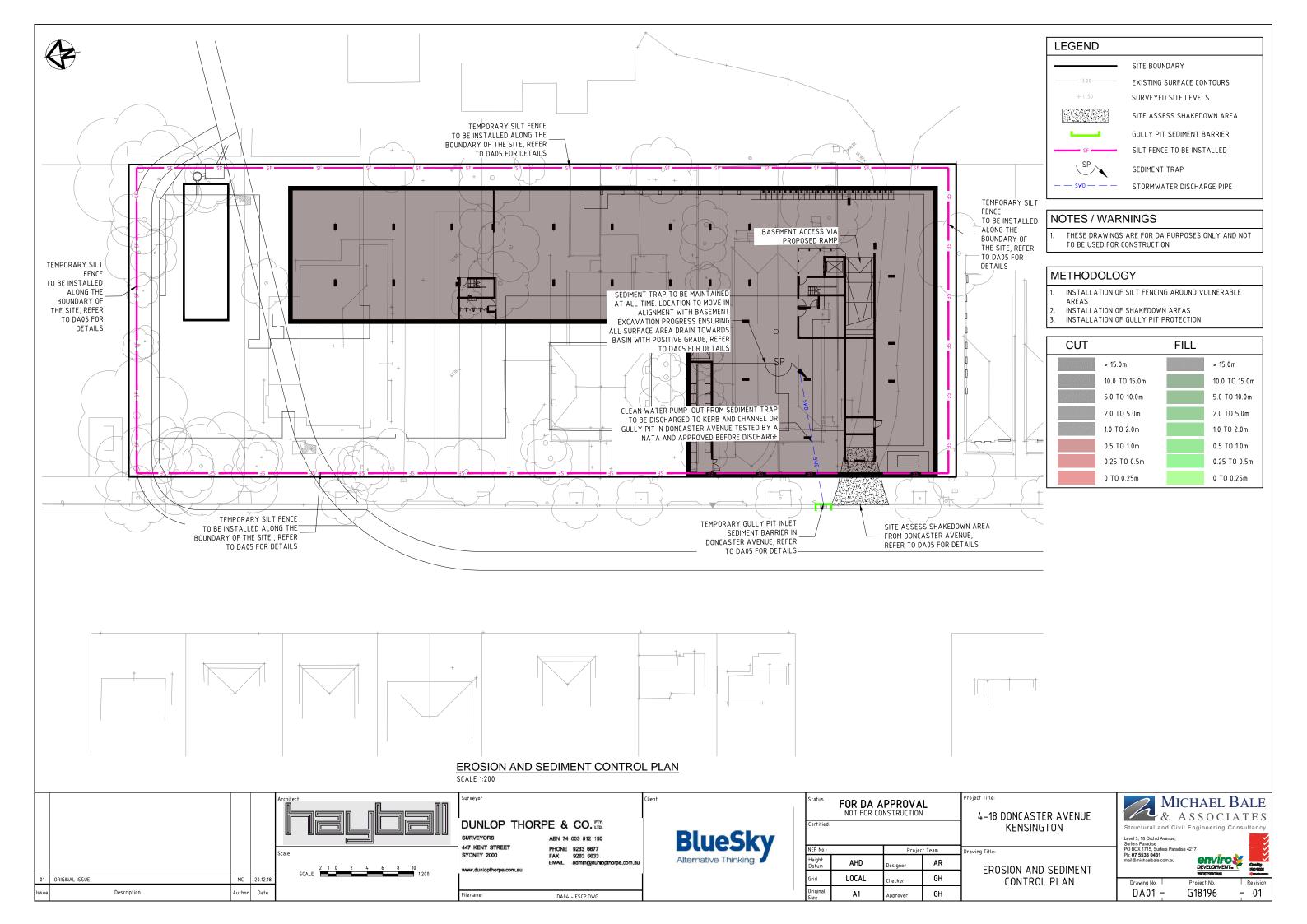
NOTES / WARNINGS

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SECTION VIEW SCALE: NTS





SILT MANAGEMENT PROGRAM

PHASE DESCRIPTION

SITE ESTABLISHMENT •SILT FENCES TO BE ERECTED, VEHICLE SHAKEDOWN &

GULLY PIT SEDIMENT BARRIER INSTALLED

•TOPSOIL TO BE STRIPPED & STOCKPILED. SILT FENCES, CONSTRUCTION VEHICLE SHAKEDOWN, GULLY PIT SEDIMENT BARRIER &

SEDIMENT BASIN

•TOPSOIL, SEEDING & TURFING TO BE COMPLETED. SILT SITE STABILISATION FENCES, GULLY PIT SEDIMENT BARRIER & VEHICLE

SHAKEDOWN TO BE REMOVED ONCE ADEQUATE COVER IS

SEWER/WATER STORMWATER/SERVICES. •EXCAVATED MATERIAL TO BE PLACED ON HIGH SIDE OF TRENCH IN ORDER TO PROTECT PIPE WORK AND DIRECT SURFACE FLOW AWAY FROM EXCAVATIONS.

•MEASURES ARE TO BE TAKEN TO PREVENT SILT ROADWORKS INGRESS TO STORMWATER SYSTEM

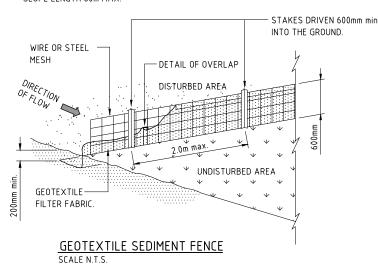
MAINTENANCE PERIOD •EROSION CONTROL MEASURES ARE TO BE INSPECTED AFTER MAJOR EVENTS (> 25mm). ANY REPAIRS

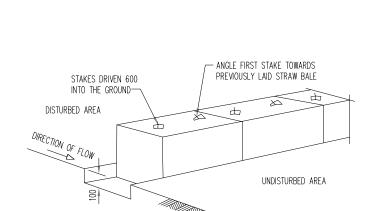
REQUIRED ARE TO BE EFFECTED IMMEDIATELY.

SEDIMENT AND EROSION CONTROL PROGRAM

- 1. THE CONTRACTOR IS TO TAKE ALL NECESSARY PRECAUTIONS TO CONTROL EROSION AND DOWNSTREAM SEDIMENTATION DURING ALL STAGES OF CONSTRUCTION INCLUDING THE MAINTENANCE PERIOD.
- ALL SEDIMENT CONTROL DEVICES SHALL BE MONITORED, CLEANED AND/OR REPAIRED WHENEVER THE ACCUMULATED SEDIMENT REDUCES THE CAPACITY
- THE SEDIMENT BASINS ARE TO BE RELOCATED AND REINSTATED AS THE BASEMENT EXCAVATION PROGRESSES, ENSURING THAT ALL SITE RUNOFF CAN CONSTANTLY DRAIN TO BASIN.
- THE SEDIMENT BASINS ARE TO BE INSPECTED REGULARLY AND CLEANED OUT WHEN SEDIMENT STORAGE ACHIEVES 50% OF THE PROVIDED STORAGE
- THE EXCAVATED BASEMENT AREA ABOVE THE SEDIMENT BASINS ARE TO BE UNOBSTRUCTED AND UTILISED AS THE SETTLEMENT ZONE FOR SEDIMENTS IN THE EVENT OF A MAJOR RAINFALL EVENT.
- AFTER EVERY RAINFALL EVENT THE SEDIMENT BASINS ARE TO BE INSPECTED.
 SETTLED SEDIMENTS ARE TO BE EXCAVATED AND DISPOSED OF, CLEAN WATER SEPARATED FROM SEDIMENT IS TO BE PUMPED OUT TO NEAREST KERB AND CHANNEL
- PROVISION TO BE MADE FOR DIRT/SAND REMOVAL FROM CONSTRUCTION VEHICLES PRIOR TO TRAVEL ON PUBLIC ROADS. IN THE EVENT OF ROCK-SHAKE DOWN BEING SOAKED OR SEDIMENT LADEN VEHICLES MUST BE MANUALLY WASHED UNTIL THE ROCK SHAKE DOWN IS REPAIRED.
- ANY SILT OR SEDIMENT CAUSED BY THE MOVEMENT OF CONSTRUCTION TRAFFIC ON EXISTING ROADS IS TO BE REMOVED DAILY.
- THE CONTRACTOR IS TO BE RESPONSIBLE FOR THE DAILY REMOVAL OF SILT FOR THE DURATION OF THE CONSTRUCTION AND MAINTENANCE PERIOD, THAT HAS BEEN BLOWN, WASHED OR TRACKED FROM THE SITE ONTO COUNCIL ROADS OR INTO COUNCIL DRAINAGE SYSTEMS, WATERCOURSES AND ANY PRIVATE PROPERTY.
- 10. THE CONTRACTOR IS TO BE RESPONSIBLE FOR THE CONTROL OF DUST EMANATING FROM THE SITE AT ALL TIMES, INCLUDING ON WEEKENDS AND PUBLIC HOLIDAYS, FOR THE DURATION OF THE CONSTRUCTION AND MAINTENANCE PERIOD.
- ALL RUBBISH, WASTE MATERIALS, OILS AND FUELS ARE TO BE CONTAINED APPROPRIATELY. OIL AND FUEL SPILLS ARE NOT TO ENTER ANY DRAINAGE SYSTEM OR WATERCOURSE.
- THE CONTRACTOR IS TO ENSURE THAT NO SILT REACHES THE DOWNSTREAM WATER COURSE AND IS TO PROVIDE ADEQUATE PROTECTION TO PREVENT THIS OCCURRING
- 13. ALL WATER COLLECTED IN SEDIMENT BASIN DURING THE CONSTRUCTION PHASE MUST BE TESTED BY A NATA AND APPROVED FOR RELEASE PRIOR TO PUMP-OUT TO KERB AND CHANNEL. ALTERNATIVELY WATER MAY BE REMOVED FROM SITE AND DUMPED AT AN APPROVED LOCATION.

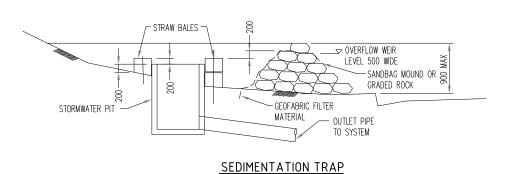
DRAINAGE AREA 0.6ha. MAX. SLOPE GRADIENT 1: 2 MAX. SLOPE LENGTH 60m MAX.

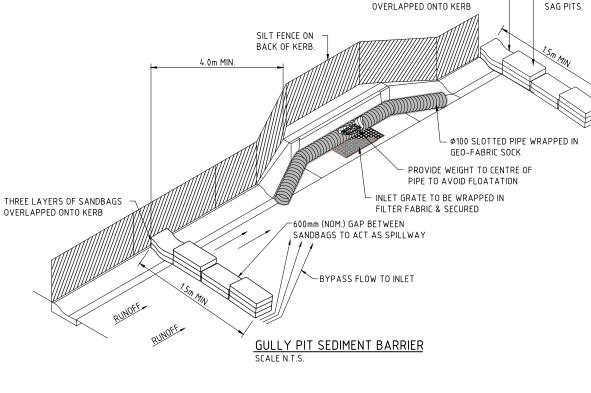




HAY BALE SEDIMENT FILTER

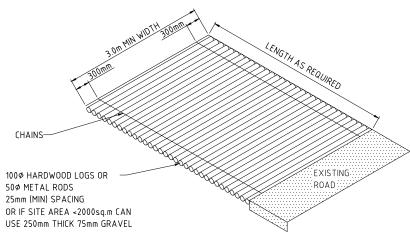
NOTE: STAKE TO BE EITHER TAR COATED STAR OR 50 x 50 HARDWOOD



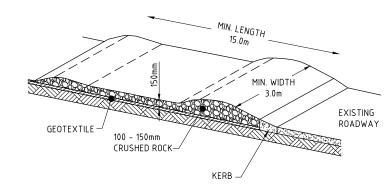


THREE LAYERS OF SANDBAGS

TO BE INCLUDED FOR



METAL GRID SHAKE DOWN (OR APPROVED EQUIVALENT) SCALE N.T.S.



ROCK SHAKE DOWN AREA DETAIL SCALENTS

