

CIVIL ENGINEERING SERVICES

UNSW Health Translation Hub Development Application Report



DOCUMENT CONTROL

05	24 th February 2021	Issue for SSDA	Current
04	3 rd February 2021	Issue for SSDA	Superseded
03	16 th December 2020	Issue for SSDA	Superseded
02	15 th December 2020	Issue for SSDA	Superseded
01	4 th December 2020	DRAFT Issue for SSDA	Superseded
Rev #	Date	Description of Change	Status

APPROVALS

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CIVIL ENGINEERING SERVICES

1. INTRODUCTION

This report supports a State Significant Development Application (SSDA) for the proposed UNSW Health Translation Hub (UNSW HTH) at the Randwick Hospitals Campus (RHC), which is submitted to the Department of Planning, Industry and Environment (DPIE) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (the Act). Health Infrastructure on behalf of Health Administration Corporation (HAC) is the applicant for the UNSW HTH, which will be delivered with the University of New South Wales (UNSW).

The UNSW HTH forms an extension of the existing and proposed hospital facilities at the RHC, providing a specialist health-related research and education facility on the Campus.

1.1 BACKGROUND

A partnership agreement has been established between HAC and the UNSW to develop the UNSW HTH. This partnership will also allow UNSW to operate the building as well as manage its design and delivery.

The partnership will bring together educational and medical researchers, clinicians, educators and public health officials to drive excellence, and support the rapid translation of research, innovation and education into improved patient care. It will strengthen the symbiotic relationship between UNSW and the RHC and its research institutes and broader health partners which form part of the Randwick Health and Innovation Precinct (RHIP).

The UNSW HTH will build on the existing affiliation between UNSW and the Sydney Children's Hospital Network (SCHN); Health Infrastructure; and the South Eastern Sydney Local Health District, including Prince of Wales Hospital, The Royal Hospital for Women and Eastern Suburbs Mental Health Services.

1.2 SITE DESCRIPTION AND LOCATION

The site is located approximately 6 kilometres (km) from the Sydney Central Business District (CBD), within the Randwick Local Government Area (LGA). It is located approximately 4km from Sydney Airport. Figure 1.1 provides a regional context map of the site showing its location in relation to the Sydney CBD and surrounding centres.

This block sits in between the existing Randwick Hospitals Campus and the UNSW Kensington Campus, and directly adjacent to the CBD and South East Light Rail service which runs along High Street (Error! Reference source not found.). The site of the proposed UNSW HTH has an area of 8,897square metres (sqm).

The site has been subject to some site preparation and early works associated with the broader development of the block. Adjacent to the site, along the High Street and Botany Road frontages, runs a 6-metre (m) wide stormwater and sewage easement.

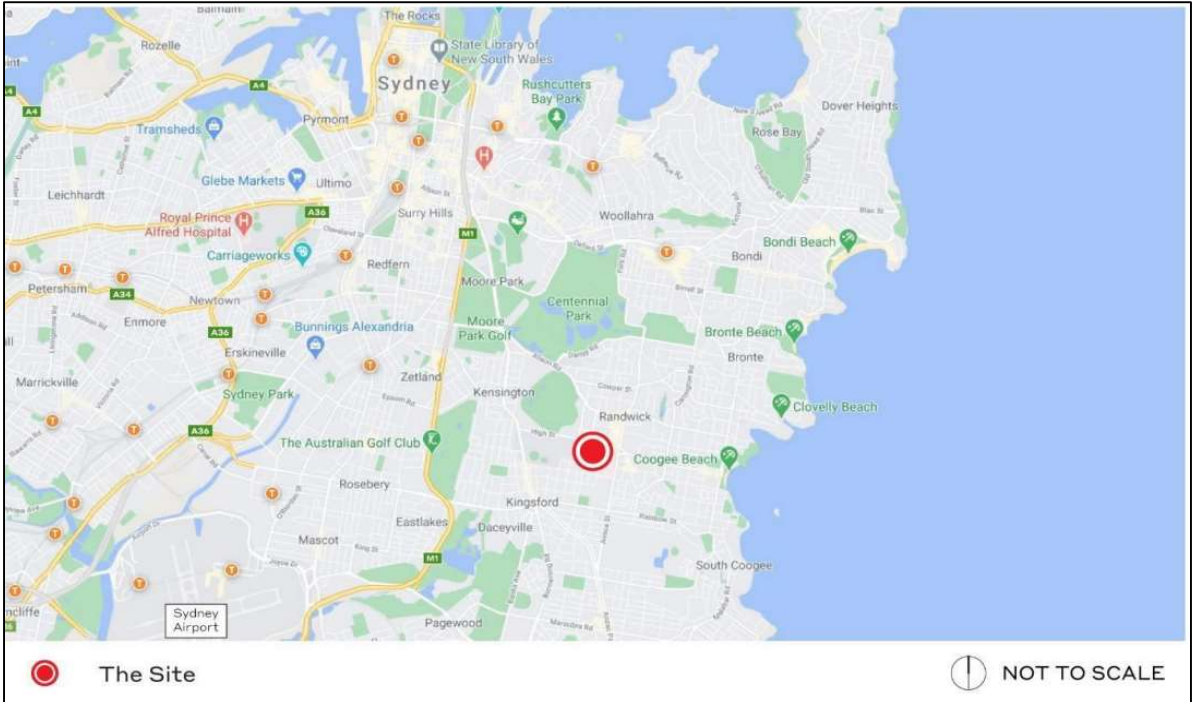


Figure 1.1: Site Context (Source: Google Maps and Ethos Urban)

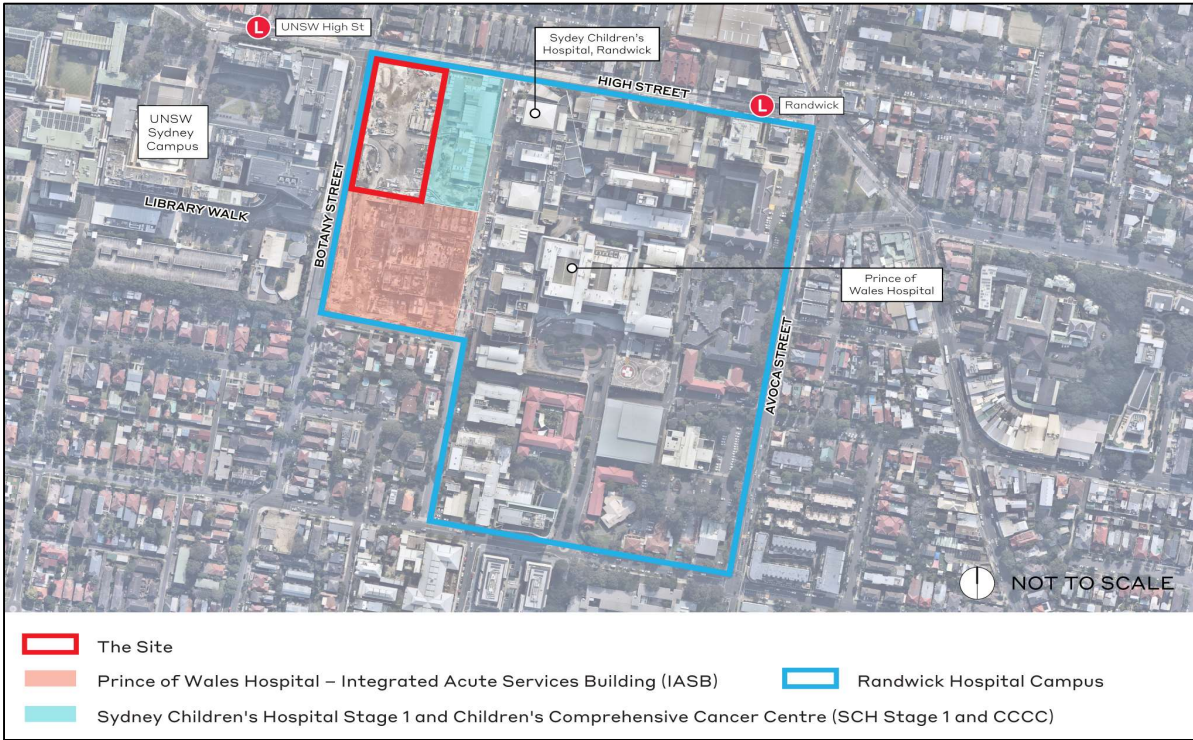


Figure 1.2: Site Aerial (Source: Nearmaps and Ethos Urban)

1.3 OVERVIEW OF THE PROPOSED DEVELOPMENT

The proposal involves the expansion of the existing and proposed hospital facilities at the RHC to provide ancillary health research and education uses. This will be in the form of a single building which will be physically connected (at podium level) to the neighbouring Sydney Children's Hospital Stage 1 and Children's Comprehensive Cancer Centre (SCH Stage 1 and the CCCC) redevelopment.

Specifically, the SSDA seeks approval for:

- Relevant site preparation, excavation and enabling works.
- Construction and use of a new, 15-storey building accommodating research and health education uses, comprising:
 - One basement level; and
 - A total GFA of approximately 35,600sqm, including health-related research, education and administrative floor space.
- Pedestrian link bridges connecting the UNSW Kensington Campus to the RHC, via the Wallace Wurth Building to the UNSW HTH and through to the SCH Stage 1 and the CCCC.
- Landscaping and public domain works, including the creation of over 2,500 sqm of new publicly accessible open space within the eastern portion of the site, sitting between the UNSW HTH and the SCH Stage 1 and the CCCC redevelopment.
- Building signage.
- Stratum subdivision.
- Services and utilities augmentation as required.

1.4 OPERATION AND FUNCTION OF THE HTH

The UNSW HTH will be an expansion of the RHC to accommodate new health related education, research, and administrative facilities. It will include:

- Purpose-built spaces for health educators and researchers to work alongside clinicians.
- Floor plates for health translation research focused work with physical connections to the SCH Stage 1 and the CCCC and wider Randwick Hospitals Campus.
- Dedicated facilities for the CCCC directly linking the UNSW HTH with the SCH Stage 1 and the CCCC.
- An education hub, including education and training rooms allowing hospital staff to educate and train UNSW medical students.
- Facilities for education, training, research, seminars and industry events.
- Clinical schools for the Women's and Children's Health, Psychiatry and Prince of Wales Hospital.
- Ambulatory care clinics including in neurosciences, public and population health.
- Supporting facilities including retail premises.

1.5 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Department of Planning, Industry and Environment has issued Secretary's Environmental Assessment Requirements (SEARs) for the proposed development. This report has been prepared having regard to the relevant SEARs as follows:

Sears Requirement / Description	Relevant Section of Report
15. Stormwater Drainage	
<p>Provide:</p> <ul style="list-style-type: none"> a preliminary stormwater management plan for the development that: <ul style="list-style-type: none"> is prepared by a suitably qualified person in consultation with Council and any other relevant drainage authority details the proposed drainage design for the site including on-site detention facilities, water quality measures and the nominated discharge point demonstrates compliance with Council or other drainage authority requirements. stormwater plans detailing the proposed methods of drainage without impacting on the downstream properties. <p>Where drainage infrastructure works are required that would be handed over to Council, provide full hydraulic details and detailed plans and specifications of proposed works that have been prepared in consultation with Council and comply with Council's relevant standards.</p>	<p>Refer Section 5 for details on the proposed stormwater drainage system.</p> <p>Stormwater drainage plans and details have been provided by WS&P on the following drawings:</p> <p>7047000-WS+P-CS-DA-C6.01 – Stormwater Layout Plan</p> <p>7047000-WS+P-CS-DA-C6.02 – Pit Schedule</p> <p>7047000-WS+P-CS-DA-C6.03 – Stormwater Catchment Plan</p> <p>7047000-WS+P-CS-DA-C6.04 – OSD Plan & Sections</p> <p>7047000-WS+P-CS-DA-C6.06 – Stormwater Drainage Details</p> <p>7047000-WS+P-CS-DA-C6.11 – WSUD Treatment Device Details</p> <p>Refer Section 6 for details on the proposed water sensitive urban design water quality treatment system.</p>
16. Flooding	
<ul style="list-style-type: none"> Identify any flood risk on-site in consultation with Council and having regard to the most recent flood studies for the project area and the potential effects of climate change, sea level rise and an increase in rainfall intensity Assess the impacts of the development, including any changes to flood risk on-site or off-site, and detail design solutions to mitigate flood risk where required. <p><u>Relevant Policies and Guidelines:</u></p> <p>NSW Floodplain Development Manual (DIPNR, 2005)</p>	<p>Refer Section 4.4 for the flooding design criteria consider and Section 5 for proposed stormwater drainage system.</p>

1.6 SUMMARY OF MITIGATION MEASURES

Based on the findings and recommendations of this report, the following measures are suggested to mitigate the identified impacts of the development:

Sears Requirement / Description	Mitigation Measure
15. Stormwater Drainage	
<p>Provide:</p> <ul style="list-style-type: none"> a preliminary stormwater management plan for the development that: <ul style="list-style-type: none"> is prepared by a suitably qualified person in consultation with Council and any other relevant drainage authority details the proposed drainage design for the site including on-site detention facilities, water quality measures and the nominated discharge point demonstrates compliance with Council or other drainage authority requirements. stormwater plans detailing the proposed methods of drainage without impacting on the downstream properties. <p>Where drainage infrastructure works are required that would be handed over to Council, provide full hydraulic details and detailed plans and specifications of proposed works that have been prepared in consultation with Council and comply with Council's relevant standards.</p>	<ul style="list-style-type: none"> This report outlines the preliminary stormwater management plan. <ul style="list-style-type: none"> All Council and relevant authority requirements which has been considered are listed in Section 4. Refer Section 5 for details on the proposed stormwater drainage system. Refer Section 6 for details on the proposed water sensitive urban design water quality treatment system. Refer to Section 5.2 for the stormwater drainage modelling results and Section 6.4 for the water quality modelling results which demonstrate compliance with the relevant requirements. Stormwater drainage plans and details have been provided by WS&P on the following drawings: <ul style="list-style-type: none"> 7047000-WS+P-CS-DA-C6.01 – Stormwater Layout Plan 7047000-WS+P-CS-DA-C6.02 – Pit Schedule 7047000-WS+P-CS-DA-C6.03 – Stormwater Catchment Plan 7047000-WS+P-CS-DA-C6.04 – OSD Plan & Sections 7047000-WS+P-CS-DA-C6.06 – Stormwater Drainage Details 7047000-WS+P-CS-DA-C6.11 – WSUD Treatment Device Details <p>There is no infrastructure proposed as part of the development to be handed over to Council.</p>

Sears Requirement / Description	Mitigation Measure
16. Flooding	
<ul style="list-style-type: none"> Identify any flood risk on-site in consultation with Council and having regard to the most recent flood studies for the project area and the potential effects of climate change, sea level rise and an increase in rainfall intensity Assess the impacts of the development, including any changes to flood risk on-site or off-site, and detail design solutions to mitigate flood risk where required. <p><u>Relevant Policies and Guidelines:</u> NSW Floodplain Development Manual (DIPNR, 2005)</p>	<ul style="list-style-type: none"> The Randwick Campus redevelopment ASB Project Summary Flood Report by BMT dated October 2018, the BMT letter dated 17th March 2019 which address the Probable Maximum Flood conditions in Botany, and Council's flood planning requirements have been considered. Refer to Section 4.4 for the flooding design criteria. The flood risks have been considered on-site in-line with the adjoining NSW Health Infrastructure projects and BMT Flood and Stormwater Modelling report.

2. ABBREVIATIONS AND DEFINITIONS

AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ARI	Average Recurrence Interval
DN	Diameter (mm)
EY	Exceedances per Year
IFD	Intensity-Frequency-Duration
L/s	Litres per second
m/s	Metres per second
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
OSD	On-Site Detention
PSD	Permissible Site Discharge
RCP	Reinforced Concrete Pipe
RWT	Rainwater Reuse Tank
SID	Safety In Design
SSR	Site Storage Requirement
WSC	Water Services Coordinator
WSUD	Water Sensitive Urban Design

The Use of Must, Shall & Should:

In accordance with the international Organisation for Standardisation (ISO) Directives, the word “shall” is used to state that a requirement is strictly to be followed in order to conform to a Performance Requirement. Consequently, there can be no deviation from that requirement, other than a specific tolerance.

It is noted that in legislation and specifications it is common to use the word “must” to express a requirement. The word “shall” in this document should be considered as equivalent to “must” in the legislation.

The word “should” introduces a suggestion or recommendation that is not a requirement. It is not necessary that such recommendations or suggestions be followed in order to comply with the Performance Requirement.

3. EXISTING DRAINAGE INFRASTRUCTURE

3.1 EXISTING DRAINAGE INFRASTRUCTURE & SITE GRADING

A desktop review of the existing site and a site inspection were undertaken to determine the existing site conditions and drainage infrastructure within the proposed development site. The investigations revealed the following:

- The existing site grades from north-east to south-west at an average grade of approximately 2.5%;
- There is existing stormwater culvert located at the north of the proposed development along the High Street when reticulates west then south along Botany Street. There are eight (8) grated inlet pits incorporated in the culvert along the north of the proposed development and there are twenty-two (22) grated surcharge pits to the south east of the proposed development. Refer to Schedule 1 Early and Enabling Works drawings prepared by ACOR for the details of the existing stormwater culvert;
- There is an existing DN1050 pipe located at the south of the proposed development which reticulates from east to west. There are four (4) 1500SQ pits located along this stormwater line which reticulate south along Botany Street;
- There is existing DN300 sewer pipe located adjacent the stormwater culvert alignment which intercepts the existing sewer line at the north with a sewer pit incorporated within the stormwater chamber. The sewer reticulates south. The existing DN300 sewer asset which previously traversed the proposed development, has been deviated, and therefore disused and removed;
- There are four (4) Council kerb inlet pits located in High Street fronting the proposed development.

Refer to Figure 3.1 below for aerial view of the current existing site and to Figure 3.2 for an illustration of the existing drainage infrastructure.

Refer to Schedule 1 for the existing stormwater culvert drawings by ACOR.



Figure 3.1: Aerial View of the Randwick Campus Redevelopment (September 26, 2020)

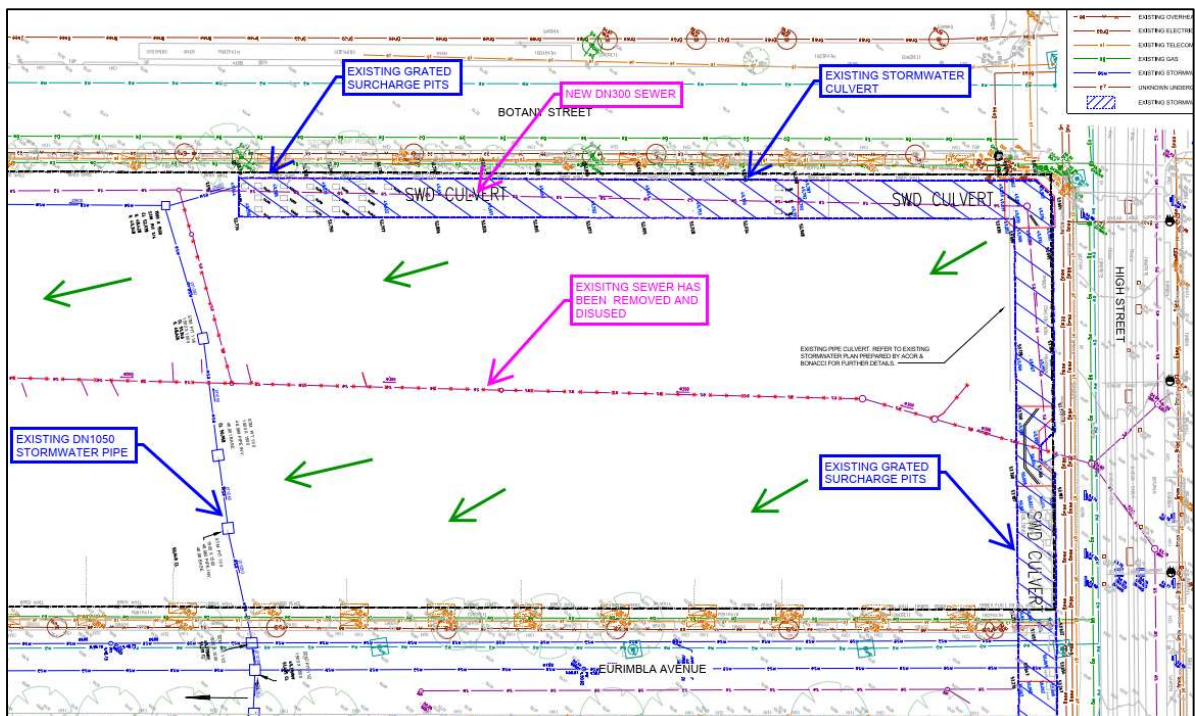


Figure 3.2: Existing Site Grading and Stormwater Infrastructure

4. AUTHORITY AND REGULATORY REQUIREMENTS

4.1 DESIGN CRITERIA

Table 4.1: Design Criteria

Item	Design Criteria
Stormwater Drainage Works	AS/NZS 3500.3 – 2015 – Stormwater Drainage Randwick City Council Development Control Plan 2013, Part B General Controls Randwick City Council Private Stormwater Code, March 2013
Water Quality Requirements and Proposed Treatment System	Draft NSW MUSIC Modelling Guidelines 2010 Randwick City Council Development Control Plan 2013, Part B General Controls
Sediment and Erosion Control	Landcom 'Blue Book' – Managing Urban Stormwater Soils and Construction Guideline Edition 4

The proposed development application design has considered the *Planning Secretary's Environmental Assessment Requirement, Section 4.12 of the Environmental Planning and Assessment Act 1979*. The items related to civil and stormwater design has been set out in Table 4.2.

4.2 STORMWATER DRAINAGE AND ON-SITE DETENTION (OSD) REQUIREMENTS

With reference to the following documents, the Council requirements are presented in the sub-sections below:

- Randwick City Council *Private Stormwater Code (March 2013)*;
- Randwick City Council Development Control Plan 2013, Part B General Controls.

4.3 STORMWATER DRAINAGE REQUIREMENTS

- Post development stormwater discharge rates must not exceed pre-development discharge rates for all storm events up to 1 in 20-year storm;
- An overland escape route or overflow system must be provided from the OSD system to the Council's street drainage system for all storms up to and including the 1% AEP storm event. If the overland escape route is unavailable, the OSD tank must be sized to cater for the 1% AEP storm event;
- The permissible site discharge (PSD) of the site is to be determined using the rational method. As the site is located in the Northern Ward of Randwick City Council (RCC) On-Site Detention map, the rainfall intensity of 55.4 mm/hr (20% AEP storm of 1 hour duration);
- Stormwater discharged to the Council's drainage system cannot exceed the PSD for the site for all storms up to and including the 5% AEP storm event;
- The maximum discharge rate to Council's kerb and gutter in all areas must not exceed 25L/s for the 5% AEP storm event, and;
- Rainwater tanks cannot be used to meet OSD requirements.

Please refer to Schedule 2 for calculations of the site PSD and to Figure 4.1 for Randwick Council On-Site Detention Map and the location of the proposed system.



Figure 4.1: Randwick Council On-site Detention Map

- Minimum pit size is governed by pit depth to invert. For depth up to 600mm, minimum pit size of 450mm x 450mm is required. For pit depth between 600mm and 1m, minimum pit size of 600mm x 600mm is required. For pit depth above 1m, minimum pit size of 750mm x 900mm is required;
- Stormwater pipelines must be capable of discharging a 1 in 20-year storm flow. Minimum pipe size must be 150mm diameter. Site graded to direct any surplus flow to the proposed drainage system;
- Sediment/silt arrestor pits are to be provided within site prior to stormwater being discharged from the site, and;

- Trash screen is required, prior to discharge to public drainage system, to for reduction of floatable material.

4.4 FLOODING & FREEBOARD REQUIREMENTS

The proposed development in UNSW Health Translational Hub is within the flooding zone, therefore **500mm freeboard** requirements above the Probable Maximum Flood (PMF) to the habitable spaces are required for the proposed development. The PMF flood level on High Street is 55.738, therefore with the 500mm freeboard requirement, the lowest FFL for the proposed development is RL56.24.

The PMF flood level of 55.738 on High Street was provided by the Sydney Children's Hospital (SCH) Stage 1 and Comprehensive Children's Cancer Centre (CCCC) project team which is based on the flood model developed as part of the Integrated Acute Services Building (IASB) project.

Refer to Figure 4.2 for the location of the proposed development on the flooding map and to Schedule 3 for BMT flood report and letter.

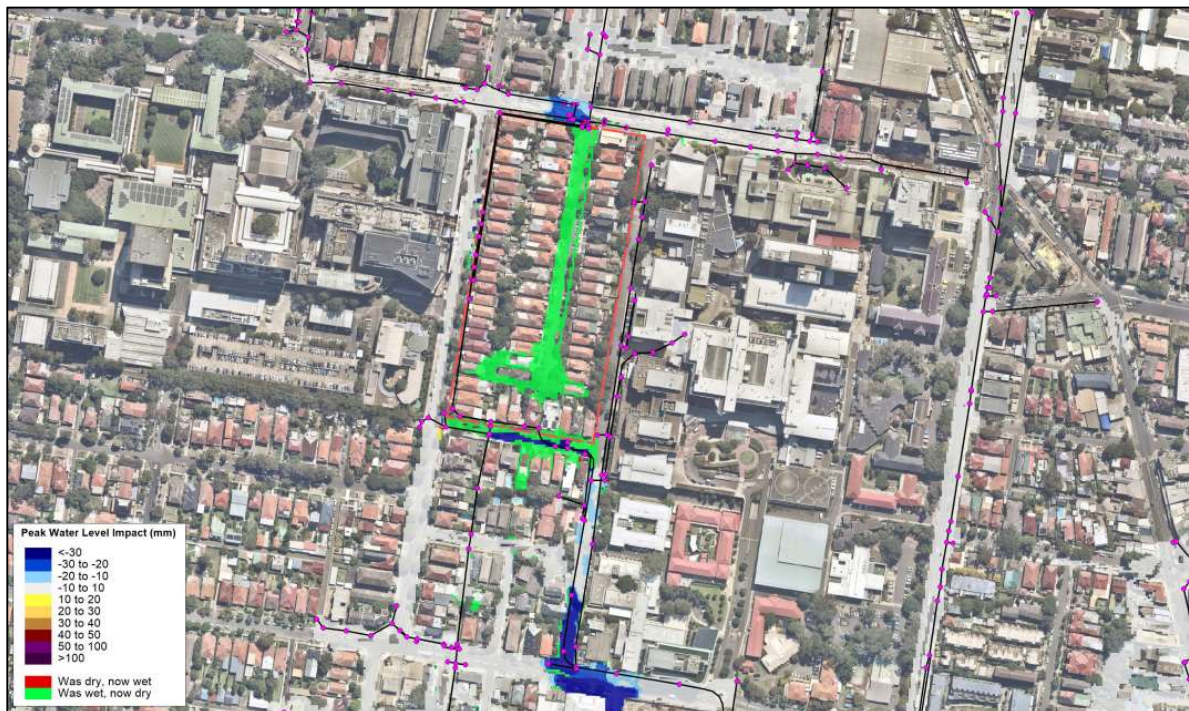


Figure 4.2: Location of the proposed development on the flooding map (Source: Randwick LGA Flood Study 2018 & BMT)

The nominated FFL level for the proposed building is RL56.24 and all external level have been designed to grade away from the development entries to minimise the risk of flooding.

4.5 WATER SENSITIVE URBAN DESIGN (WSUD) REQUIREMENTS

As Randwick City Council does not specify minimum pollutant reduction targets, the Green Building Council of Australia requirements for water quality have been adopted. Refer to Table 4.1 for the pollutant reduction targets.

Table 4.2: WSUD Stormwater Quality Reduction Targets (Source: GBCA)

Pollutant Type	Column A Target Reduction Percentage (%)	Column B Target Reduction Percentage (%)	Column C Target Reduction Percentage (%)
Gross Pollutants (GP)	85	90	95
Total Suspended Solids (TSS)	80	80	90
Total Phosphorus (TP)	30	60	70
Total Nitrogen (TN)	30	45	60

As there is no ESD Framework requirements regarding targets reduction, the standard industry practice for this type of development is to adopt Column B targets.

5. PROPOSED STORMWATER SYSTEM

The total site development area is **8897 m²**. A breakdown of the proposed development area is presented in Table 5.1.

Table 5.1: Breakdown of Proposed Development Site Catchment

Catchment	Impervious (m ²)	Pervious (m ²)	Total Area (m ²)
Plaza, Landscape & Hardstands	2401	981	3382
Roof	3865	-	3865
Bypass	825	825	1650
Total Area	7091	1806	8897

It is proposed that there will be On-Site Detention tank located suspended in the Basement. The size of the OSD tank has been calculated based on the Randwick City Council requirements and the proposed size is **300m³**. Please refer to Figure 4.1 for the proposed location of the OSD Tank and Schedule 2 for the PSD Calculation.

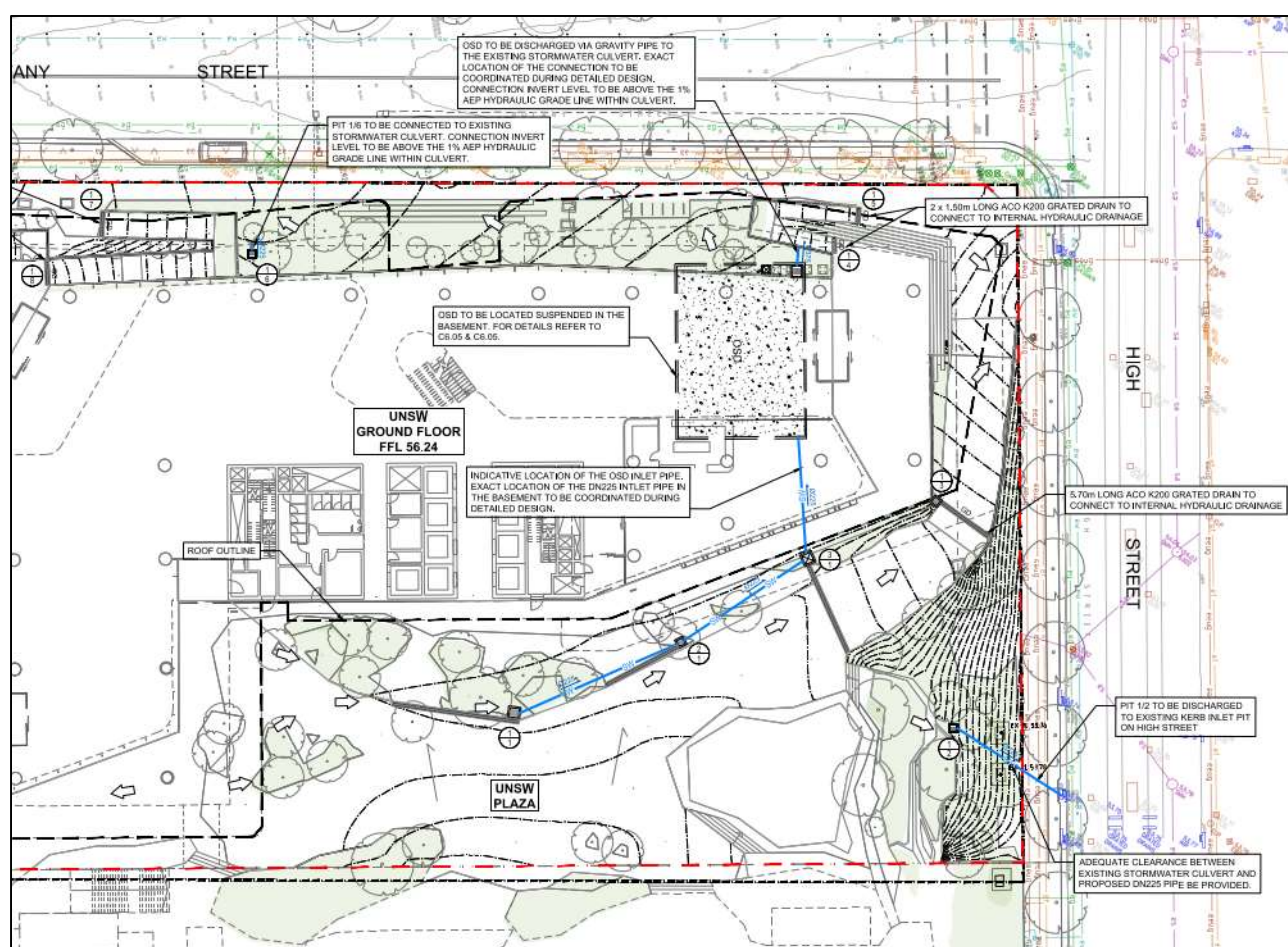


Figure 4.1: Proposed location of On-Site Detention Tank.

5.1 STORMWATER SYSTEM DESIGN

5.1.1 DRAINS INPUT PARAMETERS

The drainage system has been modelled utilising DRAINS to ensure the system is designed to meet Council and the ESD framework stormwater requirements. DRAINS is a stormwater drainage design and analysis program which performs hydraulic grade line analysis and generates the flows which would occur for a particular Annual Exceedance Probability (AEP) storm event.

The catchment characteristic factor values which have been used in the DRAINS model are summarised below:

- Paved (impervious) Area Depression Storage 1mm
- Supplementary Area Depression Storage 1mm
- Grassed (Pervious) Area Depression Storage 5mm
- Soil Type - Normal 3.0
- Antecedent Moisture Condition (AMC) 3.0
- Minimum Pit Freeboard 300mm
- Blockage Factor for On-Grade Pits 20%
- Blockage Factor for Sag Pits 50%

5.2 RESULTS

5.2.1 PRE VS POST REQUIREMENT

The proposed development has been designed to ensure that the post development stormwater runoff from the total development area does not exceed the pre-development runoff. Refer to Table 5.2 for the development area's site discharge results.

Table 5.2: Development Area's Site Discharge Results

Scenario	50% AEP Storm Event (L/s)	20% AEP Storm Event (L/s)	10% AEP Storm Event (L/s)	5% AEP Storm Event (L/s)
Pre-Development	172	246	298	351
Post Development	62	88	105	117

5.2.2 PSD REQUIREMENT

The proposed development has been designed to ensure that stormwater discharged to the Council's drainage system cannot exceed the PSD for the site for all storms up to and including the 5% AEP storm event. PSD for proposed development is **118 l/s**.

6. WATER QUALITY REQUIREMENTS AND PROPOSED TREATMENT SYSTEM

In order to comply with the Green Star requirements for the adequate treatment of stormwater runoff, treatment solutions have been provided to remove suspended solids, hydrocarbons, and nutrients prior to being discharged from site.

The pollutants that could potentially be generated as a result of the development are as follows:-

- Litter;
- Sediment;
- Nutrients (Phosphorus and Nitrogen), and;

The development has been modelled to demonstrate the performance of the stormwater treatment system utilising a program called MUSIC. MUSIC models the proposed stormwater treatment devices and estimates their respective performance against the performance targets of the project. The pollutants modelled in MUSIC are Gross Pollutants (GP), Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Nitrogen (TN).

6.1 RAINFALL

A continuous simulation of ten (10) years was run with a six (6) minute time step. The time period for which the model was run is 1st January 1988 to 31st December 1998. The rainfall station utilised was 066037 Sydney Airport AMO.

The average potential evapotranspiration (PET) data used in the MUSIC model was based on the average Sydney PET and is presented in Table 6.1 below.

Table 6.1: Evapotranspiration Data for MUSIC Modelling

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PET (mm)	180	135	128	85	58	43	43	58	88	127	152	163

6.2 RAINFALL RUNOFF PROPERTIES

In accordance with the Draft NSW MUSIC Modelling Guidelines, dated August 2010, the following Table 6.2 and Table 6.3 presents the rainfall runoff properties which have been used in the MUSIC model.

Table 6.2: MUSIC Rainfall Runoff Properties

Parameter	Unit	Value
Impervious Area Parameters		
Rainfall Threshold	mm	1.0 (for roads/paths etc.) 0.3 (for roofs)
Pervious Area Parameters		
Soil Storage Capacity	mm	120
Initial Storage Capacity	%	30
Field Capacity	mm	80
Infiltration Capacity co-efficient a		100
Infiltration Capacity co-efficient b		1.0
Groundwater Properties		
Initial depth	mm	10
Daily recharge rate	%	25
Daily base seepage rate	%	5
Daily seepage rate (%)	%	0

Table 6.3: Pollutant Concentration Parameters for MUSIC Source Nodes

Land Use Category		Concentration (mg/L-log ₁₀)					
		Total Solids	Suspended	Total Phosphorus		Total Nitrogen	
		Storm Flow	Base Flow	Storm Flow	Base Flow	Storm Flow	Base Flow
General Urban (incl public open space)	Mean	2.43	1.20	-0.30	-0.85	0.34	0.11
	Standard Deviation	0.32	0.17	0.25	0.19	0.19	0.12
Roofs	Mean	1.30	*	-0.89	*	0.30	*
	Standard Deviation	0.32	*	0.25	*	0.19	*

*Base flows are only generated from pervious areas; therefore these parameters are not relevant to impervious areas.

6.3 MUSIC MODEL CATCHMENT AREAS AND STORMWATER TREATMENT PLAN

The MUSIC model's total catchment area to be treated is **0.8897 Ha**. Refer to Table 6.4 for a breakdown of the MUSIC model catchment areas.

Table 6.4: Breakdown of MUSIC Model Catchment

Catchment	Impervious (Ha)	Pervious (Ha)	Total Area (Ha)
Plaza, Landscape & Hardstands	0.2847	0.1427	0.4274
Roof	0.3865	-	0.3865
Bypass	0.0379	0.0379	0.0758
Total Area	0.7091	0.1806	0.8897

The proposed site treatment will utilise two (2) different products by Ocean Protect: OceanGuard and 690mm PSORB Stormfilter.

The first level of treatment will include OceanGuards, which intercept surface water runoff at the pit grates and filter the runoff prior to entering the piped stormwater system. There will be total number of seven (7) Ocean Guards installed for the proposed development.

The OceanGuard is fitted with a monofilament 200 micron pore size filter bag that removes gross pollutants such as sediment, trash and debris, as well as suspended solids. Please refer to Figure 6.1 below for an illustration of a typical Ocean Guard.

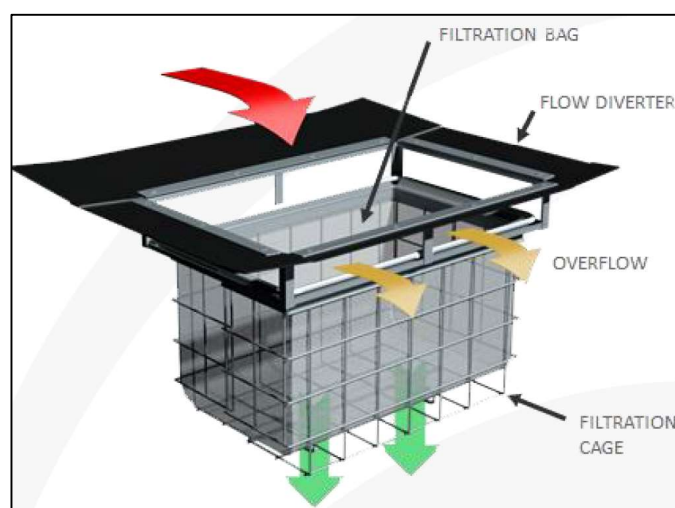


Figure 6.1: Typical OceanGuard Filter

The second treatment device to be utilised 690mm PSORB StormFilters. There will be ten (10) 690mm PSORD Stormfilters installed inside the proposed On Site Detention Tank.

A Psorb StormFilter cartridge system is provided to remove any remaining suspended sediments, hydrocarbons and nutrients which have entered the stormwater system. Please refer to Figure 6.2 below for an illustration of a typical Psorb StormFilter.

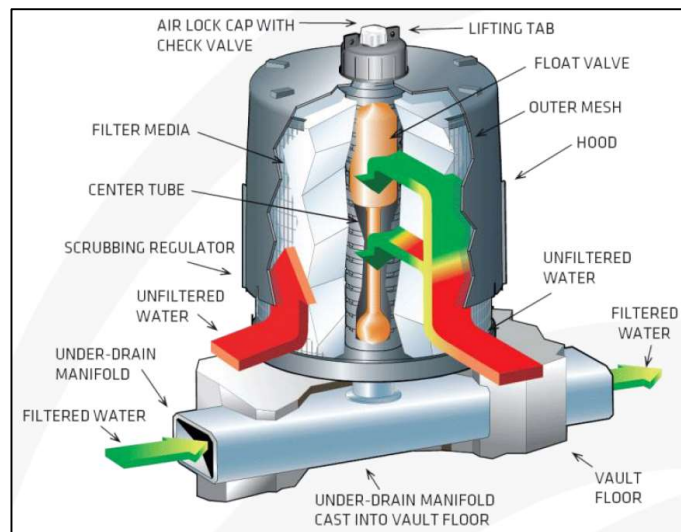


Figure 6.2: Typical PSorb StormFilter

6.4 MUSIC MODEL TREATMENT RESULTS

The stormwater quality treatment system has been modelled using the MUSIC software. Refer to **Figure 6.3** for the treatment plan and Table 6.5 for the treatment results.

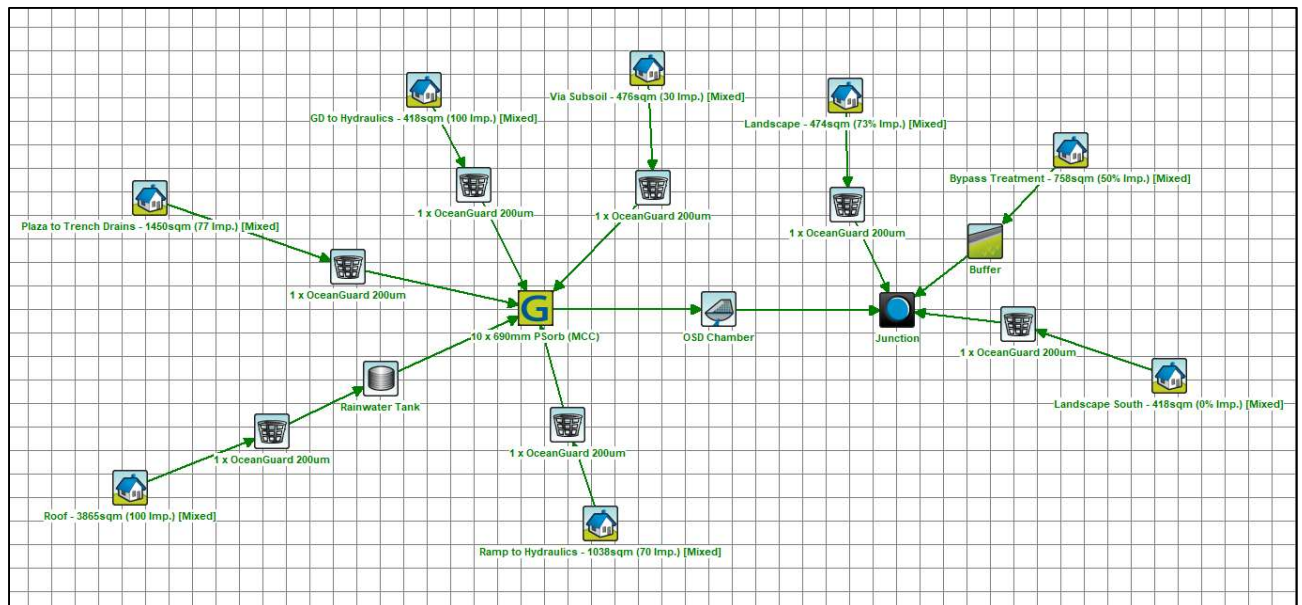


Figure 6.3: MUSIC Model Treatment Plan

Table 6.5: Percentage Based Load Reduction in Pollutant Results

Pollutant Type	Source (kg/yr)	Residual Load (kg/yr)	Reduction % Achieved	Target Reduction %
Gross Pollutants (GP)	236	17.2	92.7	90
Total Suspended Solids (TSS)	1910	280	85.3	80
Total Phosphorus (TP)	3.91	1.35	65.5	60
Total Nitrogen (TN)	28.4	14	50.7	45

As is demonstrated by the results, the development is achieving the Green Star Column B targets for pollutant load reduction.

7. SEDIMENT AND EROSION CONTROL

The Contractor for the works is required to provide Sedimentation and Erosion Control in accordance with the general requirements outlined below.

7.1 SITE PROTECTION MEASURES

It is proposed to provide the following protection measures will be incorporated in order to inhibit the movement of sediment off the site during the inground and above ground construction phases.

7.1.1 SITE ACCESS

Site access shall be established from Botany Street. Construction vehicles leaving the site shall be required to pass over a Temporary Construction Vehicle Entry consisting of a 1.5m long by 3m wide 'cattle rack'.

7.1.2 SEDIMENT CONTROL

All exposed earth areas where it may be possible for runoff to transport silt down slope shall be protected with a sediment and erosion control silt fence generally installed along the boundaries of the site.

The fence will be constructed in accordance with details provided by the Department of Conservation and Land Management incorporating geotextile fabric which will not allow suspended particles greater than 50mg/L non-filterable solids to pass through, and as such comply with the appropriate provisions of the Clean Waters Act 1970.

The construction of the silt fence will include the following:-

- Geotextile fabric buried to a maximum of 100mm below the surface;
- Overlapping any joins in the fabric, and;
- Turning up on the ends for a length of 1 metre in order to prevent volumes of suspended solids escaping in a storm event.

Please refer to Figure 7.1 for details.

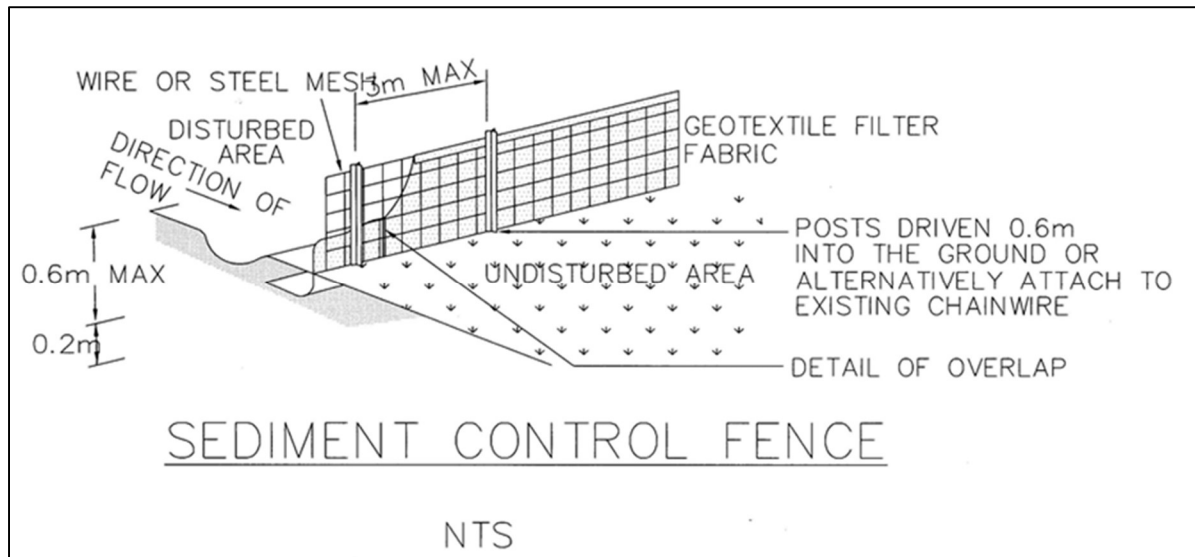


Figure 7.1: Sediment Control Fence Illustration

Existing stormwater infrastructure is also to be protected from incoming sediment using the following methods:

- Any Council owned road kerb entry and/or gully pits will be protected by Filter Bales and EcoSocks. Additional protection will be provided by inserting Water Clean Filter Cartridges into the gully opening, and;
- Internal site drainage pits shall be protected by Sediment Traps consisting of hay bales.

Please refer to Figure 7.2, Figure 7.3 and Figure 7.4 for details.

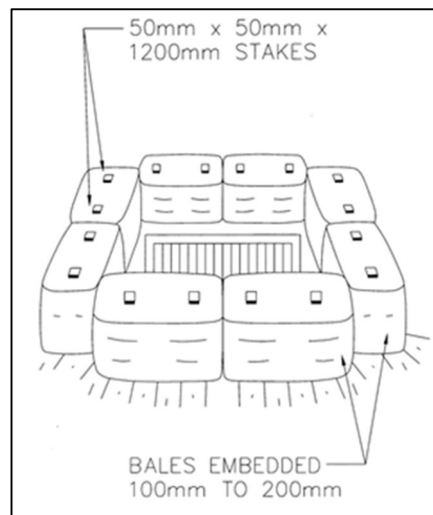


Figure 7.2: Stormwater Pit Sediment Trap (NTS)

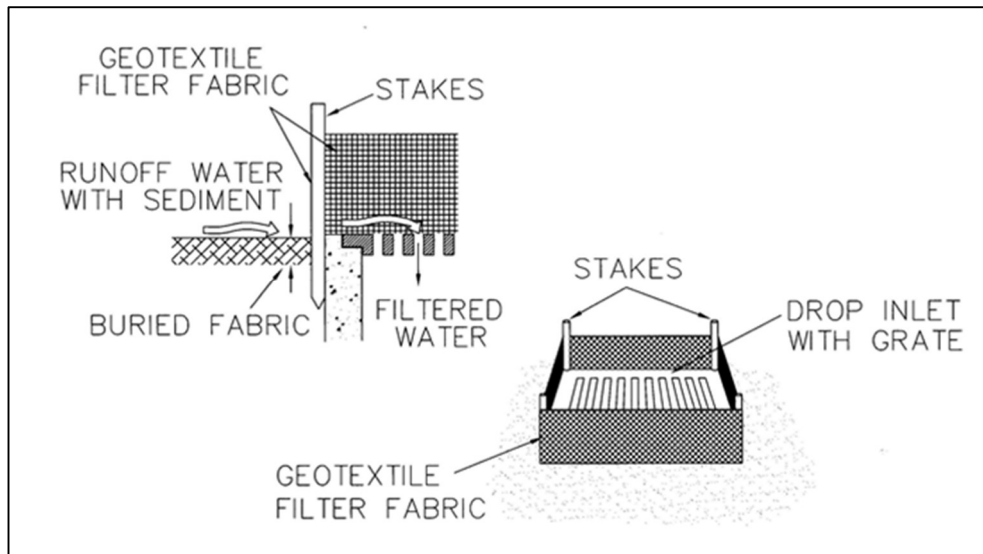


Figure 7.3: Geotextile Filter Fabric Drop Inlet Sediment Trap (NTS)



What are FilterBales?

Water Clean FilterBales are a unique new patented 7 stage sediment filter device developed to substantially reduce the migration of sediment and contaminants into drainage systems while allowing filtered water to easily pass through. FilterBales reduce customers' time and money by providing solutions to comply with environmental and regulatory requirements.

Durable, Dependable, Reusable. Replacing hay bales and other inadequate attempts to stop sediment run-off, FilterBales are durable and reusable, effectively stopping your money from "pouring down the drain". They are also lightweight and easy to handle. Replaceable Water Clean Filter Cartridges guarantee peak performance is maintained.




Ask your local FilterBales stockist about replacement frequencies in your area. Cartridges and filter covers should be changed when the infiltration rate decreases. Water Clean FilterBales are suitable for a wide range of sediment and water management situations and can be easily secured in place for long term use. The unique multi-directional filter system allows you to position Water Clean FilterBales in any direction without reducing performance.

Water Clean FilterBales can be fixed to concrete or bitumen surfaces using an epoxy mortar-binder or fixed to earth surfaces using 6-10 mm pegs or stakes. When positioning, the side with the red reflective marker should be facing traffic.



1. **FilterBales frames** are a perforated plastic structure made from recycled wheelie bins, battery cases, milk bottles etc.
2. **Filter medium** (bio engineered soil media) used in the filter cartridges is made from a special blend of recycled organic (RO) materials from kerbside and vegetation drop off centres. The RO hosts enhanced naturally occurring micro-organisms. The blend also contains natural minerals to capture nutrients. The filter medium is as safe as normal soil.
3. **FilterBales** have a seven (7) stage filtration system:
 1. In through the filter bag
 2. Through the perforated plastic structure wall
 3. In through the filter cartridge bag
 4. Through the bio engineered filter medium
 5. Out through the filter cartridge bag
 6. Out through the perforated plastic structure wall
 7. Out through the filter bag
4. **The filter bag** is made from 300-micron (one third of a millimetre) pore size geotextile. This is the first stage that filters much of the sediment and other suspended solids from the run-off water. The geotextile is designed to stop sediment and reduce clogging but allow water to pass through easily. The filter cartridge bags are made from a similar geotextile.
5. **FilterBales** work effectively up to "a one-in-one-year 48 hours, 100 mm "storm events". This is the largest storm event experienced since the commercialisation of FilterBales. Having handled this easily, Filter Bales are considered capable of handling much greater "storm events". During these storm events FilterBales were used inside gully pits in one application and on the ground surrounding the gully pit in another application.
6. **EcoSocks** are made from a similar geotextile to the filter cartridge bags and contain the same bio engineered soil media as the FilterBales. They appear able to stand up to as much wear and tear as a sandbag.
7. **FilterBales** are much lighter (at around 15 kgs dry weight) than hay bales. This reduces exposure to Occupational Health and Safety problems

Product Range

Item No.	Description	
HFB001	High FilterBale , suitable for high flow situations and higher retention time applications. Contains two standard size WaterClean Filter Cartridges in upright formation to treat contaminated waters. (605mm x 485mm x 460mm)	
LFB002	Low FilterBale , suitable for low flow situations and kerb & gutter applications. Multi-directional module containing two standard size WaterClean Filter Cartridges. (605mm x 485mm x 220mm)	
ESF004	Directional EcoSock , can be used in conjunction with FilterBales to direct water. Will also provide some sediment filtration from seepage through bio-remediating media contained within the EcoSock (1135mm x 160mm x 30mm)	

Accessories



Item No.	Description	
FCR004	WaterClean Filter Cartridges contain a unique blend of fixating and bio-remediating products that treat common pollutants. To achieve maximum performance, each FilterBale uses two WaterClean Filter Cartridges. (440mm x 400mm x 100mm)	
HBC005 (High bale)	Replaceable FilterBale covers , made from specially designed geotextile. FilterBale covers have a standard aperture of 300 microns.	
HBC006 (Low bale)	Replaceable FilterBale covers , made from specially designed geotextile. FilterBale covers have a standard aperture of 300 microns.	

Figure 7.4: Erosion Control Filter Products

7.2 TEMPORARY STORMWATER SYSTEM (WHERE REQUIRED)

Site runoff within the zones of the excavation will be drained into a central holding well within the excavation. Runoff will be allowed to settle out suspended particles and debris, and an acceptable water of 50mg per litre of Non Filterable Residues (NFR) is required to be achieved prior to discharge.

7.2.1 DUST CONTROL

The following dust control procedures will be adhered to:

- Loose loads entering or leaving the site will be securely covered by a tarpaulin or like material in accordance with RMS and Randwick City Council Guidelines.
- Soil transport vehicles will use the single main access to the site.
- There will be no burning of any materials on site.
- Water sprays will be used across the site to suppress dust. The water will be applied either by water sprinklers or water carts across ground surfaces whenever the surface has dried out and has the potential to generate visible levels of dust either by the operation of equipment over the surface or by wind. The watercraft will be equipped with a pump and sprays.
- Spraying water at the rate of not less than three (3) L/s and not less than 700kPa pressure. The area covered will be small enough that surfaces are maintained in a damp condition and large enough that runoff is not generated. The water spray equipment will be kept on site during the construction of the works.
- During excavation all trucks/machinery leaving the site will have their wheels washed and/or agitated prior to travelling on Council Roads.
- Fences will have shade cloth or similar fabric fixed to the inside of the fence.

7.2.2 MAINTENANCE

Generally, the following maintenance measures shall be adhered to during construction:-

- It will be the responsibility of the contractor to ensure sediment and erosion control devices on site are maintained. The devices shall be checked daily and the appropriate maintenance undertaken as necessary.
- Prior to the closing of the site each day, the road shall be swept and materials deposited back onto the site.
- Gutters and roadways will be kept clean regularly to maintain them free of sediment.
- Appropriate covering techniques, such as the use of plastic sheeting will be used to cover excavation faces, stockpiles and any unsealed surfaces;
- If dust is being generated from a given surface, and water sprays fail;
- If fugitive emissions have the potential to cause the ambient air quality to foul the ambient air quality;
- The area of soils exposed at any one time will be minimised wherever possible by excavating in a localised progressive manner over the site; and,
- Materials processing equipment suitably comply with regulatory requirements. The protection will include the covering of feed openings with rubber curtains or socks.

It is considered that by complying with the above, appropriate levels of protection are afforded to the site, the adjacent public roads, footpaths, and environment.

SCHEDULE 1 STORMWATER CULVERT DRAWINGS BY ACOR

EARLY AND ENABLING WORKS - PRINCE OF WALES - REDEVELOPMENT
ACUTE SERVICES BUILDING - RANDWICK NSW, AUSTRALIA
CIVIL SERVICES



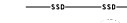


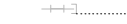
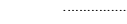
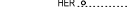
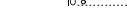












DRAWING NUMBER	DRAWING TITLE	REVISION
RCR-ACR-CV-01-DWG-DD-001	EARLY AND ENABLING WORKS - COVER SHEET	06
RCR-ACR-CV-01-DWG-DD-002	EARLY AND ENABLING WORKS - NOTES	03
RCR-ACR-CV-01-DWG-DD-101	EARLY AND ENABLING WORKS - STORMWATER LAYOUT - SHEET 1	04
RCR-ACR-CV-01-DWG-DD-102	EARLY AND ENABLING WORKS - STORMWATER LAYOUT - SHEET 2	05
RCR-ACR-CV-01-DWG-DD-201	EARLY AND ENABLING WORKS - STORMWATER LONGSECTION - SHEET 1	03
RCR-ACR-CV-01-DWG-DD-202	EARLY AND ENABLING WORKS - STORMWATER LONGSECTION - SHEET 2	04
RCR-ACR-CV-01-DWG-DD-203	EARLY AND ENABLING WORKS - STORMWATER LONGSECTION - SHEET 3	04
RCR-ACR-CV-01-DWG-DD-204	EARLY AND ENABLING WORKS - STORMWATER LONGSECTION - SHEET 4	04
RCR-ACR-CV-01-DWG-DD-205	EARLY AND ENABLING WORKS - STORMWATER LONGSECTION - SHEET 5	04
RCR-ACR-CV-01-DWG-DD-301	EARLY AND ENABLING WORKS - STANDARD DETAILS - SHEET 1	04
RCR-ACR-CV-01-DWG-DD-302	EARLY AND ENABLING WORKS - STANDARD DETAILS - SHEET 2	03
RCR-ACR-CV-01-DWG-DD-303	EARLY AND ENABLING WORKS - STANDARD DETAILS - SHEET 3	05
RCR-ACR-CV-01-DWG-DD-304	EARLY AND ENABLING WORKS - STANDARD DETAILS - SHEET 4	03
RCR-ACR-CV-01-DWG-DD-305	EARLY AND ENABLING WORKS - STANDARD DETAILS - SHEET 5	03
RCR-ACR-CV-01-DWG-DD-306	EARLY AND ENABLING WORKS - STANDARD DETAILS - SHEET 6	04
RCR-ACR-CV-01-DWG-DD-307	EARLY AND ENABLING WORKS - STANDARD DETAILS - SHEET 7	04
RCR-ACR-CV-01-DWG-DD-308	EARLY AND ENABLING WORKS - STANDARD DETAILS - SHEET 8	04
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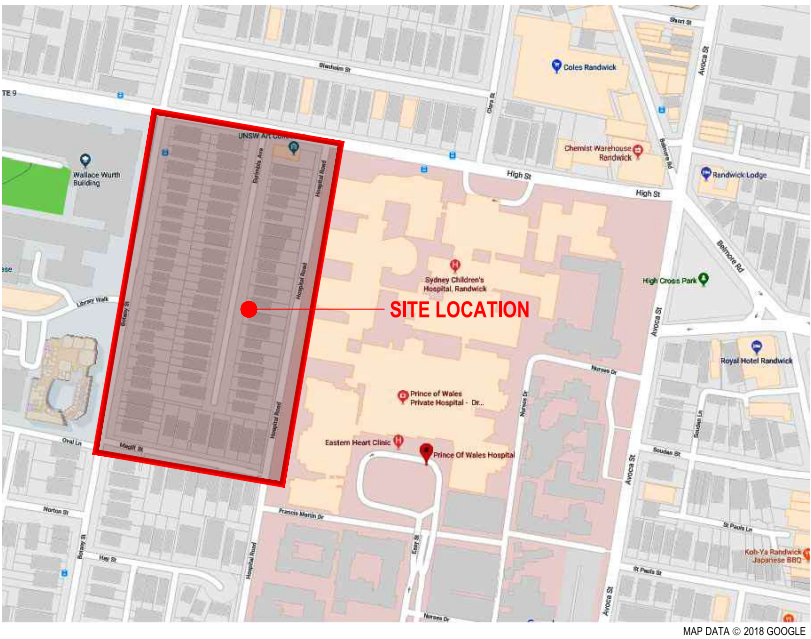


DIAL BEFORE YOU DIG

www.1100.com.au

IMPORTANT: THE CONTRACTOR IS TO MAINTAIN A CURRENT SET OF "DIAL BEFORE YOU DIG" DRAWINGS ON SITE AT ALL TIMES.

CIVIL LEGEND	
STORMWATER DRAINAGE LINE
PROPOSED SEWER LINE
SUBSOIL DRAINAGE LINE
STORMWATER DRAINAGE STRUCTURE WITH STRUCTURE NUMBER
SWALE DRAIN
CAP OFF
CONNECTION INTO EXISTING PIPE
	HER. 0.....HIGH END RISER
	IO. 0.....INTERMEDIATE RISER
	- S - - - - -EXISTING SEWER MAIN
	- C - - - - -EXISTING CONDUIT
	- FO - - - - -EXISTING FIBRE OPTIC
	- FI - - - - -EXISTING FIRE MAIN
	- G - - - - -EXISTING GAS MAIN
	- W - - - - -EXISTING WATER MAIN
	- SC - - - - -EXISTING SECURITY
	- RM - - - - -EXISTING RISING MAIN
	- D - - - - -EXISTING DRAINAGE
	- E - - - - -EXISTING ELECTRICITY
	- (ELV) - - - - -EXISTING LOW VOLTAGE ELECTRICITY
	- (EHV) - - - - -EXISTING HIGH VOLTAGE ELECTRICITY



AcOR

CONSULTANT

Suite 2, Level 1

33 Herbert Street

St Leonards

NSW 2065

T +61 2 9438 5098

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THE DRAWING.

ISSUE	DATE	FOR
01	10.08.18	ISSUE FOR CONSTRUCTION
02	02.10.18	RE-ISSUE FOR CONSTRUCTION
03	12.10.18	RE-ISSUE FOR CONSTRUCTION
04	18.12.18	RE-ISSUE FOR CONSTRUCTION
05	25.01.19	RE-ISSUE FOR CONSTRUCTION
06	20.02.19	RE-ISSUE FOR CONSTRUCTION

PROJECT MANAGEMENT
PWC
STRUCTURAL ENGINEERING
ENSTRUCT GROUP
MECHANICAL ENGINEERING
FREDON AIR
ELECTRICAL ENGINEERING
FREDON
HYDRAULIC ENGINEERING
CP CONSULTANTS
CLIENT



PROJECT
POW - REDEVELOPMENT
ACUTE SERVICES BUILDING
RANDWICK NSW AUSTRALIA
ACOR PROJECT NUMBER
SY180053
DRAWING KEY



TRUE NORTH

PROJECT NORTH

GRAPHIC SCALE

0 4 10

SCALE

@ B1 DO NOT SCALE

STATUS
FOR CONSTRUCTION
DRAWING
EARLY & ENABLING WORKS
COVER SHEET

DRAWING NUMBER	ISSUE
RCR-ACR-CV-01-DWG-DD-001	06

GENERAL NOTES	
1.	CIVIL TRADE CONTRACTOR TO LOCATE BY ELECTRONIC MEANS IN BOTH LINE AND LEVEL, ALL EXISTING UNDERGROUND SERVICES BEFORE COMMENCEMENT OF ANY DEMOLITION AND ALL OTHER WORKS. ANY CONFLICTS WITH PROPOSED WORKS, DISCREPANCIES, AND ADDITIONAL SERVICES NOT SHOWN ON THE DRAWING ARE TO BE ADVISED TO THE MANAGING CIVIL TRADE CONTRACTOR IN WRITING IMMEDIATELY FROM THE TIME OF FINDING THE CONFLICT, DISCREPANCY, OR ADDITIONAL SERVICE, AND AWAIT THE MANAGING CIVIL TRADE CONTRACTOR'S DIRECTION. LOCATION IS TO BE UNDERTAKEN IN ACCORDANCE WITH SPECIFICATION.
2.	ALL WORK SHALL BE UNDERTAKEN IN ACCORDANCE WITH THE DETAILS SHOWN ON THE DRAWINGS AND THE SPECIFICATION, AND DIRECTIONS OF THE MANAGING CIVIL TRADE CONTRACTOR.
3.	THE CIVIL TRADE CONTRACTOR IS TO ENSURE THAT AT ALL TIMES, THE OPERATIONS OF THE PRINCIPAL ARE NOT DISRUPTED IN ANY WAY. THE MANAGING CIVIL TRADE CONTRACTOR SHALL BE ADVISED OF ALL TEMPORARY OR FINAL RELOCATION OF UNDERGROUND SERVICES. THE CIVIL TRADE CONTRACTOR SHALL OBTAIN THE APPROVAL OF THE MANAGING CIVIL TRADE CONTRACTOR PRIOR TO THE TEMPORARY OR FINAL RELOCATION OF ANY UNDERGROUND SERVICES.
4.	THE CIVIL TRADE CONTRACTOR SHALL ARRANGE ALL SURVEY SETOUT TO BE CARRIED OUT BY A REGISTERED SURVEYOR.
5.	ON COMPLETION OF PROPOSED WORKS ALL DISTURBED AREAS MUST BE RESTORED TO ORIGINAL, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRASS AND LANDSCAPED AREAS AND ROAD PAVEMENTS. (U.N.O.)
6.	CIVIL TRADE CONTRACTOR TO OBTAIN ALL AUTHORITY APPROVALS UNLESS ADVISED OTHERWISE.
7.	WHERE NEW WORKS ABUT EXISTING THE CIVIL TRADE CONTRACTOR SHALL ENSURE THAT A SMOOTH EVEN PROFILE, FREE FROM ABRUPT CHANGES IS OBTAINED.
8.	CARE IS TO BE TAKEN WHEN EXCAVATING NEAR EXISTING SERVICES. NO MECHANICAL EXCAVATIONS ARE TO BE UNDERTAKEN OVER THESE SERVICES. HAND EXCAVATE IN THESE AREAS, IN ACCORDANCE WITH SPECIFICATION.
9.	THE CIVIL TRADE CONTRACTOR SHALL PROVIDE ALL TEMPORARY DIVERSION DRAINS AND MOUNDS TO ENSURE THAT AT ALL TIMES EXPOSED SURFACES ARE FREE DRAINING AND WHERE NECESSARY EXCAVATE SUMPS AND PROVIDE PUMPING EQUIPMENT AND OR TEMPORARY STORMWATER DRAINAGE TO DRAIN EXPOSED AREAS.
10.	THESE PLANS SHALL BE READ IN CONJUNCTION WITH APPROVED SURVEY, HYDRAULIC, STRUCTURAL, ARCHITECTURAL, ELECTRICAL, & LANDSCAPE, DRAWINGS AND SPECIFICATIONS.
11.	THE CIVIL TRADE CONTRACTOR SHALL CO-ORDINATE HIS WORKS CLOSELY AND CO-OPERATE WITH OTHER CIVIL TRADE CONTRACTORS ENGAGED BY MANAGING CIVIL TRADE CONTRACTOR.
12.	FOR EARTHWORKS NOTES REFER TO SPECIFICATION.
13.	THE CIVIL TRADE CONTRACTOR SHALL CO-ORDINATE AND LIAISE WITH THE MANAGING CIVIL TRADE CONTRACTOR TO STAGE AND UNDERTAKE THE WORKS SO AS NOT TO CAUSE INCONVENIENCE TO HEALTH INFRASTRUCTURE AND MINIMISE DISTURBANCE TO THE ACCESS AND OPERATION OF HOSPITAL FACILITIES.
14.	FOR DETAILS OF THE REQUIREMENTS IN RELATION TO THE EXISTING ABOVE GROUND OR BELOW GROUND ELECTRICAL, TELECOMMUNICATION, AND SECURITY SERVICES TEMPORARY OR FINAL RELOCATION, REFER TO ELECTRICAL ENGINEER'S DRAWINGS.
15.	ALL DEMOLITION WORKS ARE TO BE UNDERTAKEN IN ACCORDANCE WITH THE SPECIFICATION.
16.	ANY ITEM REQUIRED TO BE REMOVED AND STORED FOR POSSIBLE REUSE AND REINSTALLATION SHALL BE KEPT MAINTAINED IN GOOD WORKING CONDITION DURING THE STORAGE PERIOD.
17.	LOCALLY REGRADE ALL INTERFACE OF PROPOSED LEVELS TO EXISTING LEVELS USING BATTER AT MAX SLOPE OF 1 IN 4, UNLESS DIRECTED OR NOTED OTHERWISE.
18.	THE CIVIL TRADE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL EXCAVATIONS IN A SAFE, STABLE CONDITION, WITHOUT AFFECTING NEARBY BUILDINGS OR SERVICES. THIS INCLUDES OBTAINING APPROVALS FOR SHORING AND ANCHOR SYSTEMS.
19.	SURVEY WAS CARRIED OUT BY REGISTERED SURVEYOR. REFER TO SURVEYING DRAWINGS FOR ORIGIN OF LEVELS. DETAILS SHOWN ON SURVEY DRAWINGS ARE THOSE AT DATE OF SURVEY.
20.	PROVIDE PROTECTION OF EXISTING STRUCTURES AND TREES DURING CONSTRUCTION. REFER TO LANDSCAPE ARCHITECTS SPECIFICATION FOR TREE PROTECTION DETAIL.
21.	THE CIVIL TRADE CONTRACTOR SHALL ALLOW FOR ALL ASSOCIATED COSTS AND EQUIPMENT FOR DEWATERING THE WORKS
22.	THE CIVIL TRADE CONTRACTOR SHALL COORDINATE WITH ALL OTHERS TRADES TO ENSURE PIT LIDS AND FRAMES SUPPLIED ARE MINIMUM CLASS 'D' IN PAVEMENTS AND CLASS 'C' IN LANDSCAPE AREAS AND ARE INSTALLED FLUSH WITH THE FINISHED SURFACE

SITEWORKS NOTES	
1.	ORIGIN OF LEVELS - AUSTRALIAN HEIGHT DATUM (A.H.D.)
2.	CIVIL TRADE CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO COMMENCEMENT OF WORK
3.	ALL WORK IS TO BE UNDERTAKEN IN ACCORDANCE WITH THE DETAILS SHOWN ON THE DRAWINGS, THE SPECIFICATIONS AND THE DIRECTIONS OF THE PRINCIPAL'S REPRESENTATIVE.
4.	EXISTING SERVICES HAVE BEEN PLOTTED FROM SUPPLIED DATA AND AS SUCH THEIR ACCURACY CANNOT BE GUARANTEED. IT IS THE RESPONSIBILITY OF THE CIVIL TRADE CONTRACTOR TO ESTABLISH THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE PRINCIPAL'S REPRESENTATIVE. CLEARANCES SHALL BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY.
5.	CARE IS TO BE TAKEN WHEN EXCAVATING NEAR EXISTING SERVICES. NO MECHANICAL EXCAVATIONS ARE TO BE UNDERTAKEN OVER COMMUNICATIONS OR ELECTRICAL SERVICES. HAND EXCAVATE IN THESE AREAS.
6.	ALL SERVICE TRENCHES UNDER VEHICULAR PAVEMENTS SHALL BE BACKFILLED WITH AN APPROVED NON-NATURAL GRANULAR MATERIAL AND COMPACTED TO 98% STANDARD MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS.1289.5.1.1.
7.	ALL TRENCH BACKFILL MATERIAL SHALL BE COMPACTED TO THE SAME DENSITY AS THE ADJACENT MATERIAL.
8.	ON COMPLETION OF PIPE INSTALLATION ALL DISTURBED AREAS MUST BE RESTORED TO ORIGINAL, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL AND GRASSED AREAS AND ROAD PAVEMENTS.
9.	PROVIDE 12mm WIDE EXPANDING CORK JOINTS BETWEEN CONCRETE PAVEMENTS AND ALL BUILDINGS, WALLS, FOOTINGS, COLUMNS, KERBS, DISH DRAINS, GRATED DRAINS, BOLLARD FOOTINGS ETC
10.	CIVIL TRADE CONTRACTOR TO OBTAIN ALL AUTHORITY APPROVALS.
11.	ALL BATTERS TO BE GRASSED LINED WITH MINIMUM 100 TOPSOIL AND APPROVED COUCH LAID AS TURF.
12.	MAKE SMOOTH TRANSITION TO EXISTING SERVICES AND MAKE GOOD.
13.	TRENCHES THROUGH EXISTING ROAD AND CONCRETE PAVEMENTS SHALL BE SAWCUT TO FULL DEPTH OF CONCRETE AND A MIN 50mm IN BITUMINOUS PAVING.
14.	ALL BRANCH GAS AND WATER SERVICES UNDER DRIVEWAYS AND BRICK PAVING SHALL BE LOCATED IN Ø80 uPVC SEWER GRADE CONDUITS EXTENDING A MIN OF 500mm PAST PAVING.
15.	ON COMPLETION OF WORKS ALL DISTURBED AREAS MUST BE RESTORED TO ORIGINAL INCLUDING, BUT NOT LIMITED TO, KERBS, FOOTPATHS, CONCRETE AREAS, GRASS AND LANDSCAPED AREAS.

STORMWATER NOTES	
1.	ALL 225 DIA. DRAINAGE PIPES AND LARGER SHALL BE CLASS 'T' APPROVED SPIGOT AND SOCKET FRC OR RCP PIPES WITH RUBBER RING JOINTS. (U.N.O.) ALL DOWNPIPE DRAINAGE LINES SHALL BE SEWER GRADE uPVC WITH SOLVENT WELD JOINTS. (U.N.O.)
2.	EQUIVALENT STRENGTH REINFORCED CONCRETE PIPES MAY BE USED.
3.	ALL PIPE JUNCTIONS UP TO AND INCLUDING 450 DIA. AND TAPERS SHALL BE VIA PURPOSE MADE FITTINGS.
4.	MINIMUM GRADE TO STORMWATER LINES TO BE 1%, (U.N.O.)
5.	CIVIL TRADE CONTRACTOR TO SUPPLY AND INSTALL ALL FITTINGS AND SPECIALS INCLUDING VARIOUS PIPE ADAPTORS TO ENSURE PROPER CONNECTION BETWEEN DISSIMILAR PIPEWORK.
6.	ALL CONNECTIONS TO EXISTING DRAINAGE PITS SHALL BE MADE IN A TRADESMAN-LIKE MANNER AND THE INTERNAL WALL OF THE PIT AT THE POINT OF ENTRY SHALL BE CEMENT RENDERED TO ENSURE A SMOOTH FINISH.
7.	WHERE TRENCHES ARE IN ROCK, THE PIPE SHALL BE BEDDED ON A MIN. 50MM CONCRETE BED (OR 75MM THICK BED OF 12MM BLUE METAL) UNDER THE BARREL OF THE PIPE. THE PIPE COLLAR AT NO POINT SHALL BEAR ON THE ROCK. IN OTHER THAN ROCK, PIPES SHALL BE LAID ON A 75MM THICK SAND BED. IN ALL CASES BACKFILL THE TRENCH WITH SAND TO 200MM ABOVE THE PIPE. WHERE THE PIPE IS UNDER PAVEMENTS BACKFILL REMAINDER OF TRENCH WITH SAND OR APPROVED GRANULAR BACKFILL COMPACTED IN 150MM LAYERS TO 98% STANDARD MAX. DRY DENSITY.
8.	BEDDING SHALL BE (U.N.O.) TYPE H1, IN ACCORDANCE WITH CURRENT RELEVANT AUSTRALIAN STANDARDS.
9.	WHERE STORMWATER LINES PASS UNDER FLOOR SLABS SEWER GRADE RUBBER RING JOINTS ARE TO BE USED.
10.	WHERE SUBSOIL DRAINAGE LINES PASS UNDER FLOOR SLABS AND VEHICULAR PAVEMENTS UNSLOTTED uPVC SEWER GRADE PIPE SHALL BE USED.
11.	PROVIDE 3.0M LENGTH OF 100 DIA. SUBSOIL DRAINAGE PIPE WRAPPED IN FABRIC SOCK, AT UPSTREAM END OF EACH PIT.
12.	ALL PROPRIETARY STORMWATER QUALITY IMPROVEMENT DEVICES SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS AND SPECIFICATION. THE CIVIL TRADE CONTRACTOR SHALL ALLOW FOR ALL ANCLLARIES, SPECIALS AND FITTINGS (EG. RISERS, ANTI-FLOATATION ANCHORS, PEA GRAVEL BACKFILL ETC.) AS NECESSARY TO INSTALL THE DEVICES IN ACCORDANCE TO THE MANUFACTURERS REQUIREMENTS.

EXISTING SERVICES AND FEATURES	
1.	THE CIVIL TRADE CONTRACTOR SHALL ALLOW FOR THE CAPPING OFF, EXCAVATION, REMOVAL AND DISPOSAL IF REQUIRED OF ALL EXISTING SERVICES IN AREAS AFFECTED BY WORKS WITHIN THE CONTRACT AREA, AS SHOWN ON THE DRAWINGS UNLESS DIRECTED OTHERWISE BY THE SUPERINTENDENT.
2.	THE CIVIL TRADE CONTRACTOR SHALL ENSURE THAT AT ALL TIMES SERVICES TO ALL BUILDINGS NOT AFFECTED BY THE WORKS ARE NOT DISRUPTED.
3.	PRIOR TO COMMENCEMENT OF ANY WORKS THE CIVIL TRADE CONTRACTOR SHALL GAIN WRITTEN APPROVAL OF HIS PROGRAMME FOR THE RELOCATION/CONSTRUCTION OF TEMPORARY SERVICES.
4.	EXISTING BUILDINGS, EXTERNAL STRUCTURES, AND TREES SHOWN ON THESE DRAWINGS ARE FEATURES EXISTING PRIOR TO ANY DEMOLITION WORKS.
5.	CIVIL TRADE CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES TO MAINTAIN EXISTING SUPPLY TO BUILDINGS REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND APPROVAL OF THE SUPERINTENDENT. ONCE DIVERSION IS IS COMPLETE AND COMMISSIONED THE CIVIL TRADE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT.
6.	INTERRUPTION TO SUPPLY OF EXISTING SERVICES SHALL BE DONE SO AS NOT TO CAUSE ANY INCONVENIENCE TO THE PRINCIPAL. CIVIL TRADE CONTRACTOR TO GAIN APPROVAL OF SUPERINTENDENT FOR TIME OF INTERRUPTION.
7.	CIVIL TRADE CONTRACTOR TO MAKE GOOD ALL DISTURBED PAVEMENTS, FEATURES,SURFACES ETC. UPON COMPLETION OF ALL WORKS TO MATCH EXISTING OR AS DETAILED ON THESE DRAWINGS

EROSION AND SEDIMENT CONTROL NOTES	
IMPORTANT NOTES	
1.	THE EROSION AND SEDIMENT CONTROL DRAWINGS PROVIDED ARE FOR GUIDANCE PURPOSES ONLY - THE SOIL AND EROSION CONTROLS ARE INDICATIVE AND REMAIN SUBJECT TO CONSTRUCTION METHODOLOGY. THE CIVIL TRADE CONTRACTOR SHALL AT ALL TIMES REMAIN RESPONSIBLE FOR COMPLIANCE WITH ALL LAWS AND REGULATIONS PERTAINING TO SAFETY AND PROTECTION OF THE ENVIRONMENT.
2.	CIVIL TRADE CONTRACTOR SHALL ENSURE THAT SEDIMENT IS NOT ALLOWED TO ENTER WATERCOURSES, ROADWAYS, PROPERTY OR DRAINAGE INFRASTRUCTURE. ANY DAMAGE WHATSOEVER CAUSED THROUGH BREACH OF THIS CONDITION BY THE CIVIL TRADE CONTRACTOR SHALL BE RECTIFIED SOLELY AT THE CIVIL TRADE CONTRACTORS COST.
GENERAL INSTRUCTIONS	
1.	THIS SOIL AND WATER MANAGEMENT PLAN IS TO BE READ IN CONJUNCTION WITH OTHER ENGINEERING PLANS RELATING TO THIS DEVELOPMENT.
2.	CIVIL TRADE CONTRACTORS WILL ENSURE THAT ALL SOIL AND WATER MANAGEMENT WORKS ARE UNDERTAKEN AS INSTRUCTED IN THIS SPECIFICATION AND CONSTRUCTED FOLLOWING THE GUIDELINES OF "MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION", DEPT OF HOUSING, 1998 (BLUE BOOK).
3.	ALL CIVIL TRADE CONTRACTORS WILL BE INFORMED OF THEIR RESPONSIBILITIES IN REDUCING THE POTENTIAL FOR SOIL EROSION AND POLLUTION TO DOWNSLOPE AREAS.
LAND DISTURBANCE INSTRUCTIONS	
1.	DISTURBANCE TO BE NO FURTHER THAN 5 (PREFERABLY 2) METRES FROM THE EDGE OF ANY ESSENTIAL ENGINEERING ACTIVITY AS SHOWN ON APPROVED PLANS. ALL SITE WORKERS WILL CLEARLY RECOGNISE THESE ZONES THAT, WHERE APPROPRIATE, ARE IDENTIFIED WITH BARRIER FENCING (UPSLOPE) AND SEDIMENT FENCING (DOWNSLOPE) OR SIMILAR MATERIALS.
2.	ACCESS AREAS ARE TO BE LIMITED TO A MAXIMUM WIDTH OF 10 METRES. THE SITE MANAGER WILL DETERMINE AND MARK THE LOCATION OF THESE ZONES ON-SITE. ALL SITE WORKERS WILL CLEARLY RECOGNISE THESE BOUNDARIES THAT, WHERE APPROPRIATE, ARE IDENTIFIED WITH BARRIER FENCING (UPSLOPE) AND SEDIMENT FENCING (DOWNSLOPE) OR SIMILAR MATERIALS.
3.	ENTRY TO LANDS NOT REQUIRED FOR CONSTRUCTION OR ACCESS IS PROHIBITED EXCEPT FOR ESSENTIAL THINNING OF PLANT GROWTH.
4.	WORKS ARE TO PROCEED IN THE FOLLOWING SEQUENCE: <div><div>a.</div><div>b.</div><div>c.</div><div>d.</div><div>e.</div><div>f.</div><div>g.</div><div>h.</div><div>i.</div></div>
5.	ENSURE THAT SLOPE LENGTHS DO NOT EXCEED 80 METRES WHERE PRACTICABLE. SLOPE LENGTHS ARE DETERMINED BY SILTATION FENCING AND CATCH DRAIN SPACING.
6.	ON COMPLETION OF MAJOR WORKS LEAVE DISTURBED LANDS WITH A SCARIFIED SURFACE TO ENCOURAGE WATER INFILTRATION AND ASSIST WITH KEYING TOPSOIL LATER.
SITE INSPECTION AND MAINTENANCE INSTRUCTIONS	
1.	THE SITE SUPERINTENDENT WILL INSPECT THE SITE AT LEAST WEEKLY AND AT THE CONCLUSION OF EVERY STORM EVENT TO: <div><div>a.</div><div>b.</div><div>c.</div><div>d.</div><div>e.</div><div>f.</div></div>
2.	THE SITE SUPERINTENDENT WILL KEEP A LOGBOOK MAKING ENTRIES AT LEAST WEEKLY, IMMEDIATELY BEFORE FORECAST RAIN AND AFTER RAINFALL. ENTRIES WILL INCLUDE: <div><div>a.</div><div>b.</div><div>c.</div><div>d.</div><div>e.</div></div>
SEDIMENT CONTROL INSTRUCTIONS	
1.	SEDIMENT FENCES WILL BE INSTALLED AS SHOWN ON THE PLAN AND ELSEWHERE AT THE DISCRETION OF THE SITE SUPERINTENDENT TO CONTAIN SOIL AS NEAR AS POSSIBLE TO THEIR SOURCE.
2.	SEDIMENT FENCES WILL NOT HAVE CATCHMENT AREAS EXCEEDING 900 SQUARE METRES AND HAVE A STORAGE DEPTH OF AT LEAST 0.6 METRES.
3.	SEDIMENT REMOVED FROM ANY TRAPPING DEVICES WILL BE RELOCATED WHERE FURTHER POLLUTION TO DOWNSLOPE LANDS AND WATERWAYS CANNOT OCCUR.
4.	STOCKPILES ARE NOT TO BE LOCATED WITHIN 5 METRES OF HAZARD AREAS INCLUDING AREAS OF HIGH VELOCITY FLOWS SUCH AS WATERWAYS, PAVED AREAS AND DRIVEWAYS.
5.	WATER WILL BE PREVENTED FROM DIRECTLY ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS THE CATCHMENT AREA HAS BEEN PERMANENTLY LANDSCAPED AND/OR WATER HAS BEEN TREATED BY AN APPROVED DEVICE.
6.	TEMPORARY SEDIMENT TRAPS WILL REMAIN IN PLACE UNTIL AFTER THE LANDS THEY ARE PROTECTING ARE COMPLETELY REHABILITATED.
7.	ACCESS TO SITES SHOULD BE STABILISED TO REDUCE THE LIKELIHOOD OF VEHICLES TRACKING SOIL MATERIALS ONTO PUBLIC ROADS AND ENSURE ALL-WEATHER ENTRY/EXIT.

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NOTE
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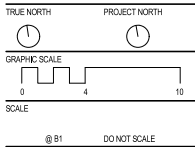
ISSUE	DATE	FOR
01	10.08.18	ISSUE FOR CONSTRUCTION
02	18.12.18	RE-ISSUE FOR CONSTRUCTION
03	20.02.19	RE-ISSUE FOR CONSTRUCTION

PROJECT MANAGEMENT
PWC
STRUCTURAL ENGINEERING
ENSTRUCT GROUP
MECHANICAL ENGINEERING
FREDON AIR
ELECTRICAL ENGINEERING
FREDON
HYDRAULIC ENGINEERING
CP CONSULTANTS
CLIENT



PROJECT
POW - REDEVELOPMENT
ACUTE SERVICES BUILDING
RANDWICK NSW AUSTRALIA

ACOR PROJECT NUMBER
SY180053



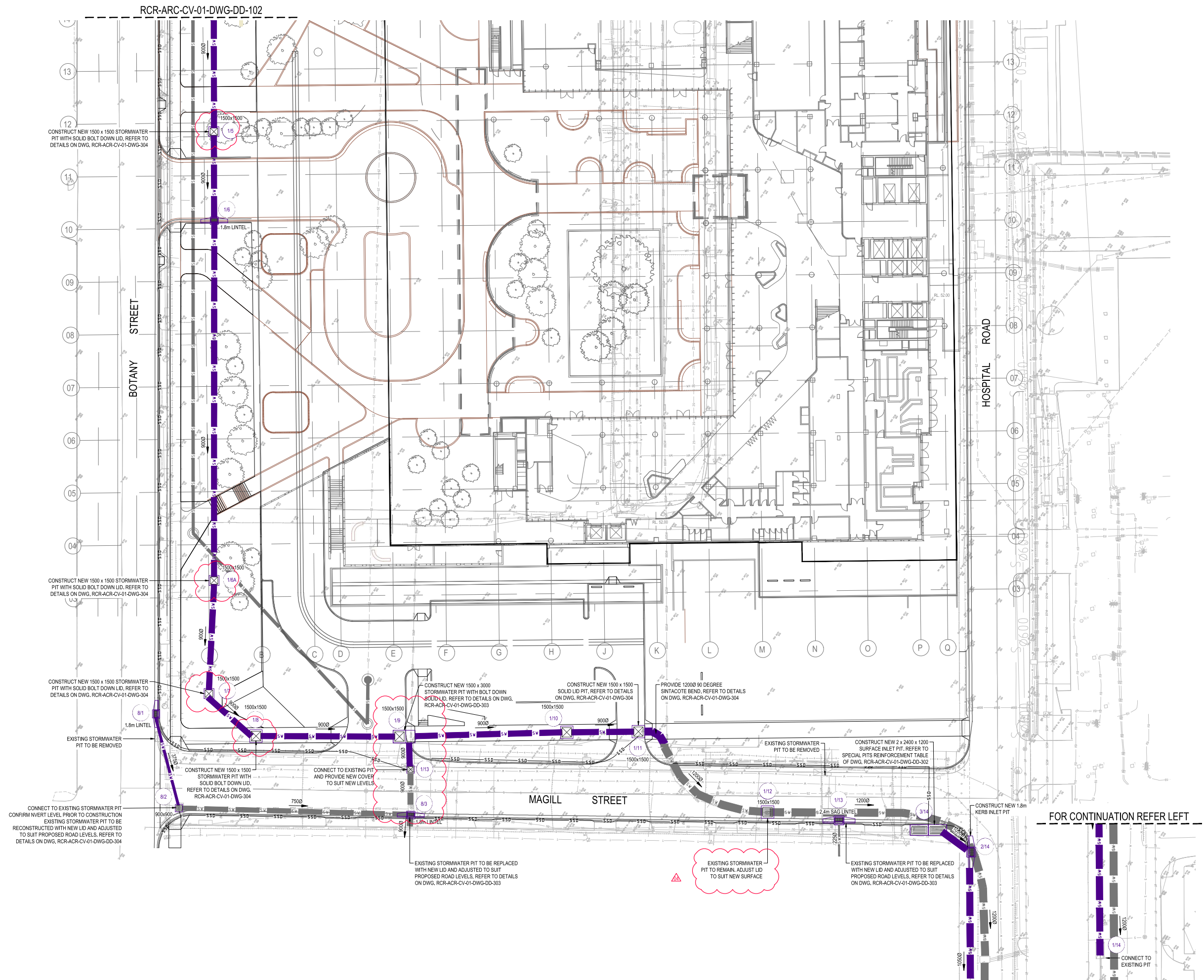
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FOR CONSTRUCTION

DRAWING

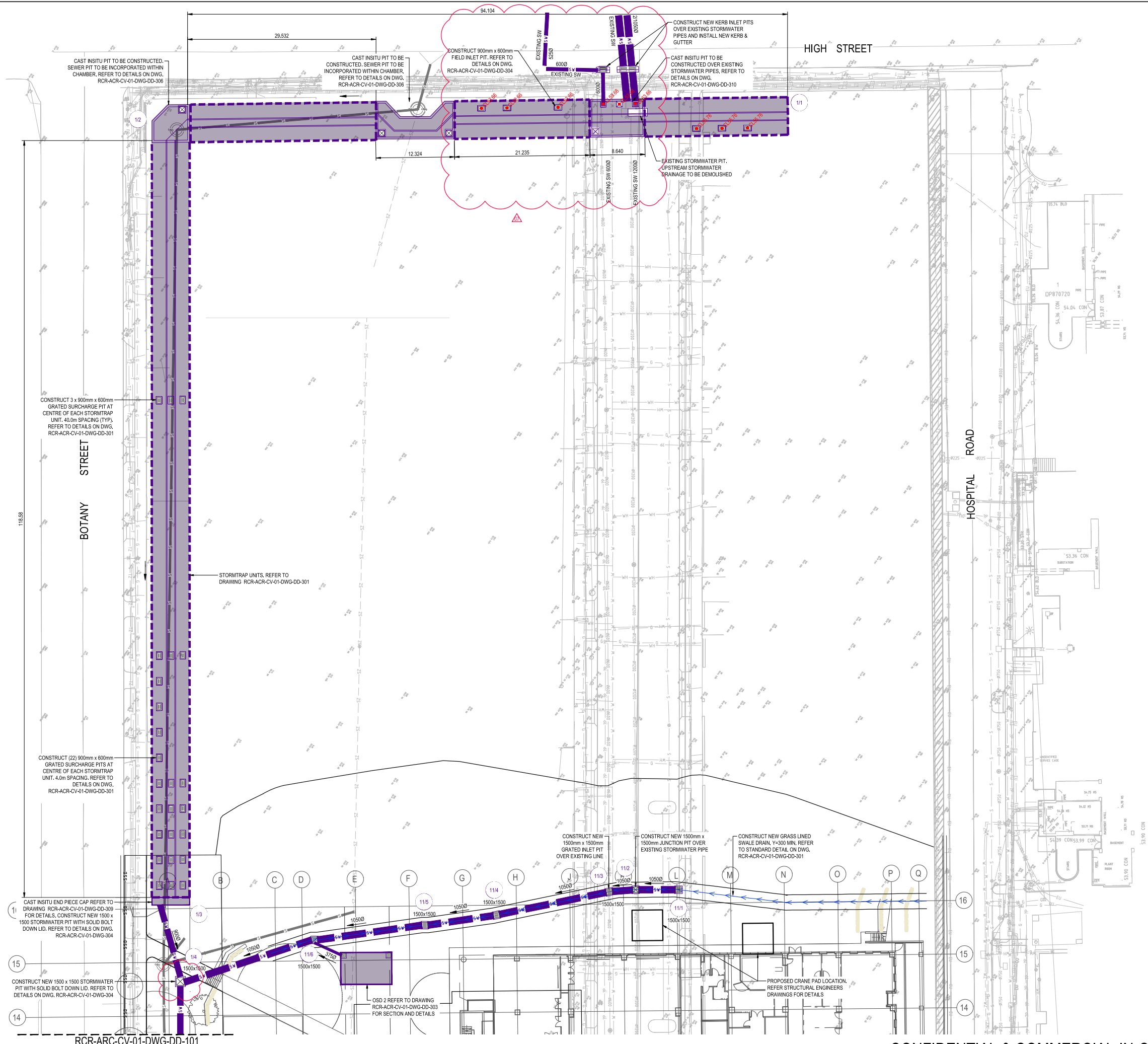
EARLY & ENABLING WORKS NOTES

DRAWING NUMBER	ISSUE
RCR-ACR-CV-01-01WG-DD-002	03



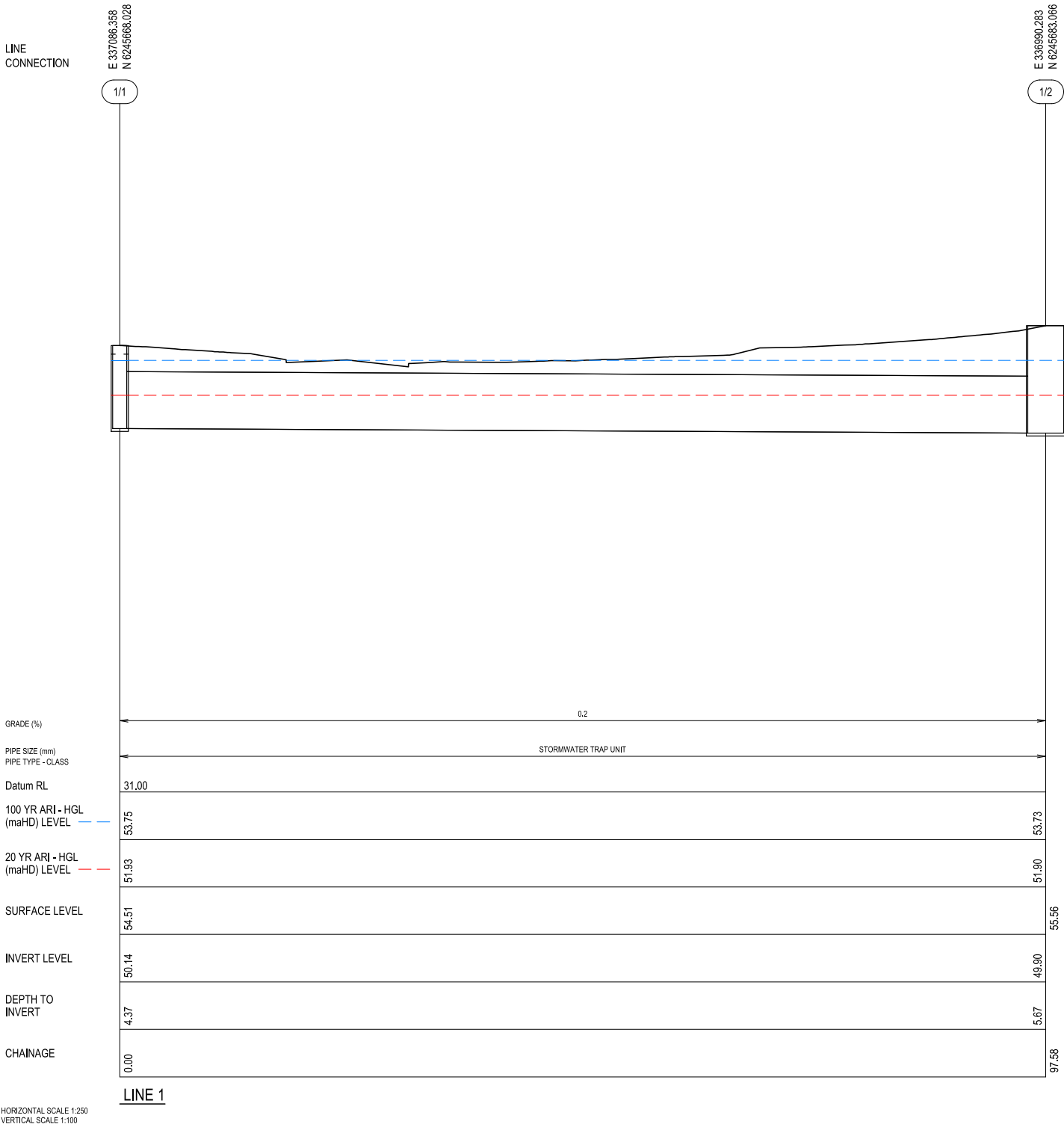
FOR CONTINUATION REFER TO INSET

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NOTES:
STORMWATER DRAINAGE HYDRAULIC GRADE
LINE ANALYSIS DETERMINED BY FLOOD
MODELLERS (BMT WBM PTY LTD)



STORMWATER LINE ALTERED



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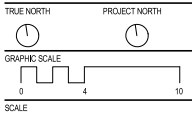
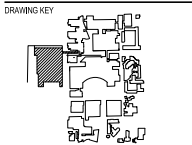
NOTE
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ISSUE	DATE	FOR
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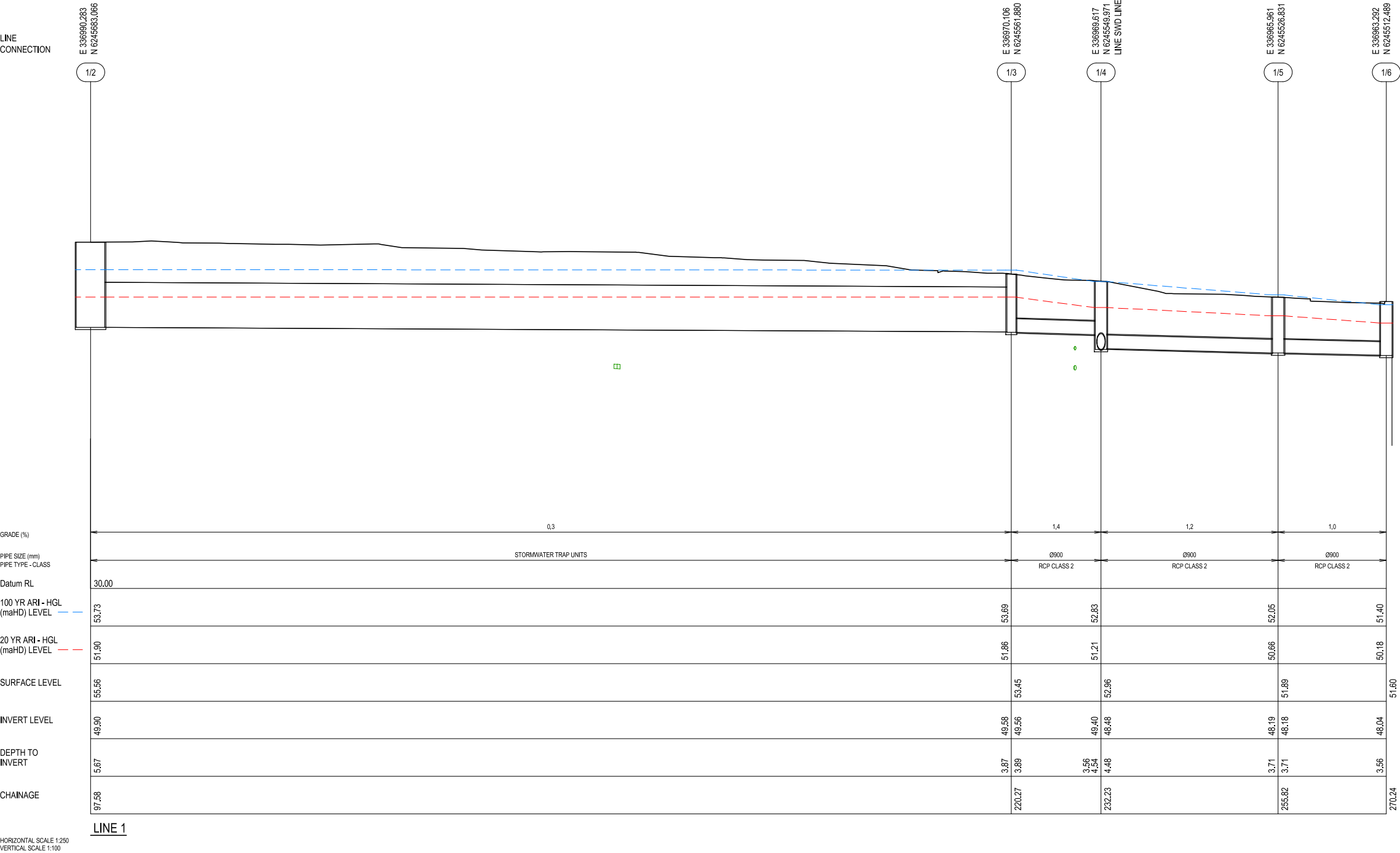


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STATUS
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DRAWING
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STORMWATER
LONGSECTIONS - SHEET 1
DRAWING NUMBER
RCR-ACR-CV-01-DWG-DD-201
ISSUE
03

NOTES:
STORMWATER DRAINAGE HYDRAULIC GRADE
LINE ANALYSIS DETERMINED BY FLOOD
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STORMWATER LINE ALTERED



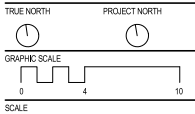
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ACOR PROJECT NUMBER
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STATUS

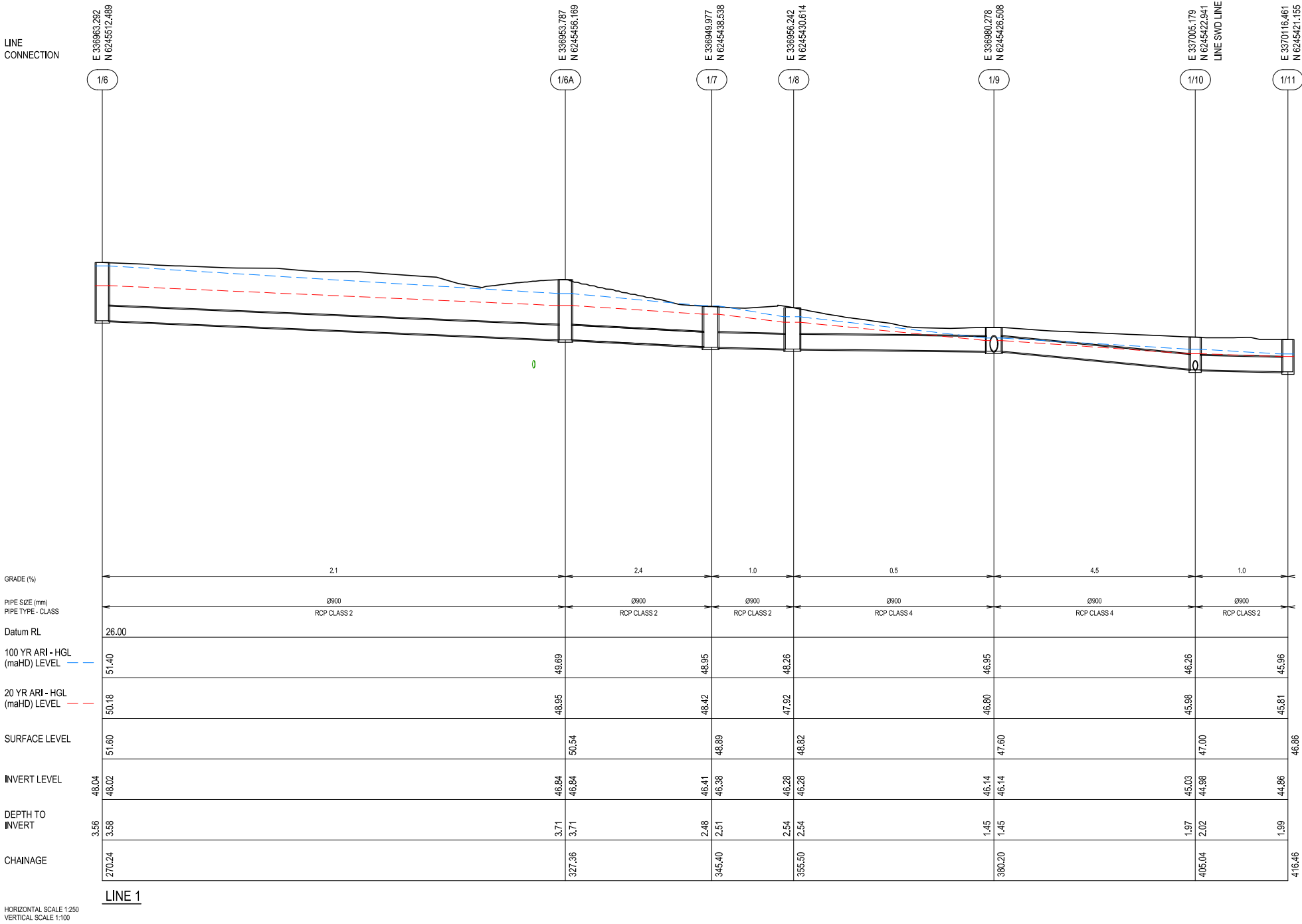
FOR CONSTRUCTION

DRAWING
EARLY & ENABLING WORKS
STORMWATER
LONGSECTIONS - SHEET 2

DRAWING NUMBER	ISSUE
RCR-ACR-CV-01-DWG-DD-202	04

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NOTES:
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STORMWATER LINE ALTERED



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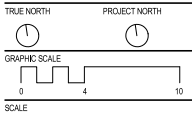
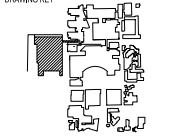
NOTE
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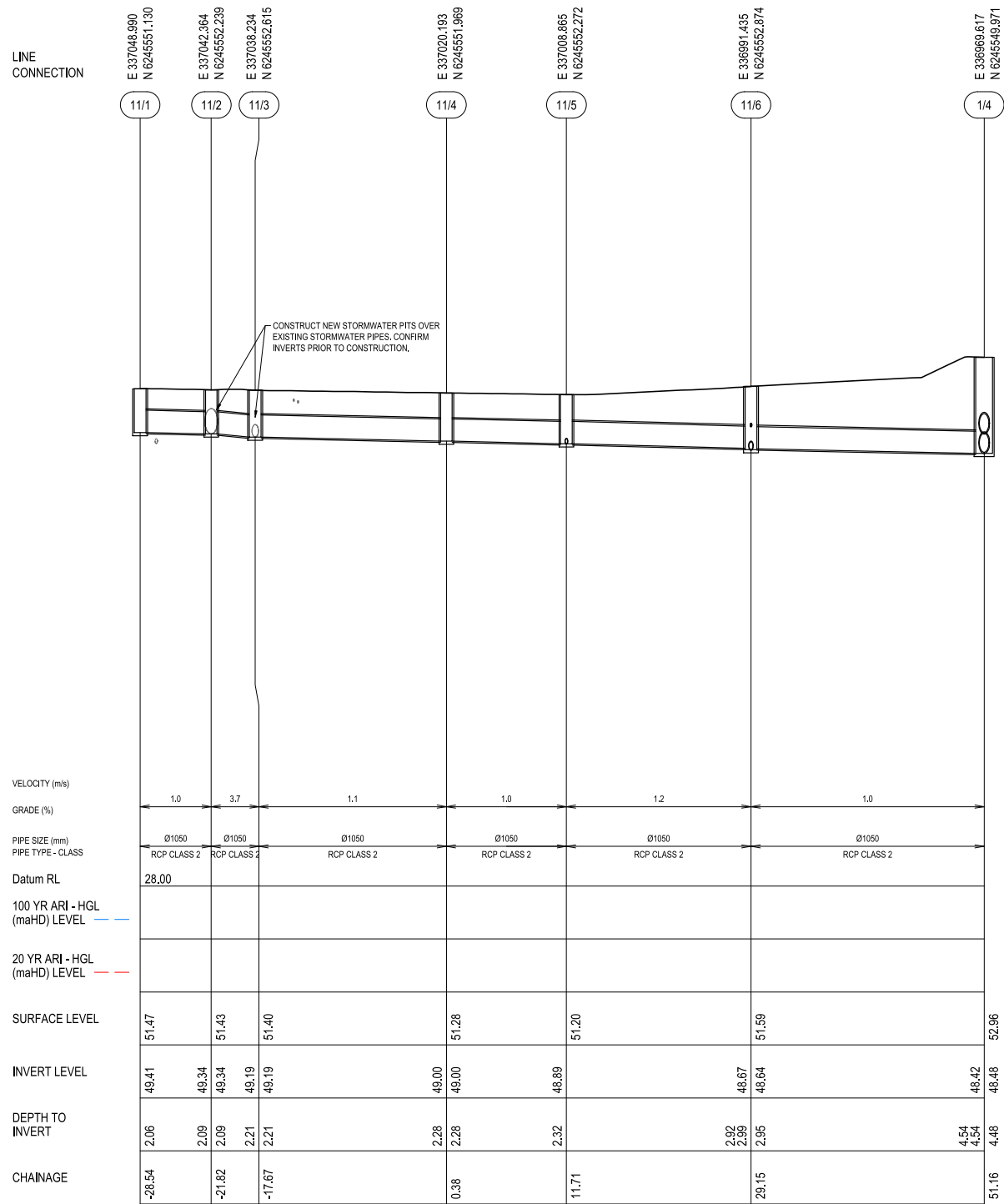


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STATUS
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DRAWING
EARLY & ENABLING WORKS
STORMWATER
LONGSECTIONS - SHEET 3
DRAWING NUMBER
RCR-ACR-CV-01-DWG-DD-203
ISSUE
04

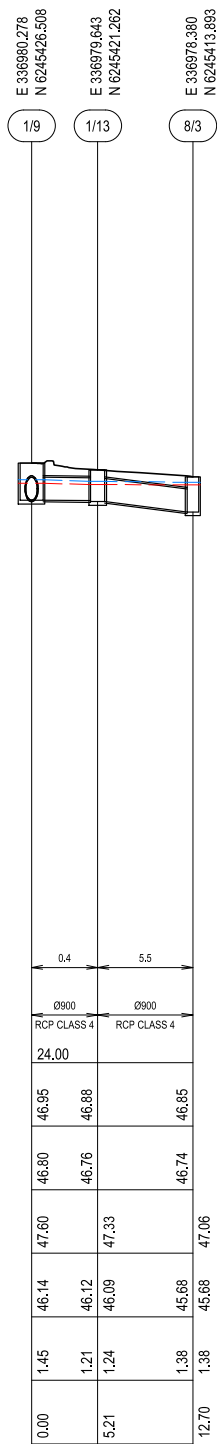
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LINE ANALYSIS DETERMINED BY FLOOD
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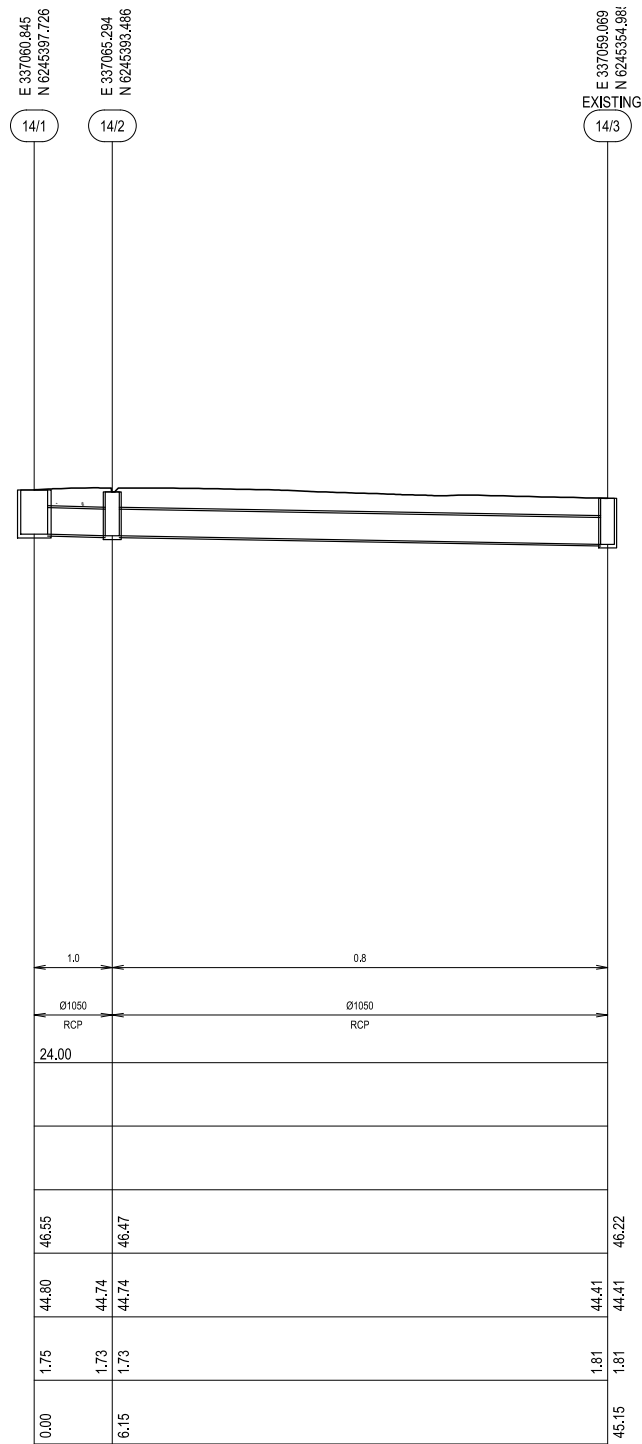
LINE 11

HORIZONTAL SCALE 1:250
VERTICAL SCALE 1:100

STORMWATER LINE ALTERED



LINE 13



LINE 14

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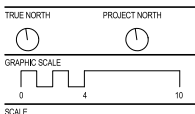
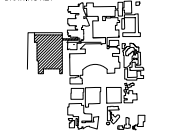
NOTE:
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TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS.
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ISSUE	DATE	FOR
01	10.08.18	ISSUE FOR CONSTRUCTION
02	18.12.18	RE-ISSUE FOR CONSTRUCTION
03	25.01.19	RE-ISSUE FOR CONSTRUCTION
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STATUS
FOR CONSTRUCTION
DRAWING
EARLY & ENABLING WORKS
STORMWATER
LONGSECTIONS - SHEET 4
DRAWING NUMBER
RCR-ACR-CV-01-DWG-DD-204
ISSUE
04

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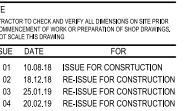
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LINE 3

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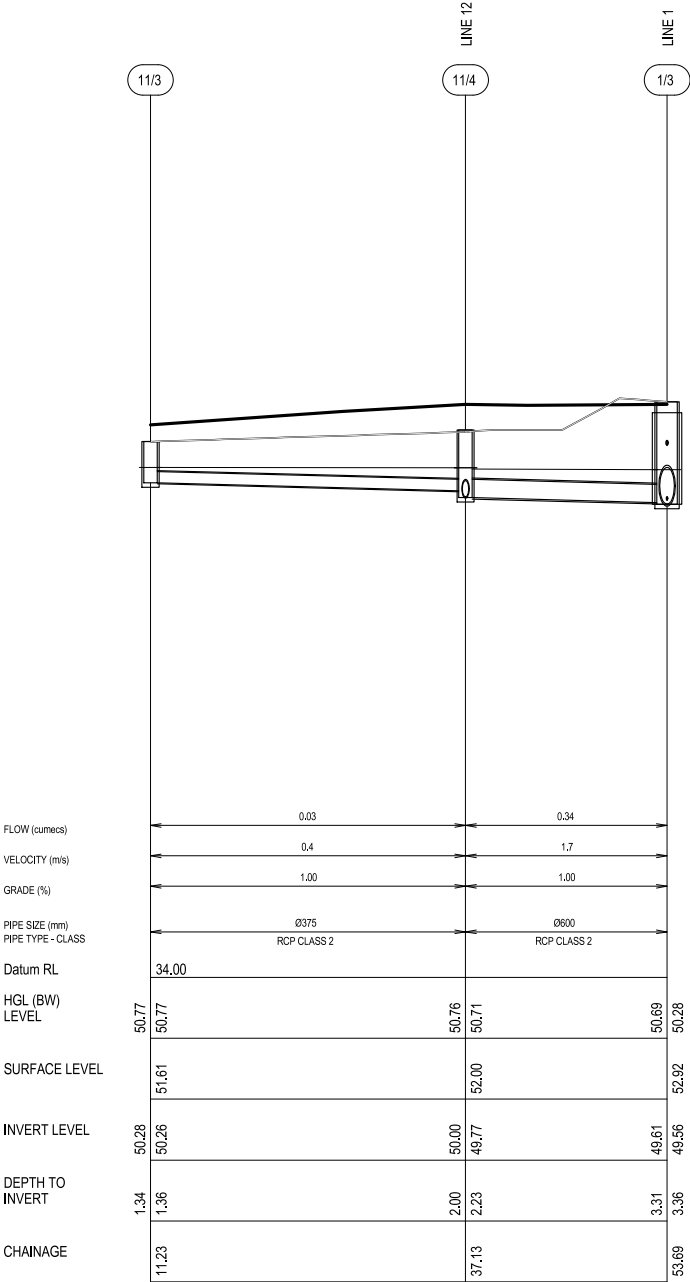
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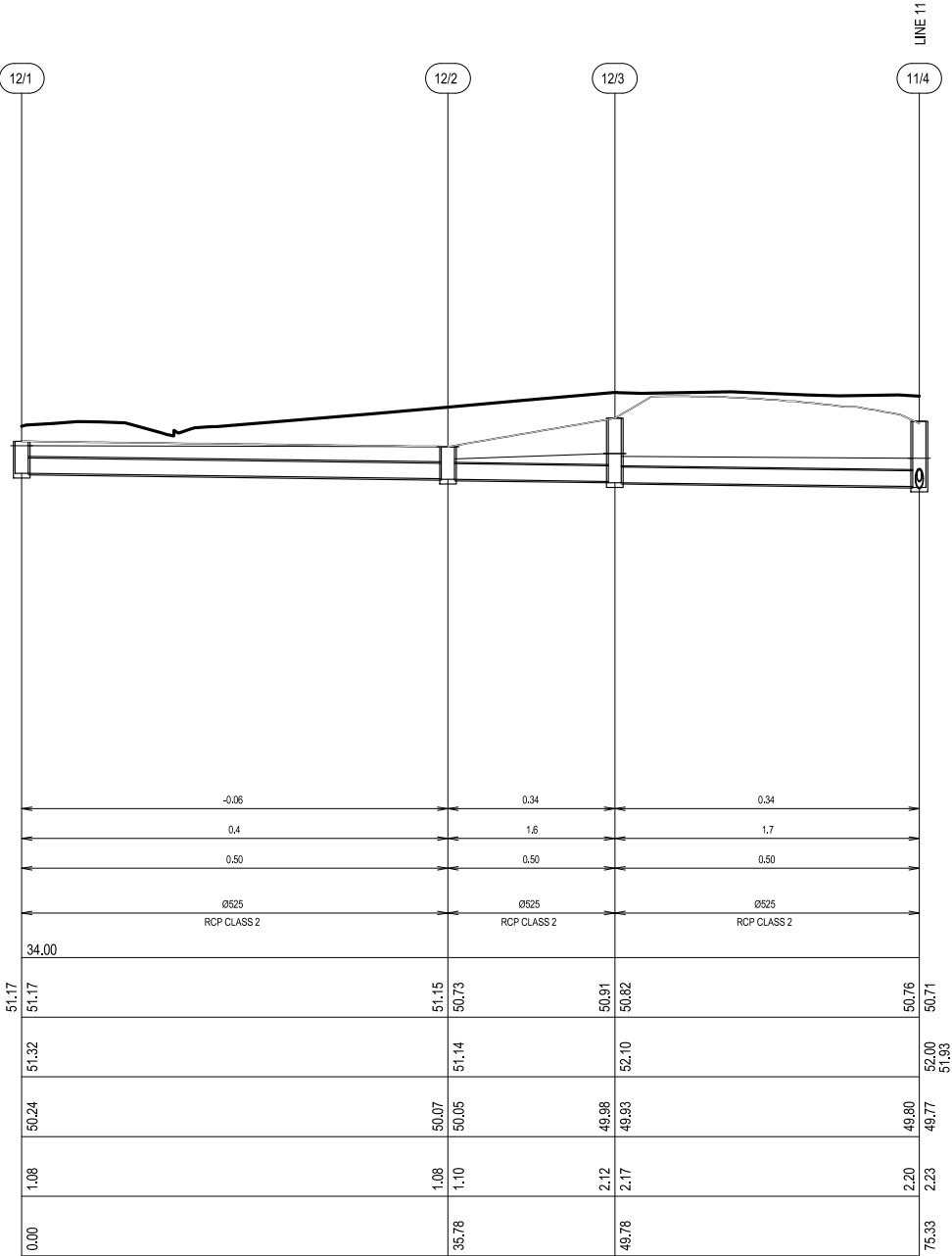
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LINE
CONNECTION



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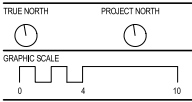
NOTE
DRAWINGS ARE PRELIMINARY
AND SUBJECT TO CHANGE UPON
UPDATED FLOOD MODELLING

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PROJECT
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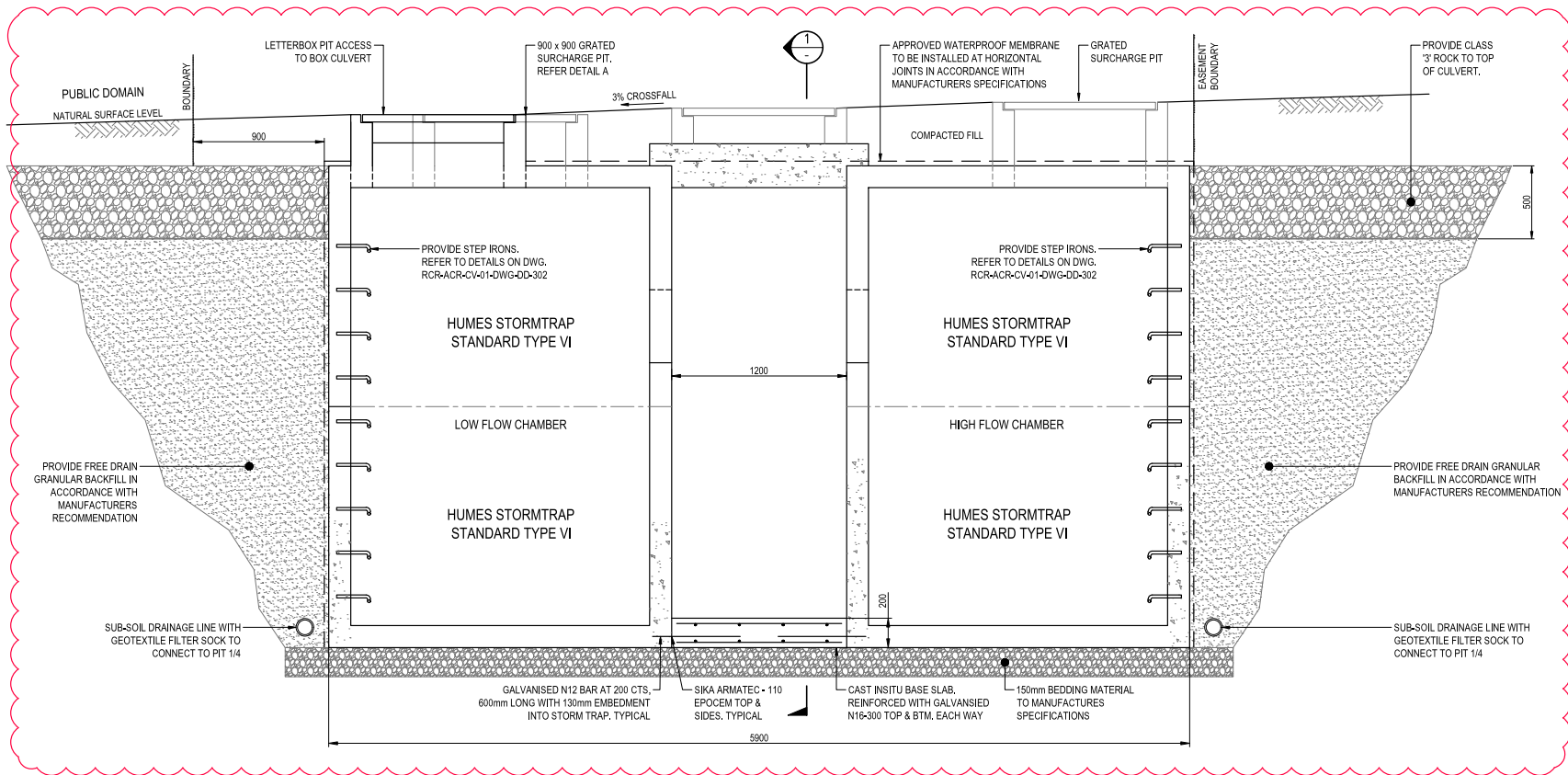


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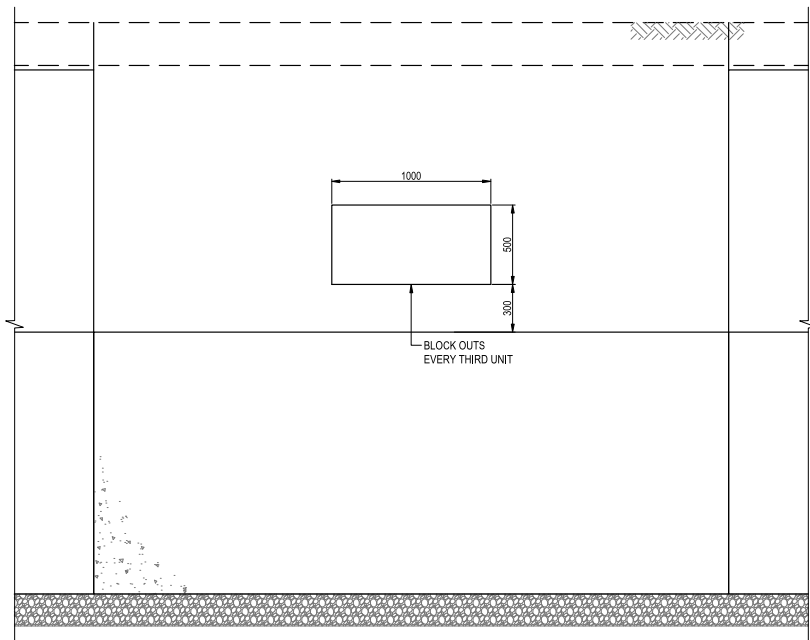
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EARLY & ENABLING WORKS
STORMWATER
LONGSECTIONS - SHEET 6

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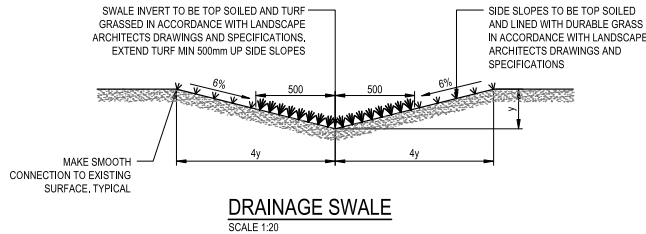
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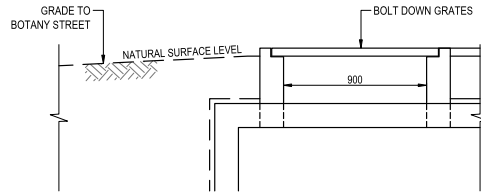
TYPICAL REINFORCED CONCRETE BOX CULVERT & BASE SLAB DETAIL



SECTION 1 - 1
SCALE 1:20



DRAINAGE SWALE
SCALE 1:20



DETAIL A - 900 x 900 GRATED SURCHARGE PIT
SCALE 1:20

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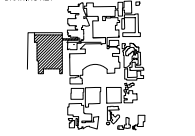
ACOR CONSULTANT
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ISSUE	DATE	FOR
01	10.08.18	ISSUE FOR CONSTRUCTION
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PROJECT MANAGEMENT	PWC
STRUCTURAL ENGINEERING	ENSTRUCT GROUP
MECHANICAL ENGINEERING	FREDON AIR
ELECTRICAL ENGINEERING	FREDON
HYDRAULIC ENGINEERING	CP CONSULTANTS
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PROJECT
POW - REDEVELOPMENT
ACUTE SERVICES BUILDING
RANDWICK NSW AUSTRALIA
ACOR PROJECT NUMBER
SY180053
DRAWING KEY



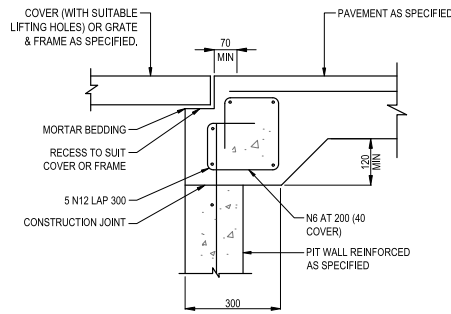
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GRAPHIC SCALE	
	
SCALE	

AS SHOWN @ B1
STATUS

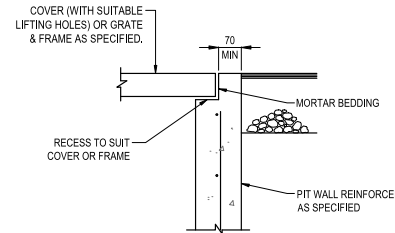
FOR CONSTRUCTION

DRAWING
EARLY & ENABLING WORKS
STANDARD DETAILS
SHEET 1

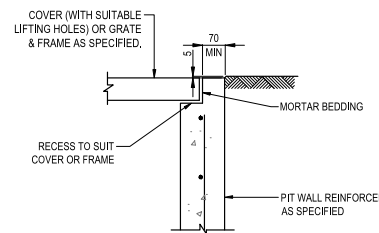
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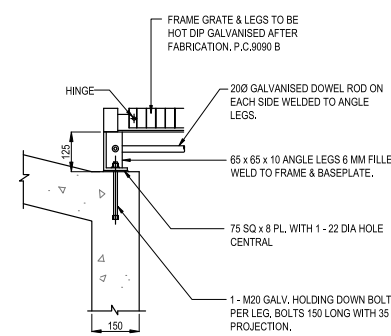
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IN CONCRETE PAVEMENT**
SCALE 1:10



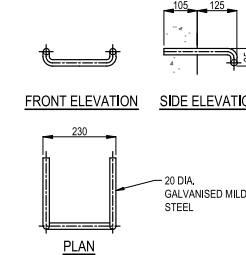
**PIT EDGE DETAIL "B"
IN FLEXIBLE PAVEMENT**
SCALE 1:10



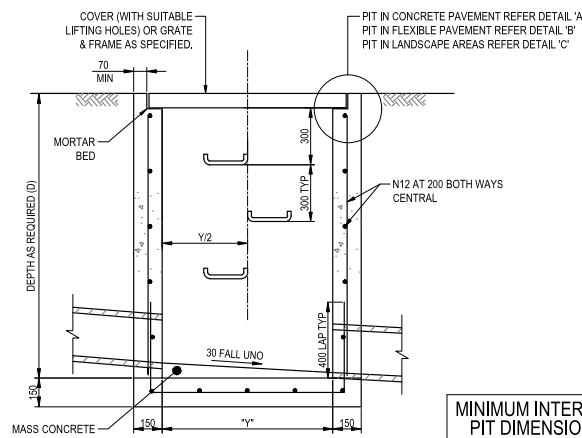
**PIT EDGE DETAIL "C"
IN LANDSCAPE AREAS**
SCALE 1:10



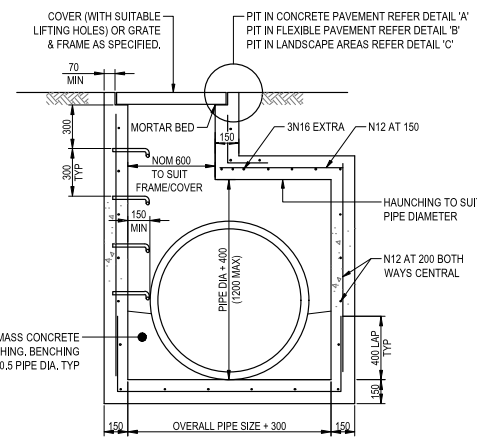
DETAIL "D"
SCALE 1:10



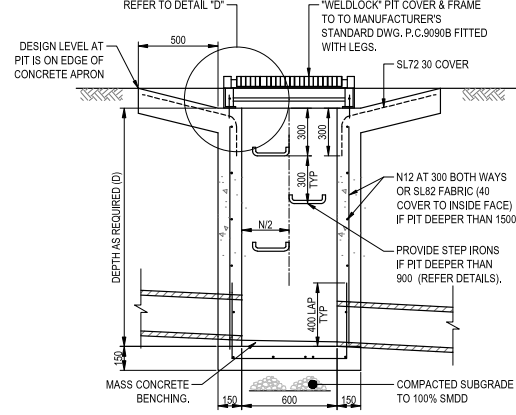
STEP IRON DETAIL
N.T.S.



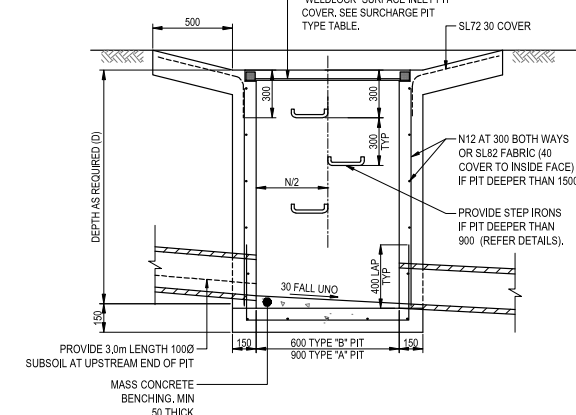
SECTION 1
SCALE 1:20



SECTION 2
SCALE 1:20



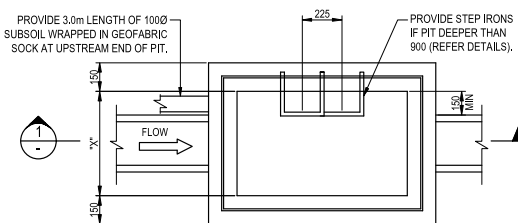
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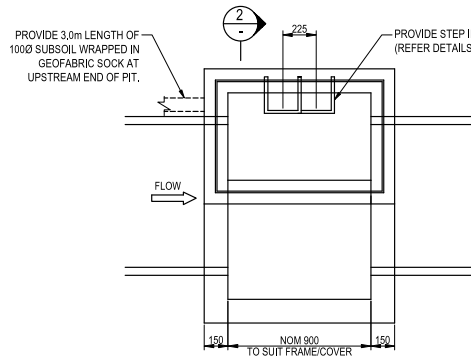
SURCHARGE PIT TYPE "B" & "C"
SCALE 1:20

"D"	"X"	"Y"
D ≤ 600	450	450*
D ≤ 900	600	600*
D ≤ 1200	600	900
D > 1200	900	900

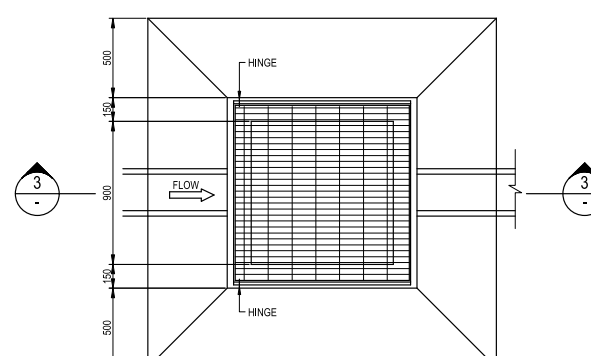
NOTE
PITS DENOTED * SHALL BE USED ONLY WHERE SPECIFIED IN DRAINAGE SCHEDULE OR ON PLAN.



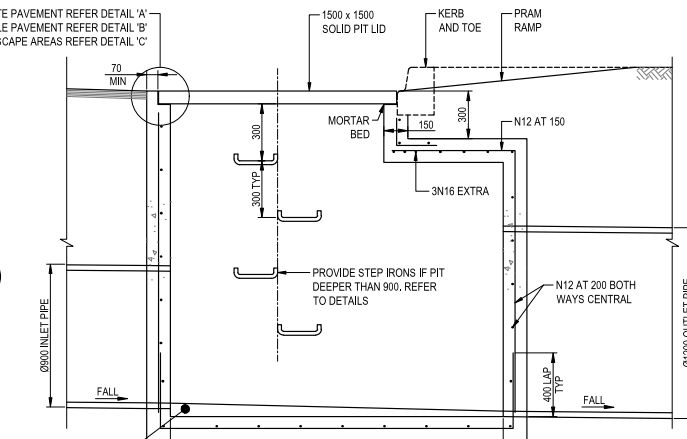
SURFACE INLET/JUNCTION PIT TYPE "A"
SCALE 1:20



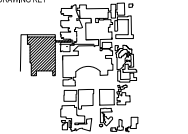
SURFACE INLET/JUNCTION PIT TYPE "B"
SCALE 1:20

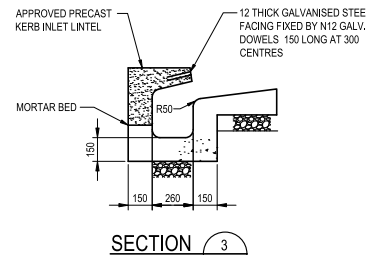
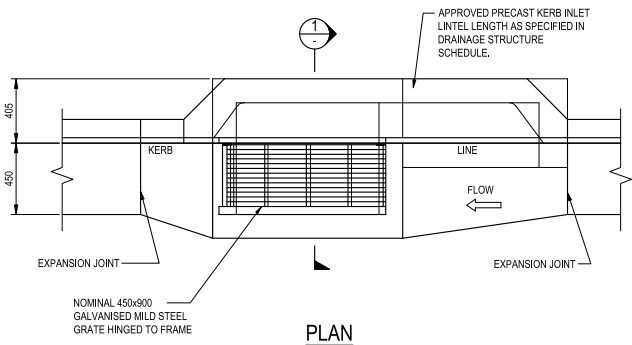
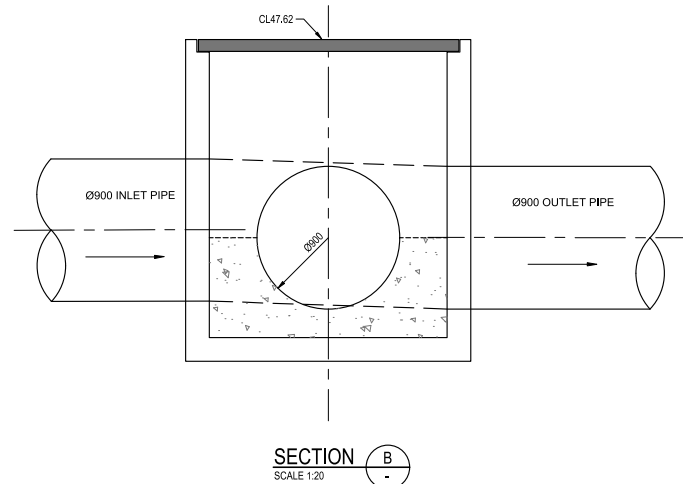
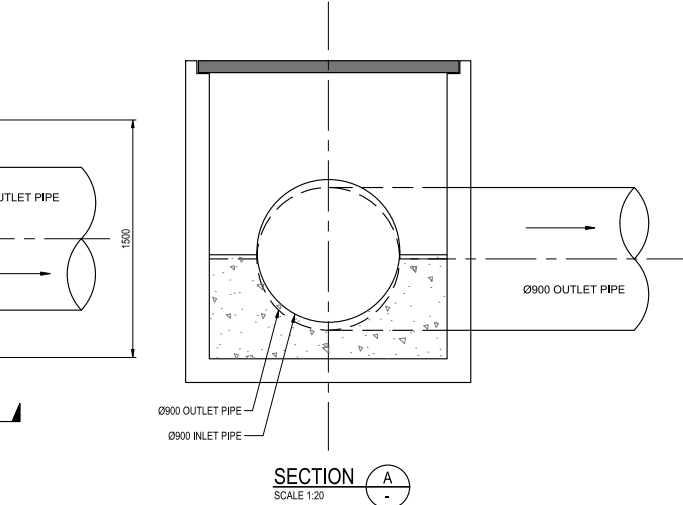
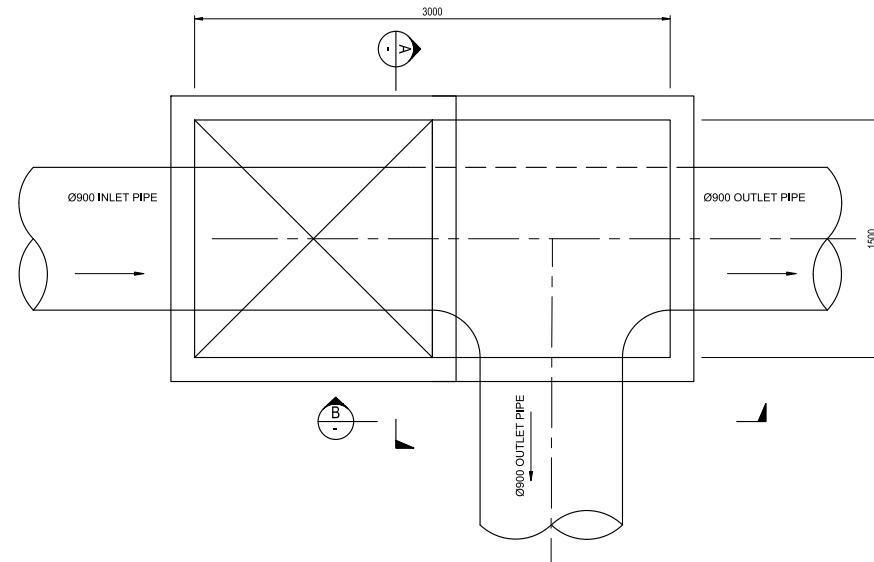
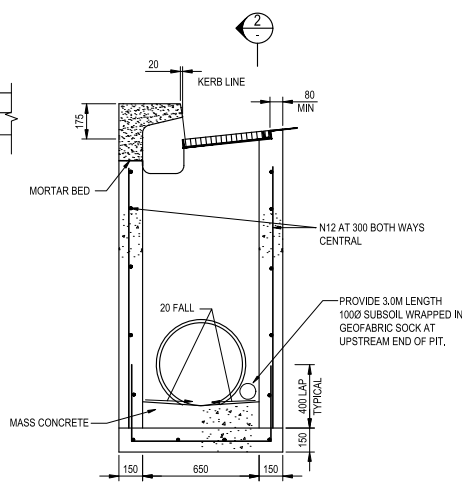
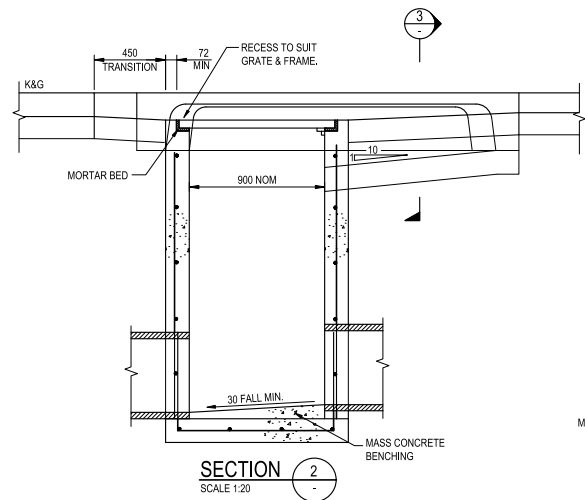


SURCHARGE PITS TYPES A, B & CPIT TYPE "D"
SCALE 1:20



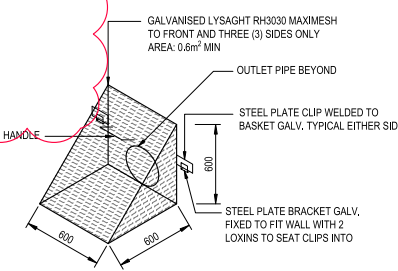
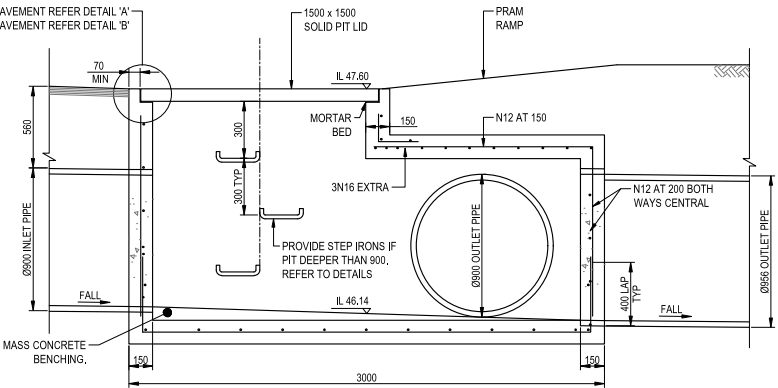
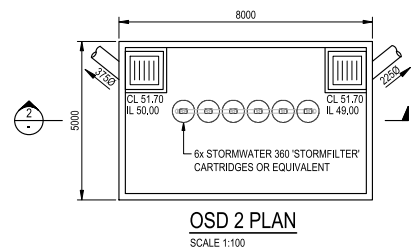
PIT 1/11 CONFIGURATION
SCALE 1:20



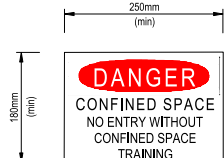
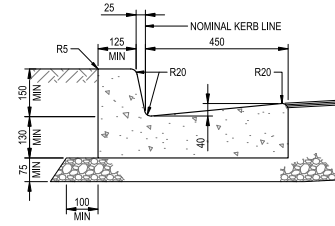


KERB INLET PIT TYPE "C"
SCALE 1:20

DEPTH TO INVERT (m)	MIN. BASE WALL THICKNESS (T)	MIN. INTERNAL DIMENSIONS L x W	REMARKS
0 - 0.70	150	600 x 600	EASEMENT AND JUNCTION PITS ONLY
0.75 - 0.95	150	900 x 600	MINIMUM PIT DIMENSIONS FOR SIDE ENTRY PITS TO BE 900 x 600
1.00 - 2.00	150	900 x 900	STEP IRONS TO BE PROVIDED IN PITS 1.0m IN DEPTH AND GREATER REFER TO MP219 FOR STEP IRON DETAILS
OVER 2.00	150	900 x 900 SEE NOTE 3	WALLS TO BE REINFORCED AS SPECIFIED STEP IRONS TO BE PROVIDED. REFER TO MP213 & 214 FOR REINFORCEMENT



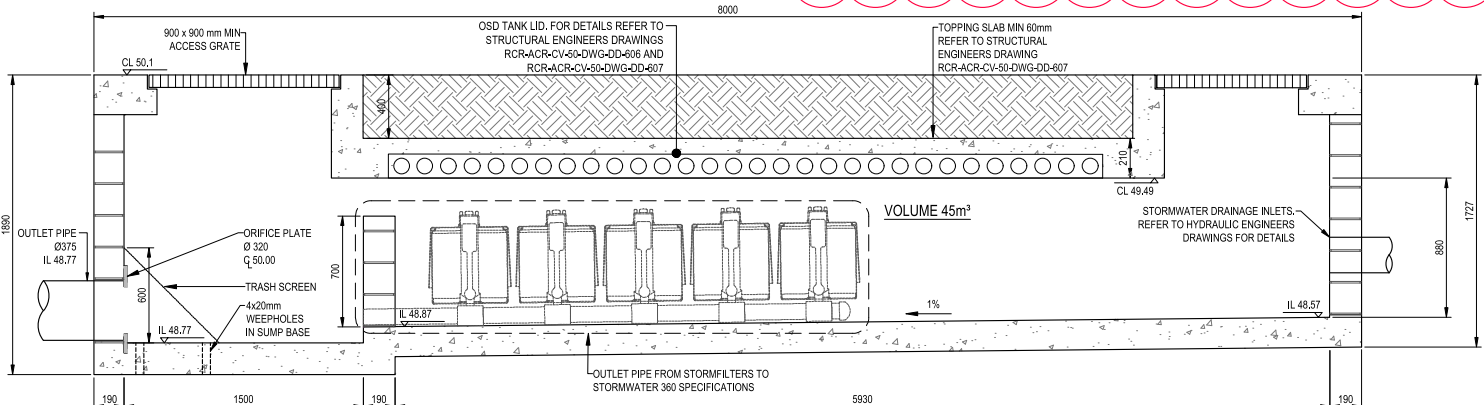
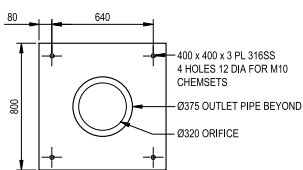
KERB & GUTTER
SCALE 1:10
SHOWN AS 'B&C'

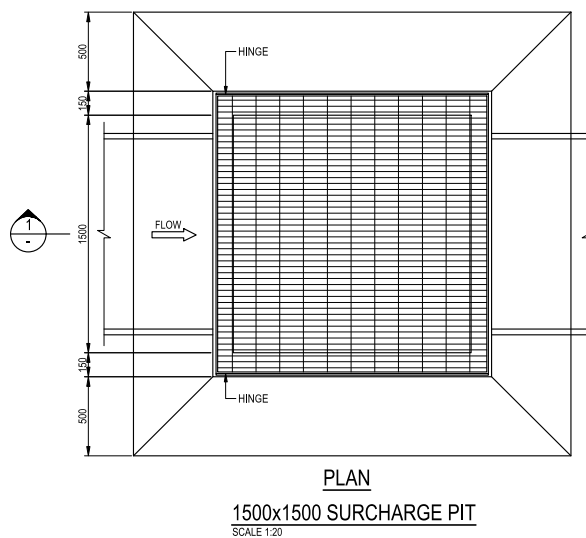
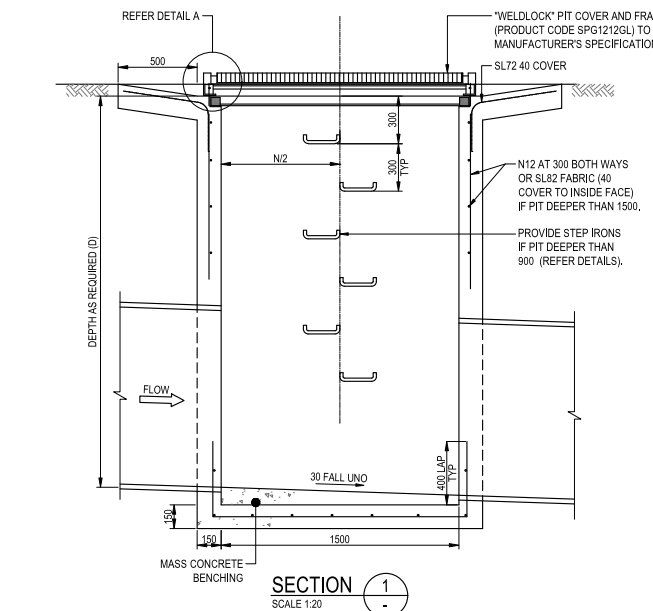


CONFINED SPACE DANGER SIGN

NOTES

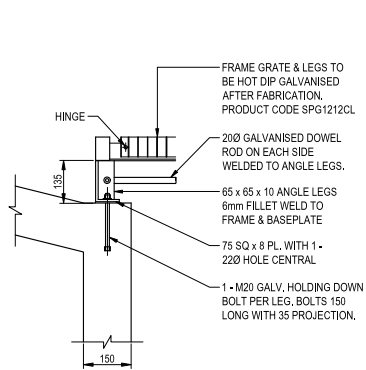
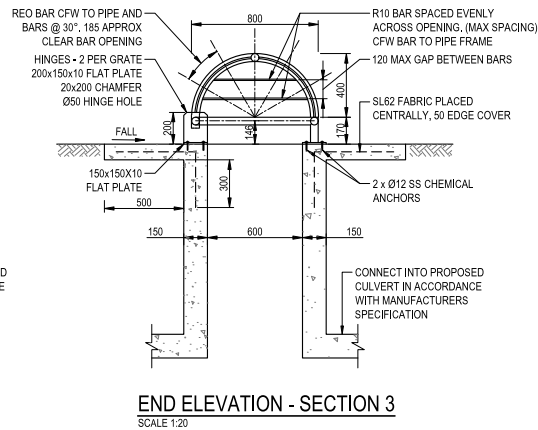
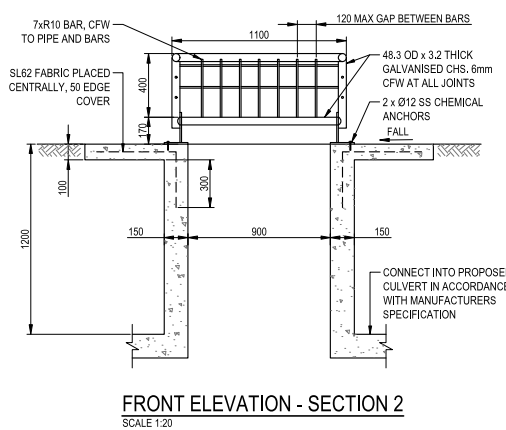
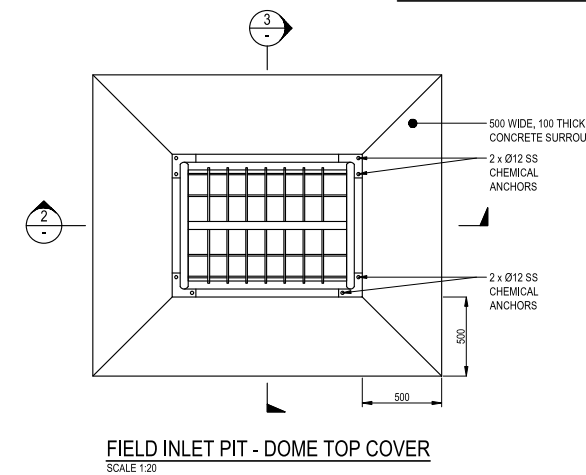
- A CONFINED SPACE SIGN SHALL BE PLACED NEXT TO EACH AND EVERY ACCESS POINT THEY ARE VISIBLE TO PERSON ENTERING ANY BELOW GROUND TANK OR PIT.
- COLOURS:
"DANGER" AND BACKGROUND - WHITE
ELLIPTICAL AREA - RED
LETTERING AND BORDER - BLACK
- MINIMUM OF THE SIGN:
LARGE ENTRIES - 300mm x 450mm
SMALL ENTRIES - 250 mm x 180mm
- SIGN TO BE MADE FROM COLOUR BONDED ALUMINIUM OR POLYPROPYLENE
- SIGN FIXED USING HILTI CHEMSETS OR EPOXY



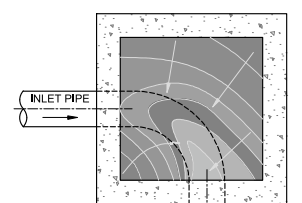


SPAN (m)	HEIGHT (max) (m)	THICKNESS (mm)	X	Y	BASE (mm)	VERTICAL REINFORCEMENT	HORIZONTAL REINFORCEMENT	BASE REINFORCEMENT
<1.5	2.0000	150.0000	2N16	2N16	150.0000	N12@200	N12@200	N12@200
1.5-2.0	2.0000	200.0000	2N16	3N16	200.0000	N12@200	N12@200	N12@200
2.0-2.5	2.5000	230.0000	3N20	3N20	230.0000	N16@200	N16@200	N16@200
2.5-3.0	2.5000	230.0000	3N20	3N20	230.0000	N16@200	N16@200	N16@200
3.0-3.5	3.5000	250.0000	4N20	4N20	250.0000	N16@200	N16@200	N16@200

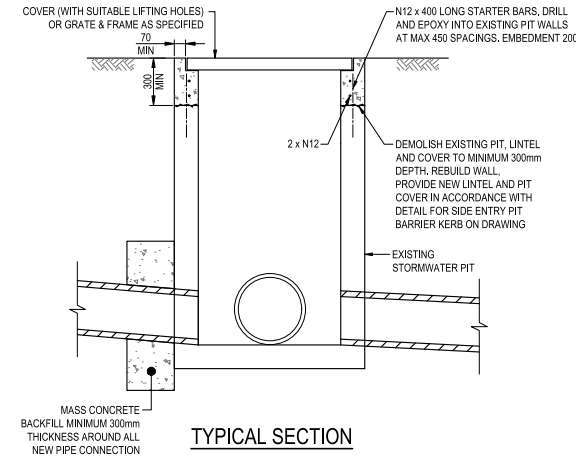
SPECIAL PITS REINFORCEMENT TABLE



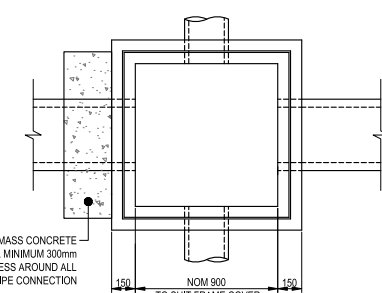
DETAIL A
SCALE 1:20



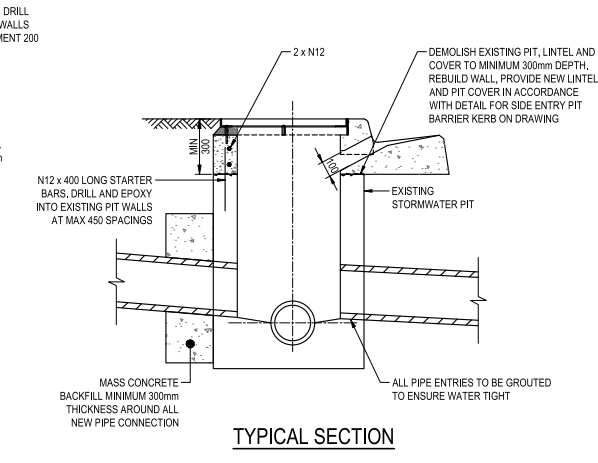
TYPICAL PIT BENCHING DETAILS



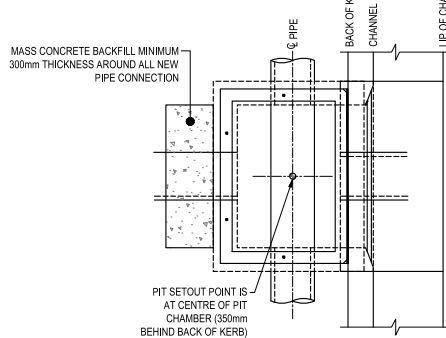
TYPICAL SECTION



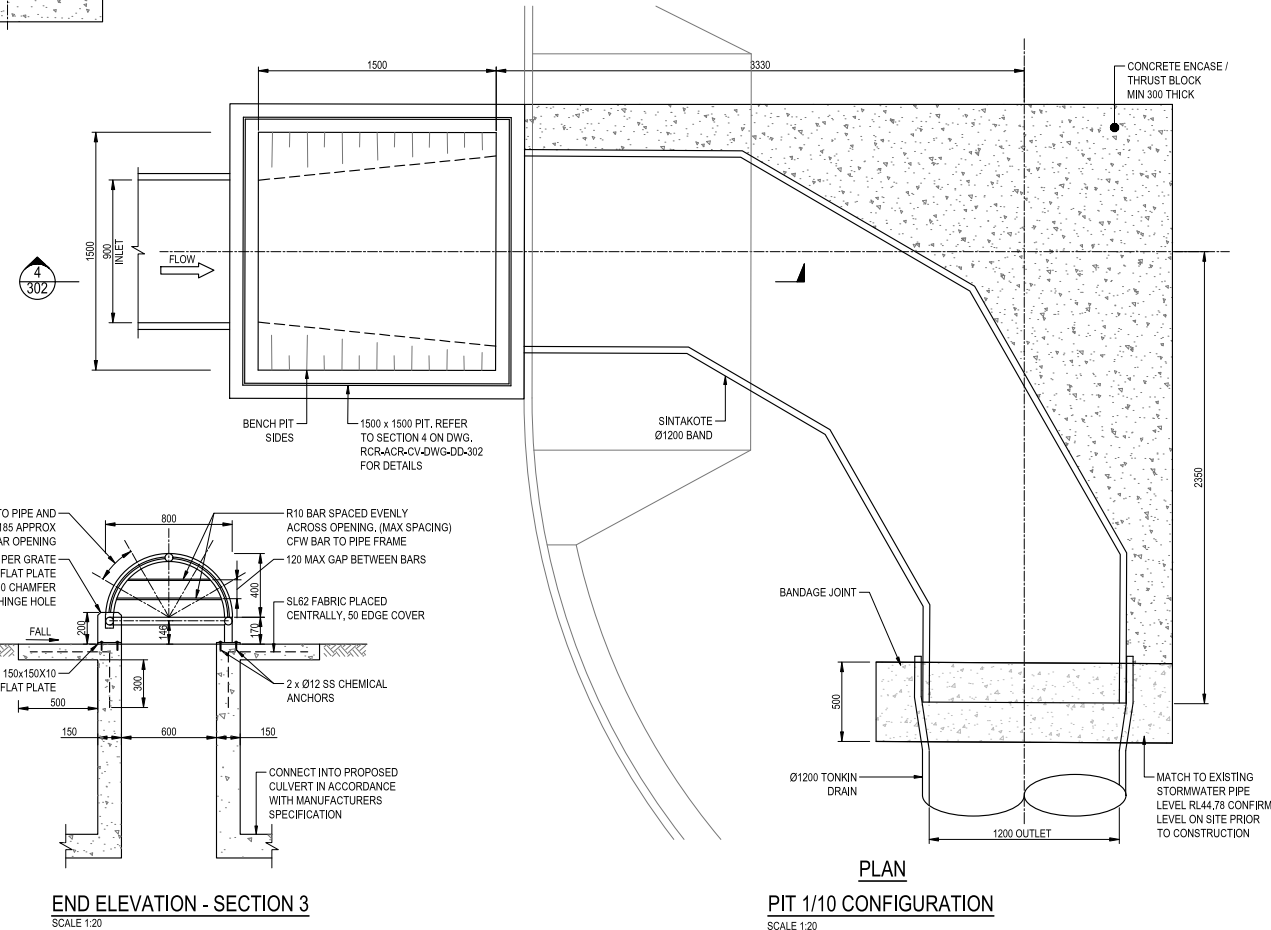
PLAN
RECONSTRUCT SURFACE INLET/JUNCTION PIT
SCALE 1:20



TYPICAL SECTION



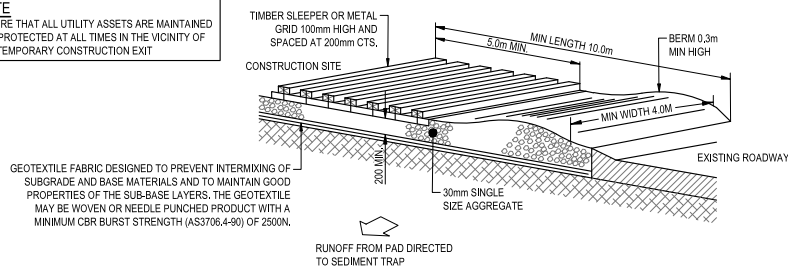
PLAN
RECONSTRUCT EXISTING SIDE ENTRY PIT BARRIER KERB
SCALE 1:20



PLAN

PIT 1/10 CONFIGURATION
SCALE 1:20

NOTE
ENSURE THAT ALL UTILITY ASSETS ARE MAINTAINED
AND PROTECTED AT ALL TIMES IN THE VICINITY OF
THE TEMPORARY CONSTRUCTION EXIT



CONSTRUCTION NOTES

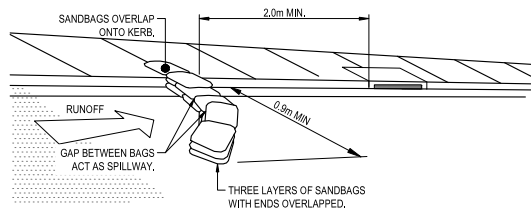
1. STRIP TOPSOIL AND LEVEL SITE.
2. COMPACT SUBGRADE.
3. COVER AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
4. CONSTRUCT 200mm THICK PAD OVER GEOTEXTILE USING 30mm SINGLE SIZE AGGREGATE.
5. CONSTRUCT HUMP IMMEDIATELY WITHIN BOUNDARY TO DIVERT WATER TO A SEDIMENT FENCE OR OTHER SEDIMENT TRAP WHERE THE SEDIMENT IS COLLECTED AND REMOVED.

MAINTENANCE NOTES

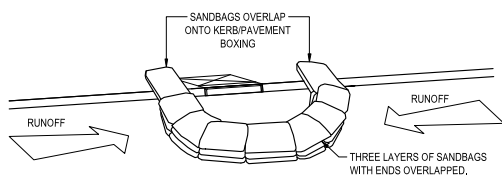
THE EXIT SHALL BE MAINTAINED IN A CONDITION WHICH PREVENTS TRACKING OR FLOWING OF SEDIMENT OFF THE CONSTRUCTION SITE. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL GRAVEL AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED OFF THE CONSTRUCTION SITE MUST BE REMOVED IMMEDIATELY.

TEMPORARY STABILISED CONSTRUCTION EXIT

N.T.S.



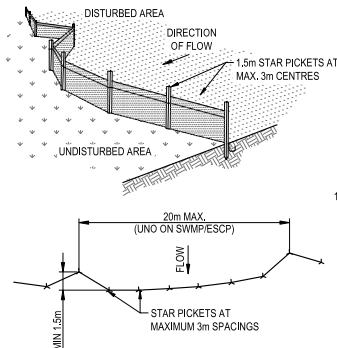
SANDBAG SEDIMENT TRAP - AT ON GRADE PIT



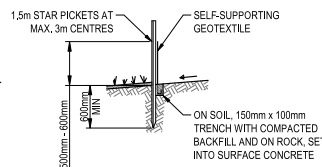
SANDBAG SEDIMENT TRAP - AT KERB SAG PIT

SANDBAG SEDIMENT TRAP.

N.T.S.



PLAN



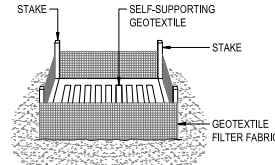
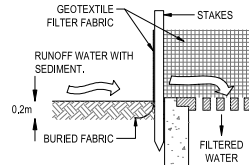
SECTION DETAIL

CONSTRUCTION NOTES

1. CONSTRUCT SEDIMENT FENCE AS CLOSE AS POSSIBLE TO PARALLEL TO THE CONTOURS OF THE SITE.
2. DRIVE 1.5m LONG STAR PICKETS INTO GROUND, 3 METRES APART.
3. DIG A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
4. BACKFILL TRENCH OVER BASE OF FABRIC.
5. FIX SELF-SUPPORTING GEOTEXTILE TO UPSLOPE SIDE OF POSTS WITH WIRE TIES OR AS RECOMMENDED BY GEOTEXTILE MANUFACTURER.
6. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.

SEDIMENT CONTROL FENCE

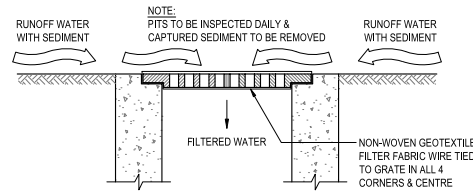
N.T.S.



GEOTEXTILE FILTER FABRIC

DROP INLET SEDIMENT TRAP.

N.T.S.

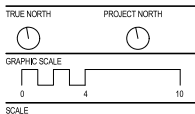


INLET TRAP

N.T.S.

NOTE
TO BE USED IN PAVED AREAS WHERE TRAFFIC
ACCESS IS REQUIRED

PROJECT MANAGEMENT	PWC
STRUCTURAL ENGINEERING	ENSTRUCT GROUP
MECHANICAL ENGINEERING	FREDON AIR
ELECTRICAL ENGINEERING	FREDON
HYDRAULIC ENGINEERING	CP CONSULTANTS
CLIENT	

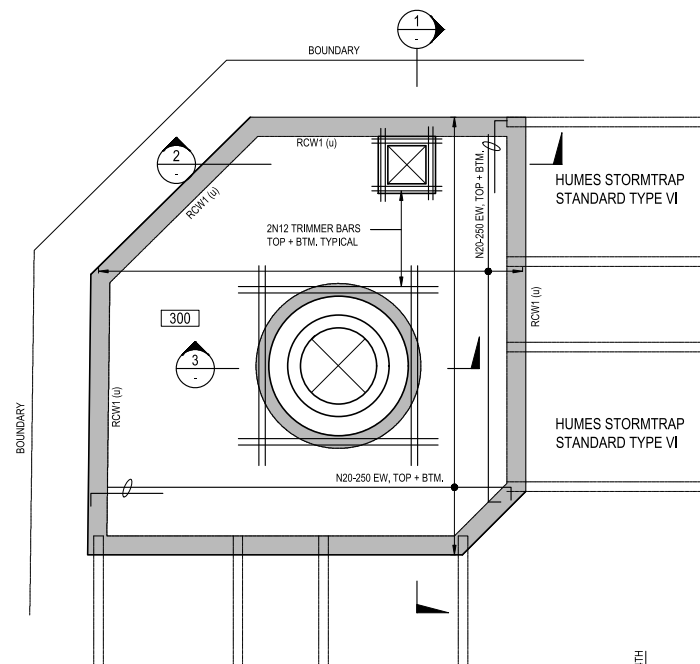


AS SHOWN @ B1
STATUS

FOR CONSTRUCTION

DRAWING
EARLY & ENABLING WORKS
STANDARD DETAILS
SHEET 5

ISSUE	DATE	FOR
01	10.08.18	ISSUE FOR CONSTRUCTION
02	05.12.18	RE-ISSUE FOR CONSTRUCTION
03	18.12.18	RE-ISSUE FOR CONSTRUCTION
04	20.02.19	RE-ISSUE FOR CONSTRUCTION

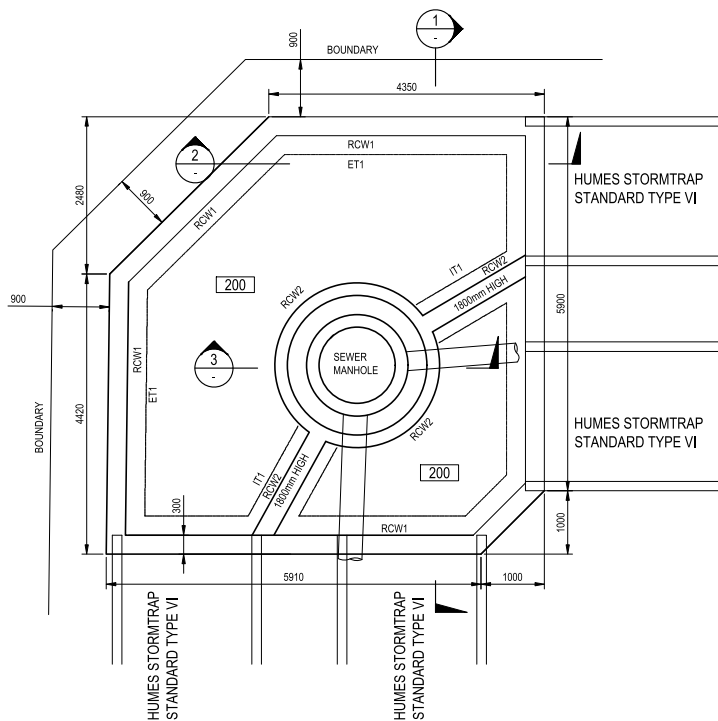
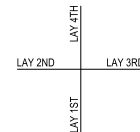


CULVERT CORNER PIT TOP PLAN

SCALE 1:50

300 DENOTES SLAB TO BE MIN 300mm THICK, REINFORCED WITH N20-250 EACH WAY, TOP AND BOTTOM. ANY ADDITIONAL REINFORCEMENT IS SHOWN ON PLAN AND SECTIONS.

BAR LAYING SEQUENCE U.N.O.

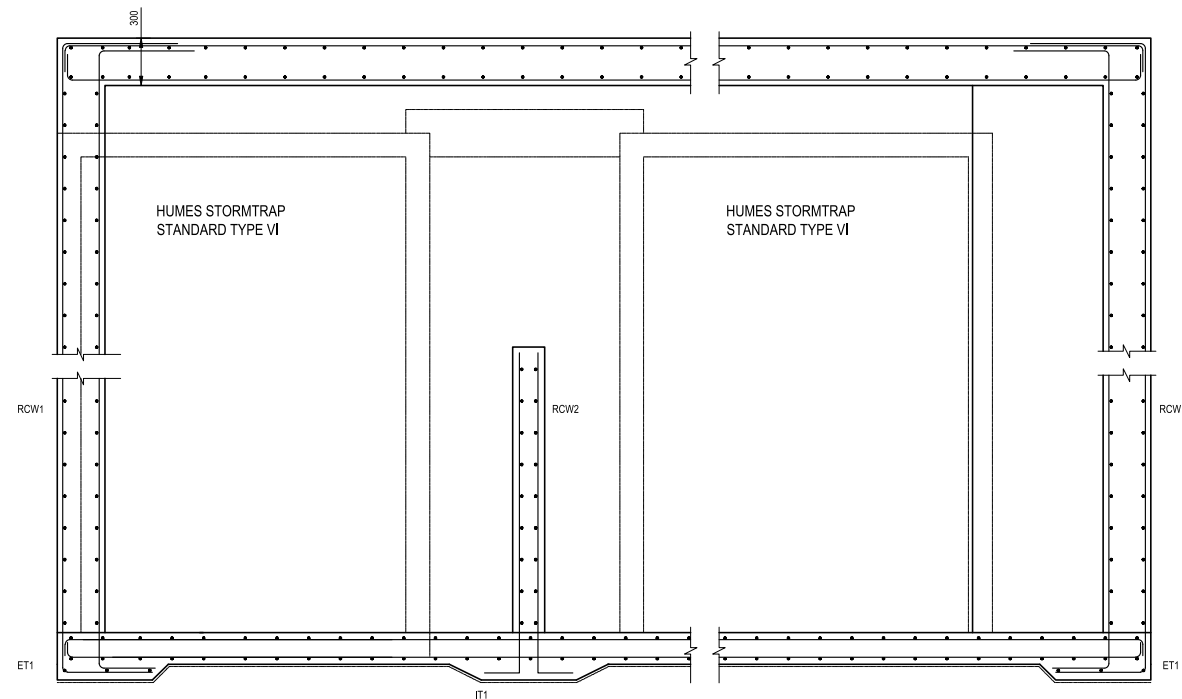


CULVERT CORNER PIT BASE PLAN

SCALE 1:50

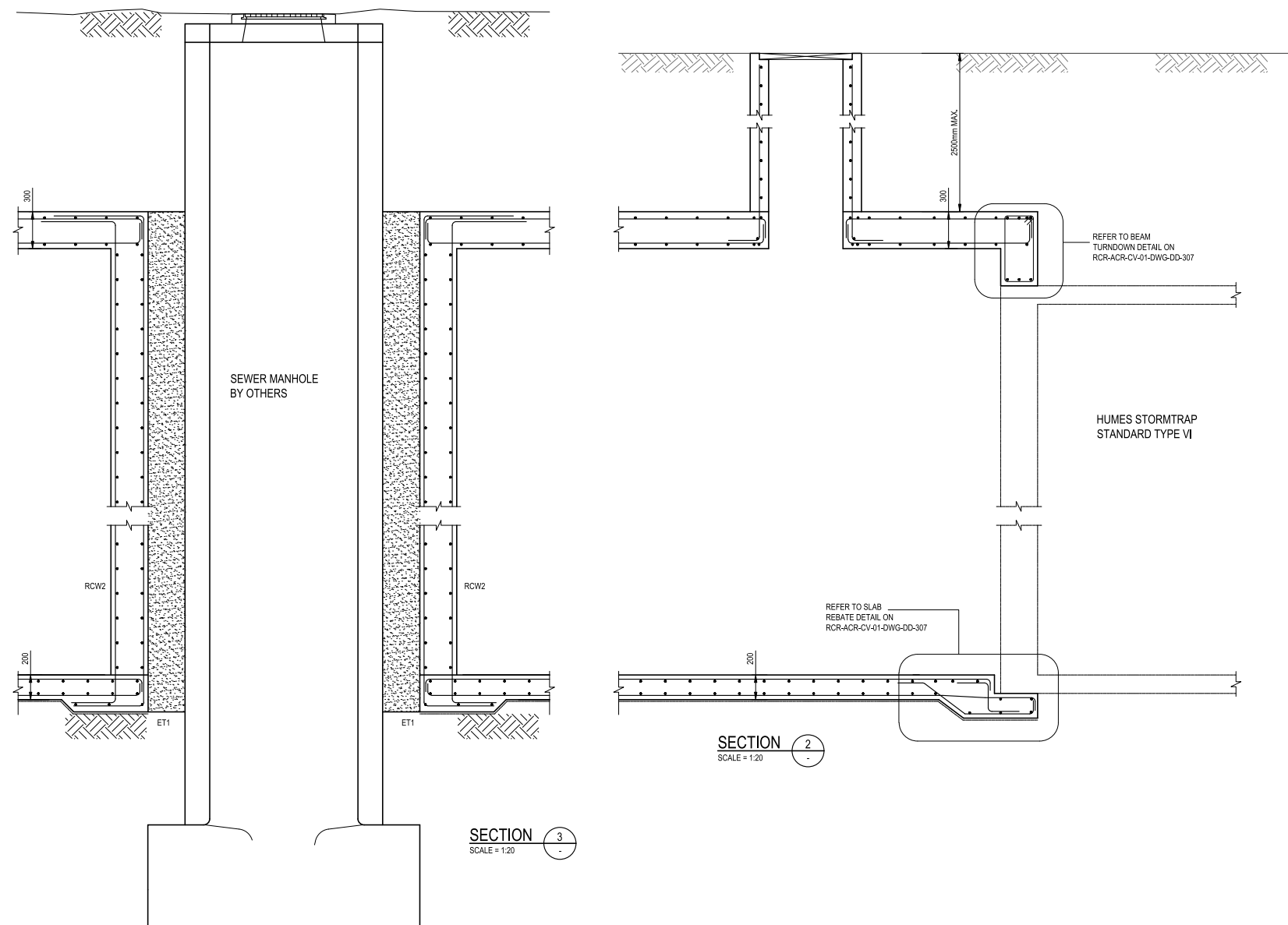
ET1 DENOTES 300(d) x 600(w) CONCRETE EDGE THICKENING. REFER TO DETAILS FOR REINFORCEMENT
IT1 DENOTES 300(d) x 600(w) CONCRETE INTERNAL THICKENING. REFER TO DETAILS FOR REINFORCEMENT
RCW1 DENOTES 300mm REINFORCED CONCRETE WALL. WALL REINFORCED WITH N20-200 EACH FACE, VERT. + HORIZ.
RCW2 DENOTES 200mm REINFORCED CONCRETE WALL. WALL REINFORCED WITH N16-200 EACH FACE, VERT. + HORIZ.

200 ALL SLABS ON GROUND ARE TO BE MIN 200mm THICK U.N.O.
ALL SLABS ON GROUND ARE TO BE POURED ONTO A 300 MICRON MEMBRANE.
SLAB TO BE REINFORCED WITH N16-200 EACH WAY, TOP & BTM.
ANY ADDITIONAL REINFORCEMENT IS SHOWN ON PLAN AND SECTIONS.



SECTION 1

SCALE = 1:20



SECTION 2

SCALE = 1:20

SECTION 3

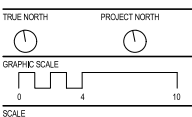
SCALE = 1:20

CONFIDENTIAL & COMMERCIAL-IN-CONFIDENCE

PROJECT MANAGEMENT	PWC
STRUCTURAL ENGINEERING	ENSTRUCT GROUP
MECHANICAL ENGINEERING	FREDON AIR
ELECTRICAL ENGINEERING	FREDON
HYDRAULIC ENGINEERING	CP CONSULTANTS
CLIENT	



PROJECT
POW - REDEVELOPMENT
ACUTE SERVICES BUILDING
RANDWICK NSW AUSTRALIA
ACOR PROJECT NUMBER
SY180053



AS SHOWN @ B1
STATUS
DO NOT SCALE

FOR CONSTRUCTION

DRAWING

EARLY & ENABLING WORKS

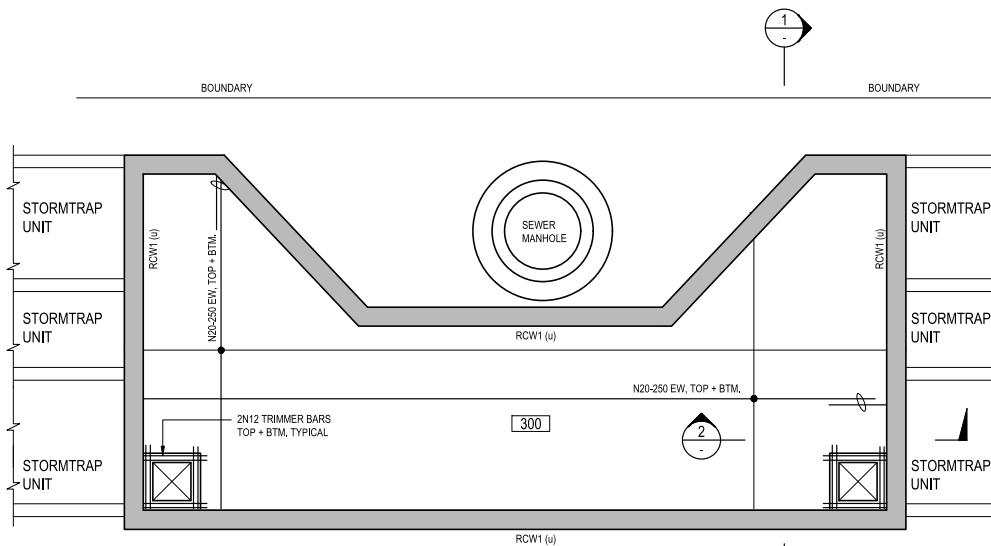
STANDARD DETAILS

SHEET 6

DRAWING NUMBER

ISSUE

RCR-ACR-CV-01-DWG-DD-306 04

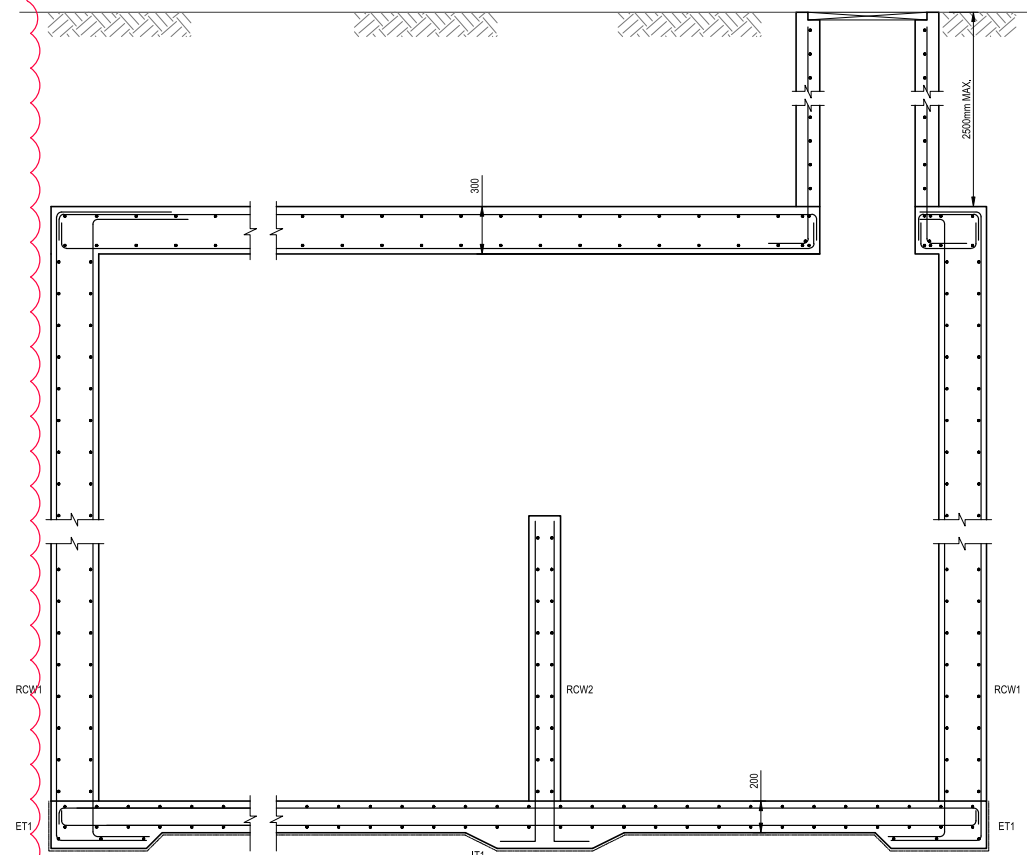
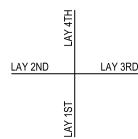


CULVERT CORNER PIT TOP PLAN

SCALE 1:50

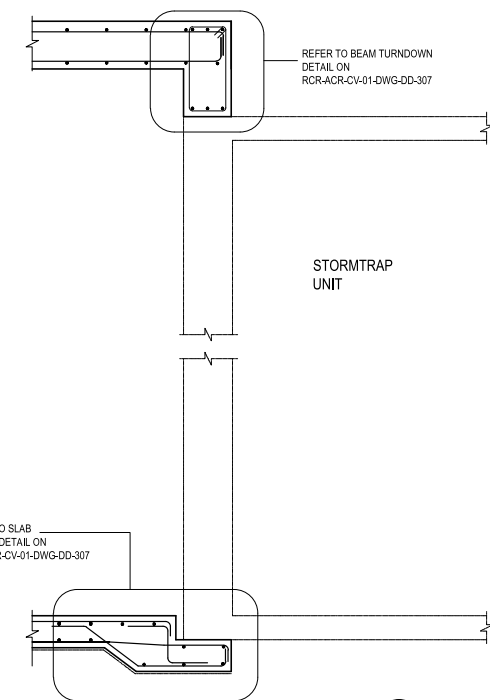
300 DENOTES SLAB TO BE MIN 300mm THICK.
REINFORCED WITH N20-250 EACH WAY, TOP AND BOTTOM.
ANY ADDITIONAL REINFORCEMENT IS SHOWN ON PLAN AND SECTIONS.

BAR LAYING SEQUENCE U.N.O.



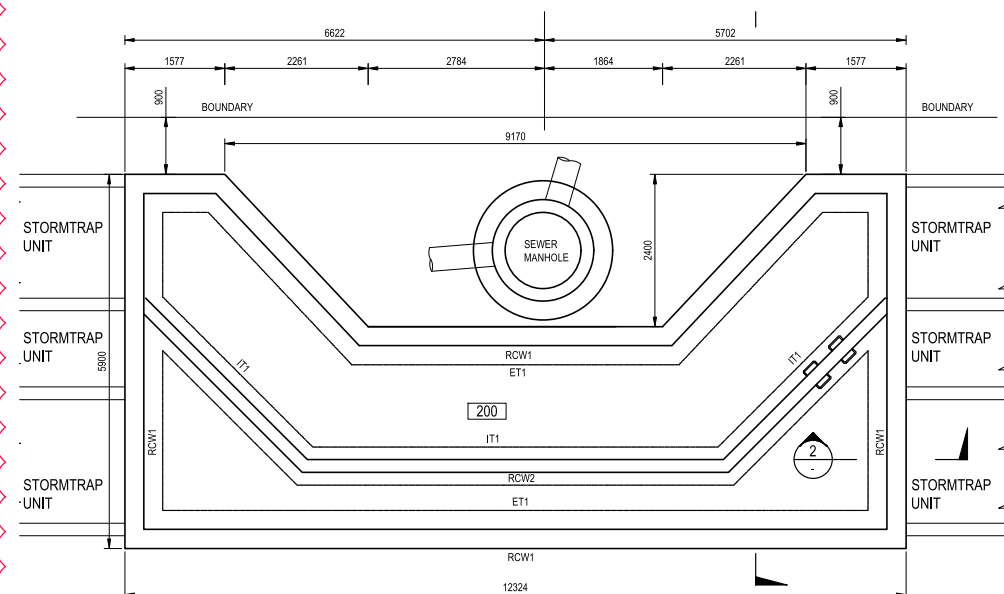
SECTION 1

SCALE 1:20



SECTION 2

SCALE 1:20

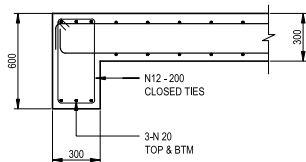


CULVERT CORNER PIT BASE PLAN

SCALE 1:50

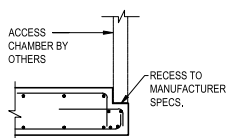
ET1 DENOTES 300(d) x 600(w) CONCRETE EDGE THICKENING. REFER TO DETAILS FOR REINFORCEMENT
IT1 DENOTES 300(d) x 600(w) CONCRETE INTERNAL THICKENING. REFER TO DETAILS FOR REINFORCEMENT
RCW1 DENOTES 300mm REINFORCED CONCRETE WALL. WALL REINFORCED WITH N20-200 EACH FACE, VERT. + HORIZ.
RCW2 DENOTES 200mm REINFORCED CONCRETE WALL. WALL REINFORCED WITH N16-200 EACH FACE, VERT. + HORIZ.

200 ALL SLABS ON GROUND ARE TO BE MIN 200mm THICK U.N.O.
ALL SLABS ON GROUND ARE TO BE POURED ONTO A 300 MICRON MEMBRANE.
SLAB TO BE REINFORCED WITH N16-200 EACH WAY, TOP & BTM.
ANY ADDITIONAL REINFORCEMENT IS SHOWN ON PLAN AND SECTIONS.



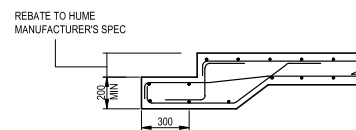
BEAM TURNDOWN

(IF REQUIRED FOR COVER)
SCALE 1:20



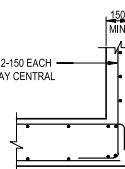
ACCESS CHAMBER DETAILS

(IF PRECAST A/C USED)
SCALE 1:20



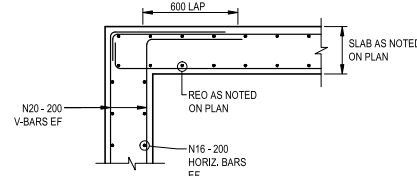
SLAB REBATE DETAIL

SCALE 1:20



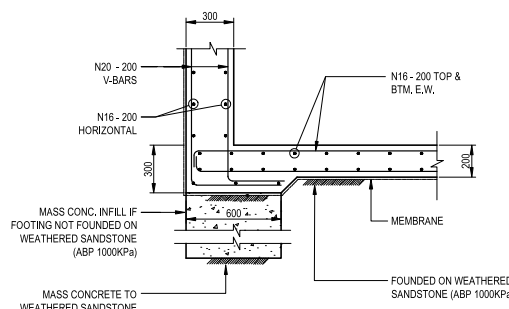
ACCESS CHAMBER DETAILS

(IF CAST IN PLACE)
SCALE 1:20



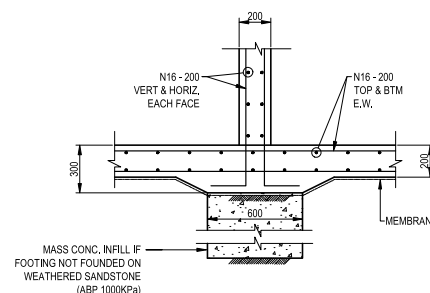
WALL TO PIT LID CONNECTION

SCALE 1:20



WALL TO FOUNDATION SLAB CONNECTION

SCALE 1:20



THICKENING UNDER INTERNAL WALL

SCALE 1:20

PROJECT MANAGEMENT	PWC
STRUCTURAL ENGINEERING	ENSTRUCT GROUP
MECHANICAL ENGINEERING	FREDON AIR
ELECTRICAL ENGINEERING	FREDON
HYDRAULIC ENGINEERING	CP CONSULTANTS
CLIENT	



GENERAL NOTES

- G1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANTS DRAWINGS, SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE STRUCTURAL ENGINEER BEFORE PROCEEDING WITH THE WORK.
- G2. DO NOT COMMENCE CONSTRUCTION USING THESE STRUCTURAL DRAWINGS UNTIL A CONSTRUCTION CERTIFICATE IS ISSUED BY THE PRINCIPAL AUTHORITY.
- G3. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT CURRENT AUSTRALIA CODES AND STANDARDS AND WITH THE BUILDING CODE OF AUSTRALIA.
- G4. ALL DIMENSIONS RELEVANT TO SETTING OUT AND OFF-SITE WORK SHALL BE VERIFIED BY THE CONTRACTOR BEFORE CONSTRUCTION AND FABRICATION IS COMMENCED.
- G5. DIMENSIONS SHALL NOT BE OBTAINED BY SCALING THE STRUCTURAL DRAWINGS.
- G6. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE. ALL LEVELS ARE EXPRESSED IN METRES. THE RLS SHOWN ON THESE DRAWINGS ARE FOR THE SOLE PURPOSE OF ASSISTING THE STRUCTURAL DOCUMENTATION. THEY MUST NOT BE USED FOR CONSTRUCTION. REFER TO THE ARCHITECT'S DRAWINGS FOR ALL CONSTRUCTION RLS.
- G7. DURING CONSTRUCTION THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE STRUCTURE IN A STABLE CONDITION AND ENSURING NO PART SHALL BE OVER STRESSED UNDER CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL PROVIDE TEMPORARY BRACING, SHORING AND PROPPING IN ORDER TO KEEP THE BUILDING WORKS AND EXCAVATIONS STABLE AT ALL TIMES.
- G8. THE BUILDER IS RESPONSIBLE FOR THE ADEQUACY OF ALL TEMPORARY WORKS INCLUDING SHORING, PROPPING AND BRACING. WHERE NECESSARY THE CONTRACTOR IS TO ENGAGE A STRUCTURAL ENGINEER TO DESIGN AND CERTIFY THE TEMPORARY WORKS.
- G9. THE METHOD OF CONSTRUCTION AND THE MAINTENANCE OF SAFETY DURING CONSTRUCTION ARE THE RESPONSIBILITY OF THE BUILDER. IF ANY STRUCTURAL ELEMENT PRESENTS DIFFICULTY IN RESPECT OF CONSTRUCTIBILITY OR SAFETY, THE MATTER SHALL BE REFERRED TO THE STRUCTURAL ENGINEER FOR RESOLUTION BEFORE PROCEEDING WITH THE WORK.
- G10. IF THERE IS A DISCREPANCY IN MEMBER SIZES FOR ANY COMPONENT, ASSUME FOR PRICING PURPOSE ONLY THAT THE LARGER OR MORE EXPENSIVE SIZE IS CORRECT. REFER TO STRUCTURAL ENGINEER FOR DECISION BEFORE DETAILING OR CONSTRUCTION.
- G11. THE APPROVAL OF A SUBSTITUTION SHALL BE SOUGHT FROM THE ENGINEER BUT IS NOT AN AUTHORIZATION FOR A VARIATION. ANY VARIATIONS INVOLVED MUST BE TAKEN UP WITH THE ARCHITECT OR PROJECT MANAGER BEFORE THE WORK COMMENCES.
- G12. ANY DISCREPANCIES OR OMISSIONS SHALL BE REFERRED TO THE ENGINEER FOR A DECISION BEFORE PROCEEDING WITH THE WORK.
- G13. THE WRITTEN CONSENT OF ADJOINING PROPERTY OWNERS SHALL BE OBTAINED BEFORE INSTALLATION OF UNDERPINNING, ANCHORING WORKS, DRAINAGE LINES OR ANY OTHER WORKS BEYOND THE PROPERTY BOUNDARY.
- G14. UNLESS AGREED OR SPECIFIED OTHERWISE, THE BUILDER IS REQUIRED TO NOTIFY AND ALLOW TIME FOR THE STRUCTURAL ENGINEER TO INSPECT THE WORKS AT THE FOLLOWING POINTS: COMPLETED EXCAVATION, FORMWORK, REINFORCEMENT, MEMBRANES AND EMBEDMENTS PRIOR TO PLACEMENT OF CONCRETE, COMPLETED ERECTED STRUCTURAL AND / OR TIMBER FRAMING ELEMENTS PRIOR TO COVERING.
- G15. THE BUILDER SHALL GIVE 48 HOURS NOTICE FOR ALL ENGINEERING INSPECTIONS.
- G16. SITE INSPECTIONS BY THE STRUCTURAL ENGINEER DO NOT RELIEVE THE BUILDER OF RESPONSIBILITY FOR THE COMPLETENESS AND CORRECTNESS OF THEIR WORK.
- G17. WHERE STRUCTURAL ELEMENTS ARE DESIGNED AND CERTIFIED BY OTHER PARTIES, THE CONTRACTOR SHALL OBTAIN WRITTEN CERTIFICATION PRIOR TO PROCEEDING WITH ANY CONSTRUCTION WORK WHICH WOULD PREVENT INSPECTION OR REMEDIAL WORKS TO BE UNDERTAKEN. ALL CERTIFICATIONS ARE TO BE ISSUED TO THE STRUCTURAL ENGINEER FOR REVIEW PRIOR TO WORK PROCEEDING.
- G18. THE WORD 'ENGINEER' USED IN THESE NOTES REFERS TO AN EMPLOYEE OR NOMINATED REPRESENTATIVE OF ACOR CONSULTANTS PTY.LTD.

FOUNDATIONS

- F1. FOOTINGS HAVE BEEN DESIGNED FOR AN ALLOWABLE BEARING INTENSITY OF 250 kPa ON MEDIUM DENSE SAND IN ACCORDANCE WITH: GEOTECHNICAL REPORT No. : 72505.11 FROM FEB 2018
- PREPARED BY : DOUGLASS PARTNERS PTY LTD
- IF A GEOTECHNICAL INVESTIGATION HAS NOT BEEN MADE, THE FOUNDATION CONDITIONS AND REACTIVITY CLASS ARE AN ASSUMPTION AND MUST BE CONFIRMED BY TRIAL EXCAVATIONS BY THE BUILDER.
- FOUNDATION MATERIAL SHALL BE APPROVED FOR THIS BEARING PRESSURE BEFORE PLACING MEMBRANE, REINFORCEMENT OR CONCRETE.
- F2. RESIDENTIAL SLABS AND FOOTINGS HAVE BEEN DESIGNED FOR A REACTIVITY CLASS A TO AS2870.
- F3. BEARING MATERIAL AT BASES OF PIERS TO BE CONFIRMED BY AN EXPERIENCED GEOTECHNICAL ENGINEER OR ENGINEERING GEOLOGIST PRIOR TO POURING CONCRETE.
- F4. EXCAVATION NEAR FOOTINGS SHALL NOT EXTEND BELOW FOUNDATION LEVEL WITHOUT THE ENGINEERS APPROVAL.
- F5. ALL FOOTINGS SHALL BE LOCATED CENTRALLY UNDER WALLS AND COLUMNS UNLESS NOTED OTHERWISE
- F6. DO NOT BACKFILL RETAINING WALLS (OTHER THAN CANTILEVER WALLS) UNTIL FLOOR CONSTRUCTION AT TOP AND BOTTOM IS COMPLETED.
- F7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ANY EXCAVATION IN A STABLE CONDITION WITHOUT ADVERSELY AFFECTING SURROUNDING PROPERTY INCLUDING SERVICES. THIS INCLUDES OBTAINING ALL NECESSARY APPROVALS FOR SHORING AND ANCHOR SYSTEMS.
- F8. ANY OVER EXCAVATION SHALL BE BACKFILLED WITH CONCRETE GRADE N15.
- F9. FOUNDATIONS ADJACENT TO SERVICES ETC. SHALL BE EXTENDED DOWN SUCH THAT THE INFLUENCE LINE OF THE FOUNDATION IS BELOW THE ADJACENT SERVICE.

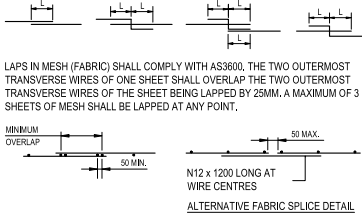
REINFORCEMENT

- R1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3600, AS4671 AND OTHER RELEVANT AUSTRALIAN CODES.
- R2. REINFORCEMENT TYPE AND GRADE.
- | SYMBOL | TYPE | MPa | DUCTILITY CLASS |
|--------|-----------------------------|-----|-----------------|
| N | HOT ROLLED DEFORMED BARS | 500 | NORMAL |
| R | HOT ROLLED PLAIN BARS | 250 | NORMAL |
| W | COLD DRAWN PLAIN ROUND WIRE | 500 | LOW |
| SL | SQUARE WELDED MESH | 500 | LOW |
| RL | RECTANGULAR WELDED MESH | 500 | LOW |
| L TM | RECTANGULAR WELDED MESH | 500 | LOW |
- R3. ALL REINFORCEMENT TO CONFORM TO AS4671, CURRENT EDITIONS WITH AMENDMENTS. REINFORCEMENT NOTATION GIVES THE FOLLOWING INFORMATION: NO. OF BARS, TYPE, SIZE (MM), SPACING (MM), LAYER. FOR EXAMPLE 17N16-250 T
- R4. FABRIC OR MESH NOTATION GIVES THE FOLLOWING INFORMATION: 'RL' OR 'SL', PRODUCT CODE, LAYER. FOR EXAMPLE SL82 T
- R5. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND NOT NECESSARILY SHOWN IN TRUE PROJECTION.
- R6. COVER TO REINFORCEMENT - CLEAR COVER TO ALL REINFORCEMENT FOR DURABILITY SHALL BE AS INDICATED IN THE CONCRETE NOTES. COVER SHALL NOT BE LESS THAN THE SIZE OF THE AGGREGATE OR THE MAIN BAR, PIPES OR CONDUITS SHALL NOT BE PLACED WITHIN THE COVER TO REINFORCEMENT.
- R7. SUPPORT REINFORCEMENT ON MILD STEEL PLASTIC TIPPED CHAIRS, PLASTIC CHAIRS OR CONCRETE CHAIRS AT NOT GREATER THAN 1 METRE CENTRES BOTH WAYS, IN EXPOSED CONDITIONS B2 OR C (TO AS3600) USE ONLY PLASTIC OR CONCRETE CHAIRS.
- R8. WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED WITHOUT THE APPROVAL OF THE ENGINEER.
- R9. PROVIDE DISTRIBUTION REINFORCEMENT OR TIE BARS IF NOT SHOWN, WHERE NECESSARY PROVIDE N12-400 CENTRES (SPLICE 450)
- R10. SITE BENDING OF N BARS SHALL BE DONE COLD WITH POWER OR MECHANICAL BENDING TOOLS AND A MANDREL OR FORMER WITH A BAR DIAMETER OF 5 TIMES THE BAR SIZE. NOTE: IF N BARS ARE HEATED ABOVE 450°C (LESS THAN RED HEAT) THEY LOSE STRENGTH.
- R11. LAP REINFORCEMENT ONLY AT LOCATIONS SHOWN ON THE STRUCTURAL DRAWINGS OR AS OTHERWISE APPROVED IN WRITING BY THE STRUCTURAL ENGINEER.

SLAB REINFORCEMENT - LAP LENGTH (mm)				
BAR DIA.	CONCRETE GRADE			
	25 MPa	32 MPa	40 MPa	
N12	600	500	450	
N16	850	750	650	
N20	1100	1000	900	

BEAM REINFORCEMENT - LAP LENGTH (mm)						
BAR DIA.	< 300mm CONCRETE CAST BELOW THE BAR			> 300mm CONCRETE CAST BELOW THE BAR		
	CONCRETE GRADE			CONCRETE GRADE		
	25 MPa	32 MPa	40 MPa	25 MPa	32 MPa	40 MPa
N12	600	500	450	750	650	600
N16	850	750	650	1100	950	850
N20	1100	1000	900	1450	1300	1150
N24	1400	1250	1100	1800	1600	1400
N28	1700	1500	1350	2200	1950	1700
N32	2000	1800	1600	2600	2300	2050
N36	2400	2100	1850	3050	2700	2400

BAR DIA.	COLUMN AND WALL REINFORCEMENT LAP LENGTH (mm)
N12	500
N16	650
N20	800
N24	950
N28	1150
N32	1300
N36	1450



- R11. SLAB REINFORCEMENT SHALL EXTEND 70mm ONTO SUPPORTING WALLS, WITH 50% OF BOTTOM BARS COGGED TO ACHIEVE ANCHORAGE AT SIMPLY SUPPORTED ENDS. MESH IN SLABS SHALL EXTEND 70mm ONTO SUPPORTING WALLS WITH A CROSS WIRE.
- R12. ALL BEAM TIES ARE TO HAVE BAR ANCHORAGES LOCATED ON THE TOP FACE OF THE BEAM UNO.
- R13. REINFORCEMENT BAR JOGGLES SHALL BE 1 BAR DIAMETER OVER A LENGTH OF 12 BAR DIAMETERS.

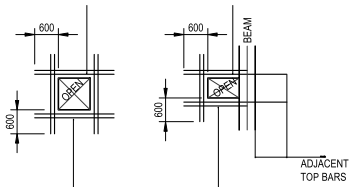
CONCRETE NOTES

- C1. ALL WORKMANSHIP AND MATERIALS SHALL COMPLY WITH AS 3600 CURRENT EDITIONS WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.
- C2. ALL CONCRETE SUPPLY SHALL COMPLY WITH AS1379. CONCRETE PROPERTIES AND COVER TO REINFORCING SHALL BE AS FOLLOWS :
- | ELEMENT | COVER (mm) | f _c (MPa) (28 DAYS) | MAX 95 DAY SHRINKAGE |
|-----------------|--------------------|--------------------------------|----------------------|
| SLAB ON GROUND | EXTERNAL T 50 B 50 | 40 | |
| | INTERNAL T 50 B 50 | 40 | 800 microns |
| SUSPENDED SLABS | EXTERNAL T 50 B 50 | 40 | |
| | INTERNAL T 50 B 50 | 40 | 800 microns |
| CONCRETE WALLS | EXTERNAL 50 | 40 | |
| | INTERNAL 50 | 40 | 800 microns |
- MAXIMUM AGGREGATE SIZE = 20mm UNO
SLUMP DURING PLACEMENT = 80mm UNO
EXPOSURE CLASSIFICATION = A2 (INTERNAL)
= B1 (EXTERNAL)
- C3. CEMENT TO BE TYPE SL TO AS 3972 UNLESS NOTED OTHERWISE, THIS IS A MODIFIED TYPE 'GP' CEMENT. SEE ACSE CONCRETE SPECIFICATION.
- C4. NO 'BRECCIA' TYPE AGGREGATE IS TO BE USED.
- C5. NO ADMIXTURES SHALL BE USED IN CONCRETE UNLESS APPROVED IN WRITING BY THE ENGINEER.
- C6. PROJECT ASSESSMENT OF CONCRETE SHALL BE CARRIED OUT IN ACCORDANCE WITH AS1379.
- C7. PROJECT CONTROL TESTING SHALL BE CARRIED OUT IN ACCORDANCE WITH AS1379 BY A NATA REGISTERED TESTING LABORATORY. SAMPLES SHALL BE TAKEN FOR TESTING OF: SLUMP, COMPRESSIVE STRENGTH AND ANY OTHER TEST SPECIFIED.
- SLUMP SHALL BE SAMPLED FOR EACH TRUCK AT THE TIME OF POURING.
- THE MINIMUM FREQUENCY OF SAMPLING FOR COMPRESSIVE TESTING OF EACH TYPE AND GRADE SHALL BE IN ACCORDANCE WITH THE FOLLOWING TABLE.
- | NUMBER OF BATCHES PER DAY | NUMBER OF SAMPLES
1 SAMPLE = 3 CYLINDERS
4 CYLINDERS FOR POST TENSIONED CONCRETE |
|---------------------------|--|
| 1 | 1 SAMPLE |
| 1 TO 5 | 2 SAMPLES |
| 6 TO 10 | 3 SAMPLES |
| 11 TO 20 | 4 SAMPLES |
| FOR EACH ADDITIONAL 10 | 1 ADDITIONAL SAMPLE |
- SAMPLES SHALL BE TESTED FOR COMPRESSIVE STRENGTH AS FOLLOWS: ONE CYLINDER AT 3 DAYS (POST TENSIONED CONCRETE ONLY)
ONE CYLINDER AT 7 DAYS
TWO CYLINDERS AT 28 DAYS
- C8. BEAM DEPTHS ARE WRITTEN FIRST AND INCLUDE SLAB THICKNESS.
- C9. SIZES OF CONCRETE ELEMENTS DO NOT INCLUDE THICKNESS OF APPLIED FINISHES.
- C10. NO HOLES, CHASES OR EMBEDMENT OF PIPES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT PRIOR APPROVAL OF THE ENGINEER.
- C11. CONSTRUCTION JOINTS SHALL BE PROPERLY FORMED AND USE ONLY WHERE SHOWN OR SPECIFICALLY APPROVED BY THE ENGINEER.
- C12. ALL CONCRETE COLUMNS ARE TO BE POURED A MINIMUM OF 4 HOURS PRIOR TO SLAB OR BEAM OVER.
- C13. DRIP GROOVES ARE TO BE PROVIDED AT ALL EXPOSED EDGES. COVER TO REINFORCEMENT IS TO BE MAINTAINED.
- C14. CONDUITS, PIPES AND THE LIKE SHALL NOT BE PLACED WITHIN THE CONCRETE COVER.
- C15. ALL CONCRETE (INCLUDING FOOTINGS AND SLABS ON GROUND) SHALL BE MECHANICALLY VIBRATED TO ACHIEVE FULL COMPACTION.
- C16. SAWN OUT JOINTS ARE TO BE CUT AFTER THE CONCRETE HAS SUFFICIENTLY HARDENED SUCH THAT WILL NOT BE DAMAGED BY THE SAWING BUT BEFORE SHRINKAGE CRACKING CAN OCCUR.
- C17. CURING OF ALL CONCRETE SHALL BE IN ACCORDANCE WITH AS3600 AND SHALL COMMENCE WITHIN 2 HOURS OF FINISHING OPERATIONS. CURING SHALL BE BY CONTINUAL SATURATION WITH PORTABLE WATER FOR 3 DAYS FOLLOWED BY PREVENTION OF MOISTURE LOSS FOR THE NEXT 4 DAYS USING POLYTHENE SHEETING OR WET HESSIAN PROTECTED FROM WIND OR TRAFFIC AND THEN ALLOWING GRADUAL DRYING OUT. CURING COMPOUNDS MAY BE USED PROVIDED THAT THEY COMPLY WITH AS3799 AND DO NOT AFFECT THE APPLICATION OF FLOOR FINISHES. THE COMPATIBILITY OF CURING COMPOUNDS WITH PROPOSED APPLIED FINISHES SHALL BE VERIFIED PRIOR TO APPLICATION. CURING COMPOUNDS ARE TO BE APPLIED UNIFORMLY IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATION. PVA BASED CURING COMPOUNDS ARE NOT ACCEPTABLE.
- C18. ALIPHATIC ALCOHOL:- WHEN SHADE TEMPERATURE EXCEEDS 35° C SPRAY THE EXPOSED SURFACE OF CONCRETE SLAB DURING THE PLACING AND FINISHING OPERATION WITH A FINE FILM OF APPROVED ALIPHATIC ALCOHOL.
- C19. ENSURE ADEQUATE SUPPLY OF ALIPHATIC ALCOHOL ON SITE BEFORE COMMENCING CONCRETE WORK.
- C20. SLIP JOINTS ARE TO BE USED ON ALL LOAD BEARING MASONRY WALLS. USE TWO LAYERS OF GALVANIZED FLAT STEEL WITH GRAPHITE GREASE BETWEEN, ON INTERNAL SKIN & TWO LAYERS OF FLAT STAINLESS STEEL WITH GRAPHITE GREASE BETWEEN, ON EXTERNAL SKINS. PROVIDE MORTAR LEVELLING STRIP AS REQUIRED.
- C21. NON LOAD BEARING MASONRY SHALL BE SEPARATED FROM THE SOFFIT OF SLABS AND BEAMS BY 20mm. PROVIDE SUITABLE HEAD RESTRAINT TIES AS REQUIRED.
- C22. MASONRY WALLS MUST NOT BE CONSTRUCTED ON SUSPENDED CONCRETE UNTIL ALL TEMPORARY SUPPORTS ARE REMOVED AND ALL MASONRY TO BE LAID HAS BEEN STACKED ADJACENT TO PROPOSED POSITION.

CONCRETE CONT'

TYPICAL OPENINGS IN SLABS

- C23. LOCATION OF ALL OPENINGS TO BE TO THE APPROVAL OF ACOR.
- C24. FOR OPENINGS LESS THAN 300 x 300mm, BARS TO BE RE-ARRANGED AROUND HOLE.
- C25. FOR PENETRATIONS GREATER THAN 300 x 300mm BUT LESS THAN 1000mm x 1000mm USE DETAILS BELOW.
- C26. FOR PENETRATIONS GREATER THAN 1000 x 1000mm REFER TO ENGINEER'S PLANS. WHERE OPENINGS ARE NOT DETAILED, CONTACT ENGINEER IMMEDIATELY.
- C27. TOP BARS: FOR EVERY TWO BARS THAT ARE TERMINATED BY OPENINGS, ADD ONE BAR EACH SIDE USING SAME GRADE AND SIZE OF REINFORCEMENT, WHERE NO TOP BARS ARE SHOWN, ADD 1-N16 TOP EACH SIDE OF OPENING.
- C28. BOTTOM BARS: FOR EVERY TWO BARS THAT ARE TERMINATED BY OPENINGS, ADD ONE BAR EACH SIDE USING SAME GRADE AND SIZE OF REINFORCEMENT.
- PIPE PENETRATION THROUGH BEAM
- C28. LOCATION OF ALL OPENINGS TO BE TO THE APPROVAL OF THE STRUCTURAL ENGINEER.
- C29. MINIMUM DISTANCE FROM BEAM SOFFIT TO PIPE SOFFIT TO BE 150mm.
- C30. FOR PIPES UP TO Ø90, ADD ONE ROW OF TIES EACH SIDE OF PIPE.
- C31. FOR PIPES Ø91 TO Ø150, ADD TWO ROWS OF TIES EACH SIDE OF PIPE AND 1-N16 HORIZONTAL BAR 1200 LONG TOP AND BOTTOM OF PIPE AT EVERY VERTICAL TIE LEG.
- C32. FOR HOLES GREATER THAN Ø150 REFER TO ENGINEER'S DETAILS, WHERE PENETRATIONS ARE NOT DETAILED, CONTACT STRUCTURAL ENGINEER IMMEDIATELY.
- C33. LOCATION OF HOLES TO BE TO THE APPROVAL OF THE STRUCTURAL ENGINEER.



PIPE PENETRATION THROUGH BEAM

CHARACTERISTIC STRENGTH f_c = 20 MPa AT 28 DAYS.
MAXIMUM AGGREGATE SIZE = 10 mm.
SLUMP = 230 mm.

MAXIMUM CONTINUOUS POUR HEIGHT SHALL BE 3600 mm, STOP POUR 50 mm BELOW TOP OF BLOCK TO PROVIDE KEY FOR THE FOLLOWING POUR.

BUILDER IS TO PROVIDE TEMPORARY PROPPING TO WALLS WHERE REQUIRED FOR STABILITY DURING CONSTRUCTION.

VERTICAL JOINTS

B111. PROVIDE VERTICAL CONTROL JOINTS IN ALL WALLS AT A MAXIMUM OF 8000 mm CENTRES OR AT SLAB JOINTS UNLESS INDICATED OTHERWISE ON THE STRUCTURAL DRAWINGS.

HORIZONTAL JOINTS

B12. PROVIDE HORIZONTAL JOINT REINFORCEMENT EVERY THIRD COURSE FOR SOLID OR CORE FILLED BLOCKS

B13. REFER TO TYPICAL "REINFORCED BLOCK WALL JUNCTION DETAILS" FOR REINFORCEMENT REQUIREMENTS AT CORNERS AND INTERSECTIONS.

B14. REFER TO THE ARCHITECTS SPECIFICATIONS FOR ALL WATERPROOFING DETAILS OF WALLS AS REQUIRED.

B15. REFER TO "RETAINING WALL NOTE" FOR ADDITIONAL INFORMATION ON BACKFILLING AND DRAINAGE SYSTEMS BEHIND RETAINING WALLS.

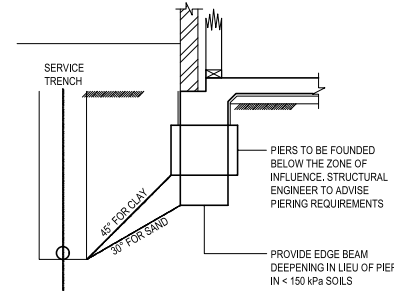
B16. REFER TO TYPICAL DETAILS FOR BOND BEAM LINTELS.

B17. MASONRY WALLS MUST NOT BE CONSTRUCTED ON SUSPENDED CONCRETE UNTIL ALL TEMPORARY SUPPORTS ARE REMOVED AND ALL MASONRY TO BE LAID HAS BEEN STACKED ADJACENT TO PROPOSED POSITION.

ADDITIONAL REINFORCEMENT REFER TO NOTES

PIERING REQUIREMENT

- C34. WHERE A SERVICE TRENCH IS PARALLEL TO A SIDE OF THE SLAB, WHETHER THE SLAB BE IN AN EXCAVATED OR FILLED AREA, THEN PIERING TO SUPPORT THE SLAB BESIDE THE SERVICE TRENCH IS ONLY REQUIRED IF THE SERVICE LINE IS BELOW A LINE OF INFLUENCE DRAWN FROM THE BOTTOM OF THE EDGE BEAM, REFER TO DIAGRAM BELOW.



- C35. THESE NOTES ARE INTENDED AS A GUIDE. THERE IS ALWAYS A POSSIBILITY OF SITE CONDITIONS REQUIRING VARIATION TO THESE PROCEDURES. IN SUCH CASES, THE STRUCTURAL ENGINEER MUST BE CONSULTED.

REINFORCED CONCRETE BLOCKWORK

- RB1. ALL WORKMANSHIP SHALL COMPLY WITH AS 3700, AND THE SPECIFICATIONS.
- RB2. ALL BLOCKS SHALL CONFORM TO AS 2733.
- RB3. THE DESIGN STRENGTH OF CONCRETE MASONRY SHALL BE AS FOLLOWS :-

ELEMENT	BLOCK STRENGTH GRADE	MORTAR MIX CEMENT:LIME:SAND
WALLS	15	M3 MORTAR (NORMAL) 1:1:6 M4 MORTAR (EXPOSURE GRADE) 1:0.5:4.5

- RB4. LAY BOTTOM COURSE OF BLOCKS ON FULL MORTAR BED. ALL PERPENDS SHALL BE FULLY FILLED WITH MORTAR, EXCEPT WHERE REQUIRED FOR WEEPHOLES.
- RB5. CLEAN OUT BLOCKS SHALL BE PROVIDED AT THE BASE OF ALL REINFORCED CORES. REINFORCED CORES SHALL BE CLEANED OF MORTAR PROTRUSIONS BEFORE GROUTING.
- RB6. ALL REINFORCED CORES SHALL BE FILLED WITH GROUT. THE GROUT FILLING SHALL BE THOROUGHLY COMPACTED BY MECHANICAL VIBRATOR OR RODDING. UNREINFORCED CORES NEED NOT BE FILLED UNLESS OTHERWISE NOTED.
- RB7. GROUT COVER TO REINFORCEMENT IN BLOCK RETAINING WALLS SHALL BE MAINTAINED BY THE USE OF PLASTIC 'BLOCKAID' REINFORCEMENT LOCATION BRACKETS (OR APPROVED EQUIVALENT) AT THE INTERSECTION OF ALL HORIZONTAL AND VERTICAL REINFORCEMENT.
- RB8. GROUT SHALL BE IN ACCORDANCE WITH AS 3600 AND COMPLY WITH THE FOLLOWING :-

CHARACTERISTIC STRENGTH f_c = 20 MPa AT 28 DAYS.
MAXIMUM AGGREGATE SIZE = 10 mm.
SLUMP = 230 mm.

MAXIMUM CONTINUOUS POUR HEIGHT SHALL BE 3600 mm, STOP POUR 50 mm BELOW TOP OF BLOCK TO PROVIDE KEY FOR THE FOLLOWING POUR.

BUILDER IS TO PROVIDE TEMPORARY PROPPING TO WALLS WHERE REQUIRED FOR STABILITY DURING CONSTRUCTION.

VERTICAL JOINTS

B111. PROVIDE VERTICAL CONTROL JOINTS IN ALL WALLS AT A MAXIMUM OF 8000 mm CENTRES OR AT SLAB JOINTS UNLESS INDICATED OTHERWISE ON THE STRUCTURAL DRAWINGS.

HORIZONTAL JOINTS

B12. PROVIDE HORIZONTAL JOINT REINFORCEMENT EVERY THIRD COURSE FOR SOLID OR CORE FILLED BLOCKS

B13. REFER TO TYPICAL "REINFORCED BLOCK WALL JUNCTION DETAILS" FOR REINFORCEMENT REQUIREMENTS AT CORNERS AND INTERSECTIONS.

B14. REFER TO THE ARCHITECTS SPECIFICATIONS FOR ALL WATERPROOFING DETAILS OF WALLS AS REQUIRED.

B15. REFER TO "RETAINING WALL NOTE" FOR ADDITIONAL INFORMATION ON BACKFILLING AND DRAINAGE SYSTEMS BEHIND RETAINING WALLS.

B16. REFER TO TYPICAL DETAILS FOR BOND BEAM LINTELS.

B17. MASONRY WALLS MUST NOT BE CONSTRUCTED ON SUSPENDED CONCRETE UNTIL ALL TEMPORARY SUPPORTS ARE REMOVED AND ALL MASONRY TO BE LAID HAS BEEN STACKED ADJACENT TO PROPOSED POSITION.



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ISSUE	DATE	FOR
01	10.08.18	ISSUE FOR CONSTRUCTION
02	05.12.18	RE-ISSUE FOR CONSTRUCTION
03	18.12.18	RE-ISSUE FOR CONSTRUCTION
04	20.02.19	RE-ISSUE FOR CONSTRUCTION

PROJECT MANAGEMENT PWC
STRUCTURAL ENGINEERING ENSTRUCT GROUP
MECHANICAL ENGINEERING FREDON AIR
ELECTRICAL ENGINEERING FREDON
HYDRAULIC ENGINEERING CP CONSULTANTS
CLIENT



PROJECT
POW - REDEVELOPMENT
ACUTE SERVICES BUILDING
RANDWICK NSW AUSTRALIA
ACOR PROJECT NUMBER
SY180053
DRAWING KEY



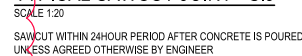
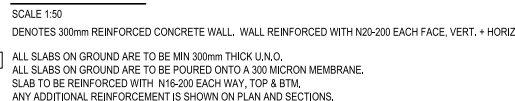
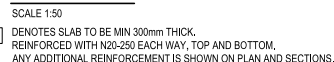
TRUE NORTH	PROJECT NORTH
	
GRAPHIC SCALE	
	
SCALE	

AS SHOWN @ B1
STATUS

FOR CONSTRUCTION


DRAWING
EARLY & ENABLING WORKS
STANDARD DETAILS
SHEET 8

DRAWING NUMBER	ISSUE
RCR-ACR-CV-01-DWG-DD-308	04



200	DEMOTES MIN. 200 THICK SLAB. ALL SLABS ON GROUND TO BE POURED ONTO 300um WATERPROOF MEMBRANE. SLAB TO BE REINFORCED WITH N16-200 TOP & BTM 500mm. ANY ADDITIONAL REINFORCEMENT SHOWN ON PLANS AND SECTIONS. FC = 40MPa
CC1	DEMOTES 250 x 250 CONCRETE COLUMN. REINFORCED WITH 4N8 BARS N12-200 CLOSED TIES. 50mm COVER. FC = 40MPa
BW1	DEMOTES 190 BLOCKWORK REINFORCED WITH N12-200 HORIZONTAL AND VERTICAL. MAX. HEIGHT OF RETAINING 1600mm. FC = 32MPa
ET1	DEMOTES 300(x) 600(V) CONCRETE EDGE THICKENING. FC = 40MPa
PF1	DEMOTES 1500 x 1500 x 300(D) PAD FOOTING (CAST INTEGRAL WITH SLAB). REINFORCED WITH N16-200 RTM EACH WAY. FC = 40MPa



210	DENOTES SLAB TO BE MIN 210mm THICK. REINFORCED WITH N12-200 TOP AND BOTTOM BOTHWAYS. ANY ADDITIONAL REINFORCEMENT IS SHOWN ON PLAN AND SECTIONS. $f_c = 40\text{MPa}$
	DENOTES SPAN OF DELTACORE DC150.9(0.7) SLAB + 60mm MINIMUM INSITU TOPPING WITH SL72 MESH TOP. $f_c = 40\text{MPa}$
C83	DENOTES 450(4) x 250(V) CONCRETE BEAM. REINFORCED WITH 3N28 TOP + B1M WITH N12-200 CLOSED TIES. $f_c = 40\text{MPa}$. 50mm COVER
C84	DENOTES 300(3) x 200(V) CONCRETE BEAM. REINFORCED WITH 2N24 TOP + B1M WITH N12-200 CLOSED TIES. $f_c = 40\text{MPa}$. 50mm COVER
SJ	DENOTES SAW CUT JOINT. REFER TO DETAIL
CJ	DENOTES CONSTRUCTION JOINT. REFER TO DETAIL

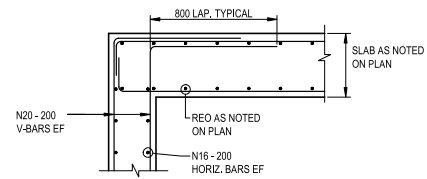
SCREED THICKNESS WITH REINFORCEMENTS
 60mm - 150mm = SL82 MESH (40mm TOP COVER)
 150mm - 200mm = SL82 MESH x 2 LAYERS (40mm TOP COVER, 30mm BTM COVER)
 200mm - 250mm = SL92 MESH x 2 LAYERS (40mm TOP COVER, 30mm BTM COVER)

STRUCTURAL DESIGN LOADS

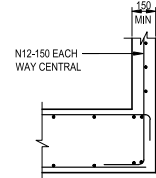
CONSTRUCTION LOADING ON SLABS

- C1.1. U.N.O, ON PLANS, SLABS ON GRADE AND SUSPENDED SLABS HAVE BEEN DESIGNED TO SUIT THE END USE AS SHOWN ON THE LOADING NOTES AND HAVE NOT BEEN DESIGNED TO CARRY EXCESS LOADS (EITHER DISTRIBUTED OR POINT LOADS) FROM BUILDERS EQUIPMENT, MATERIALS OR TEMPORARY WORKS.
- C1.2. IF THE BUYER WISHES TO STORE MATERIALS OR RUN EQUIPMENT / VEHICLES ON SLABS WE ARE IN EXCESS OF THE END USES REQUIREMENTS THE BUYER MAY, AT HIS OWN EXPENSE, EITHER HAVE THE SLAB DESIGN REVISED TO SUIT HIS REQUIREMENTS, BRIDGE OVER THE SLAB OR DELAY INSTALLATION OF THE SLAB UNTIL LATER IN THE CONSTRUCTION PROGRAMME WITH APPROPRIATE JOINTING AND BACK PROPPING.
- DESIGN AND DOCUMENTATION COSTS AND DELAY COSTS ASSOCIATED WITH SUCH WORK WILL BE BORNE BY THE BUYER.
- L1. THE STRUCTURAL COMPONENTS DETAILED ON THESE DRAWINGS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS AND THE BUILDING CODE OF AUSTRALIA FOR THE FOLLOWING LOADINGS, REFER TO ARCHITECTURAL DRAWINGS FOR PROPOSED FLOOR USAGE.
- L2. SUPERIMPOSED LOADS IN ACCORDANCE WITH AS1170.1

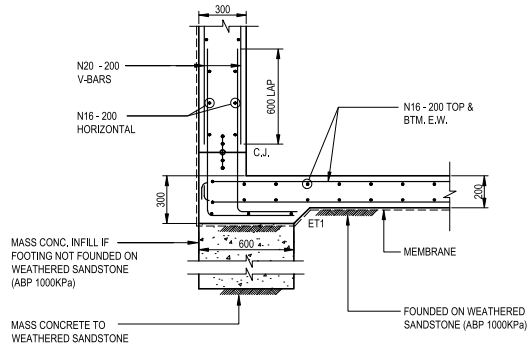
FLOOR USAGE	SUPERIMPOSED DEAD LOAD (kPa)	LIVE LOAD (kPa)
OSD 1	1	20
OSD 2	2	20



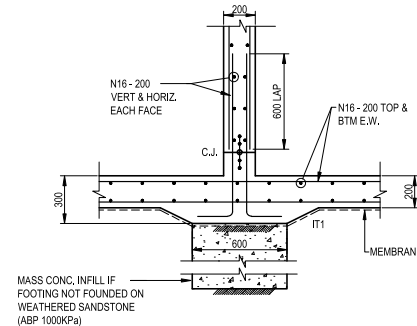
WALL TO PIT LID CONNECTION
SCALE 1:20



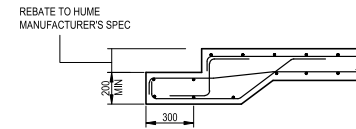
ACCESS CHAMBER DETAILS
(IF CAST IN PLACE)
SCALE 1:20



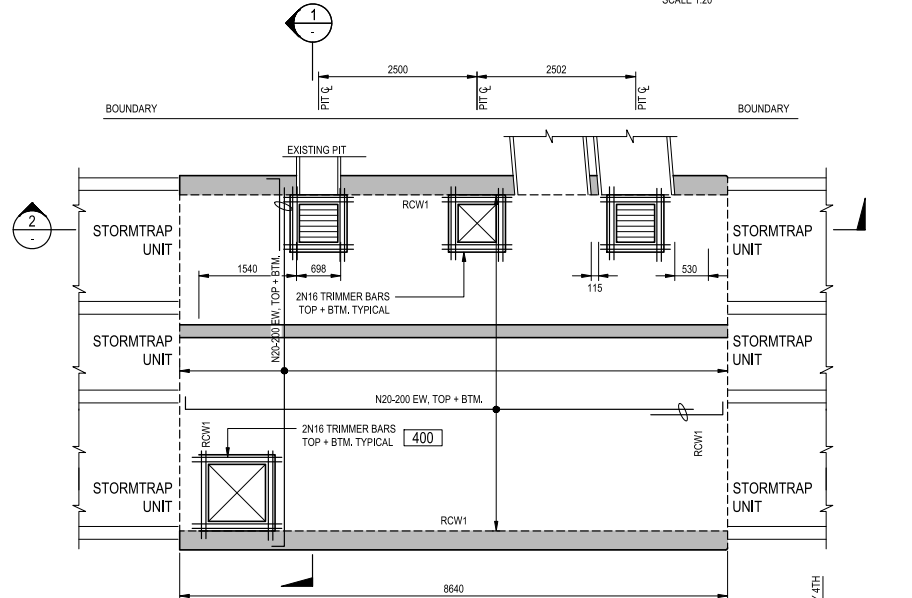
WALL TO FOUNDATION SLAB CONNECTION
SCALE 1:20



THICKENING UNDER INTERNAL WALL
SCALE 1:20



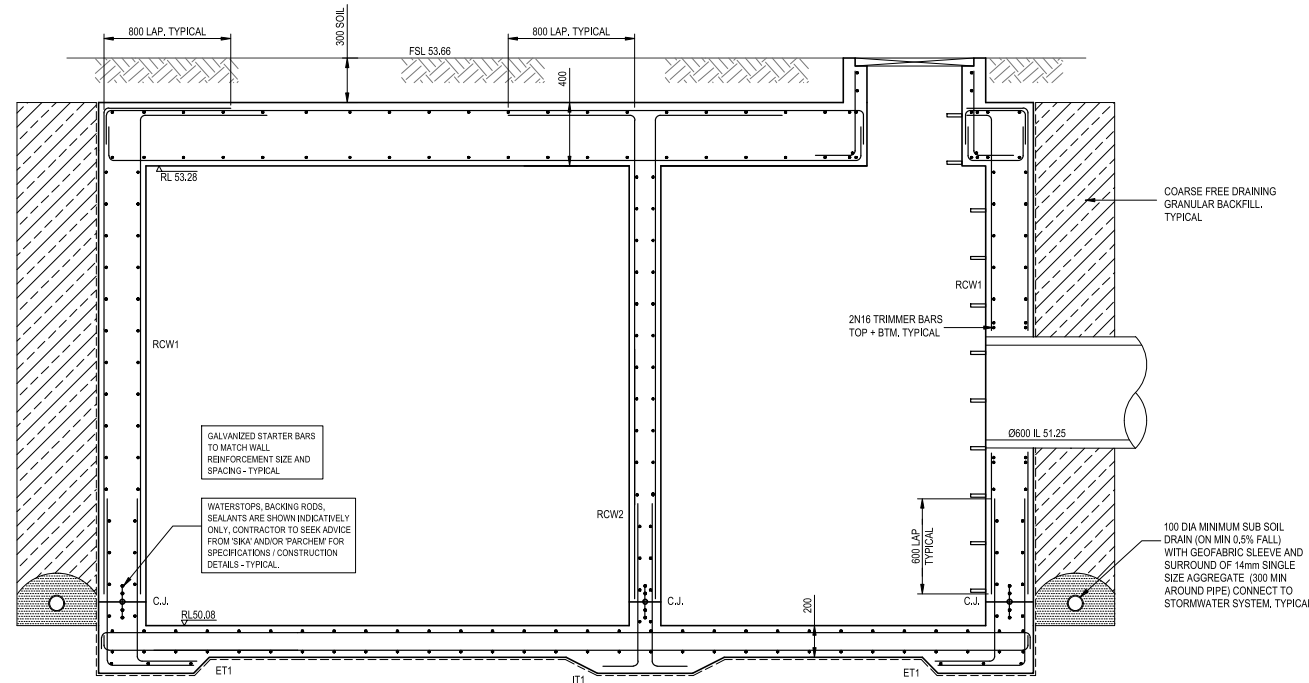
SLAB REBATE DETAIL
SCALE 1:20



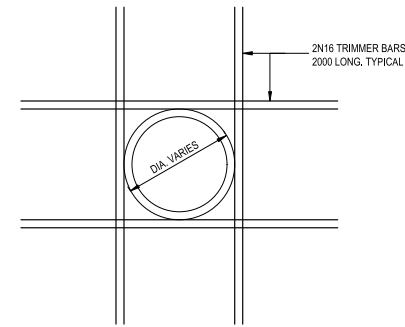
PIT TOP PLAN
SCALE 1:50

400
DENOTES SLAB TO BE MIN 400mm THICK.
REINFORCED WITH N20-300 EACH WAY, TOP AND BOTTOM.
ANY ADDITIONAL REINFORCEMENT IS SHOWN ON PLAN AND SECTIONS.

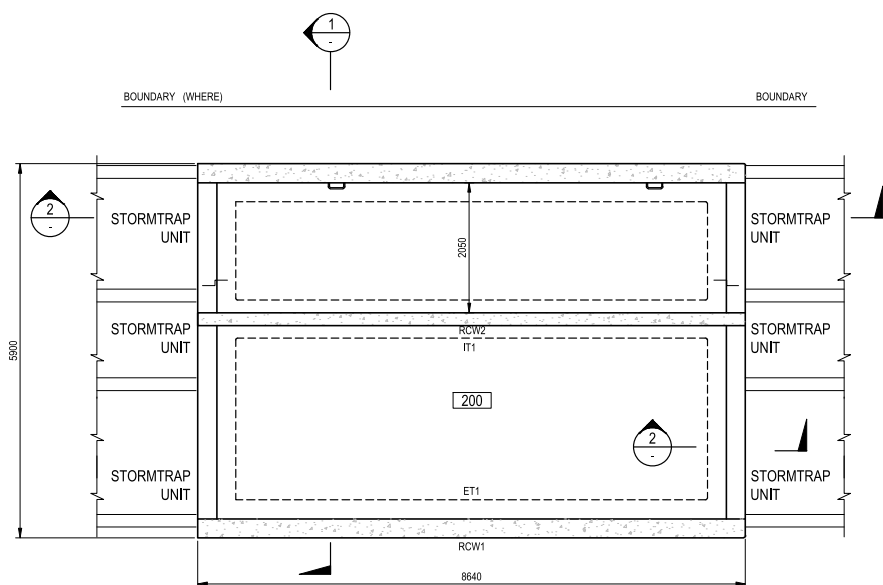
BAR LAYING SEQUENCE U.N.O.



SECTION 1
SCALE 1:20



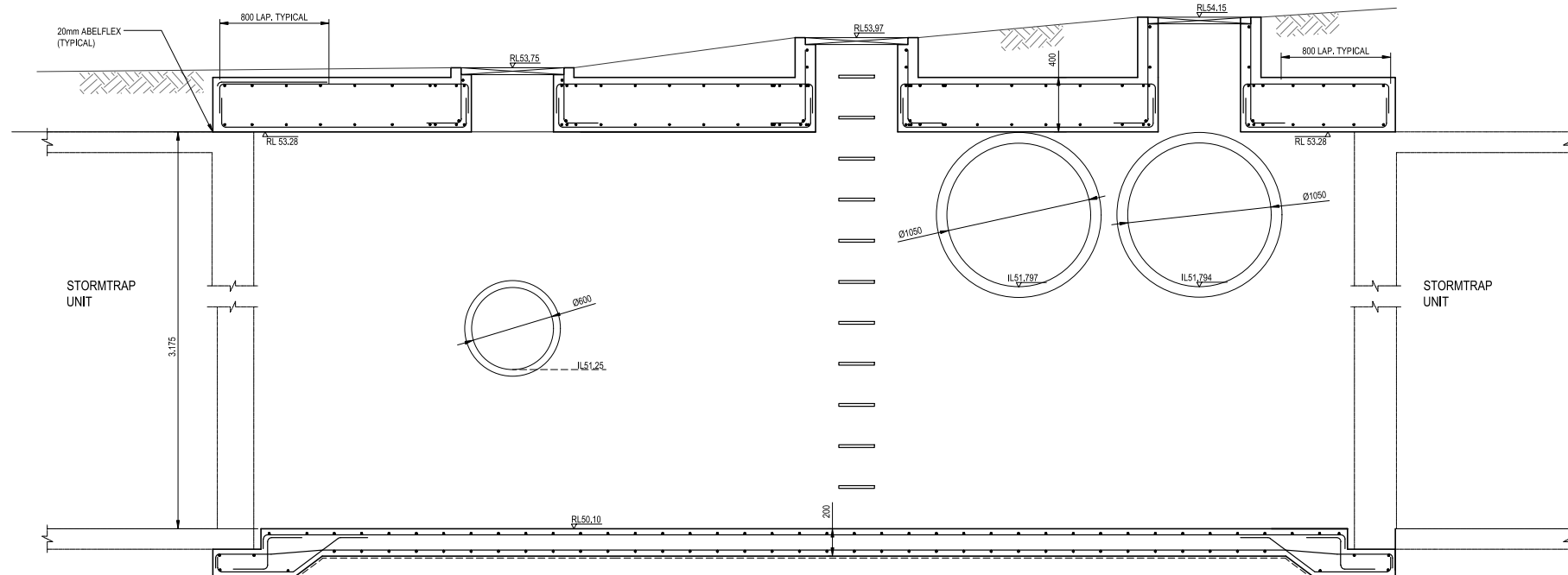
**TYPICAL TRIMMER BAR DETAIL
FOR PIPE PENETRATION**
SCALE = 1:20



PIT BASE PLAN
SCALE 1:50

ET1 DENOTES 300(d) x 600(w) CONCRETE EDGE THICKENING, REFER TO DETAILS FOR REINFORCEMENT
IT1 DENOTES 300(d) x 600(w) CONCRETE INTERNAL THICKENING, REFER TO DETAILS FOR REINFORCEMENT
RCW1 DENOTES 300mm REINFORCED CONCRETE WALL, WALL REINFORCED WITH N20-200 EACH FACE, VERT. + HORIZ.
RCW2 DENOTES 200mm REINFORCED CONCRETE WALL, WALL REINFORCED WITH N16-200 EACH FACE, VERT. + HORIZ.

200
ALL SLABS ON GROUND ARE TO BE MIN 200mm THICK U.N.O.
ALL SLABS ON GROUND ARE TO BE POURED ONTO A 300 MICRON MEMBRANE.
SLAB TO BE REINFORCED WITH N16-200 EACH WAY, TOP & BTM.
ANY ADDITIONAL REINFORCEMENT IS SHOWN ON PLAN AND SECTIONS.



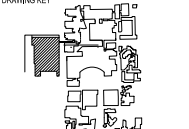
SECTION 2
SCALE 1:20

CONFIDENTIAL & COMMERCIAL-IN-CONFIDENCE

PROJECT MANAGEMENT
PWC
STRUCTURAL ENGINEERING
ENSTRUCT GROUP
MECHANICAL ENGINEERING
FREDON AIR
ELECTRICAL ENGINEERING
FREDON
HYDRAULIC ENGINEERING
CP CONSULTANTS
CLIENT

**Health
NSW
Infrastructure**

PROJECT
POW - REDEVELOPMENT
ACUTE SERVICES BUILDING
RANDWICK NSW AUSTRALIA
ACOR PROJECT NUMBER
SY180053
DRAWING KEY



TRUE NORTH PROJECT NORTH
GRAPHIC SCALE
0 4 10
SCALE

AS SHOWN @ B1
STATUS

FOR CONSTRUCTION

EARLY & ENABLING WORKS
STANDARD DETAILS
SHEET 10

DRAWING NUMBER
RCR-ACR-CV-01-DWG-DD-310
ISSUE
01

SCHEDULE 2 PSD CALCULATION

PSD and OSD calculation

7047000 UNSW HTH

RANDWICK CITY COUNCIL

1. As per Randwick City Council DCP Part B General Controls, OSD size to be specified as per Council's Private Stormwater Code.

3.2 On-site Detention and infiltration

Explanation

On-site Stormwater Detention (OSD) temporarily stores excess stormwater on a site. It acts to restrict the rate that the stormwater leaves the site with the aim of better managing the rate and quantity of stormwater entering the drainage system, and reducing the risk of downstream flooding effects.

On-site detention will be required for certain development types, and certain locations within Randwick City. These are specified in Council's Private Stormwater Code

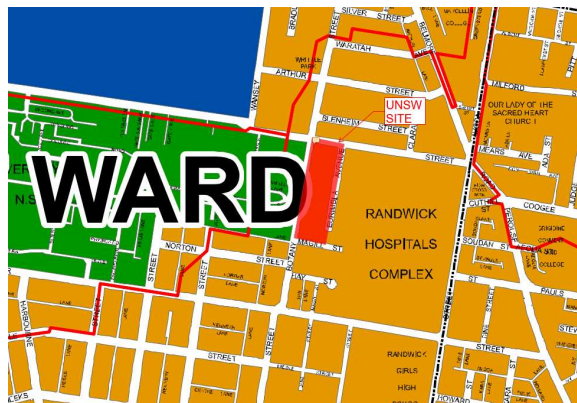
2. Council Private Stormwater Code
 - 2.1. As per Council Private Stormwater Code, Part 3.1 Stormwater Management Systems,
 - 3.2 On-site detention systems the design of the OSD involves the following steps:

The design of on-site detention systems involves the following steps:


- 1) Calculating the permissible (maximum) site discharge rate
- 2) Calculating the required volume of storage
- 3) Calculating the required Orifice size
- 4) Selecting the most appropriate method of detention

- 2.3 To calculate PSD, we require Rainfall Intensity (mm/hr) which can be found in Appendix A.

UNSW HTH is located in the orange area below, which has 55.4mm/hr rainfall intensity.



Legend

-  On-site detention required with a permissible site discharge to be determined using a rainfall intensity of 55.4 mm/hr (5 year ARI storm of 1 hour duration)

PSB is to be calculated as per formula:

$$PSD = \frac{C \cdot I \cdot A}{3,600} \text{ l/s}$$

Where PSD = Permissible Site

Discharge (l/s)

C = Co-efficient of Run-off
(use AR & R, 1987
method. The pervious
area run-off co-efficient for
Randwick City is 0.6054)

A = Site Area (m²)

I = Rainfall Intensity (mm/hr)
from Appendix A or B.

To calculate Co-efficient of Run-off we use AR & R, 1987 method below:

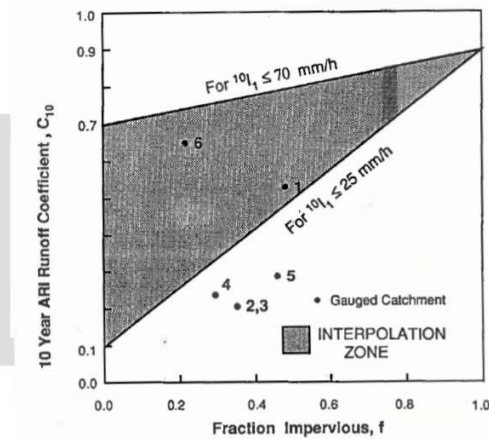


Figure 2.4 10 year ARI Runoff Coefficients (after 1987 ARR)

The graphical relationship is further supplemented by the following numerical relationships:

$$C_{10} = 0.9f + C_{10}^p(1-f) \quad (4)$$

and

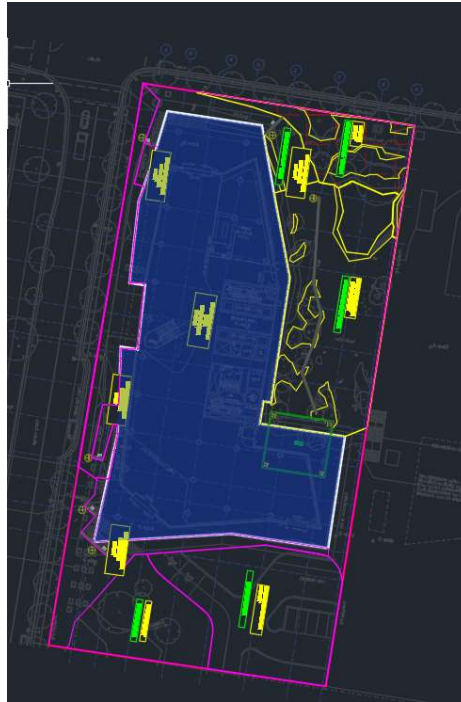
$$C_{10}^p = 0.1 + 0.0133(10I_1 - 25) \quad (5)$$

where

C_{10} = 10 year ARI runoff coefficient
 C_{10}^p = pervious area 10 Year ARI runoff coefficient
 f = fraction impervious (0.0 to 1.0)
 $10I_1$ = 10 year ARI, 1 hour rainfall intensity

Below is the catchment plan for the proposed development.

The total catchment area is **8897m²** and the fraction of impervious area is **0.87** (87% of impervious area).



As per Private Stormwater Code, the pervious area run-off coefficient for Randwick Council is 0.6054.

Where PSD = Permissible Site
Discharge (l/s)
C = Co-efficient of Run-off
(use AR & R, 1987
method. The pervious
area run-off co-efficient for
Randwick City is 0.6054)
A = Site Area (m²)
I = Rainfall Intensity (mm/hr)
from Appendix A or B.

For the proposed development:

$$C_{10} = 0.9 \cdot f + C_{1,10} (1-f) = (0.9 \cdot 0.87) + 0.6054 \cdot (1-0.87) = 0.783 + 0.078702 = \mathbf{0.8617}$$

$$\text{Therefore PSD} = (0.8617 \cdot 55.4 \cdot 8897) / 3600 = \mathbf{118 \text{ l/s} = 0.118 \text{ m}^3/\text{s}}$$

2.2. Volume of Storage

Volume of Storage to be calculated using Mass Curve Technique.

Once the permissible site discharge (PSD) has been determined, the required volume of storage can be calculated using the Mass Curve Technique detailed in Technical Note 1, Chapter 14 of Australian Rainfall and Run-off, 1987.

2.3. Orifice Design

The size of the orifice is critical as it controls the operation of the detention area. The cross-sectional area of the orifice is calculated as follows:

$$A_o = \frac{Q}{C_d \times \sqrt{(2gh)}} \text{ m}^2$$

Where Q = Permissible Site Discharge (m³/s)
 A_o = Cross Sectional Area of Orifice (m²)
 C_d = Discharge Co-efficient = 0.6
 g = Acceleration Due to Gravity = 9.8m/s²
 h = Head of Water (m) above the orifice, i.e. the vertical distance from the centre of the orifice to the maximum storage level.

I have assumed that h Head of Water (effective headheight) is 2.2m.

$$A_o = Q / 0.6 \times \sqrt{(2 \times 9.8 \times 2.2)} = \underline{\underline{0.0268 \text{ m}^2}}$$

Orifice = 185mm

SCHEDULE 3 BMT FLOOD REPORT & LETTER



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Brisbane Qld 4000
Australia
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Tel: +61 7 3831 6744
Fax: + 61 7 3832 3627

ABN 54 010 830 421

www.bmt.org

17 March 2019

Lend Lease
Level 14, Tower Three
International Towers Sydney
Exchange Place
300 Barangaroo Avenue
Barangaroo, NSW 2000

Attention: John Gillen

Dear John

**RE: RCR PRINCE OF WALES, RANDWICK
FLOOD AND STORMWATER MODELLING
COUNCIL QUERY, PMF CONDITIONS IN BOTANY STREET**

We refer to the recent meeting with Randwick City Council. At the meeting, it is understood that the trunk drainage system designed for the Randwick Campus Redevelopment was discussed, specifically the drainage of the Probable Maximum Flood (PMF) event in Botany Street.

Prior to development, flow would drain through the Randwick Campus Redevelopment site via a combination of underground drainage pipes and overland flow in Eurimbla Avenue. To allow a flood free development to be achieved, it is necessary to divert flow around the site via a trunk drainage system that captures flow at High Street and then conveys flow underground down Botany Street. The system comprises a combined detention/ conveyance system in High Street and the northern half of the site frontage to Botany Street, followed by a conventional drainage system to drain the detention/ conveyance system to the existing drainage system in Magill Street.

For events more severe than the 1% AEP design standard (i.e. extreme events), surcharge pits have been located at the downstream end of the detention/ conveyance system in Botany Street to allow water to surcharge from the system and drain to the south via Botany Street. To the south of Magill Street, the flow re-joins the flow path that existed prior to development.

No surcharge occurs from the surcharge pits for the 1% AEP (100-year Average Recurrence Interval (ARI)) event.

The conditions that occur in the PMF are discussed in Section 2.1.5 of the *Randwick Campus Redevelopment ASB Project Summary Flood Report* (BMT, Revision 2, October 2018) that was submitted to Council. Revision 1 of the flood report (July 2018) and supporting modelling files were submitted to Council prior to Revision 2 of the report. However, there is essentially no difference between the two reports with respect to the PMF event.

Figures C1-7 to C1-10 from Appendix C of the report are attached.

Figure C1-7 presents the flood level change for the 1% AEP (100-year ARI) event, demonstrating that there is no unacceptable impact (satisfying the Council DCP 2013) with respect to the 1% AEP event and no surcharge from the system to Botany Street.

Figure C1-8 presents the flood level change for the 0.05% AEP (200-year ARI) event, with the commencement of surcharging to Botany Street.

Figures C1-9 and C1-10 present the flood level change for the PMF event, with Figure C1-9 showing conditions in the vicinity of the hospital and Figure C1-10 showing a larger area. With reference to Figure C1-10, the flow surcharged to Botany Street re-joins the existing flow path to the south of Magill Street.

If you have any queries in relation to this letter, please do not hesitate to contact us.

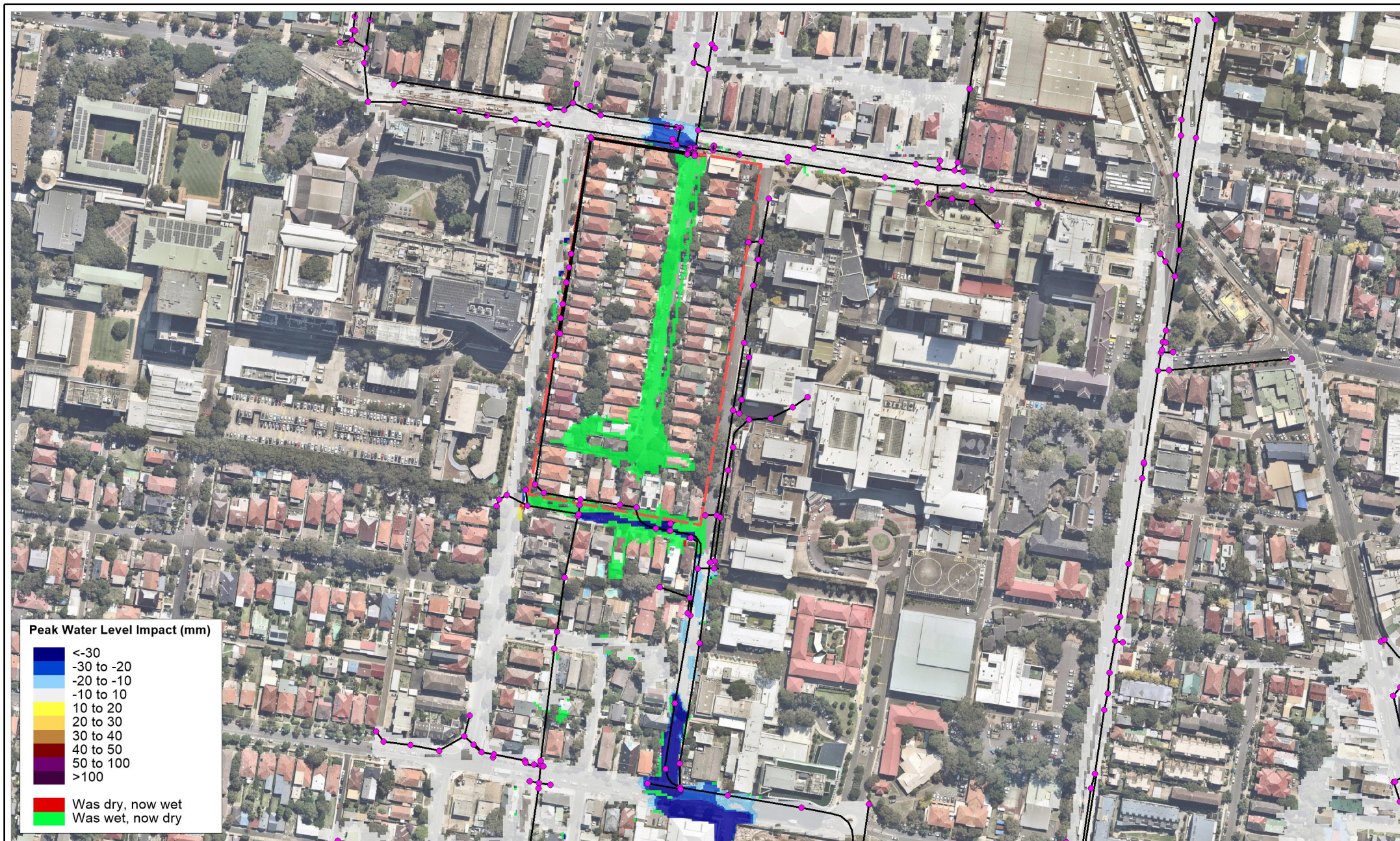
Yours Faithfully

BMT



A handwritten signature in black ink, appearing to read 'M. Giles', is positioned above the printed name.

Martin Giles
Senior Principal

Enc. Figures C1-7, C1-8, C1-9, and C1-10



LEGEND

-  Stormwater Pit and Pipe
 Site Boundary

Title: RCR Prince of Wales, Randwick 1% AEP Flood Impact - Developed Option

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



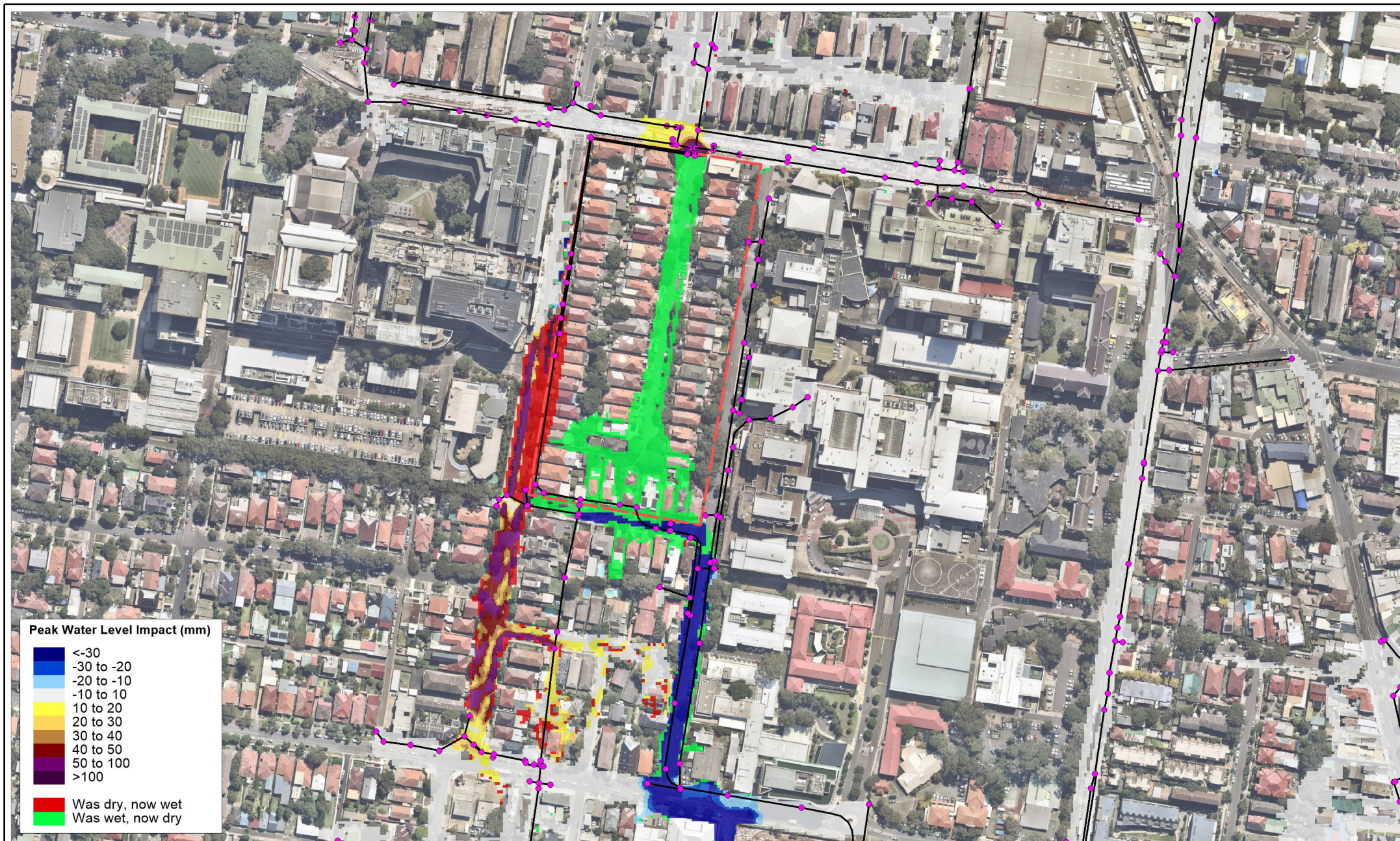
0 50 100 m
Approx. Scale

Figure:
C1-7



Rev:
A



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LEGEND

-  Stormwater Pit and Pipe
 Site Boundary

Title:

RCR Prince of Wales, Randwick 0.5% AEP Flood Impact - Developed Option

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0 50 100 m
Approx. Scale

Figure:

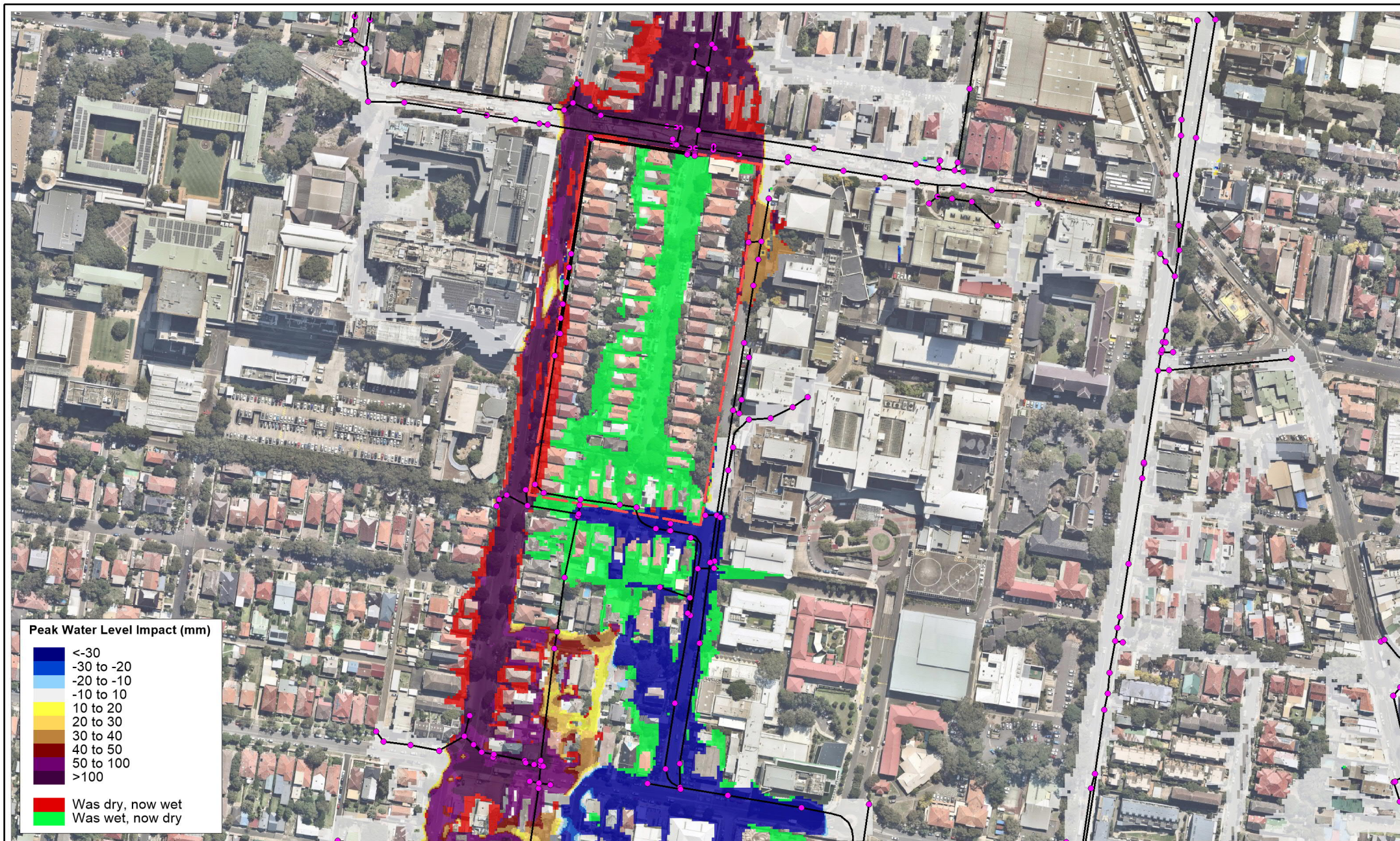
C1-8

Rev:



A



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LEGEND

-  Stormwater Pit and Pipe
 Site Boundary

Title:

RCR Prince of Wales, Randwick Probable Maximum Flood Impact - Developed Option

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0 50 100 m
Approx. Scale

Figure:

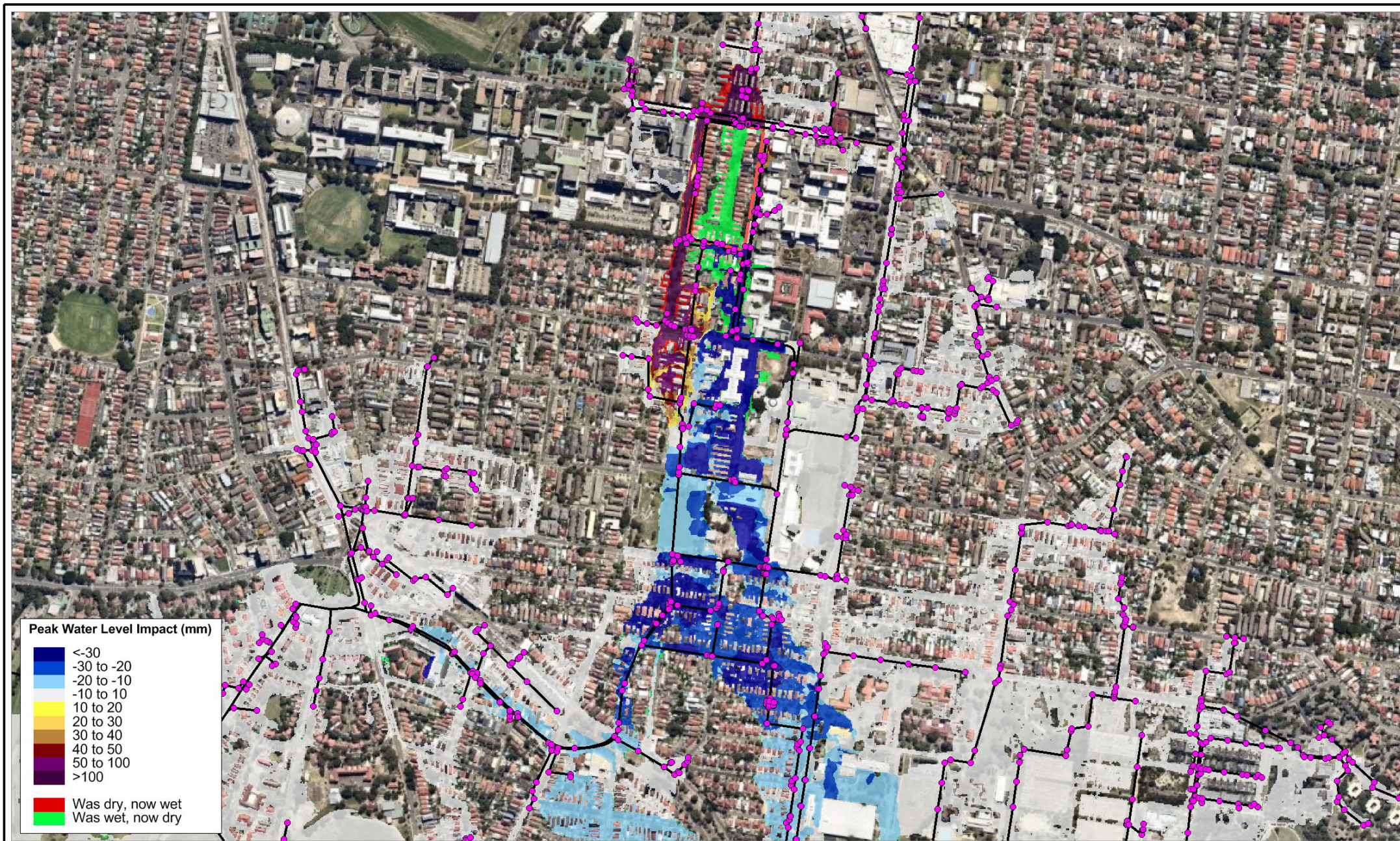
C1-9

Rev:

A



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LEGEND

- Stormwater Pit and Pipe
 Site Boundary

Title:

RCR Prince of Wales, Randwick
Probable Maximum Flood Impact - Developed Option

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0 150 300
metres

Figure:

C1-10

Rev:

A



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