



Civil Engineering Design Report

2-60 Cumberland Street, The Rocks

REPORT

PREPARED FOR

Sirius Developments Pty Ltd
52 Victoria Street
Paddington NSW 2021

PREPARED BY

Northrop Consulting Engineers
Level 2
3 Horwood Place
Parramatta NSW 2150

Tel: 02 9241 4188

Ref: S193308-CR01

Rev: C

Date: 27/10/2020

CIVIL ENGINEERING DESIGN REPORT

Activity Schedule

Date	Revision	Issue	Prepared By	Approved By
31/07/20	A	Draft SSDA	N. Naicker	S. Fryer
31/08/20	B	SSDA	N. Naicker	S. Fryer
27/10/20	C	SSDA	N. Naicker	S. Fryer

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1. DESIGN REPORT

1.1 General

This civil engineering design report has been prepared by Northrop Consulting Engineers Pty Ltd. The documentation of the works will include the stormwater quantity and stormwater quality facilities to be completed for the proposed development.

This Design Report is intended to clarify the Civil Engineering design aspects for this development.

1.2 Project Description

The proposed development is for the restoration and refurbishment of the existing Sirius building, including alterations and additions. The existing building is proposed to be substantially retained and restored with integrity. New residential additions are proposed to be added to the existing structure in appropriate locations to maintain the legibility of the original architectural form, and new structures for commercial uses are proposed to be added at the Cumberland Street and Gloucester Walk frontages of the site.

The existing Sirius building has a varied height profile due to its modular form and due to the fall across the site when observed from Cumberland Street and from Gloucester Walk. The existing building rises from the north and south towards a central tower with a maximum height of 34.6m above ground level at Cumberland Street (equivalent to an 11-storey building). Due to the existing split-level apartments, the building is conveyed as having a greater number of levels (25 storeys).

The proposed alterations and additions to the existing building will increase the overall building height by 5.4m to a maximum building height of 40.9m above ground level at Cumberland Street. On the Cumberland Street entry side of the site, the building presents as thirteen (13) levels at the highest occupied level. When observed from Gloucester Walk, and due to the fall across the site, the building presents as fourteen (14) occupied levels.

The building incorporates two levels of basement car parking.

The proposed works include:

- Alterations and additions to the existing building to provide for:
 - Residential accommodation (a total of 76 apartments);
 - Commercial premises, including retail floorspace; and
 - Basement car parking.
- Provision of a through-site link between Cumberland Street and Gloucester Walk.
- Upgrades to Gloucester Walk including landscaping and pedestrian access.
- Improvements to Cumberland Street including landscaping and improved carpark entry.
- Associated works, including:
 - Minor demolition works;
 - Earthworks;
 - Structural upgrades;
 - Services upgrades; and
 - Landscaping works.

1.3 Referenced Documents

This Design Report has been prepared with reference to the following documentation:

- Architectural Plans provided by BVN
- Survey Plans prepared by LTS Lockley
- Utilities Locating prepared by Utility Mapping

1.4 Civil Engineering Drawings

The drawings which accompany this report are as follows:

Document Number	Document Title	Revision
SSDAC01.01	Cover Sheet, Drawing Schedule, and Locality Plan	3
SSDAC01.11	Specification Notes	3
SSDAC02.01	Concept Sediment and Erosion Control Plan	3
SSDAC2.11	Sediment and Erosion Control Details	3
SSDAC3.01	Stormwater Management Plan B4-B3	3
SSDAC3.02	Stormwater Management Plan B2-B1	4
SSDAC3.11	Stormwater Management Details	2
SSDAC3.21	Stormwater Longitudinal Section	2
SSDAC4.01	Details	2

1.5 Regulatory

1.5.1 National Construction Code

Northrop's engineering design for this project will be prepared in accordance with the requirements and regulations of all Statutory Authorities and Codes relevant to the works, including:

- The National Construction Code (Building Code of Australia) Standards Australia;
- AS3500:Part 3 Stormwater Drainage
- City of Sydney Stormwater Drainage Manual February 2017;
- City Area Catchment Floodplain Risk Management Plan

2. SITE GRADING

2.1 Existing Conditions

The existing building currently occupies majority of area within the boundary. The site falls to the south towards Cumberland Street, however, the courtyard from the rear of the site falls towards Gloucester Walk. Stormwater runoff from the roof, planter boxes and podium area are collected by a system of downpipes and surface pits and is piped through the basement level, discharging to Council's drainage system in George Street via a piped system in Gloucester Walk. Refer to Figure 1 below for site location.



Figure 1: Site Location (Source: BVN)

3. SITE STORMWATER DRAINAGE SYSTEM

3.1 Stormwater Quantity - Hydraulic Modelling

3.1.1 Proposed Stormwater System

Sydney Water is the statutory authority that dictates stormwater discharge requirements for this site. Sydney Water has confirmed that on-site detention (OSD) is not required for this development. A copy of the correspondence is attached in Appendix 4.1. Where possible, the existing stormwater drainage system (i.e. pipes and inlet pits) will be utilised to collect and discharge stormwater runoff. Review of existing overland flow paths found them to be adequate to direct 1% AEP storm runoff to either Gloucester Walk and Cumberland Street. Existing overland flow paths will be unaltered as the general building footprint will be unchanged. Additional drainage provisions will be provided to the podium to minimise nuisance ponding of water and maintain amenity during inclement weather.

3.1.2 Modelling of Stormwater Quantity

The piped drainage system and overland flow paths were designed using “DRAINS” hydraulic design software. Refer Northrop’s Stormwater Management Plans for details of the proposed drainage system. Below are the results for 1% AEP and 20% AEP. In addition, a rainwater tank is proposed to capture the roof run-off and the overflow will be directed to the water quality chamber. The stormwater network has been modelled to capture the overflow from the rainwater tank assuming that the rainwater tank will be at capacity during the 1% AEP event in which case the surcharge occurs.

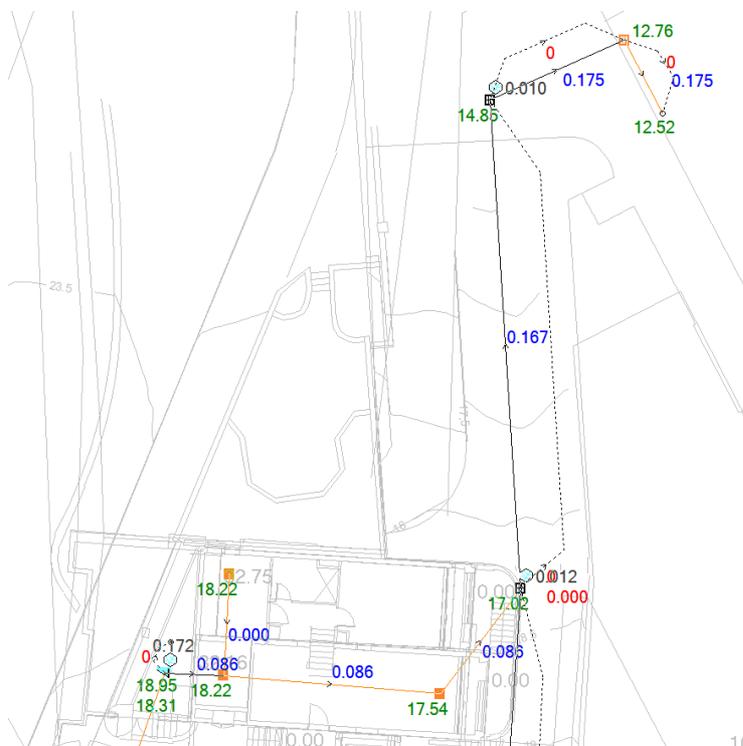


Figure 2: Drains Result – 1% AEP

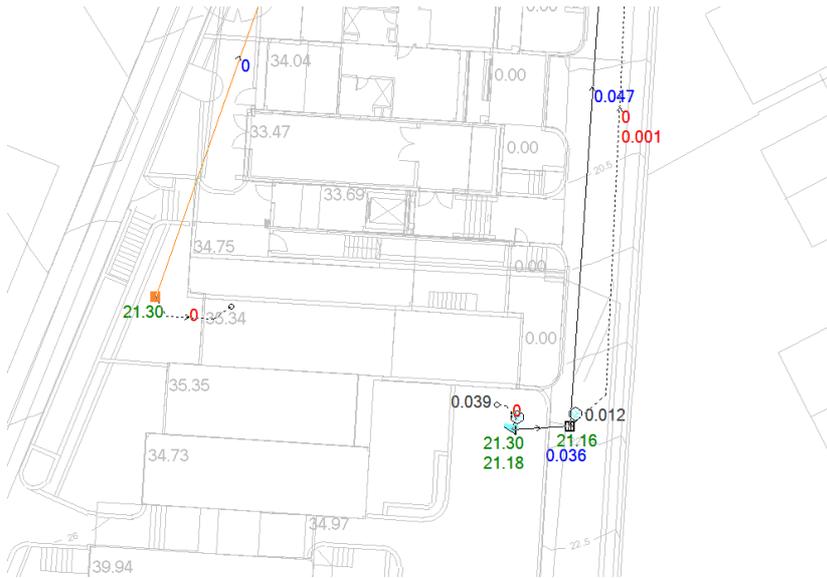


Figure 5: Drains Result – 20% AEP

3.2 Stormwater Quality

3.2.1 Modelling of Stormwater Quantity

Stormwater treatment was modelled using Modelling Urban Stormwater Improvement Conceptualisation (MUSIC) software v 6.3.0. The MUSIC model's design parameters were set using the NSW MUSIC Modelling Guidelines utilizing modified % impervious area, rainfall threshold, soil properties & pollutant concentration

3.2.2 Performance Criteria

Stormwater quality treatment system has been proposed that will comply with the City of Sydney's Water Sensitive Urban Design (WSUD) strategy. The following treatment targets are to be achieved post-development:

- 90% reduction in the post development average annual Gross Pollutant (GP) load.
- 85% reduction in the post development average annual Total Suspended Solids (TSS) load.
- 65% reduction in the post development average annual Total Phosphorus (TP) load.
- 45% reduction in the post development average annual Total Nitrogen (TN) load.

"MUSIC" water quality modelling software has been used to demonstrate the above targets can be achieved.

3.2.3 Proposed Water Quality Treatment System

The first step in preventing pollution is to reduce the risk of pollutants being entrained in stormwater runoff. Good site design is important in reducing the risk profile of runoff from all developments. Generally, the roof generate small pollutant loads and thus benefit from being directly connected to a rainwater tank. The simplest way to manage water quality at the ground level is to direct hardstand areas (paving and paths, etc.) to landscaped areas to provide passive irrigation.

BUILDING ROOF CATCHMENT

- The roof drainage system connects to an in-ground rainwater re-use tank (RWT).

- The overflow from the RWT connects to the stormwater system draining the hardstand area. The combined overflow water and hardstand water treated through filter cartridges within the water quality chamber before discharging into the drainage network within Gloucester Walk.

SOURCE NODE / POLLUTANT GENERATION PARAMETERS

Source node parameters for the proposed development were sourced the MUSIC software default nodes. The catchments were modelled using the following source nodes:

- Roof (roof areas) – 100% impervious
- Urban (hardstand areas) – 100% impervious
- Urban (landscaping areas) – 0% impervious

MODEL SCHEMATIC

MUSIC Model Layout and pollutant removing performance is shown below.

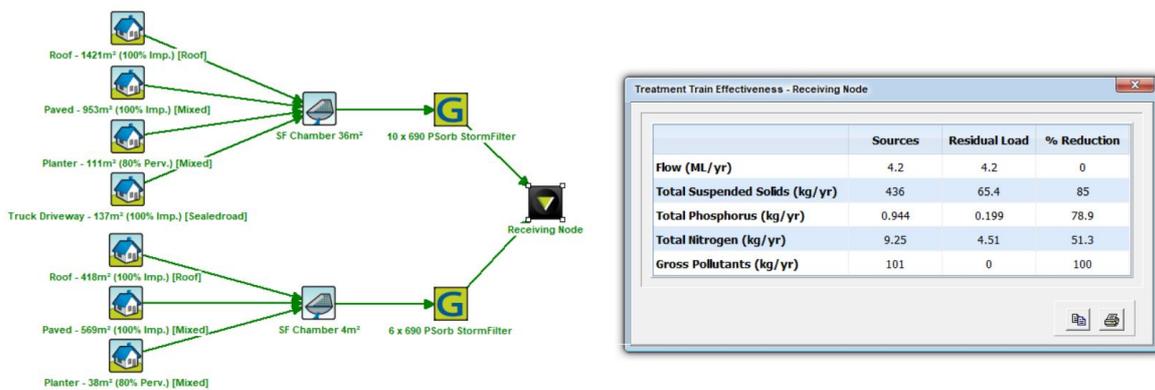


Figure 3: MUSIC model layout

Stormwater Pollutants	% Reduction in average annual load	Pollution Reduction Target (%)
Total Suspended Solids	85.3	85
Total Phosphorus	78.4	65
Total Nitrogen	51	45
Gross Pollutants	100	90

As shown above, the stormwater treatment targets appropriate for the site will be met by the treatment measures provided. The pollutant removal performance as predicted by MUSIC modelling exceeded City of Sydney Water quality targets of 90%/85%/65%/45% for GP, TSS, TP and TN respectively.

STORMWATER TREATMENT

The stormwater treatment train consists of

- Rainwater tank
- 2 x Water Quality Chambers
- Ocean Protect 16x 690 PSorb filter cartridges

4. APPENDIX

4.1 Sydney Water Correspondence

Neville Naicker

From: Stormwater <Stormwater@sydneywater.com.au>
Sent: Thursday, 27 February 2020 11:06 AM
To: Neville Naicker
Subject: RE: [192208] - Sirius Building - OSD/Water Quality Requirements

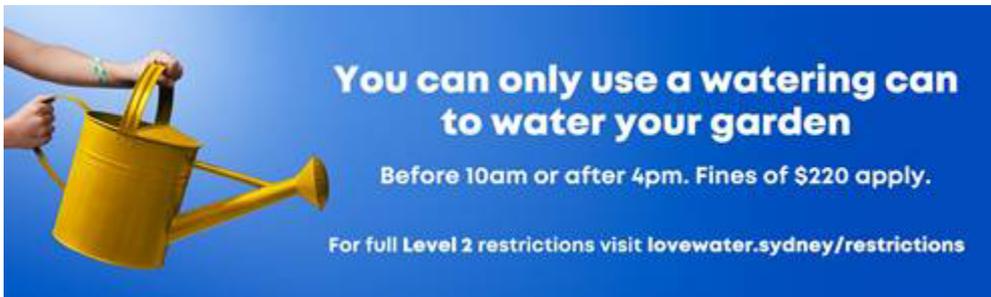
Neville,

If the extent of the proposed development remain as per the submitted details, then Sydney Water will not ask On Site Detention for the proposed development.

Best Regards

Jeya Jeyadevan
Senior Capability Assessor
Liveable City Solutions
Sydney Water, Level 7, 1 Smith Street, Parramatta NSW 2150

Sydney
WATER Ph 02 8849 6118
Mob 0409 318 827
jeya.jeyadevan@sydneywater.com.au



From: Neville Naicker <NNaicker@northrop.com.au>
Sent: Thursday, 27 February 2020 9:18 AM
To: JEYADEVAN, JEYA <JEYA.JEYADEVAN@sydneywater.com.au>
Cc: Stormwater <Stormwater@sydneywater.com.au>
Subject: RE: [192208] - Sirius Building - OSD/Water Quality Requirements

Hi Jeya,

Following our discussion on Tuesday, I have attached sketches of the proposed pod being constructed above the existing roof catchments. As mentioned the pods are relatively smaller in catchment and spread across the site.

Currently the roof area of the new pods / soho and commercial totals approx. 1304sqm. However all of this area is within the current existing site catchment, so effectively there is actually a zero change in catchment areas.

Orange – New pods on top of existing building (previously existing building catchment) = 723sqm total
Blue – Soho new rooftops (previously existing ground plane catchment) = 294sqm total
Green – New commercial building rooftop (previously existing ground plane catchment) = 287sqm total

Existing Site boundary area = 3640sqm

Please let us know if this is deemed to require inclusion of a new OSD tank or whether this can be avoided as there are existing basement level below the ground floor.

Regards,
Neville Naicker
Civil Engineer

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Level 2, 3 Horwood Place Parramatta NSW 2150
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From: Stormwater <Stormwater@sydneywater.com.au>
Sent: Tuesday, 25 February 2020 11:19 AM
To: Neville Naicker <NNaicker@northrop.com.au>
Subject: RE: [192208] - Sirius Building - OSD/Water Quality Requirements

Neville,

With reference to the proposed development at 48 Cumberland Street, The Rocks.

On Site Detention

As you have mentioned that the proposed development is a refurbishment, Sydney Water will not provide On Site Detention requirements until such time you are able to submit a copy of the approved DA. Determination of On Site Detention requirements is subject to the development descriptions as per the approved DA.

Water Quality Treatments

Within City of Sydney, proponent is required to comply with the City of Sydney's Water Quality guidelines.

Best Regards
Planning and Technical, Liveable City Solutions.

From: Neville Naicker <NNaicker@northrop.com.au>
Sent: Tuesday, 25 February 2020 10:23 AM
To: Stormwater <Stormwater@sydneywater.com.au>
Subject: [192208] - Sirius Building - OSD/Water Quality Requirements

Hi,

I am writing in regards to a development we are currently working on at 48 Cumberland St, The Rocks NSW 2000 (Sirius building).

Site Area: 3640m2

Pre-dev Imp: 3640m2 with podium landscaping
Post-dev Imp: Same as above.

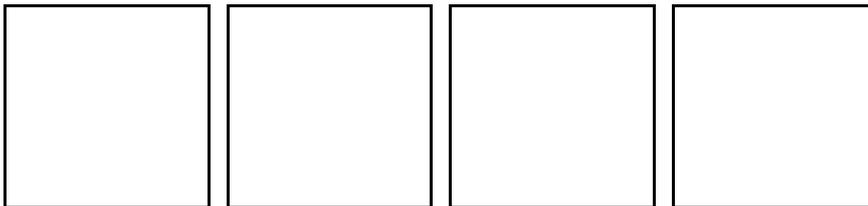
The proposed development is to refurbish the existing apartments while maintain the existing building and footprint.

Would you be able confirm if any on-site detention and water quality treatments are required for our site (if any)?

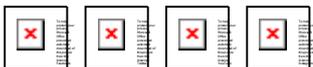
If you require further information please don't hesitate to contact me.

Kind regards,
Neville Naicker
Civil Engineer

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4.2 Stormwater Management Plan

SIRIUS SITE

2-60 CUMBERLAND STREET, THE ROCKS CIVIL DOCUMENTATION



CIVIL DRAWING SCHEDULE

DWG No.	DRAWING TITLE
SSDAC01.01	COVER SHEET, DRAWING SCHEDULE AND LOCALITY PLAN
SSDAC01.11	SPECIFICATION NOTES
SSDAC02.01	CONCEPT SEDIMENT AND EROSION CONTROL PLAN
SSDAC02.11	SEDIMENT AND EROSION CONTROL DETAILS
SSDAC03.01	STORMWATER MANAGEMENT PLAN B2b-B2a
SSDAC03.02	STORMWATER MANAGEMENT PLAN B1b-B2a
SSDAC03.11	STORMWATER MANAGEMENT DETAILS
SSDAC03.21	STORMWATER LONGITUDINAL SECTION
SSDAC04.01	DETAILS

DRAWN: J.TAI
DESIGNED: N.NAICKER
JOB MANAGER: N.NAICKER
VERIFIER:

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR REVIEW	JP		NN	31.07.20
2	ISSUED FOR DEVELOPMENT APPLICATION	MM		NN	31.08.20
3	ISSUED FOR DEVELOPMENT APPLICATION	MM		NN	27.10.20

CLIENT
SIRIUS DEVELOPMENTS PTY LTD

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VERIFICATION SIGNATURE HAS BEEN ADDED

ARCHITECT
BVN

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PROJECT
SIRIUS SITE
**2-60 CUMBERLAND STREET,
THE ROCKS**

DRAWING TITLE
CIVIL ENGINEERING PACKAGE
**COVER SHEET, DRAWING
SCHEDULE AND LOCALITY PLAN**

JOB NUMBER
193308

DRAWING NUMBER SSDAC01.01	REVISION 3
-------------------------------------	----------------------

DRAWING SHEET SIZE = A1

NOT FOR CONSTRUCTION

Printed By: MICHAEL MAI
Date: 15.02.2018 11:24 AM
Found: \\na-files\project\2019\Jobs\193308 - Sirius Building\Drawings\Civil\SSDAC01\SSDAC01.dwg

NOTE: ALL CIVIL ENGINEERING CONSTRUCTION WORKS TO BE CARRIED OUT IN ACCORDANCE WITH CITY OF SYDNEY DEVELOPMENT GUIDELINES .THE AFOREMENTIONED GUIDELINES INCLUSIVE OF ALL SPECIFICATIONS TAKE PRECEDENCE OVER NOTES PROVIDED BELOW.

STORMWATER DRAINAGE

- ALL DRAINAGE LINES SHALL BE UPVC (CLASS SN4) SEWER GRADE DRAINAGE PIPE, U.N.O.
- ALL DRAINAGE LINES SHALL BE LAID AT 1% MIN. FALL, UNO.
- ALL LEVELS ARE AUSTRALIAN HEIGHT DATUM (AHD).
- ALL DOWNPIPES GUTTERS TO BE DESIGNED IN ACCORDANCE WITH AS/NZS 3500.3.2 - 2003 'STORMWATER' DRAINAGE.
- THE STORMWATER DRAINAGE DESIGN HAS BEEN CARRIED OUT IN ACCORDANCE WITH AS/NZS 3500.3.2-2003 'STORMWATER' DRAINAGE.
- ANY VARIATIONS TO THE NOMINATED LEVELS SHALL BE REFERRED TO ENGINEER IMMEDIATELY.
- SUBSOIL DRAINAGE SHALL BE PROVIDED TO ALL RETAINING WALLS & EMBANKMENTS, WITH THE LINES FEEDING INTO THE STORMWATER DRAINAGE SYSTEM.
- ALL GRATES TO BE GALVANISED STEEL WITH HINGES AND CHILD PROOF LOCK.
- ALL GRATES TO BE HEEL SAFE WITHIN AGED CARE DEVELOPMENTS. THE STORMWATER DRAINAGE IS DESIGNED IN ACCORDANCE WITH CITY OF SYDNEY - A4 STORMWATER DRAINAGE DESIGN

GENERAL NOTES

THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH OTHER CONSULTANTS' DRAWINGS AND SPECIFICATIONS AND WITH OTHER SUCH WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DIMENSIONS ARE IN MILLIMETRES & ALL LEVELS ARE IN METRES, UNO (UNLESS NOTED OTHERWISE).

NO DIMENSION SHALL BE OBTAINED BY SCALING THE DRAWINGS.

ALL LEVELS AND SETTING OUT DIMENSIONS SHOWN ON THE DRAWINGS SHALL BE CHECKED ON SITE PRIOR TO THE COMMENCEMENT OF THE WORK.

DETAIL SURVEY DATA WAS SUPPLIED BY LTS LOCKLEY REGISTERED SURVEYORS, DRAWING DATED 06.07.17 AND UTILITY MAPPING, DATED 20.05.20

EXISTING SERVICES WHERE SHOWN HAVE BEEN PLOTTED FROM SUPPLIED DATA AND SUCH THEIR ACCURACY CAN NOT BE GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH THE LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF WORK.

ON COMPLETION OF STORMWATER INSTALLATION, ALL DISTURBED AREAS MUST BE RESTORED TO ORIGINAL CONDITION, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL AND GRASSED AREAS AND ROAD PAVEMENTS, UNLESS DIRECTED OTHERWISE.

ALL STORMWATER MANAGEMENT MEASURES SHOWN ON THIS DRAWING HAVE BEEN PREPARED FOR DEVELOPMENT APPLICATION PURPOSES TO DEMONSTRATE FEASIBILITY. ALL MEASURES WILL BE SUBJECT TO DETAIL DESIGN AT THE CONSTRUCTION CERTIFICATE STAGE AND MAY BE SUBJECT TO VARIATION PROVIDED THAT THE DESIGN INTENT IS MAINTAINED.

DESIGN SUMMARY

TOWN CENTRE = CITY OF SYDNEY
CATCHMENT NAME = CITY AREA CATCHMENT

WATER QUALITY:

MUSIC MODEL SUMMARY (REFER NORTHROP REPORT FOR FURTHER DETAILS -IF REPORT PROVIDED).

WATER QUALITY CHAMBER 1

MUSIC MODEL SUMMARY:

SOURCE NODE	CATCHMENT	AREA
URBAN	ROOF AREA	1421m ²
URBAN	PAVED AREA	953m ²
URBAN	PLANTER	111m ²
URBAN	TRUCK DRIVEWAY	137m ²
		TOTAL 2622m²

WATER QUALITY CHAMBER 2

MUSIC MODEL SUMMARY:

SOURCE NODE	CATCHMENT	AREA
URBAN	ROOF AREA	418m ²
URBAN	PAVED AREA	569m ²
URBAN	PLANTER	38m ²
		TOTAL 1025m²

TREATMENT NOTES:

- OCEAN PROTECT 690mm PSORB STORMFILTERS (x16)

TREATMENT STANDARDS:

POLLUTANT	REDUCTION STANDARDS	REDUCTION ACHIEVED
GROSS POLLUTANTS	90%	100%
TOTAL SUSPENDED SOLIDS	85%	85.3%
TOTAL PHOSPHORUS	60%	78.4%
TOTAL NITROGEN	45%	51.0%

MUSIC MODEL PARAMETERS IN ACCORDANCE WITH SYDNEY WATER AND CITY OF SYDNEY GUIDELINES.

POLLUTANT REMOVAL DESIGN CRITERIA ADOPTED FROM WESTERN SYDNEY GROWTH CENTRES - STORMWATER GUIDANCE FOR PRECINCT PLANNING (PREPARED BY DEC NOV 2006).

STORMWATER DRAINAGE

- ALL PIPES SHALL BE CLASS 2 RUBBER-RING JOINTED RCP U.N.O. WHERE UPVC PIPES HAVE BEEN SPECIFIED, THE FOLLOWING CLASS PIPEWORK IS TO BE ADOPTED U.N.O. Ø100mm OR LESS TO BE CLASS 'SN10' AND ABOVE Ø100mm TO BE CLASS 'SN8'. CLASS 4 PIPES ARE TO BE USED WHERE COVER OVER THE PIPE IS BELOW 600mm AND BENEATH A TRAFFICABLE PAVEMENT.
- UPVC STORMWATER LINES PASSING UNDER FLOOR SLABS TO BE CONCRETE ENCASED.
- FRC PIPES EQUAL TO THAT OF THE STEEL REINFORCED CONCRETE PIPE CLASS SPECIFIED ON THE DRAWINGS MAY BE USED SUBJECT TO APPROVAL FROM THE SUPERINTENDENT.
- ALL PIPE ARE TO BE LAID AT 1.0% MIN GRADE U.N.O.
- COVERS**
 - USE HOT DIPPED GALVANISED COVERS AND GRATES COMPLYING WITH RELEVANT COUNCIL AND AUSTRALIAN STANDARDS.
 - ALL COVERS AND GRATES TO BE POSITIONED IN A FRAME AND MANUFACTURED AS A UNIT.
 - ALL COVERS AND GRATES TO BE FITTING WITH POSITIVE COVER LIFTING KEYS
 - OBTAIN SUPERINTENDENTS APPROVAL FOR THE USE OF CAST IRON SOLID COVERS AND GRATES. CAST IRON SOLID COVERS (IF APPROVED) TO CONSIST OF CROSS-WEBBED, CELLULAR CONSTRUCTION WITH THE RIBS UPPERMOST TO ALLOW INFILLING WITH CONCRETE. INSTALL POSITIVE COVER LIFTING KEYS AND PLASTIC PLUGS.
 - UNLESS DETAILED OR SPECIFIED OTHERWISE, COVERS AND GRATES TO BE CLASS 'D' IN VEHICULAR PAVEMENTS AND CLASS 'B' ELSEWHERE.
 - ALL GRATED TRENCH DRAINS SHOULD BE 'CLASS D' CAST IRON WITHIN VEHICULAR PAVEMENTS AND CLASS 'B' HEEL SAFE WITHIN PEDESTRIAN PAVEMENTS.
- ALL PIPE BENDS, JUNCTIONS, ETC ARE TO BE PROVIDED USING PURPOSE MADE FITTINGS OR STORMWATER PITS.
- ALL CONNECTIONS TO EXISTING DRAINAGE STRUCTURES SHALL BE MADE IN A TRADESMAN-LIKE MANNER AND CEMENT RENDERED TO ENSURE A SMOOTH FINISH.
- ENSURE PIPEWORK DOES NOT PROTRUDE BEYOND THE INSIDE FACE OF THE PIT WALL. PIPEWORK IS TO FINISH FLUSH WITH INTERNAL WALL (UNLESS OTHERWISE NOTED OR DETAILED). CONNECTION TO BE RENDERED AND MADE NEAT ON THE INSIDE FACE OF THE PIT
- THE CONTRACTOR SHALL SUPPLY AND INSTALL ALL FITTINGS AND SPECIALS INCLUDING VARIOUS PIPE ADAPTORS TO ENSURE PROPER CONNECTION BETWEEN DISSIMILAR PIPEWORK.
- U.N.O. MATERIAL USED FOR BEDDING OF PIPES SHALL BE APPROVED NON-COHESIVE GRANULAR MATERIAL HAVING HIGH PERMEABILITY AND HIGH STABILITY WHEN SATURATED AND FREE OF ORGANIC AND CLAY MATERIAL.
- BEDDING SHALL BE U.N.O TYPE HS2 UNDER ROADS AND H2 UNDER GENERAL AREAS IN ACCORDANCE WITH CURRENT RELEVANT INDUSTRY STANDARDS AND GUIDELINES.
- THE CONTRACTOR SHALL ENSURE AND PROTECT THE INTEGRITY OF ALL STORMWATER PIPES DURING CONSTRUCTION. ANY AND ALL DAMAGE TO THESE PIPES AS A RESULT OF THESE WORKS SHALL BE REPAIRED BY THE CONTRACTOR UNDER THE DIRECTION OF THE SUPERINTENDENT AND AT NO EXTRA COST TO THE CONTRACT.
- NOTE THAT THE PIT COVER LEVEL NOMINATED IN GUTTERS ARE TO THE INVERT OF THE GUTTER WHICH ARE 4.0mm LOWER THAN THE PAVEMENT LEVEL AT LIP OF GUTTER. REFER KERB DETAILS FOR CONFIRMATION.

SUBSOIL DRAINAGE

- Ø100mm SUBSOIL DRAINAGE LINES WITH NON-WOVEN GEOTEXTILE FILTER SOCK SURROUND SHALL BE CONNECTED TO A STORMWATER DRAINAGE PIT (AT MIN 1% LONGITUDINAL GRADE) AND PROVIDED IN THE FOLLOWING LOCATIONS:
 - THE HIGH SIDE OF PROPOSED TRAFFICED PAVEMENT AREAS.
 - ALL PLANTER AND TREE BEDS PROPOSED ADJACENT TO PAVEMENT AREAS
 - BEHIND RETAINING WALLS (IN ACCORDANCE WITH RETAINING WALL DETAILS).
 - UPSTREAM OF STORMWATER PITS
 - BENEATH FLEXIBLE PAVEMENT ALONG A SAG PROFILE
 - ALL OTHER AREAS SHOWN ON DRAWINGS.
 - CONTRACTOR IS TO MAKE ALLOWANCE IN BOTH TENDER AND CONSTRUCTION COSTING TO ALLOW FOR SUBSURFACE DRAINAGE BEHIND ALL RETAINING WALLS / ABOVE LOCATIONS AND TO MAKE CONNECTION TO STORMWATER SYSTEM.
- WHERE SUBSOIL DRAINAGE PASSES BENEATH BUILDINGS / PAVED AREAS AND/OR PAVEMENTS, CONTRACTOR TO ENSURE Ø100mm CLASS 'SN10' UPVC DRAINAGE LINE IS USED AND THAT PROPRIETARY FITTINGS ARE USED TO RECONNECT SUBSOIL DRAINAGE LINE.
- THE CONTRACTOR SHALL INSTALL INSPECTION OPENINGS / CLEAROUTS TO ALL SUBSOIL DRAINAGE LINES AND DOWNPIPE LINES AS SPECIFIED ON DRAWINGS AND IN ACCORDANCE WITH COUNCIL SPECIFICATIONS, HOWEVER AS A MINIMUM THEY ARE TO BE PLACED AT MAXIMUM 30m CENTRES AND AT ALL UPSTREAM ENDPOINTS.
- PROVIDE 3.0m LENGTH OF Ø100 SUBSOIL DRAINAGE LINE WRAPPED IN NON-WOVEN GEOTEXTILE FILTER FABRIC TO THE UPSTREAM SIDE OF STORMWATER PITS, LAID IN STORMWATER PIPE TRENCHES AND CONNECTED TO DRAINAGE PIT.
- IN AREAS WHERE DUMPED / HAND PLACED ROCK IS USED AS A MEANS OF SCOUR PROTECTION, CONTRACTOR IS TO EXCAVATE A MINIMUM OF 100mm FROM PROPOSED SURFACE, LEVEL AND COMPACT SUBGRADE AS SPECIFIED. ROCK TO THEN BE PLACED ON GEOTEXTILE FILTER FABRIC A34.
- THE CONTRACTOR IS TO ENSURE THAT A MINIMUM 150mm CLEARANCE IS PROVIDED BETWEEN THE INTERNAL FACE OF PIPE AND ADJACENT INTERNAL PIT WALLS
- 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. (E.G. CLEAN 5-12mm AGGREGATE)

PRECAST STORMWATER PITS

- THE USE OF PRE-CAST STORMWATER DRAINAGE PITS IS NOT ACCEPTED WITHOUT CONFIRMATION BETWEEN NORTHROP ENGINEERS AND THE CONTRACTOR REGARDING QUALITY CONTROL AND CERTIFICATION OF FINISHES.
- REFER MANUFACTURERS SPECIFICATIONS FOR INSTALLATION GUIDELINES.
- PRECAST PIT TO BE PLACED ON MINIMUM 150mm THICK CONCRETE PAD AND BED MINIMUM 50mm WHILST CONCRETE IS STILL PARTIALLY WET.
- ENSURE PENETRATION IS CURED THROUGH PIT FACE TO ALLOW CONNECTION AND IS NOT OVERSIZED.
- ENSURE A SEALED FINISH AT PIPE CONNECTIONS BY HAND-APPLYING MINIMUM 150mm THICK CONCRETE AROUND PIPE AT THE EXTERNAL FACE OF THE PIT. ENSURE CONCRETE DOES NOT AFFECT THE INTEGRITY OF THE SUBSOIL DRAINAGE CONNECTED TO THE PIT.
- ENSURE A SMOOTH SEALED FINISH AT PIPE CONNECTIONS BY HAND APPLYING CONCRETE AROUND THE PIPE ON THE INTERNAL FACE OF THE PIT TO FILL IN ANY VOIDS CREATED WHEN PENETRATION FOR THE PIPE WAS CURED.
- ENSURE PIPEWORK DOES NOT PROTRUDE BEYOND THE INSIDE FACE OF THE PIT WALL. PIPEWORK IS TO FINISH FLUSH WITH INTERNAL WALL (UNLESS OTHERWISE NOTED OR DETAILED). CONNECTION TO BE RENDERED AND MADE NEAT ON THE INSIDE FACE OF THE PIT.
- ENSURE THE OUTLET PIPE IS CONNECTED AT THE INVERT LEVEL OF THE PIT TO DRAIN. ALTERNATIVELY FILL THE BASE OF THE PIT WITH MASS CONCRETE (MIN 50mm THICK) OR APPROVED GROUTING COMPOUND (LESS THAN 50mm THICK) TO DRAIN.
- PROVIDE CONCRETE BENCHING TO SIDES OF PIT TO SUIT PIPE DIAMETER. HEIGHT TO MATCH MINIMUM 1/3 PIPE DIAMETER.

SEDIMENT AND SOIL EROSION

- THE SEDIMENT & EROSION CONTROL PLAN PRESENTS CONCEPTS ONLY. THE CONTRACTOR SHALL AT ALL TIMES BE RESPONSIBLE FOR THE ESTABLISHMENT & MANAGEMENT OF A DETAILED SCHEME MEETING COUNCILS AND OTHER REGULATORY AUTHORITY REQUIREMENTS AND MAKE PAYMENT OF ALL FEES.
- THE CONTRACTOR SHALL INSTIGATE ALL SEDIMENT AND EROSION CONTROL MEASURES IN ACCORDANCE WITH STATUTORY REQUIREMENTS AND IN PARTICULAR THE 'BLUE BOOK' (MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION), PRODUCED BY THE DEPARTMENT OF HOUSING AND COUNCILS POLICIES. THESE MEASURES ARE TO BE INSPECTED AND MAINTAINED ON A DAILY BASIS.
- THE CONTRACTOR SHALL ENSURE THAT ALL SOIL AND WATER MANAGEMENT WORKS ARE LOCATED AS INSTRUCTED IN THE DRAWINGS AND ADHERE TO ALL REGULATORY AUTHORITY REQUIREMENTS.
- THE CONTRACTOR SHALL INFORM ALL SUB CONTRACTORS OF THEIR RESPONSIBILITIES IN MINIMISING THE POTENTIAL FOR SOIL EROSION AND POLLUTION TO DOWNSTREAM LANDS AND WATERWAYS.
- WHERE PRACTICAL, THE SOIL EROSION HAZARD ON THE SITE SHALL BE KEPT AS LOW AS POSSIBLE. TO THIS END, WORKS SHOULD BE UNDERTAKEN IN THE FOLLOWING SEQUENCE:
 - INSTALL ALL TEMPORARY SEDIMENT FENCES AND BARRIER FENCES, WHERE FENCES ADJACENT EACH OTHER, THE SEDIMENT FENCE CAN BE INCORPORATED INTO THE BARRIER FENCE.
 - INSTALL SEDIMENT CONTROL MEASURES AS OUTLINED ON THE APPROVED PLANS.
- UNDERTAKE SITE DEVELOPMENT WORKS SO THAT LAND DISTURBANCE IS CONFINED TO AREAS OF MINIMUM WORKABLE SIZE.
- AT ALL TIMES AND IN PARTICULAR DURING WINDY AND DRY WEATHER, LARGE UNPROTECTED AREAS WILL BE STABILISED / KEPT MOIST (NOT WET) TO KEEP DUST UNDER CONTROL ENSURING CONFORMITY TO REGULATORY AUTHORITY REQUIREMENTS.
- ANY SAND USED IN THE CONCRETE CURING PROCESS (SPREAD OVER THE SURFACE) SHALL BE REMOVED AS SOON AS POSSIBLE AND WITHIN 10 WORKING DAYS FROM PLACEMENT.
- WATER SHALL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS THE CATCHMENT AREA HAS BEEN STABILISED AND/OR ANY LIKELY SEDIMENT BEEN FILTERED OUT.
- TEMPORARY SOIL AND WATER MANAGEMENT STRUCTURES SHALL BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE STABILISED / REHABILITATED.
- ALLOW FOR GRASS STABILISATION OF EXPOSED AREAS, OPEN CHANNELS AND ROCK BATTERS DURING ALL PHASES OF CONSTRUCTION.
- EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED TO ENSURE THAT THEY OPERATE EFFECTIVELY. REPAIRS AND/OR MAINTENANCE SHALL BE UNDERTAKEN REGULARLY AND AS REQUIRED, PARTICULARLY FOLLOWING RAIN EVENTS.
- RECEPTORS FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER SHALL BE DISPOSED OF IN ACCORDANCE WITH REGULATORY AUTHORITY REQUIREMENTS. CONTRACTOR TO PAY ALL FEES AND PROVIDE EVIDENCE OF SAFE DISPOSAL.
- IF A TEMPORARY SEDIMENT BASIN IS REQUIRED, ENSURE SAFE BATTER SLOPES IN ACCORDANCE WITH THE GEOTECHNICAL REPORT. MAINTAIN ADEQUATE STORAGE VOLUME IN ACCORDANCE WITH PLANS. TEMPORARY PUMP 'CLEAN FLOCCULATED' WATER TO AUTHORITIES STORMWATER SYSTEM. ENSURE WHOLE DISTURBED SITE RUN-OFF IS DIRECTED TO TEMPORARY SEDIMENT BASIN.

VERIFIER:

JOB MANAGER: N. NAICKER

DESIGNED: N. NAICKER

DRAWN: J. TAI

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PROJECT

SIRIUS SITE

2-60 CUMBERLAND STREET, THE ROCKS

DRAWING TITLE

CIVIL ENGINEERING PACKAGE

SPECIFICATION NOTES

JOB NUMBER

193308

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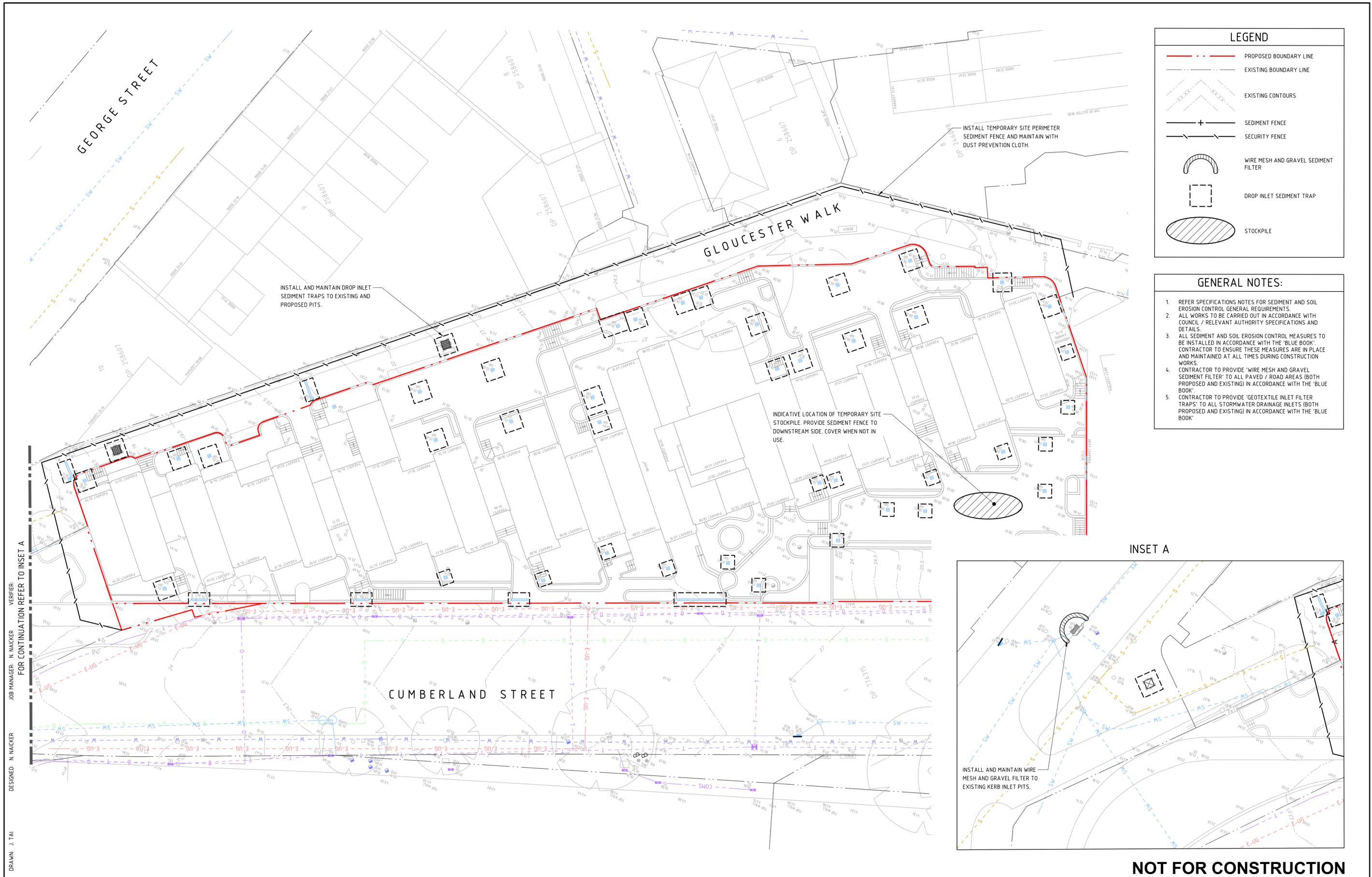
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REVISION

3

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 DRAWN: J. TAI

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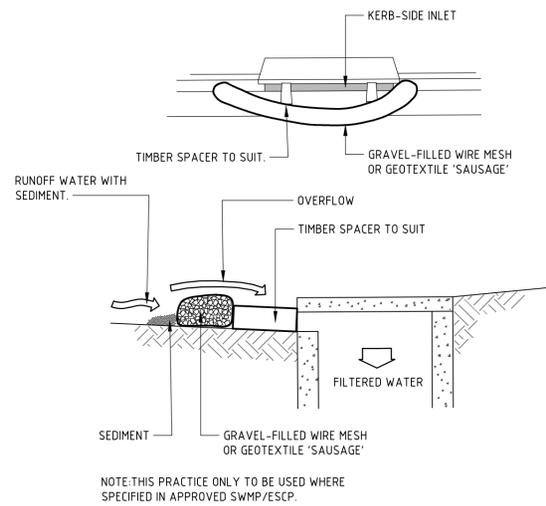
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CIVIL ENGINEERING PACKAGE
CONCEPT SEDIMENT AND EROSION CONTROL PLAN

JOB NUMBER
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DRAWING NUMBER	REVISION
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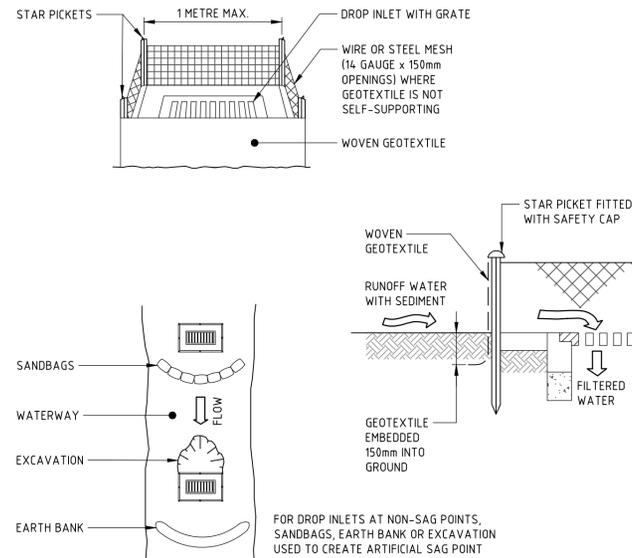


NOTE: THIS PRACTICE ONLY TO BE USED WHERE SPECIFIED IN APPROVED SWMP/ESCP.

CONSTRUCTION NOTES

1. INSTALL FILTERS TO KERB INLETS ONLY AT SAG POINTS.
2. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
3. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH x 400mm WIDE.
4. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET. MAINTAIN THE OPENING WITH SPACER BLOCKS.
5. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE FILTER.
6. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY FIRMLY ABUT EACH OTHER AND SEDIMENT-LADEN WATERS CANNOT PASS BETWEEN.

WIRE MESH AND GRAVEL SEDIMENT FILTER



FOR DROP INLETS AT NON-SAG POINTS, SANDBAGS, EARTH BANK OR EXCAVATION USED TO CREATE ARTIFICIAL SAG POINT

CONSTRUCTION NOTES

1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. FOLLOW STANDARD DRAWING 6-7 AND STANDARD DRAWING 6-8 FOR INSTALLATION PROCEDURES FOR THE STRAW BALES OR GEOTEXTILE. REDUCE THE PICKET SPACING TO 1 METRE CENTRES.
3. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING.
4. DO NOT COVER THE INLET WITH GEOTEXTILE UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

GEOTEXTILE INLET FILTER TRAPS

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JOB MANAGER: N. MAICKER
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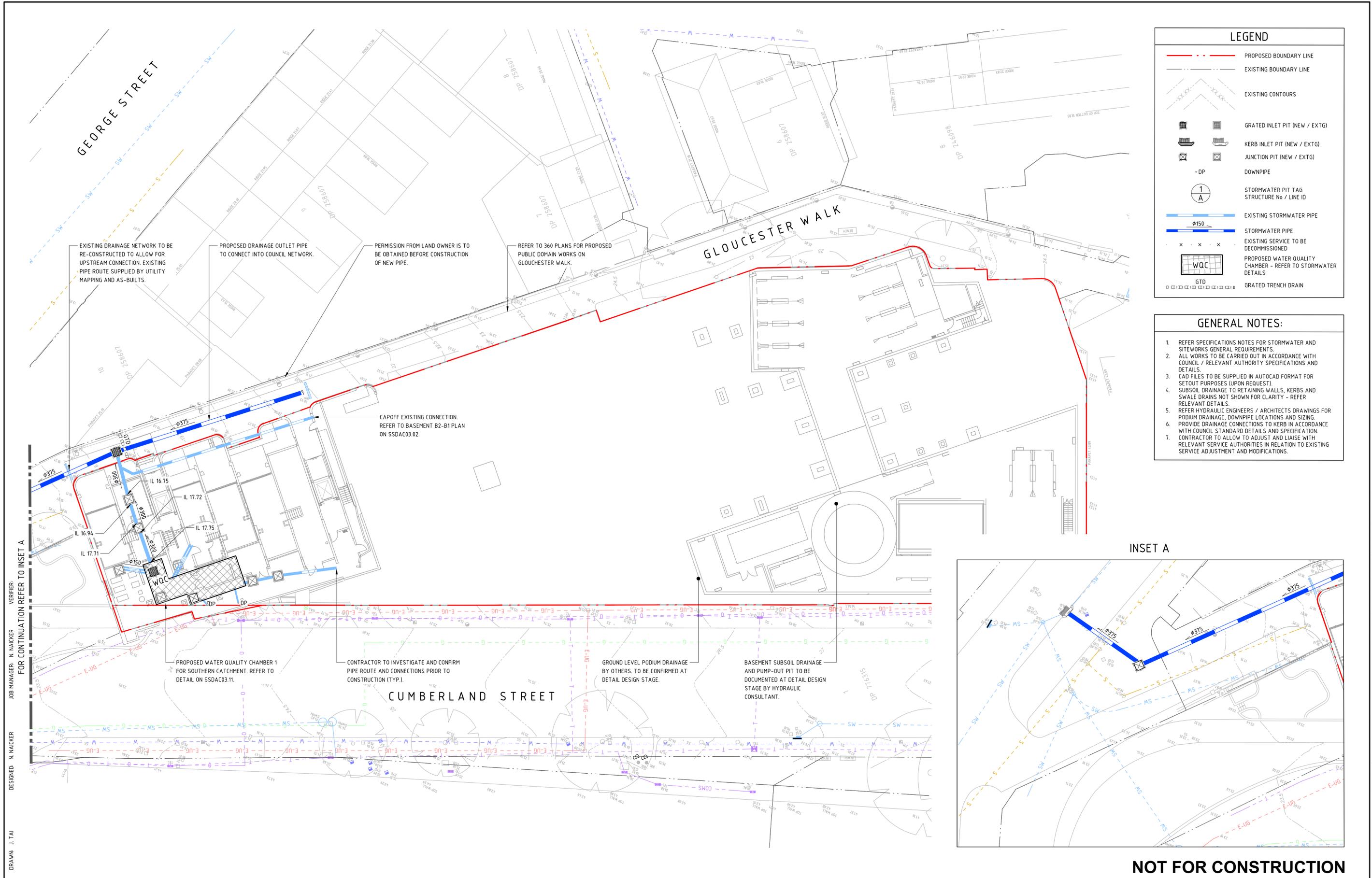
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PROJECT
SIRIUS SITE
2-60 CUMBERLAND STREET, THE ROCKS

DRAWING TITLE
CIVIL ENGINEERING PACKAGE
SEDIMENT AND EROSION CONTROL DETAILS

JOB NUMBER 193308	
DRAWING NUMBER SSDAC02.11	REVISION 3
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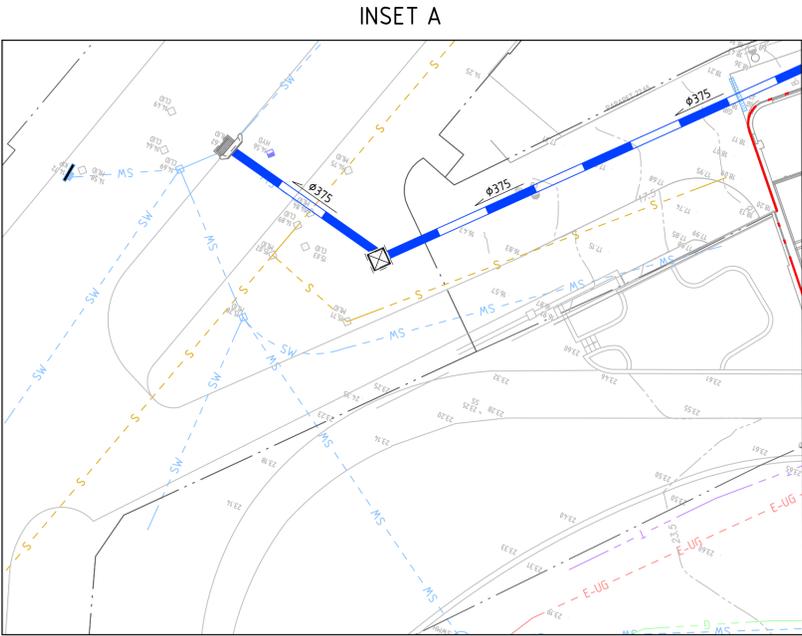
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LEGEND

- PROPOSED BOUNDARY LINE
- EXISTING BOUNDARY LINE
- EXISTING CONTOURS
- GRATED INLET PIT (NEW / EXTG)
- KERB INLET PIT (NEW / EXTG)
- JUNCTION PIT (NEW / EXTG)
- DOWNPIPE
- STORMWATER PIT TAG STRUCTURE No / LINE ID
- EXISTING STORMWATER PIPE
- STORMWATER PIPE
- EXISTING SERVICE TO BE DECOMMISSIONED
- PROPOSED WATER QUALITY CHAMBER - REFER TO STORMWATER DETAILS
- GTD
- GRATED TRENCH DRAIN

- ### GENERAL NOTES:
- REFER SPECIFICATIONS NOTES FOR STORMWATER AND SITEWORKS GENERAL REQUIREMENTS.
 - ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL / RELEVANT AUTHORITY SPECIFICATIONS AND DETAILS.
 - CAD FILES TO BE SUPPLIED IN AUTOCAD FORMAT FOR SET OUT PURPOSES (UPON REQUEST).
 - SUBSOIL DRAINAGE TO RETAINING WALLS, KERBS AND SWALE DRAINS NOT SHOWN FOR CLARITY - REFER RELEVANT DETAILS.
 - REFER HYDRAULIC ENGINEERS / ARCHITECTS DRAWINGS FOR PODIUM DRAINAGE, DOWNPIPE LOCATIONS AND SIZING.
 - PROVIDE DRAINAGE CONNECTIONS TO KERB IN ACCORDANCE WITH COUNCIL STANDARD DETAILS AND SPECIFICATION.
 - CONTRACTOR TO ALLOW TO ADJUST AND LIAISE WITH RELEVANT SERVICE AUTHORITIES IN RELATION TO EXISTING SERVICE ADJUSTMENT AND MODIFICATIONS.



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 DESIGNED: N.MACKER
 JOB MANAGER: N.MACKER
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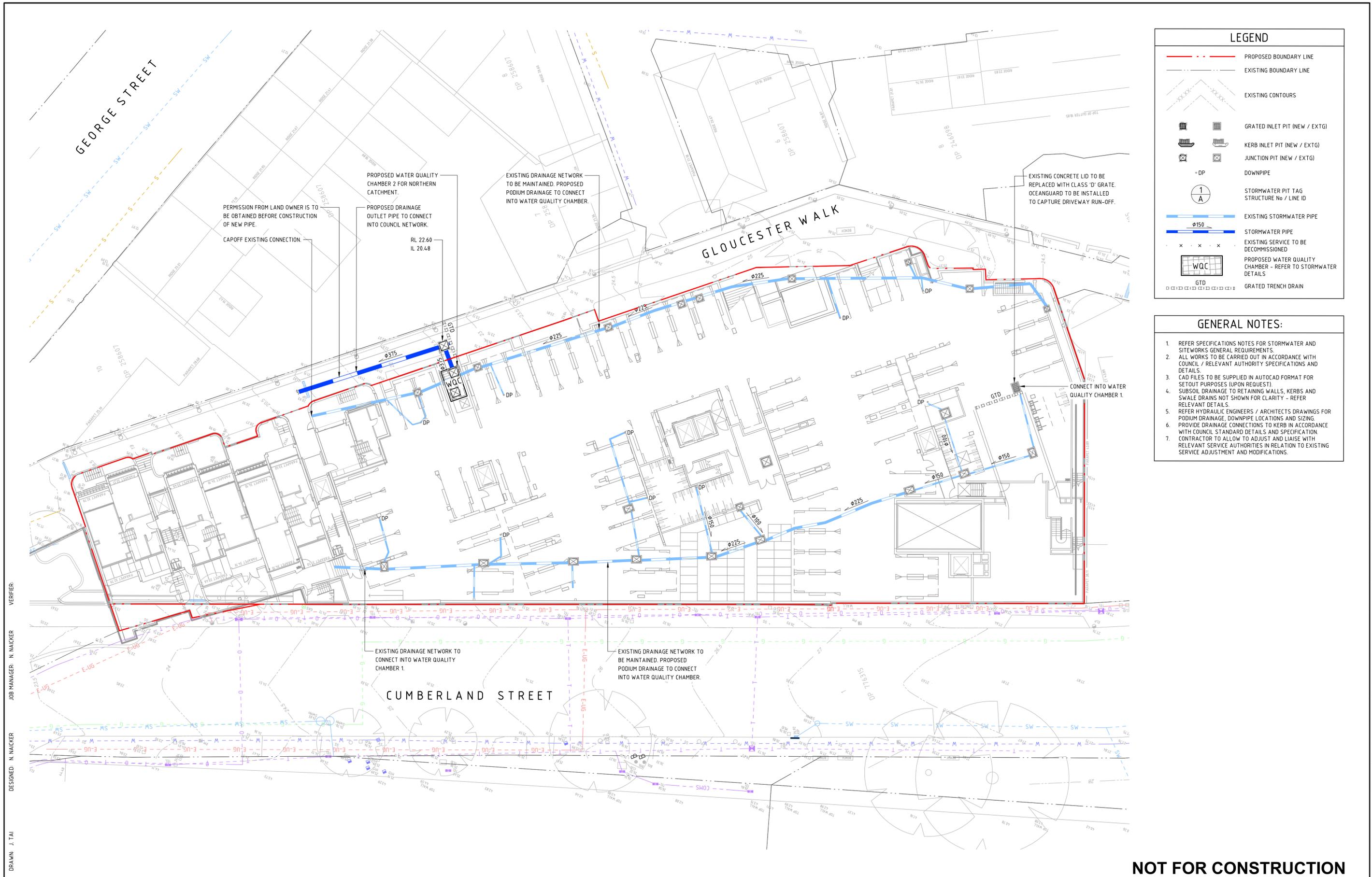
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 2-60 CUMBERLAND STREET, THE ROCKS

DRAWING TITLE: CIVIL ENGINEERING PACKAGE
 STORMWATER MANAGEMENT PLAN B2b-B2a

JOB NUMBER: 193308
 DRAWING NUMBER: SSDAC03.01
 REVISION: 3
 DRAWING SHEET SIZE = A1

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LEGEND

- PROPOSED BOUNDARY LINE
- EXISTING BOUNDARY LINE
- - - - - EXISTING CONTOURS
- GRATED INLET PIT (NEW / EXTG)
- KERB INLET PIT (NEW / EXTG)
- JUNCTION PIT (NEW / EXTG)
- +DP DOWNPIPE
- STORMWATER PIT TAG
STRUCTURE No / LINE ID
- EXISTING STORMWATER PIPE
- STORMWATER PIPE
- - - - - EXISTING SERVICE TO BE
DECOMMISSIONED
- PROPOSED WATER QUALITY
CHAMBER - REFER TO STORMWATER
DETAILS
- GTD GRATED TRENCH DRAIN

- ### GENERAL NOTES:
1. REFER SPECIFICATIONS NOTES FOR STORMWATER AND SITEWORKS GENERAL REQUIREMENTS.
 2. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL / RELEVANT AUTHORITY SPECIFICATIONS AND DETAILS.
 3. CAD FILES TO BE SUPPLIED IN AUTOCAD FORMAT FOR SETOUT PURPOSES (UPON REQUEST).
 4. SUBSOIL DRAINAGE TO RETAINING WALLS, KERBS AND SWALE DRAINS NOT SHOWN FOR CLARITY - REFER RELEVANT DETAILS.
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 6. PROVIDE DRAINAGE CONNECTIONS TO KERB IN ACCORDANCE WITH COUNCIL STANDARD DETAILS AND SPECIFICATION.
 7. CONTRACTOR TO ALLOW TO ADJUST AND LIAISE WITH RELEVANT SERVICE AUTHORITIES IN RELATION TO EXISTING SERVICE ADJUSTMENT AND MODIFICATIONS.

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 DESIGNED: N. MAICKER
 JOB MANAGER: N. MAICKER
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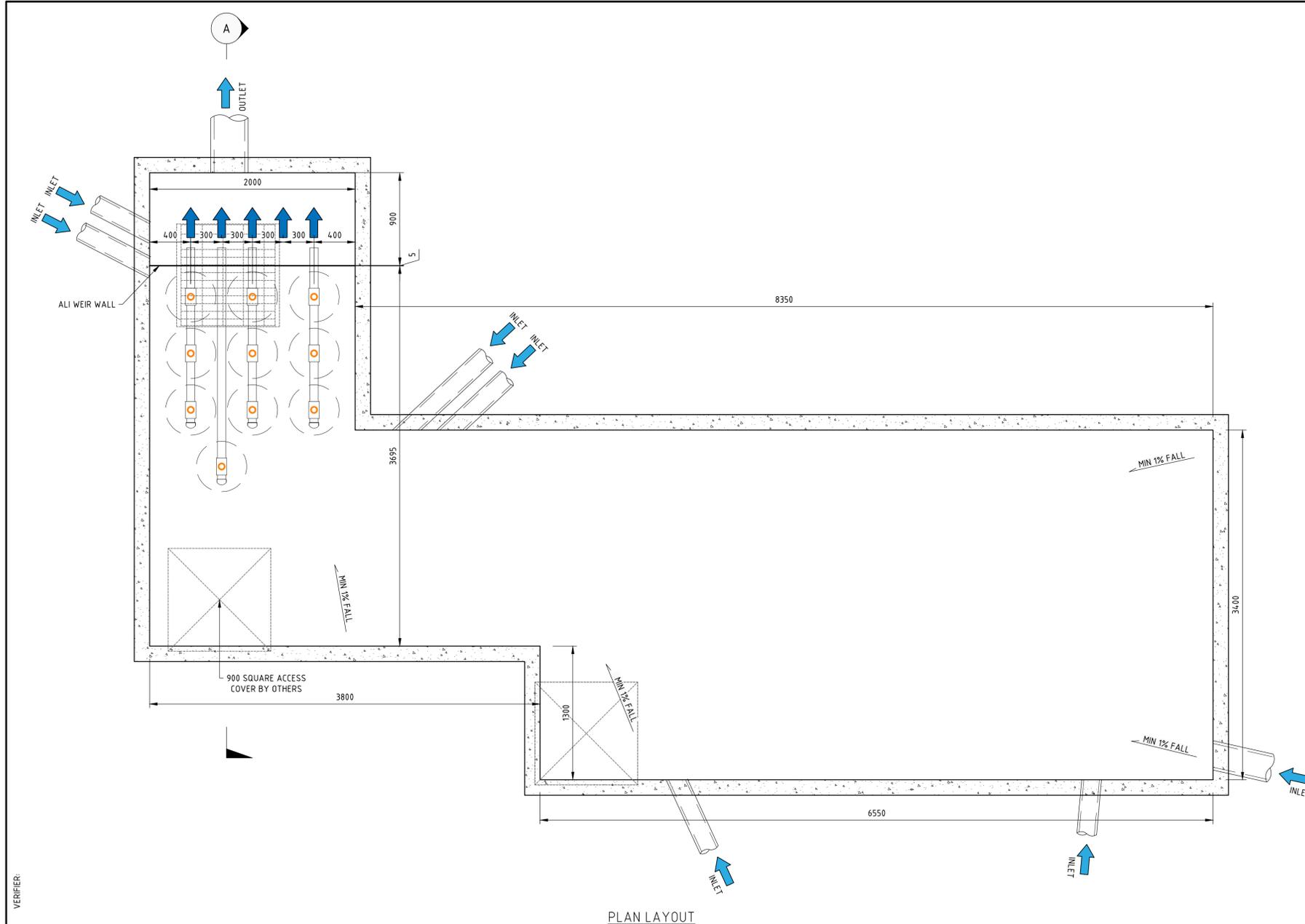
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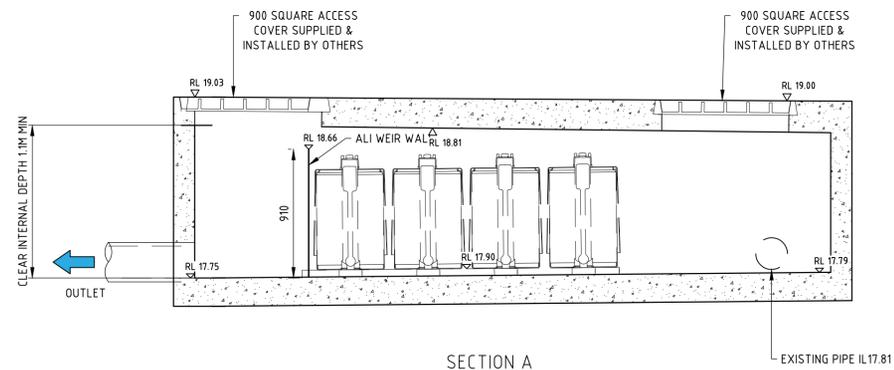
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**STORMWATER MANAGEMENT
 PLAN B1b-B1a**

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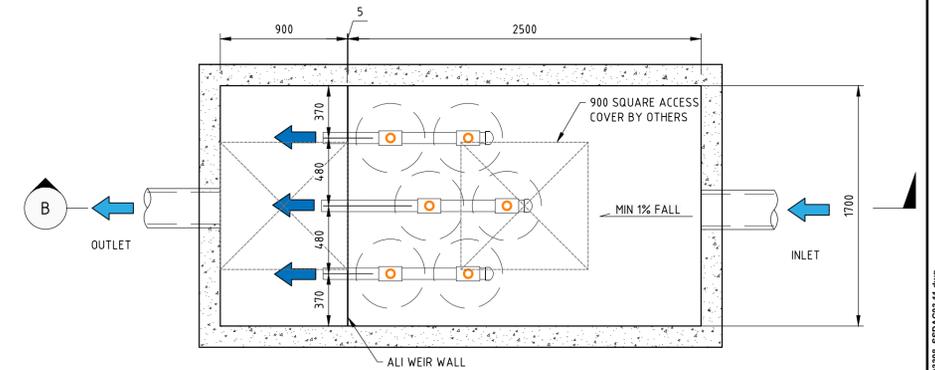
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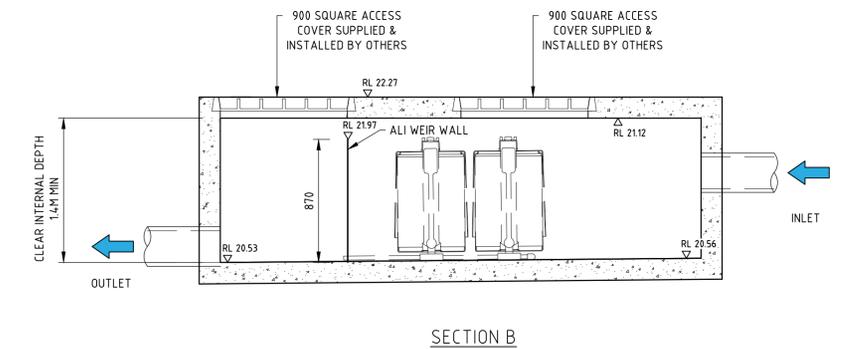
PLAN LAYOUT



SECTION A
WATER QUALITY CHAMBER 1



PLAN LAYOUT



SECTION B
WATER QUALITY CHAMBER 2

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PROJECT
SIRIUS SITE
**2-60 CUMBERLAND STREET,
THE ROCKS**

DRAWING TITLE
CIVIL ENGINEERING PACKAGE
**STORMWATER MANAGEMENT
DETAILS**

JOB NUMBER
193308

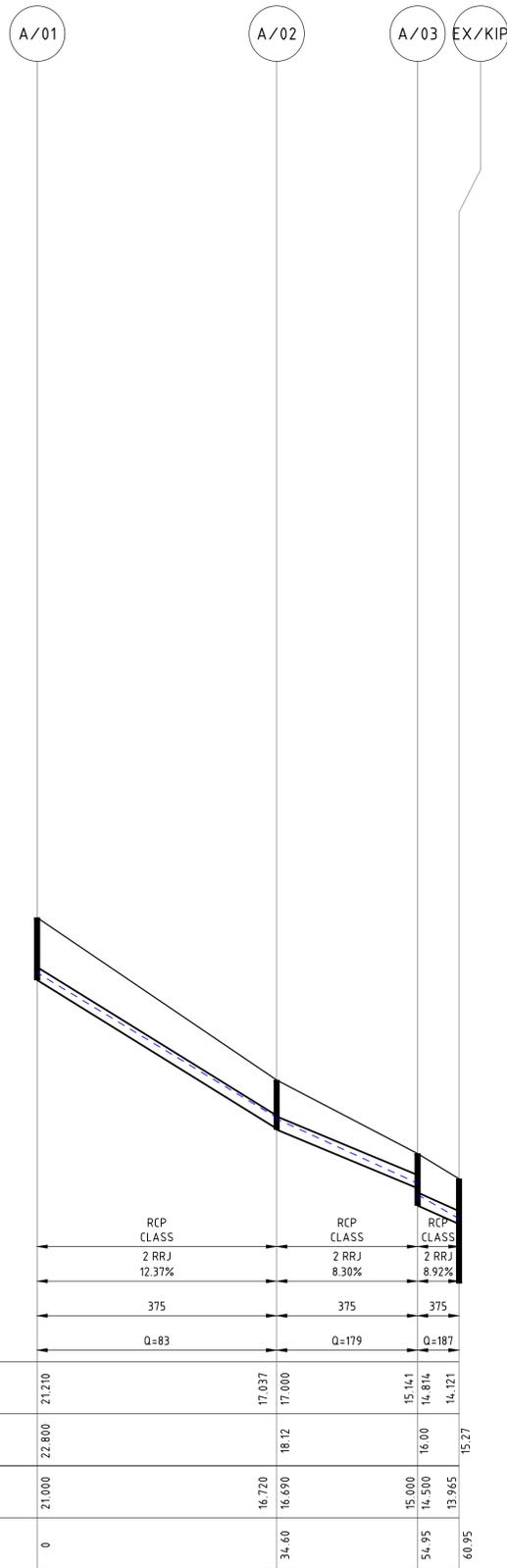
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JOB MANAGER: N. MAICKER
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DESIGNED: N. MAICKER
JOB MANAGER: N. MAICKER
VERIFIER:



PIPE CLASS
PIPE GRADE (%)
PIPE SIZE (mm)
Q - PIPE FLOW (L/s)
DATUM RL 10

	0	34.60	54.95	60.95
H.G.L. 100YR ARI	21.210	17.037	15.141	14.121
FINISHED SURFACE	22.800	18.12	16.00	15.27
INVERT LEVEL	21.000	16.720	14.500	13.965
CHAINAGE	0	34.60	54.95	60.95

STORMWATER LONGITUDINAL SECTION (100YR) 1
HOR: 1:500 VER: 1:100 C03.01

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SCALE 1:100 @ A1

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PROJECT
SIRIUS SITE
**2-60 CUMBERLAND STREET,
THE ROCKS**

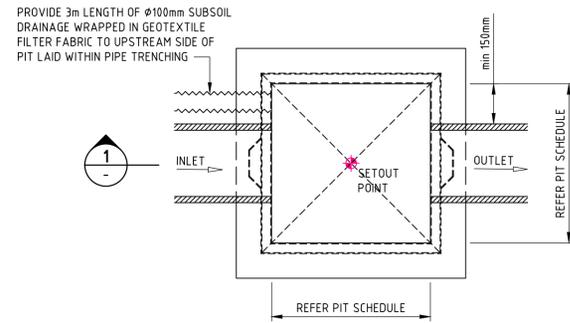
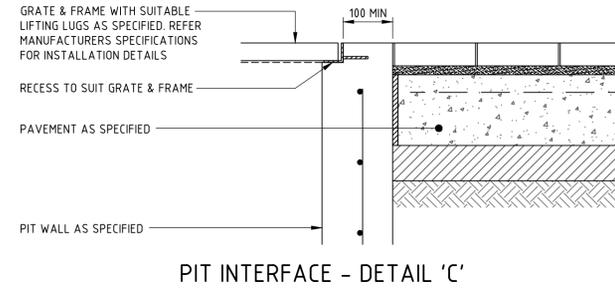
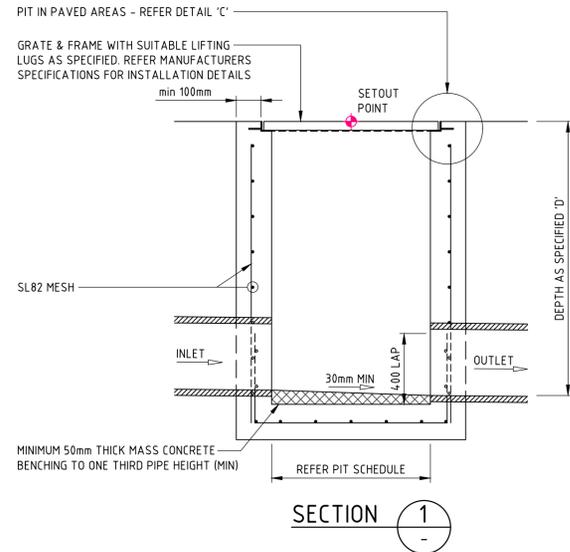
DRAWING TITLE
CIVIL ENGINEERING PACKAGE
**STORMWATER LONGITUDINAL
SECTION**

JOB NUMBER
193308

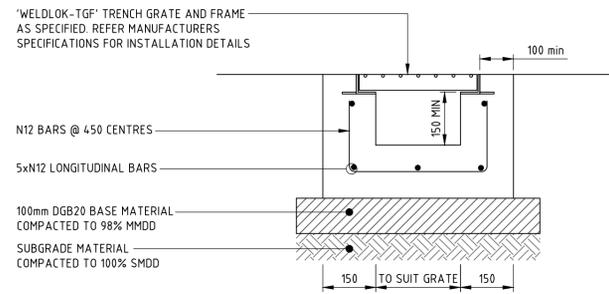
DRAWING NUMBER	REVISION
SSDAC03.21	2

DRAWING SHEET SIZE = A1

NOT FOR CONSTRUCTION



PLAN
SURFACE INLET 'SIP' / JUNCTION PIT 'JP'
 PIT STRUCTURE TO BE 200mm THICK UNLESS SHOWN OTHERWISE. DRILL AND EPOXY PLASTIC PROPRIETARY STEP IRONS IN ACCORDANCE WITH AUSTRALIAN STANDARDS AND MANUFACTURERS SPECIFICATIONS (PITS > 1000mm DEPTH). REFER PIT INTERFACE DETAIL 'F' FOR CORNER REINFORCEMENT



GRATED TRENCH DRAIN 'GTD'
 GRATED TRENCH DRAIN TO HAVE MINIMUM 150mm CLEARANCE AND 1% LONGITUDINAL FALL. GRATE CLASS TO BE CLASS 'B' HEELSAFE IN PEDESTRIAN AREAS AND CLASS 'D' IN TRAFFICKED AREAS UNLESS NOTED OTHERWISE ON PLAN

DRAWN: J.TAI
 DESIGNED: N. NAICKER
 JOB MANAGER: N. NAICKER
 VERIFIER:

NOT FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR REVIEW	JP		NN	31.07.20
2	ISSUED FOR DEVELOPMENT APPLICATION	MM		NN	31.08.20
3	ISSUED FOR DEVELOPMENT APPLICATION	MM		NN	27.10.20

CLIENT
SIRIUS DEVELOPMENTS PTY LTD

ARCHITECT

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SCALE VARIES

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PROJECT
SIRIUS SITE
2-60 CUMBERLAND STREET, THE ROCKS

DRAWING TITLE
CIVIL ENGINEERING PACKAGE
DETAILS

JOB NUMBER 193308	
DRAWING NUMBER SSDAC04.01	REVISION 3
DRAWING SHEET SIZE = A1	

4.3 City of Sydney MUSIC Link

MUSIC-link Report

Project Details		Company Details	
Project:	2-60 Cumberland St, The Rocks - MUSIC Summary	Company:	Northrop consulting Engineers
Report Export Date:	31/08/2020	Contact:	
Catchment Name:	14332 - 2-60 Cumberland St The Rocks (Prelim - Option3)	Address:	
Catchment Area:	0.365ha	Phone:	
Impervious Area*:	96.71%	Email:	
Rainfall Station:	66062 SYDNEY		
Modelling Time-step:	6 Mminutes		
Modelling Period:	1/01/1982 - 31/12/1986 11:54:00 PM		
Mean Annual Rainfall:	1278mm		
Evapotranspiration:	1265mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.33		
Study Area:	City of Sydney Sandy Loam Soil		
Scenario:	City of Sydney Development		

*takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node: Receiving Node	Reduction	Node Type	Number	Node Type	Number
Flow	0.00109%	Sedimentation Basin Node	2	Urban Source Node	7
TSS	85.5%	Generic Node	2		
TP	78.1%	GPT Node	1		
TN	50.6%				
GP	100%				

Comments

N/A

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
GPT	1 x OceanGuard200um	Hi-flow bypass rate (cum/sec)	None	99	0.02
Receiving	Receiving Node	% Load Reduction	None	None	0.00109
Receiving	Receiving Node	GP % Load Reduction	90	None	100
Receiving	Receiving Node	TN % Load Reduction	45	None	50.6
Receiving	Receiving Node	TP % Load Reduction	65	None	78.1
Receiving	Receiving Node	TSS % Load Reduction	85	None	85.5
Sedimentation	SF Chamber 10m	% Reuse Demand Met	None	None	0
Sedimentation	SF Chamber 10m	Exfiltration Rate (mm/hr)	0	0	0
Sedimentation	SF Chamber 10m	Extended detention depth (m)	0.25	1	0.77
Sedimentation	SF Chamber 10m	High Flow Bypass Out (ML/yr)	None	None	0
Sedimentation	SF Chamber 4m	% Reuse Demand Met	None	None	0
Sedimentation	SF Chamber 4m	Exfiltration Rate (mm/hr)	0	0	0
Sedimentation	SF Chamber 4m	Extended detention depth (m)	0.25	1	0.77
Sedimentation	SF Chamber 4m	High Flow Bypass Out (ML/yr)	None	None	0
Urban	Paved - 569m (100% Imp.)	Area Impervious (ha)	None	None	0.057
Urban	Paved - 569m (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	Paved - 569m (100% Imp.)	Total Area (ha)	None	None	0.057
Urban	Paved - 953m (100% Imp.)	Area Impervious (ha)	None	None	0.095
Urban	Paved - 953m (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	Paved - 953m (100% Imp.)	Total Area (ha)	None	None	0.095
Urban	Planter - 111m (80% Perv.)	Area Impervious (ha)	None	None	0.0022
Urban	Planter - 111m (80% Perv.)	Area Pervious (ha)	None	None	0.0088
Urban	Planter - 111m (80% Perv.)	Total Area (ha)	None	None	0.011
Urban	Planter - 38m (80% Perv.)	Area Impervious (ha)	None	None	0.0008
Urban	Planter - 38m (80% Perv.)	Area Pervious (ha)	None	None	0.0032
Urban	Planter - 38m (80% Perv.)	Total Area (ha)	None	None	0.004
Urban	Roof - 1421m (100% Imp.)	Area Impervious (ha)	None	None	0.142
Urban	Roof - 1421m (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	Roof - 1421m (100% Imp.)	Total Area (ha)	None	None	0.142
Urban	Roof - 418m (100% Imp.)	Area Impervious (ha)	None	None	0.042
Urban	Roof - 418m (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	Roof - 418m (100% Imp.)	Total Area (ha)	None	None	0.042
Urban	Truck Driveway - 137m (100% Imp.)	Area Impervious (ha)	None	None	0.014
Urban	Truck Driveway - 137m (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	Truck Driveway - 137m (100% Imp.)	Total Area (ha)	None	None	0.014

Only certain parameters are reported when they pass validation

Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Sedimentation	SF Chamber 10m	Notional Detention Time (hrs)	8	12	0.0738
Sedimentation	SF Chamber 10m	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Chamber 10m	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Chamber 10m	Total Suspended Solids - k (m/yr)	8000	8000	1
Sedimentation	SF Chamber 4m	Notional Detention Time (hrs)	8	12	0.0844
Sedimentation	SF Chamber 4m	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Chamber 4m	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Chamber 4m	Total Suspended Solids - k (m/yr)	8000	8000	1

Only certain parameters are reported when they pass validation