XAVIER KNIGHT

# INTEGRATED WATER MANAGEMENT PLAN

SSD-78669234

240608 - 27-29 Tryon Road, Lindfield

# Contents



## QUALITY CONTROL REGISTER

This report has been prepared and checked as per below.

| | Name | Signature | Date |
|---|---|---|---|
| Report Author: | Duncan Marshall |  | 21.02.2025 |
| Checked by: | Feris Chehade |  | 21.02.2025 |
| Authorised by: | Feris Chehade |  | 21.02.2025 |

## Document Summary

| | |
|---|---|
| Project Number: | 240608 |
| Project Name: | 27-29 Tryon Road, Lindfield |
| Prepared For: | Bridgestone Projects Pty Ltd |
| SSDA No: | SSD-78669234 |
| Date Prepared: | 21.02.2025 |
| XK Project Director: | Nathaniel Ko |

| Status | Issue | Date | Prepared By | Approved By |
|---|---|---|---|---|
| For Approval | 1 | 21.02.2025 | Duncan Marshall | Feris Chehade |

# 1 Introduction

## 1.1 EXECUTIVE SUMMARY

This civil engineering report accompanies an Environmental Impact Statement (EIS) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act), in support of a State Significant Development Application (SSDA) for the construction of the proposed residential flat building, reference SSD-78669234.

This report addresses the Secretary's Environmental Assessment Requirements (SEARs) issued for the project, notably:

| SEARs Requirement | Report Section |
|---|---|
| **11. Water Management**<br>• Detail the proposed drainage design and servicing infrastructure to be incorporated as part of the development (stormwater and wastewater).<br>• Demonstrate how the development complies with council's drainage requirements and identify proposed stormwater treatment and water quality management measures to minimise adverse environmental impacts. | Section 2 |

## 1.2 PROJECT DESCRIPTION

The proposed development is the demolition of existing structures and the construction of a 9-storey residential flat building with in-fill affordable housing and associated works. The proposal will include:

- Demolition of existing structures and site preparation / earthworks;
- Construction of 4 basement levels with vehicular access via Tryon Lane;
- Construction of a 9 storey residential flat building across 4 apartment blocks, including a mix of 1, 2 and 3 bedroom apartments; and 14 affordable units;
- Communal open spaces on the ground floor and roof terrace; and
- Landscape works including tree replacement.

The proposal seeks to utilise the Infill Affordable Housing provisions of the Housing SEPP by providing affordable housing.

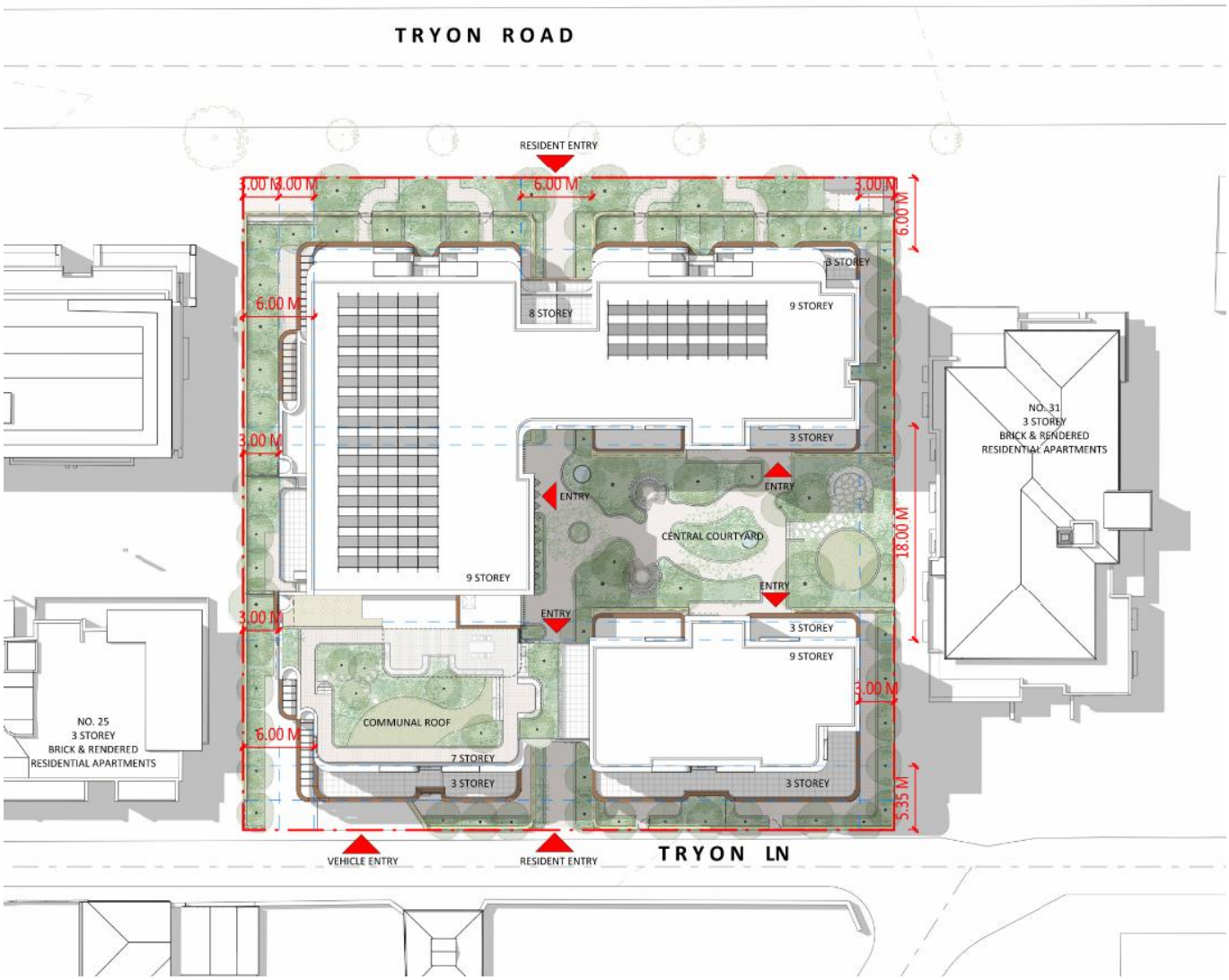


**Figure 1 – Architectural Site Plan (PTW, 2025)**

## 1.3 SITE LOCATION

The proposed development site is in the Ku Ring Gai Local Government Area within the suburb of Lindfield. The proposed development site is a 3,011m$^2$ parcel of land on Lot 11 and 12 in DP 1188210. The site is bound by Tryon Road to the north, Tryon lane to the South and neighbouring developments to the east and west. A Site Location Plan is provided at Figure 2. The site currently contains a two storey nursing home and a single storey dwelling. The remainder of the site contains concrete pavements, trees and landscaping. The site is located on local high point in which the topographic surface has a gentle gradient towards both Tryon Road and Tryon Lane, as such no upstream catchment runoff is expected to impact the development site.


**Figure 2 - Site Location (Nearmap, 2025)**

## 1.4 DESIGN STANDARDS AND GUIDELINES

The following design standards and guidelines have been used for the preparation of this civil engineering report.

- AS/NZS 3500.3: 2018 2021 Plumbing and drainage, Part 3: Stormwater drainage
- Australian Rainfall & Runoff: Volumes 1 & 2, 2019
- Managing Urban Stormwater - Soils and Construction Vol. 1 (4th edition 2004, Landcom)
- Ku-ring-gai Council Development Control Plan, 2024
- Ku-ring-gai Council Technical Guideline for Water Management, 2023

# 2 Stormwater Management

## 2.1 EXISTING STORMWATER DRAINAGE

In the current condition stormwater runoff from the site is collected by roof drainage or surface inlet pits and is discharged via kerb outlets to the kerb & gutter in Tryon Road and Tryon Lane. In larger rainfall events, runoff travels across the paved and landscaped surfaces towards the Tryon Road and Tryon Lane road reserves. All runoff from the site is then intercepted by kerb inlet pits in Nelson Road, Tryon Lane and Milray Street as shown in Figure 3.


**Figure 3 - Site Analysis Diagram**

## 2.2 STORMWATER PLANNING CONTROLS

Planning controls for stormwater discharge from the development is provided in Part 24C of Council's DCP and Council's Technical Guideline for Water Management. The Site Storage Requirement (SSR) and Permissible Site Discharge (PSD) is calculated by site area using a predetermined rate depending on the receiving stormwater system. The site falls within the Gordon Creek catchment area 'GC1' as per the maps provided in Section 4.2 of the Technical Guidelines. This then corresponds to a rate to calculate the PSD and minimum SSR as summarised in the table below.

**Table 1: Council PSD and SSR Requirements**

| | Permissible Site Discharge | | Minimum Site Storage Requirement | |
|---|---|---|---|---|
| **Site Area (ha)** | **DCP Rate (L/sec/ha)** | **Design PSD (L/sec)** | **Rate ($m^3$/ha)** | **Design SSR ($m^3$/ha)** |
| 0.3011 | 128 | 39 | 336 | 102 |

## 2.3 STORMWATER QUANTITY

Although Council have provided a streamlined design methodology for determining the site discharge, the rate is based on a proposed development is only 60% impervious, typical for a single dwelling development. Deep soil and landscape planting will provide pervious areas as part of the development, however the total of roof and pavement areas take up more than 60% of the site area compared to a typical residential development.

To ensure the proposed development is able to comply with the Council's controls, a drainage model using the simulation programme DRAINS using an ILSAX hydrological model was created to calculate post-development flows from the site. Refer to Figure 4 for the post development stormwater catchment plan used for the DRAINS analysis. It is noted that a reduction in SSR of up to 10% can be achieved by including a rainwater tank for water reuse. However, for the purpose of calculation storage in an undesirable scenario, it is assumed that rainwater tank would be completely full and overflow would continue directly into the OSD tank.

Due to competing site constraints the OSD tank will be located under the ground floor level along the Tryon Road frontage. The lowest part of the OSD tank will be designed to ensure there is sufficient vehicle headroom for the basement car park below in accordance with AS2890.6.

The design PSD of 39 L/sec is too high to discharge directly to the adjacent kerb and gutter. As such, a direct connection to Council's underground drainage system will be required. To achieve this, the outlet from the OSD tank will connect into a new kerb inlet pit at the site frontage on Tryon Road. From here, a new 375mm RCP pipe will run under the road pavement and connect into the existing kerb inlet pit in Nelson Street.


**Figure 4 – Post Development Catchment Plan**

The table below summarises the rainfall and runoff parameters set for the DRAINS analysis.

**Table 2: Rainfall and Runoff Parameters**

| | |
|---|---|
| **Rainfall Intensity – 1% AEP, 5min** | 266.4 mm/hr |
| **Rainfall Intensity – 5% AEP, 5min** | 199.2 mm/hr |
| **ILSAX - Impervious Area Storage** | 1 mm |
| **ILSAX – Pervious Area Storage** | 5 mm |

To determine the post development flow from the site, a trial on-site detention tank (OSD) was tested with the parameters as defined below.

**Table 3: Design OSD Tank Details**

| | |
|---|---|
| **Outlet Level** | RL 91.02 |
| **Overflow Weir Level** | RL 92.85 |
| **Outlet Orifice Size** | 120mm |
| **Effective Storage Volume** | 110m$^3$ |

Refer to Figure 5 showing the DRAINS model and to Figure 6 for the results during the major storm event (1% AEP).

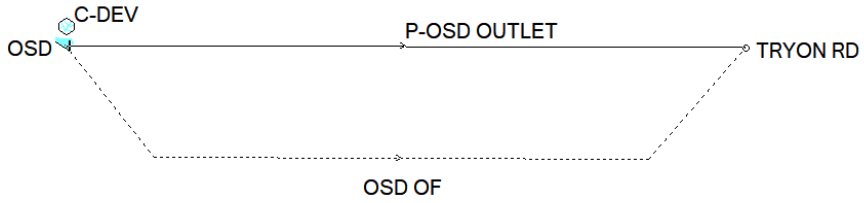


**Figure 5 - DRAINS model**

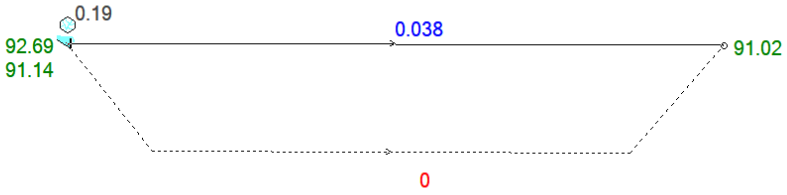


**Figure 6 - DRAINS model results for 1% AEP event**

The table below summarises the permissible site discharge rates for frequent events (50% AEP) up to the major design rainfall event (1% AEP). The table is able to demonstrate that the trial OSD tank is able to comply with Council's site storage requirement and permissible site discharge. Refer to Appendix B for DRAINS results spreadsheet.

**Table 4: DRAINS model results summary**

| Design Storm (AEP) | Post Dev. Flow (Undetained) (L/s) | Site Discharge (L/s) | OSD Tailwater Level (m AHD) |
|---|---|---|---|
| 50% | 72 | 29 | 92.06 |
| 20% | 99 | 32 | 92.24 |
| 5% | 139 | 34 | 92.43 |
| 1% | 190 | 38 | 92.69 |

## 2.4 STORMWATER QUALITY

Ku-ring-gai Council's DCP Part 24.6 outlines the pollutant reduction targets for proposed developments which can be achieved through a range of stormwater treatment options accepted by Council including drainage filters, green roofs, permeable paving, rainwater tank and water re-use. Refer to Table 2 below showing pollutant reduction targets.

**Table 5: Stormwater pollutant reduction targets**

| Pollutants | Reduction Target |
|---|---|
| Gross Pollutants (GP) | 70% |
| Total Suspended Solids (TSS) | 85% |
| Total Phosphorus (TP) | 65% |
| Total Nitrogen (TN) | 45% |

A detailed MUSIC model was developed using Ku-ring-gai Council's MUSIC link to assess a number of stormwater treatment options for the development prior to discharging into the Council stormwater system. Refer to drawing C200 from Appendix A for the water quality catchment plan. Treatment methodologies proposed include the following:

- 1 x Oceanguard Gross Pollutant Traps by Ocean Protect or similar approved
- 18.3m$^2$ water treatment chamber, integral to the detention tank with
    - 5 x 460mm high PSORB Stormfilter by Ocean Protect or similar approved

Refer to Figure 7 for MUSIC model layout and Table 6 for MUSIC link result summary. Appendix C shows the comprehensive MUSIC link report.

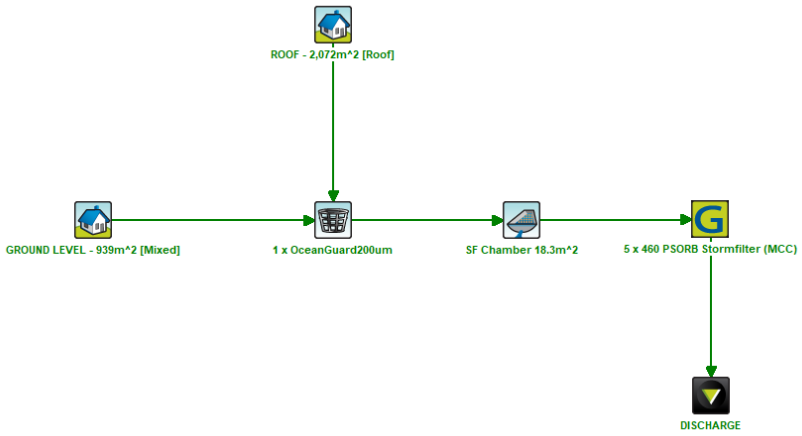


**Figure 7 - MUSIC model layout**

**Table 6 - MUSIC model result summary**

| Pollutants | Reduction Target | MUSIC Results |
|---|---|---|
| Gross Pollutants (GP) | 70% | 100.0% |
| Total Suspended Solids (TSS) | 85% | 85.0% |
| Total Phosphorus (TP) | 65% | 71.6% |
| Total Nitrogen (TN) | 45% | 51.9% |

# 3 Erosion and Sediment Control

All erosion and sediment control measures are to be in accordance with 'Managing Urban Stormwater: Soils and construction – Volume 1' (Landcom 4th edition, 1 March 2004) commonly known as the 'Blue Book'.

Erosion and sediment control devices and procedures will be put in place during construction to ensure that stormwater runoff will be collected and diverted around the disturbed site with sediments removed prior to discharge to the existing stormwater system. The proposed controls may include:

- Silt fences at the downstream boundary of the construction zone;
- Wash down and diversions at temporary vehicle entrances/exists to the construction zone;
- Sedimentation trap/basin with outlet control and overflow;
- Diversions to prevent upstream runoff entering the construction zone; and
- Sandbag sediment traps and geotextile filters to protect existing stormwater pits and inlets.

The erosion controls and sediment collection devices will need to be modified and adjusted by the contractor to suit building work stages and programme as it progresses. All erosion and sediment control measures will be constructed in accordance with "Managing Urban Stormwater – Soils & Construction Volume 1 2004 (Landcom)" and "Approved Methods for the Modelling and Assessment of air pollutants in NSW (EPA).

Erosion and sediment control measure for the proposed development have been provide on Drawing Sheets C100 and C101 from Appendix A.

# 4 Conclusions

The concept stormwater drainage system has been designed in accordance with relevant standards and Ku-ring-gai Council requirements. The design aims to convey all stormwater generated from the site to the existing kerb inlet pit in Nelson Road. An OSD Tank has been provided in the Lower Ground level to restrict flows from low to high storm events. A rainwater tank, pit filters and stormfilter cartridges all work together to treat stormwater prior to discharging into the Council network as per Ku-ring-gai Council's treatment targets. Therefore, SEARs requirement *11. Water Management* has been addressed except wastewater requirements which are to be addressed by others to meet wastewater and other Section 73 requirements.

I Duncan Marshall, confirm this Integrated Water Management Plan addresses the requirement of SEAR No. 11 and relevant State and local legislation, policies, and guidelines including Ku-ring-gai Council DCP. I further confirm that none of the information contained in the report is false or misleading.

Kind Regards,
Duncan Marshall

CIVIL GROUP LEADER & ASSOCIATE
BE (Civil)(Hons)

# APPENDIX A

**Civil Engineering Drawings**

# PROPOSED RESIDENTIAL DEVELOPMENT
# 27-29 TRYON ROAD, LINDFIELD
# CIVIL ENGINEERING PLANS


LOCALITY PLAN
SOURCE: NEAR MAPS - 03.09.2024
NOT TO SCALE

| DRAWING INDEX | |
|---|---|
| DRAWING No. | DRAWING TITLE |
| C000 | COVER SHEET |
| C001 | GENERAL NOTES - SHEET 1 |
| C100 | SEDIMENT & EROSION CONTROL PLAN |
| C101 | SEDIMENT & EROSION CONTROL DETAILS |
| C200 | CIVIL WORKS PLAN |
| C300 | WATER SENSITIVE URBAN DESIGN DETAILS - SHEET 1 |
| C400 | STORMWATER ON-SITE DETENTION TANK DETAILS - SHEET 1 |
| C401 | STORMWATER ON-SITE DETENTION TANK DETAILS - SHEET 2 |

BEFORE YOU DIG www.byda.com.au

PRINTING NOTE:
THIS DRAWING TO BE PRINTED IN COLOUR.

NOT TO BE USED FOR CONSTRUCTION

## DEVELOPMENT APPLICATION

| Rev | Description | Eng | Draft | Date |
|---|---|---|---|---|
| A | ISSUE FOR SSDA | AH | AH | 20.02.2025 |

Architect
PTW ARCHITECTS
GADIGAL COUNTRY
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SYDNEY, NSW, 2000

Client
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North

Project
PROPOSED RESIDENTIAL DEVELOPMENT
27-29 TRYON ROAD, LINDFIELD, NSW, 2070

Sheet Subject
COVER SHEET

| Scale at A1 | Drawn | Approved |
|---|---|---|
| N.T.S. | AH | FC |
| **Job No** | **Drawing No** | **Revision** |
| 240608 | C000 | A |

## GENERAL

1. ALL DIMENSIONS SHOWN ON THE DRAWINGS ARE IN MILLIMETERS AND ALL LEVELS ARE IN METRES (U.N.O.).
2. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANTS' DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ALL DISCREPANCIES SHALL BE REFERRED TO THE ARCHITECT AND ENGINEER BEFORE PROCEEDING WITH THE WORK.
3. DIMENSIONS SHALL NOT BE OBTAINED BY SCALING OF THESE DRAWINGS. USE FIGURED DIMENSIONS ONLY.
4. SETTING OUT DIMENSIONS AND LEVELS SHOWN ON THE DRAWINGS SHALL BE VERIFIED BY THE CONTRACTOR.
5. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CURRENT EDITIONS, INCLUDING AMENDMENTS OF THE RELEVANT STANDARDS AND CODES OF PRACTICE EXCEPT AS VARIED BY THE CONTRACT DOCUMENTS AND THE LAWS AND REQUIREMENTS OF THE STATUTORY AUTHORITIES.
6. ALL WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH ALL THE WORKCOVER REQUIREMENTS AND OCCUPATIONAL HEATH AND SAFETY ACT REGULATIONS
7. WHERE THE ENGINEERS ARE ENGAGED FOR INSPECTIONS AND/OR SUPERVISION A MINIMUM OF 24 HOURS NOTICE SHALL BE GIVEN.
8. DURING CONSTRUCTION, THE STRUCTURE SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVER-STRESSED. TEMPORARY STRUCTURES, FORMWORK, FALSEWORK, TEMPORARY BRACING, SHORING AND THE LIKE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
9. CONSTRUCTION USING THESE DRAWINGS SHALL NOT COMMENCE UNTIL A CONSTRUCTION CERTIFICATE IS ISSUED BY THE PRINCIPAL CERTIFYING AUTHORITY

## GROUND PREPARATION:

1. EXCAVATION AND GROUND PREPARATION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOLLOWING THE RECOMMENDATIONS OF THE GEOTECHNICAL REFERENCES AND ANY ADDITIONAL INSTRUCTIONS THAT MAY BE PROVIDED BY A GEOTECHNICAL ENGINEER DURING THE COURSE OF THE PROJECT.

## STORMWATER DRAINAGE

1. SELECTION AND INSTALLATION OF PITS, PIPES, TANKS AND TRENCHES SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF AS/NZS3500, LOCAL AND STATUTORY REQUIREMENTS (U.N.O.)
2. THE CONTRACTOR SHALL IDENTIFY AND LOCATE ALL SERVICES PRIOR TO COMMENCEMENT OF CONSTRUCTION.
3. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH ALL LOCAL AND STATUTORY REGULATIONS.
4. WHERE REQUIRED, STORMWATER EASEMENTS SHALL BE OBTAINED BY THE OWNER. ALL NEGOTIATIONS/COMPENSATION PAYMENTS AND THE INTEGRATION OF ANY EASEMENTS INTO THE TITLE DOCUMENTS SHALL BE BY THE OWNER UNLESS AGREED OTHERWISE.
5. REFER TO ARCHITECT FOR BUILDING AND DRIVEWAY SETOUT.
6. PIPE POSITIONS ARE INDICATIVE ONLY. FINAL POSITIONS TO BE DETERMINED ON-SITE AND SHALL CONFORM WITH THE INTENT OF THE DESIGN.
7. THE ENGINEER SHALL BE ADVISED IF ANY EXISTING STRUCTURES ARE WITHIN THE ZONE OF INFLUENCE OF AN EXCAVATION. ANY REQUIRED UNDER-PINNING OR PIERING SHALL BE PROVIDED.
8. WHERE EXCAVATING ADJACENT TO BOUNDARIES, ADEQUATE SHORING SHALL BE PROVIDED.
9. THE CONTRACTOR SHALL ENSURE THAT ALL NEW STRUCTURES ARE FOUNDED BELOW THE ZONE OF INFLUENCE OF ANY EXCAVATIONS WHETHER THEY BE FOR PIPELINES, TANKS OR OTHER DRAINAGE FACILITIES.
10. UNLESS NOTED OTHERWISE, THE MAXIMUM DEVIATION FROM NOMINATED LEVELS SHALL BE ±10mm, EXCEPT IN INSTANCES WHERE SUCH A DEVIATION COULD HAVE ADVERSE EFFECTS, IN WHICH CASE THE ENGINEER SHALL BE CONSULTED.
11. LOAD CLASS FOR COVERS/GRATES SHALL BE IN ACCORDANCE WITH AS3996 - 2019. COMMON CASES ARE SUMMARISED IN THE FOLLOWING TABLE:-

| CLASS | LOADING | DESCRIPTION |
|---|---|---|
| A | 10kn | INACCESSIBLE TO VEHICLES, PEDESTRIAN TRAFFIC ONLY |
| B | 80kn | FOR USE ON FOOTWAYS WHERE IT IS POSSIBLE FOR LIGHT VEHICLES OR LIVESTOCK TO USE THE PEDESTRIAN FACILITY |
| C | 150kn | FOR USE IN PEDESTRIAN ACCESS INCLUDING OCCASIONAL MOTOR VEHICLES WITH WHEEL LOADS NOT EXCEEDING 3.7 TONNES OR FOR USE IN MINOR RESIDENTIAL ROADS & CUL-DE-SACS CARRYING SLOW MOVING COMMERCIAL VEHICLES (GENERATING NO IMPACT LOADING) WHERE WHEEL LOADS WILL NOT EXCEED 7.5 TONNES |
| D | 210kn | FOR USE IN CARRIAGEWAYS OF ROADS WHICH CARRY FAST MOVING HEAVY VEHICLES WITH WHEEL LOADS NOT EXCEEDING 5.2 TONNES OR FOR USE IN AREAS TRAFFICKED BY SLOW MOVING HEAVY VEHICLES WITH WHEEL LOADS NOT EXCEEDING 10.5 TONNES |

13. UNTIL COMPLETION OF ALL WORKS, THE CONTRACTOR SHALL FIRSTLY FILTER ALL STORMWATER IN ACCORDANCE WITH APPROVED DETAILS TO ENSURE THE REMOVAL OF ALL CONCRETE AND PLASTERING FINES, AND OTHER BUILDING SITE POLLUTANTS.
14. THE CONTRACTOR SHALL SEEK DIRECTION BEFORE COMMENCING ANY EXCAVATION THAT MAY RESULT IN DAMAGE TO ANY EXISTING TREES.
15. RETAINING STRUCTURES SHALL BE PROVIDED AS REQUIRED IN ORDER TO ACHIEVE THE LEVELS NOMINATED ON THE DRAWINGS. THESE STRUCTURES SHALL COMPLY WITH ALL LOCAL AND STATUTORY REGULATIONS, AND MAY REQUIRE DESIGN BY AN ENGINEER.
16. UNLESS NOTED OTHERWISE, WHERE A PIT INVERT IS BELOW THE INVERT OF THE LOWEST OUTLET PIPE, THE CONTRACTOR SHALL EITHER PROVIDE DRAINAGE HOLES IN THE BASE OF THE PIT OR ELSE FILL THE BASE OF THE PIT WITH MASS CONCRETE TO THE INVERT OF THE LOWEST OUTLET PIPE.
17. WHERE REQUIRED BY REGULATIONS, STEP IRONS IN ACCORDANCE WITH AS1657 SHALL BE INSTALLED IN DEEP PITS/TANKS TO ALLOW ACCESS FOR MAINTENANCE. PIT COVERS OVER DEEP PITS SHALL BE 'CHILD-PROOFED' BY BOLTING THEM DOWN, EXCEPT WHERE THE COVER WEIGHS OVER 30kg.
18. ALL IMPERVIOUS SURFACES SHALL BE GRADED SUCH THAT THEY ARE FREE DRAINING.
19. YARD PITS SHALL BE PROVIDED AS REQUIRED. YARDS SHALL BE GRADED TO FALL TO PITS UNLESS INDICATED OTHERWISE (eg. BY DESIGN CONTOURS, SPOT LEVELS OR A NOTE).

## STORMWATER DRAINAGE CONTINUED

20. WHERE REQUIRED BY THE PRINCIPAL CERTIFIER, WORK-AS-EXECUTED DETAILS SHALL BE PREPARED BY A REGISTERED SURVEYOR/CHARTERED PROFESSIONAL ENGINEER VERIFYING THAT THE DRAINAGE SYSTEM HAS BEEN CONSTRUCTED IN ACCORDANCE WITH THE DRAWINGS. ANY DEVIATIONS FROM THE APPROVED PLANS SHALL BE NOTED AND BROUGHT TO THE ATTENTION OF THE ENGINEER. ADEQUATE INSPECTIONS SHOULD BE CARRIED OUT DURING THE COURSE OF CONSTRUCTION.
21. WHERE AN ENGINEER'S CERTIFICATE WILL BE REQUIRED, THE ENGINEER SHALL BE CALLED ON TO INSPECT THE WORKS PRIOR TO ANY CONCRETE POURS, PRIOR TO BACKFILLING AROUND ANY TANKS, AND AT THE COMPLETION OF WORKS. THE ENGINEER SHALL BE GIVEN A MINIMUM OF 24 HOURS NOTICE BEFORE AN INSPECTION IS REQUIRED.
22. ANY PROPOSED ALTERATIONS TO THE DETAILS SHOWN ON THE DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
23. LEAF SCREENS, SILT CONTROLS AND ANY OTHER POLLUTANT CONTROL DEVICES SHALL BE REGULARLY SERVICED TO ENSURE THAT THE DRAINAGE SYSTEM REMAINS UNBLOCKED AND OPERATES AS ORIGINALLY INTENDED.
24. OVERLAND FLOW PATHS SHALL BE REGULARLY MAINTAINED AND KEPT FREE OF OBSTRUCTIONS TO THE FLOW OF WATER.
25. SUBSOIL DRAINAGE LINES SHALL BE PROVIDED BEHIND RETAINING WALLS AND OTHER AREAS AS REQUIRED TO RELIEVE HYDROSTATIC PRESSURE AND DRAIN GROUND WATERS. CONNECT INTO THE DRAINAGE SYSTEM IN SUCH A WAY AS TO AVOID BACKFLOW OF STORMWATER INTO THE SUBSOIL DRAINAGE LINE. IF IN DOUBT REFER TO ENGINEER.
26. NEW FENCES, RETAINING WALLS AND OTHER LANDSCAPING ITEMS SHALL BE DETAILED IN SUCH A WAY SO AS TO AVOID IMPOUNDING OR DIVERTING SURFACE WATERS ON TO ADJOINING PROPERTIES.
27. UPON COMPLETION, PIPE/PIT EXCAVATIONS SHALL BE BACKFILLED WITH SUITABLE COMPACTED MATERIAL IN ACCORDANCE WITH NOTES BELOW.
28. ALL PVC PIPES ARE TO BE:-

a. SEWER GRADE (U.N.O.)

b. INSTALLED AND BACKFILLED IN ACCORDANCE WITH AS2566.1

29. ALL CONCRETE PIPES ARE TO BE:-

a. STRENGTH LOAD CLASS 4 (U.N.O.)

b. INSTALLED AND BACKFILLED IN ACCORDANCE WITH AS3725 WITH CLASS H2 BEDDING SUPPORT.

30. ALL PIPES ARE TO BE INSTALLED WITH 450mm MINIMUM COVER (U.N.O.). WHERE ADEQUATE COVER CANNOT BE PROVIDED PIPES SHALL BE ENCASED IN CONCRETE, REFER TO ENGINEER FOR DETAILS.
31. THE CONTRACTOR SHALL ADEQUATELY SHIELD PIPES AGAINST CONSTRUCTION AND PERMANENT LOADS.
32. PIPES HAVE BEEN DESIGNED TO WITHSTAND SM1600 TRAFFIC LOADING IN ACCORDANCE WITH AS5100

## EXISTING SERVICES

1. UTILITY INFORMATION SHOWN ON THE PLANS IS NOT INTENDED TO DEPICT MORE THAN THE PRESENCE OF ANY SERVICES. ACTUAL LOCATIONS SHOULD BE VERIFIED BY HAND EXCAVATION PRIOR TO CONSTRUCTION.
2. THE CONTRACTOR SHALL ALLOW FOR THE CAPPING OFF, EXCAVATION AND REMOVAL (IF REQUIRED) OF ALL EXISTING SERVICES IN AREAS AFFECTED BY THE WORKS.
3. THE CONTRACTOR SHALL ENSURE THAT SERVICES TO ALL BUILDINGS NOT AFFECTED BY THE WORKS ARE NOT DISRUPTED AT ALL TIMES. THE CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES TO MAINTAIN EXISTING SUPPLY TO BUILDINGS REMAINING WHERE REQUIRED. ONCE THE WORKS ARE COMPLETE AND COMMISSIONED THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD ALL DISTURBED AREAS.

## EROSION CONTROL

1. TEMPORARY PROTECTION FROM WIND AND WATER EROSION WILL BE UNDERTAKEN ON LANDS WHERE WORKS ARE UNLIKELY TO PROCEED FOR PERIODS OF AT LEAST TWO MONTHS AND FINAL SHAPING HAS NOT BEEN COMPLETED (eg. TOPSOIL STOCKPILES). THIS MAY BE ACHIEVED WITH A VEGETATIVE COVER. A RECOMMENDED LISTING OF PLANT SPECIES FOR TEMPORARY COVER IS AS FOLLOWS:-

SEPTEMBER - MARCH SOWING - JAPANESE MILLET @ 50 KG/HA

APRIL - AUGUST SOWING - OATS/RYECORN @ 50 KG/HA

- TETILA RYE @ 5 KG/HA

FOOT AND VEHICULAR TRAFFIC SHOULD BE KEPT AWAY FROM ANY REHABILITATED AREAS WHERE PRACTICAL.

2. DURING WINDY WEATHER, LARGE, UNPROTECTED AREAS ARE TO BE KEPT MOIST (NOT WET) BY SPRINKLING WITH WATER FOR DUST CONTROL.
3. FINAL SITE LANDSCAPING WILL BE UNDERTAKEN ON EACH PRECINCT/AREA AS SOON AS POSSIBLE AND WITHIN 20 WORKING DAYS FROM COMPLETION OF CONSTRUCTION ACTIVITIES.

## LAND DISTURBANCE

1. THE SOIL EROSION HAZARD ON THE SITE WILL BE KEPT AS LOW AS POSSIBLE AND PRACTICAL. TO THIS END, WORKS IS TO BE UNDERTAKEN IN THE FOLLOWING GENERAL SEQUENCE:-
   a) CONSTRUCTION OF SEDIMENT AND EROSION CONTROLS PRIOR TO ANY WORK COMMENCING.
   b) REHABILITATION OF ANY DISTURBED LANDS WITHIN 20 WORKING DAYS.
   c) UNDERTAKE SITE DEVELOPMENT WORKS IN ACCORDANCE WITH THE ENGINEERING PLANS. WHERE POSSIBLE, PHASE DEVELOPMENT SO THAT LAND DISTURBANCE IS CONFINED TO AREAS OF WORKABLE SIZE.
2. THE SITE MANAGER (PRINCIPAL CONTRACTOR) IS TO INFORM ALL CONTRACTORS AND SUBCONTRACTORS OF THEIR OBLIGATIONS UNDER THE EROSION AND SEDIMENT CONTROL PLAN.
3. TOPSOIL FROM ALL AREAS THAT WILL BE DISTURBED IS TO BE STRIPPED AND STOCKPILED AT THE NOMINATED LOCATION.
4. CUT AND FILL BATTER GRADIENTS TO BE 1 VERTICAL (MAX) : 2 HORIZONTAL (MIN).

## INSPECTION AND MAINTENANCE:

1. THE SITE MANAGER (PRINCIPAL CONTRACTOR) WILL ENSURE THAT ALL SEDIMENT AND EROSION CONTROL WORKS ARE LOCATED AS INSTRUCTED IN THIS SPECIFICATION OR IN ANY SUBSEQUENT SITE INSTRUCTION
2. ALL BUILDERS AND SUB-CONTRACTORS SHALL BE INFORMED OF THEIR RESPONSIBILITIES BY THE SITE MANAGER (PRINCIPAL CONTRACTOR) IN MINIMISING THE POTENTIAL FOR SOIL EROSION AND POLLUTION TO DOWNSLOPE LANDS AND WATERWAYS.
3. RECEPTORS FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER ARE TO BE EMPTIED AS NECESSARY. DISPOSAL OF WASTE SHALL BE IN A MANNER APPROVED BY THE SITE SUPERINTENDENT AND GENERALLY OFF SITE.
4. AT LEAST WEEKLY, THE CONTRACTOR SHALL INSPECT THE SITE AND ENSURE THAT:-
   a) DRAINS OPERATE EFFECTIVELY AND INITIATE REPAIR OR MAINTENANCE AS REQUIRED.
   b) SPILLED SOIL (OR OTHER MATERIAL) IS REMOVED FROM HAZARD AREAS, INCLUDING LIKELY AREAS OF CONCENTRATED OR HIGH VELOCITY FLOWS SUCH AS WATERWAYS, GUTTERS, PAVED AREAS AND DRIVEWAYS.
   c) SEDIMENT IS REMOVED FROM BASINS AND/OR TRAPS WHEN LESS THAN 20m OF TRAPPING CAPACITY REMAIN PER 1000m OF DISTURBED LANDS, AND/OR LESS THAN 500mm DEPTH REMAINS IN THE SETTLING ZONE. ANY COLLECTED SEDIMENT WILL BE DISPOSED IN AREAS WHERE FURTHER POLLUTION TO DOWNSLOPE LANDS AND WATERWAYS IS UNLIKELY.
   d) REHABILITATED LANDS HAVE EFFECTIVELY REDUCED THE EROSION HAZARD AND INITIATE UPGRADING OR REPAIRS AS APPROPRIATE.
5. THE CONTRACTOR SHALL PROVIDE A DETAILED 'LOG BOOK' RECORDING INFORMATION & DATA WITH RESPECT TO THE SEDIMENT & EROSION CONTROL PLAN AND TO ENSURE SEDIMENT CONTROL DEVICES ARE FUNCTIONING PROPERLY. THIS IS TO BE KEPT ON SITE AT ALL TIMES AND UPDATED DAILY. INFORMATION RECORDED MUST INCLUDE:-
   a) RAINFALL EVENTS
   b) RAINFALL IN MILLIMETRES
   c) RESULTS OF ANY INSPECTIONS

## SEDIMENT CONTROL

1. THE ARRANGEMENT OF SEDIMENT CONTROL MEASURES SHOWN ON THE PLAN ARE INDICATIVE ONLY AND RELATE TO A PARTICULAR STAGE OF THE CONSTRUCTION WORKS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DESIGN, CONSTRUCT AND MAINTAIN ANY ADDITIONAL MEASURES THAT MAY BE REQUIRED FOR THE CONTRACTOR'S CONSTRUCTION METHODOLOGIES, IN ORDER TO MEET ALL CONDITIONS AND REQUIREMENTS IMPOSED BY ANY STATUTORY AUTHORITY.
2. ALL SEDIMENT CONTROL MEASURES ARE TO BE INSTALLED PRIOR TO ANY SITE DISTURBANCE.
3. STOCKPILES ARE NOT TO BE LOCATED WITHIN 2m OF HAZARD AREAS, INCLUDING LIKELY AREAS OF CONCENTRATED OR HIGH VELOCITY FLOWS SUCH AS WATERWAYS, PAVED AREAS AND DRIVEWAYS. WHERE THEY ARE BETWEEN 2m AND 5m FROM SUCH AREAS, SPECIAL SEDIMENT CONTROL MEASURES SHOULD BE TAKEN TO MINIMISE POSSIBLE POLLUTION OF DOWNSLOPE WATERWAYS (eg. THROUGH INSTALLATION OF SEDIMENT FENCING).
4. WATER IS TO BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS THE CATCHMENT AREA HAS BEEN PERMANENTLY LANDSCAPED AND/OR ANY LIKELY SEDIMENT HAS BEEN FILTERED THROUGH AN APPROVED STRUCTURE.
5. CONSTRUCT SEDIMENT FENCE AS CLOSE AS POSSIBLE TO PARALLEL TO THE CONTOURS OF THE SITE.
6. A STRIP OF TURF 600mm WIDE IS TO BE PLACED IMMEDIATELY BEHIND THE KERB ON ALL NEW ROADS TO ACT AS A FILTER TRAP.
7. ALL EXPOSED FILL AREAS ARE TO BE LEFT WITH A LIP AT THE TOP OF THE SLOPE AT THE END OF EACH DAYS OPERATION.
8. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND MULCHED WITHIN 10 DAYS OF COMPLETION OF FORMATION.
9. ANY SAND USED IN THE CONCRETE CURING PROCESS (SPREAD OVER THE SURFACE) IS TO BE REMOVED AS SOON AS POSSIBLE AND WITHIN 10 WORKING DAYS AFTER PLACEMENT.
10. TEMPORARY SEDIMENT AND EROSION CONTROL STRUCTURES ARE TO BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE REHABILITATED AND WHEN REMOVAL IS APPROVED BY THE SITE SUPERINTENDENT.

## UTILITIES

1. LOCATE ALL PIPES, DUCTS, CABLES, RETAINING WALLS AND EXCAVATIONS OUTSIDE A 1:2 (VERTICAL:HORIZONTAL) ZONE OF INFLUENCE FROM THE BOTTOM EDGE OF THE FOOTING.
2. THE CONTRACTOR MUST TAKE EVERY PRECAUTION TO PROTECT EXISTING GAS, WATER, STORMWATER, SEWERAGE, ELECTRICITY, TELEPHONE CONDUITS AND OTHER EXISTING WORKS AND SERVICES.
3. CIVIL WORKS REQUIRED TO PROTECT EXISTING SERVICES IS TO BE AT THE FULL COST OF THE CONTRACTOR.

## PAVEMENTS

1. WHERE NEW WORKS ARE TO MATCH EXISTING, THE LEVELS GIVEN ARE APPROXIMATE ONLY. ALL NEW WORKS MUST NEATLY JOIN IN WITH EXISTING LEVELS.
2. PRIOR TO THE CONSTRUCTION OF NEW ROAD PAVEMENTS, THE SUBGRADE CBR SHALL BE CONFIRMED.
3. ADJUST SERVICE COVERS AS NECESSARY TO SUIT PROPOSED LEVELS PROVIDED ON ENGINEERING DRAWINGS.
4. ALL JUNCTIONS BETWEEN NEW AND EXISTING PAVEMENT/KERB AND GUTTER WORKS SHALL BE NEATLY SAW CUT.

## EARTHWORKS

1. ALL TREES AND SHRUBS (UNLESS NOTED TO BE PROTECTED ON THE LANDSCAPE PLANS), RUBBLE, EXISTING PAVEMENT AND EXISTING STRUCTURES WITHIN THE SITE SHALL BE REMOVED AND REUSED OR RECYCLED WHERE POSSIBLE. WHERE NOT POSSIBLE, THIS MATERIAL SHALL BE REMOVED FROM SITE AND DISPOSED OF AS PART OF THE CONTRACT.
2. ANY TREES WITHIN THE WORKS AREA WHICH, IN THE OPINION OF THE CONTRACT ADMINISTRATOR, ARE UNSOUND OR WOULD CONSTITUTE A DANGER, SHALL BE CUT DOWN AND REMOVED (EXCEPT THOSE IDENTIFIED AS BEING PROTECTED). ALL STUMPS OF TREES CUT DOWN WITHIN THE BOUNDS OF THE CONSTRUCTION AREA WHICH ARE LARGER THAN 250mm IN GIRTH, SHALL BE COMPLETELY REMOVED.
3. ALL ROOTS SHALL BE REMOVED FOR A DEPTH OF 1m. CAVITIES FORMED BY THE REMOVAL OF ROOTS SHALL BE BACKFILLED AND COMPACTED.
4. AFTER CLEARING AND GRUBBING ARE COMPLETE, THE CONTRACTOR SHALL STRIP AND STOCKPILE TOPSOIL FROM THE CLEARED AREA (INCLUDING AREAS THAT HAVE BEEN CLEARED AND GRUBBED). REMOVAL OF TOPSOIL FROM ANY SECTION OF THE WORKS SHALL ONLY COMMENCE AFTER SEDIMENT AND EROSION CONTROLS HAVE BEEN IMPLEMENTED.
5. TOPSOIL SHALL BE STRIPPED FROM WITHIN THE FORMATION AREAS OF ROADS, PATHWAYS, BUILDING PADS AND MISCELLANEOUS PAVEMENTS, INCLUSIVE OF BATTERS, AND IS TO BE CONSERVED FOR THE TOP-DRESSING OF FORMED FOOTWAYS, BERMS AND BATTERS TO THE SPECIFIED DEPTH, OR WHERE NO DEPTH IS SPECIFIED TO A MINIMUM DEPTH OF 150mm, OR AS DETERMINED ON-SITE.
6. EXCAVATED FILL MATERIAL NOT SUITABLE FOR REUSE ON-SITE MUST BE REMOVED OFF-SITE OR OTHERWISE USED IN LANDSCAPING AREAS WHERE AGREED IN ADVANCE WITH ENGINEER.
7. EROSION AND SEDIMENT CONTROL MUST BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL CITY COUNCIL DCP, DA AND CC CONDITIONS, AND BE INSTALLED TO THE SATISFACTION OF THE ENGINEER.
8. THE CONTRACTOR SHALL TAKE ALL NECESSARY STEPS TO LIMIT THE CREATION OF DUST NUISANCE, WHICH MIGHT ARISE DURING THE EXECUTION OF THE WORKS.
9. FILL MATERIAL MUST BE PLACED IN MAXIMUM LAYERS OF 200mm (LOOSE) AND COMPACTED TO THE LEVELS AS SPECIFIED ON THE DRAWINGS.
10. COMPACTED FILL MUST BE TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF AS3798 AND AS GIVEN IN THE CIVIL SPECIFICATION.
11. THE DESIGN CONTOURS AND LEVELS SHOWN ON THE EARTHWORKS DRAWINGS ARE THE FINISHED SURFACE LEVELS UNLESS NOTED OTHERWISE.
12. THE CONTRACTOR SHALL PROOF ROLL THE PREPARED SUBGRADE AND EXCAVATED SURFACES IN THE PRESENCE OF THE CONTRACT ADMINISTRATOR. PROOF ROLLING SHALL COMPRISE 6 PASSES OF A MINIMUM 12 TONNE DEADWEIGHT ROLLER. THE FINAL PASS IS TO BE WITNESSED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER. THERE SHALL BE NO VISIBLE DEFLECTION OF THE SURFACE BEING PROOF ROLLED.

## KERBING

1. ALL KERBS, GUTTERS, DISH DRAINS AND CROSSINGS TO BE CONSTRUCTED ON MINIMUM 75mm GRANULAR BASECOURSE COMPACTED TO MINIMUM 98% MODIFIED MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS1289 5.2.1.
2. EXPANSION JOINTS (EJ) TO BE FORMED FROM 10mm COMPRESSIBLE CORK FILLER BOARD FOR FULL DEPTH OF THE SECTION AND CUT TO PROFILE. EXPANSION JOINTS TO BE LOCATED AT DRAINAGE PITS, ON TANGENT POINTS OF CURVES AND ELSEWHERE AT 12m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE EXPANSION JOINTS ARE TO MATCH THE JOINT LOCATIONS IN SLABS.
3. WEAKENED PLANE JOINTS TO BE MINIMUM 3mm WIDE AND LOCATED AT 3m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE WEAKENED PLANE JOINTS ARE TO MATCH THE JOINT LOCATIONS IN SLABS.
4. PROVIDE BROOM FINISH TO ALL RAMPS AND VEHICULAR CROSSINGS. ALL OTHER KERBS OR DISH DRAINS TO BE STEEL FLOAT FINISHED.
5. WHERE REPLACEMENT OF EXISTING KERBING IS REQUIRED, ROAD PAVEMENT IS TO BE SAWCUT 900mm FROM LIP OF GUTTER. UPON COMPLETION OF NEW KERBS, NEW BASECOURSE AND SURFACE IS TO BE LAID 900mm WIDE. MAKE GOOD ANY DAMAGE TO SURROUNDING KERBING OR PAVEMENT. EXISTING KERBS ARE TO BE COMPLETELY REMOVED WHERE NEW KERBS ARE SHOWN.

## LINE MARKING

1. CAR PARK LINE MARKING TO BE IN ACCORDANCE WITH RTA SPEC R141 AND AS1742.2.
2. MARKING TO BE WATER BOURNE PAINT 300 MICRON DRY FILM THICKNESS.
3. CAR PARK BAY LINE TO BE 100mm WIDE CONTINUOUS WHITE ARROWS.

3.1. LENGTH AND SHAPE AS PER STANDARDS.

## REINFORCEMENT:

1. FIX REINFORCEMENT AS SHOWN ON THE DRAWINGS. THE TYPE AND GRADE IS INDICATED BY THE SYMBOL AS SHOWN BELOW ON THE DRAWINGS. THIS IS FOLLOWED BY A NUMERAL WHICH INDICATES A SIZE IN MILLIMETRES OF THE REINFORCEMENT.

   N - HOT-ROLLED DEFORMED BAR (GRADE D500N)

   R - PLAIN ROUND BAR (GRADE R250N)

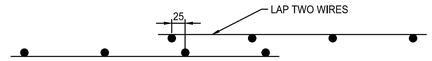
   SL - SQUARE MESH (GRADE 500L)

   RL - RECTANGULAR MESH (GRADE 500L)

2. PROVIDE BAR SUPPORTS OR SPACERS TO GIVE CONCRETE COVER TO ALL REINFORCEMENT.
3. WELDING OF REINFORCEMENT WILL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS.
4. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN THE POSITIONS SHOWN. THE WRITTEN APPROVAL OF THE ENGINEER SHALL BE OBTAINED FOR ANY OTHER SPLICES WHERE THE LAP LENGTH IS NOT SHOWN.
5. CLEAR CONCRETE COVER TO REINFORCEMENT IS AS FOLLOWS UNLESS SHOWN OTHERWISE ON THE DRAWINGS:

| ELEMENT | BOTTOM (mm) | SIDES (mm) | TOP (mm) |
|---|---|---|---|
| ALL (U.N.O.) | 40 | 40 | 40 |

6. COVER TO REINFORCEMENT ENDS TO BE 50mm (U.N.O.).
7. PROVIDE N12-450 SUPPORT BARS TO TOP REINFORCEMENT AS REQUIRED, LAP 450 (U.N.O.)
8. HOOKS, BENDS, SPLICES AND LAPS TO BE IN ACCORDANCE WITH AS3600.
9. AT SPLICES FABRIC SHALL BE LAPPED AS FOLLOWS:




10. LAPS IN REINFORCEMENT SHALL BE MADE ONLY WHERE SHOWN ON THE DRAWINGS UNLESS OTHERWISE APPROVED. LAP LENGTHS AS PER THE TABLE BELOW.

| TENSION LAPS | | | COMPRESSION LAPS |
|---|---|---|---|
| BAR SIZE | TOP BARS IN BANDS & BEAMS | ALL OTHER BARS | |
| N12 | 570 | 480 | 450 |
| N16 | 800 | 700 | 640 |
| N20 | 1150 | 950 | 800 |
| N24 | 1500 | 1250 | 960 |
| N28 | 1850 | 1500 | 1120 |
| N32 | 2250 | 1800 | 1280 |
| N36 | 2700 | 2100 | 1440 |

## CONCRETE:

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3600, CURRENT EDITION WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.
2. ALL CONCRETE TO BE MANUFACTURED AND SUPPLIED ACCORDING TO AS1379.
3. USE TYPE 'GP' CEMENT UNLESS OTHERWISE SPECIFIED.
4. CONCRETE QUALITY SHALL CONFORM TO THE FOLLOWING (U.N.O.):

| ELEMENT | SLUMP (mm) | MAX. SIZE AGGREGATE (mm) | STRENGTH (MPa) | SHRINKAGE STRAIN μ (MAX.) |
|---|---|---|---|---|
| EXTERNAL | 80 | 20 | S32MPa | 650 |
| FOOTPATH | 80 | 20 | S32MPa | 650 |
| BLOCKWORK COREFILLING | - | - | S32MPa | - |

5. ALL CONCRETE SHALL BE SUBJECT TO PROJECT ASSESSMENT AND TESTING TO AS1379.
6. CONSOLIDATE ALL CONCRETE BY MECHANICAL VIBRATION. CURE ALL CONCRETE SURFACES AS DIRECTED IN THE SPECIFICATION. (IF NO SPECIFICATION, IN ACCORDANCE WITH AS3600).
7. FOR ALL FALLS IN SLAB, DRIP GROOVES, REGLETS, CHAMFERS ETC REFER TO ARCHITECTS DRAWINGS AND SPECIFICATION.
8. NO HOLES OR CHASES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.
9. CONSTRUCTION JOINTS WHERE NOT SHOWN ON DRAWINGS SHALL BE LOCATED SUBJECT TO THE APPROVAL OF THE ENGINEER.
10. CONCRETE THICKNESSES SHOWN DO NOT INCLUDE THICKNESS OF APPLIED FINISHES.
11. BEAM DEPTHS ARE NOTED FIRST AND INCLUDE SLAB THICKNESSES, IF ANY.
12. FORMWORK: THE DESIGN, CERTIFICATION, CONSTRUCTION AND PERFORMANCE OF THE FORMWORK, FALSEWORK AND BACKPROPPING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE PROPOSED METHOD OF INSTALLATION AND REMOVAL OF FORMWORK IS TO BE SUBMITTED TO THE SUPERINTENDENT FOR COMMENT PRIOR TO WORK BEING CARRIED OUT.

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PRINTING NOTE:

THIS DRAWING TO BE PRINTED IN COLOUR.

NOT TO BE USED FOR CONSTRUCTION

# DEVELOPMENT APPLICATION

| Rev | Description | Eng | Draft | Date |
|---|---|---|---|---|
| A | ISSUE FOR SSDA | AH | AH | 20.02.2025 |


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North

Project
PROPOSED RESIDENTIAL DEVELOPMENT
27-29 TRYON ROAD, LINDFIELD, NSW, 2070

Sheet Subject
GENERAL NOTES - SHEET 1

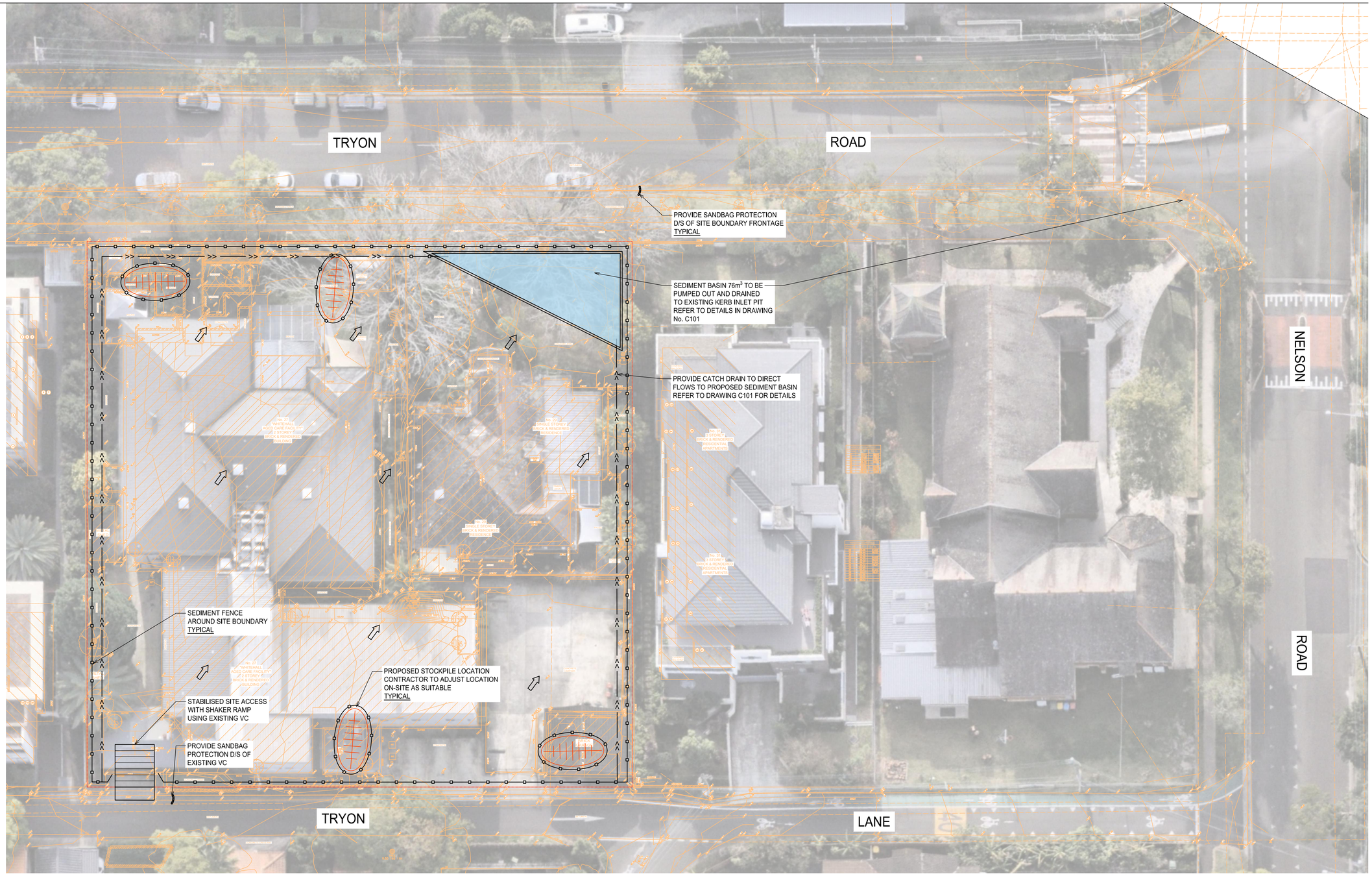
| Scale at A1 | Drawn | Approved |
|---|---|---|
| | AH | FC |
| **Job No** | **Drawing No** | **Revision** |
| 240608 | C001 | A |

## LEGEND

- SITE BOUNDARY
- SURVEY BY RYGATE, REV D & DATED 21/08/2024
- SEDIMENT FENCE
- TEMPORARY CATCH DRAIN
- FLOW DIRECTION
- SAND BAG
- PROPOSED STABILISED SITE ACCESS
- PROPOSED STOCKPILE LOCATION WITH SEDIMENT FENCE
- TEMPORARY SEDIMENT BASIN 76m$^3$

## NOTES:

1. ALL DIMENSIONS ARE IN m UNLESS NOTED OTHERWISE.
2. ALL REDUCED LEVELS ARE IN mAHD.
3. SURVEY INFORMATION OBTAINED FROM RYGATE SURVEYORS. REFER TO PLAN No. 80487-D.DWG, REV D & DATED 21/08/2024 BY RYGATE.
4. NO WORKS ARE TO OCCUR OUTSIDE THE SITE PROPERTY BOUNDARY UNLESS PRIOR APPROVAL IS PROVIDED BY COUNCIL.
5. REFER TO DRAWING C101 FOR EROSION & SEDIMENT CONTROL CONSTRUCTION SEQUENCE, GENERAL INSTRUCTIONS NOTES & TYPICAL DETAILS.
6. AERIAL IMAGE FOR CLARITY ONLY AND NOT TO SCALE




### SEDIMENT BASIN CALCULATION

| | | | |
|---|---|---|---|
| SOIL TYPE | D OR F | (ASSUMED) | |
| RAINFALL DEPTH = | 61.4 | mm | (2-YEAR ARI, 6 HOUR EVENT) |
| $C_V$ = | 0.7 | | (TABLE F2) |
| A = | 0.311 | ha | |
| $R_{X\%,5DAY}$ = | 23.4 | mm | (TABLE 6.3A) |
| SETTLING ZONE = 10 x $C_V$ x A x R = | 51 | m$^3$ | |
| SEDIMENT STORAGE ZONE = 50% OF SETTLING ZONE CAPACITY | 25 | m$^3$ | |
| TOTAL SEDIMENT BASIN VOLUME = | 76 | m$^3$ | |

PRINTING NOTE:

THIS DRAWING TO BE PRINTED IN COLOUR.

A1 0 2 4 6 8 10 12 14 16 18 20 1:200

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NOT TO BE USED FOR CONSTRUCTION

# DEVELOPMENT APPLICATION

| Rev | Description | Eng | Draft | Date |
|---|---|---|---|---|
| A | ISSUE FOR SSDA | AH | AH | 20.02.2025 |

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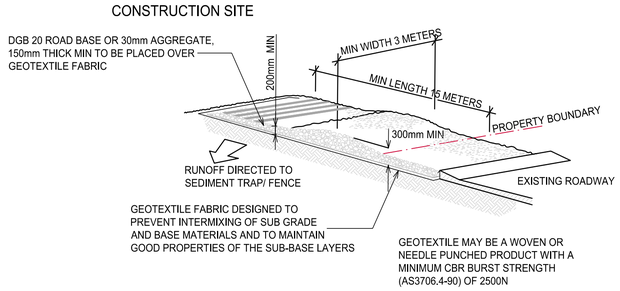
North

Project
PROPOSED RESIDENTIAL DEVELOPMENT
27-29 TRYON ROAD, LINDFIELD, NSW, 2070

Sheet Subject
SEDIMENT & EROSION CONTROL PLAN

| Scale at A1 | Drawn | Approved |
|---|---|---|
| 1:200 | AH | FC |
| **Job No** | **Drawing No** | **Revision** |
| 240608 | C100 | A |

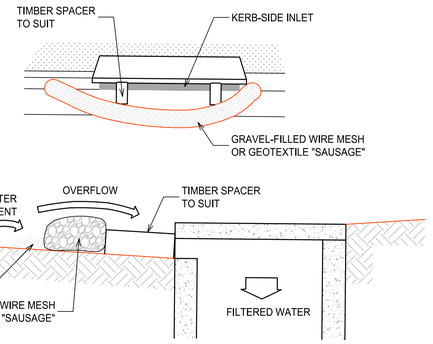



NOTES:

1. THIS DEVICE IS TO BE LOCATED AT ALL EXITS FROM CONSTRUCTION SITE.
2. THIS DEVICE IS TO BE REGULARLY CLEANED OF DEPOSITED MATERIAL SO AS TO MAINTAIN A 50mm DEEP SPACE BETWEEN PLANKS.
3. ANY UNSEALED ROAD BETWEEN THIS DEVICE AND NEAREST ROADWAY IS TO BE TOPPED WITH 100mm THICK 40-70mm SIZE AGGREGATE.
4. ALTERNATIVELY, THREE(3) PRECAST CONCRETE CATTLE GRIDS (AS MANUFACTURED BY "HUMES CONCRETE MAY BE USED. 1, 2 & 3 ABOVE ALSO APPLY.

## STABILISED SITE ACCESS WITH SHAKER RAMP

SCALE N.T.S.

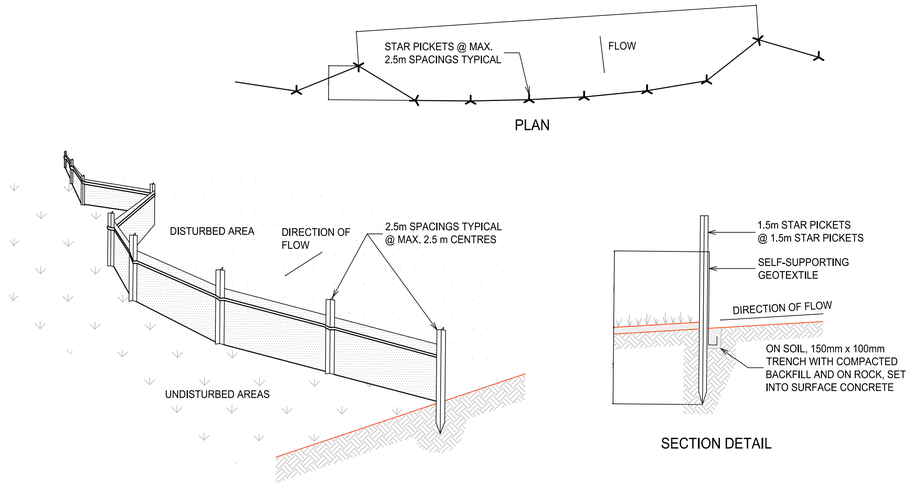



MESH & GRAVEL INLET FILTER CONSTRUCTION NOTES:

1. 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.
2. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH x 400mm WIDE.
3. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET. MAINTAIN THE OPENING WITH SPACER BLOCKS.
4. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE FILTER.
5. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY CAN FIRMLY ABUT EACH OTHER AND SEDIMENT / LADEN WATERS CANNOT PASS BETWEEN.

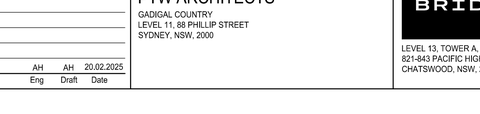
## MESH & GRAVEL INLET FILTER

SCALE N.T.S.




## SEDIMENT FENCE

SCALE N.T.S.




STOCKPILE CONSTRUCTION NOTES:

1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METRES IN HEIGHT.
4. WHERE THEY ARE TO BE PLACED FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED E.S.C.P. OR S.W.M.P. TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES 1 TO 2 METRES DOWNSLOPE.

## STOCKPILES

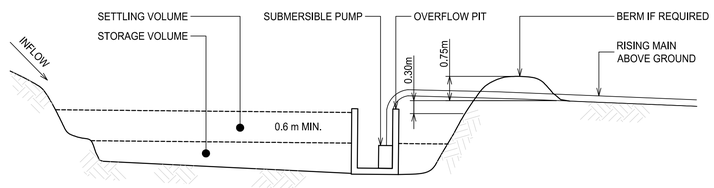
SCALE N.T.S.

NOTES:

1. PROVIDE THREE LAYERS OF SANDBAGS WITH THEIR ENDS OVERLAPPED AND ALSO OVERLAPPING ONTO THE KERB.
2. CREATE A GAP IN THE SANDBAGS TO ACT AS A SPILLWAY.
3. SANDBAG BARRIER TO BE MIN. 2m FROM THE INLET AND EXTEND MIN. 0.9m OUT FROM THE KERB.

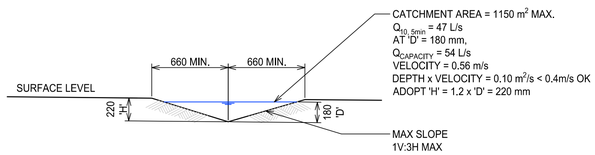

## GULLY INLET SANDBAG PROTECTION DETAIL

SCALE N.T.S.




## TYPICAL SEDIMENT BASIN

SCALE N.T.S.




## CATCH DRAIN TYPICAL SECTION

SCALE N.T.S

SEDIMENT FENCE CONSTRUCTION NOTES:

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 150 mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5 m LONG STAR PICKETS INTO GROUND @ 2.5 m INTERVALS (MAX.) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150 mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

CONSTRUCTION SEQUENCE:

WORKS SHALL BE UNDERTAKEN IN THE FOLLOWING SEQUENCE:

1. INSTALL SEDIMENT FENCING AND CUT DRAINS TO MEET THE REQUIREMENTS OF THE SEDIMENT AND EROSION CONTROL PLAN. WASTE COLLECTION BINS SHALL BE INSTALLED ADJACENT TO SITE OFFICE.
2. CONSTRUCT STABILISED SITE ACCESS IN ACCORDANCE WITH COUNCIL'S REQUIREMENTS.
3. REDIRECT CLEAN WATER AROUND THE CONSTRUCTION SITE.
4. INSTALL SEDIMENT CONTROL PROTECTION MEASURES AT ALL NATURAL AND MAN-MADE DRAINAGE STRUCTURES. MAINTAIN UNTIL ALL THE DISTURBED AREAS ARE STABILISED.
5. CLEAR AND STRIP THE WORK AREAS. MINIMISE THE DAMAGE TO THE GRASS AND LOW GROUND COVER OF NON-DISTURBED AREAS.
6. ANY DISTURBED AREAS, OTHER THAN BUILDING PAD AREAS, SHALL IMMEDIATELY BE COVERED WITH SITE TOPSOIL WITHIN 7 DAYS OF CLEARING. BUILDING PAD AREAS SHALL BE COVERED WITH BITUMEN EMULSION AS SPECIFIED.
7. APPLY PERMANENT STABILISATION TO SITE (LANDSCAPING).

GENERAL INSTRUCTIONS:

1. THIS SEDIMENT AND EROSION CONTROL WORKS FOR THE SITE SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF "MANAGING URBAN STORMWATER - SOILS AND CONSTRUCTION, 4TH EDITION (2004)" BY LANDCOM.
2. AS REQUIRED BY COUNCIL, SEDIMENT CONTROL MEASURES WILL BE REQUIRED DURING THE CONSTRUCTION OF ALL DEVELOPMENTS/BUILDING WORKS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY THAT THE WORKS ARE CARRIED OUT IN ACCORDANCE WITH THE SEDIMENT AND EROSION CONTROL PLAN AND COUNCIL'S REQUIREMENTS.
3. THE CONTRACTOR SHALL ENSURE THAT ALL SUBCONTRACTORS ARE INFORMED OF THEIR RESPONSIBILITIES IN MINIMISING THE POTENTIAL FOR SOIL EROSION AND POLLUTION TO DOWNSLOPE AREAS.
4. THE NON-DISTURBED PORTION OF THE CATCHMENT OUTSIDE OF OPERATING AREA IS TO BYPASS THE BASINS BY MEANS OF LINED CATCH DRAINS.
5. WHERE PRACTICABLE, THE SOIL EROSION HAZARD SHALL BE KEPT AS LOW AS POSSIBLE. LIMITATIONS TO ACCESS ARE TO BE VIA STANLEY LANE UNLESS OTHERWISE APPROVED BY COUNCIL.
6. ENSURE THAT ALL DRAINS ARE OPERATING EFFECTIVELY AND SHALL MAKE ANY NECESSARY REPAIRS. REMOVE TRAPPED SEDIMENT WHERE THE CAPACITY OF THE TRAPPING DEVICE FALLS BELOW 60%.
7. CONSTRUCT ADDITIONAL EROSION OR SEDIMENT CONTROL WORKS AS MAY BE APPROPRIATE TO ENSURE THE PROTECTION OF DOWNSLOPE LANDS AND WATERWAYS.
8. MAINTAIN EROSION AND SEDIMENT CONTROL MEASURES IN A FULLY FUNCTIONING CONDITION AT ALL TIMES UNTIL THE SITE IS REHABILITATED.
9. REMOVE TEMPORARY SOIL CONSERVATION STRUCTURES AS THE LAST ACTIVITY IN THE REHABILITATION PROGRAM.

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# DEVELOPMENT APPLICATION

| Rev | Description | Eng | Draft | Date |
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| A | ISSUE FOR SSDA | AH | AH | 20.02.2025 |

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GADIGAL COUNTRY
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CHATSWOOD, NSW, 2067

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Project
PROPOSED RESIDENTIAL DEVELOPMENT
27-29 TRYON ROAD, LINDFIELD, NSW, 2070

Sheet Subject
SEDIMENT & EROSION CONTROL DETAILS

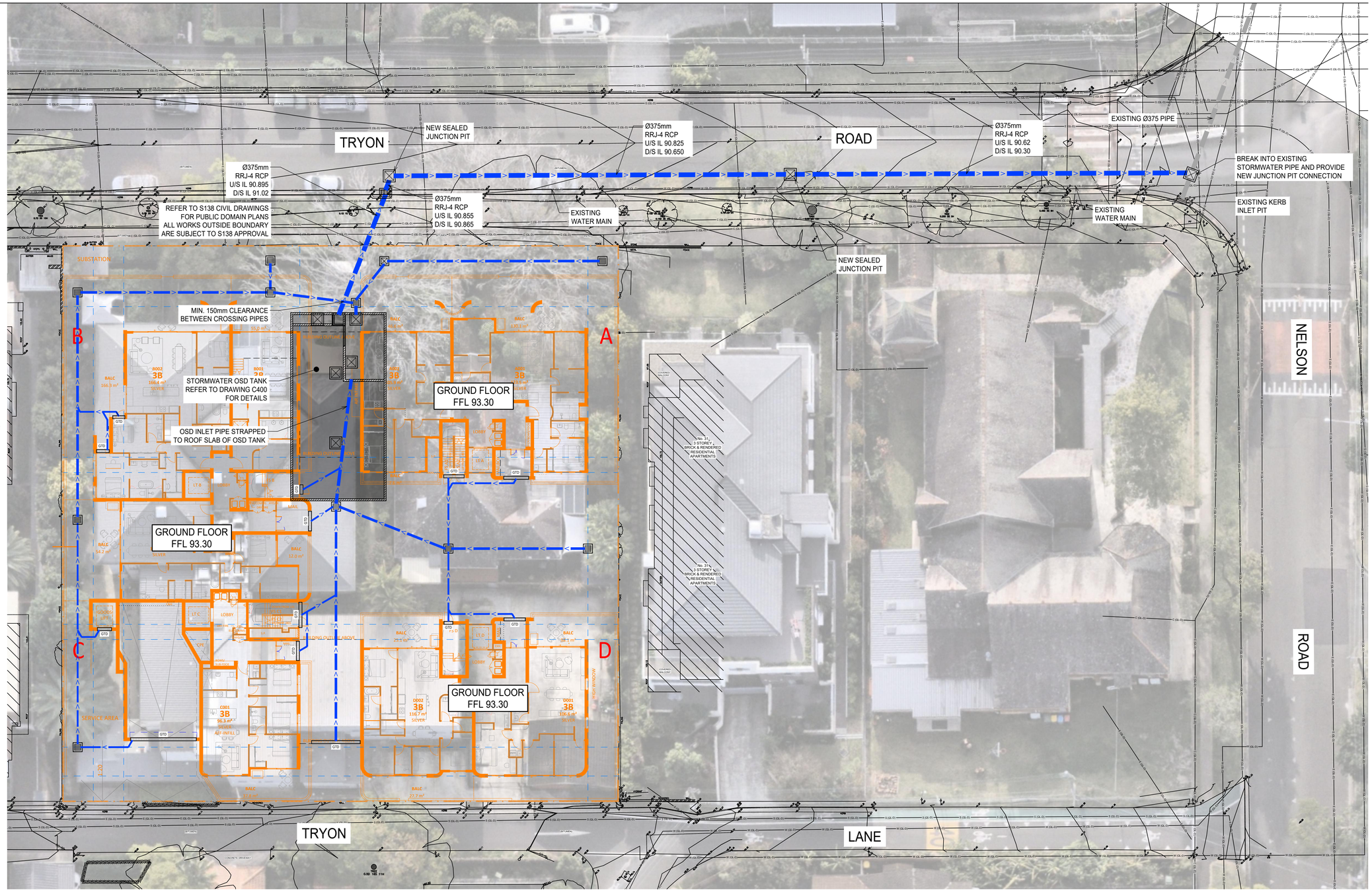
| Scale at A1 | Drawn | Approved |
|---|---|---|
| | AH | FC |
| **Job No** | **Drawing No** | **Revision** |
| 240608 | C101 | A |

## LEGEND

- SITE BOUNDARY
- ARCHITECT LAYOUT. REFER TO PLANS PREPARED BY PTW
- SURVEY. REFER TO DRAWINGS BY RYGATE, REV D, DATED 21/08/2024
- RETAINING WALL
- RL X.XX — PROPOSED LEVELS
- V — VALLEY LINE
- OVERLAND FLOW
- FW — FLOOR WASTE
- PD — PLANTER DRAIN
- ACCESS MANHOLE WITH SOLID COVER
- ACCESS MANHOLE WITH HEEL SAFE GRATED COVER
- GTD — HEEL SAFE GRATED TRENCH DRAIN
- PROPOSED MIN. Ø150mm uPVC STORMWATER PIPE @ MIN. 1% GRADE UNO.
- SS — PROPOSED SUBSOIL DRAINAGE LINE @ MIN. 1% GRADE UNO.
- RM — RISING MAIN REFER TO HYDRAULIC PLANS FOR DETAILS
- PROPOSED STORMWATER PIPE BY HYDRAULIC ENGINEER REFER TO HYDRAULIC PLANS FOR DETAILS
- GTD — GRATED TRENCH DRAIN BY HYDRAULIC ENGINEER REFER TO HYDRAULIC DRAWINGS FOR DETAILS

## NOTES:

1. ALL DIMENSIONS ARE IN m U.N.O.
2. ALL REDUCED LEVELS ARE IN mAHD.
3. SURVEY INFORMATION OBTAINED FROM RYGATE SURVEYORS. REFER TO PLAN No. 80487-D.DWG, REV D & DATED 21/08/2024 BY RYGATE.
4. NO WORKS ARE TO OCCUR OUTSIDE THE SITE PROPERTY BOUNDARY UNLESS PRIOR APPROVAL IS PROVIDED BY COUNCIL.
5. ALL PIPES ARE MIN. Ø150mm uPVC SEWER GRADE U.N.O.
6. ALL PIPES TO HAVE MINIMUM 1% GRADE U.N.O.
7. AERIAL IMAGE FOR CLARITY ONLY AND NOT TO SCALE

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# DEVELOPMENT APPLICATION

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A1 0 2 4 6 8 10 12 14 16 18 20 1:200

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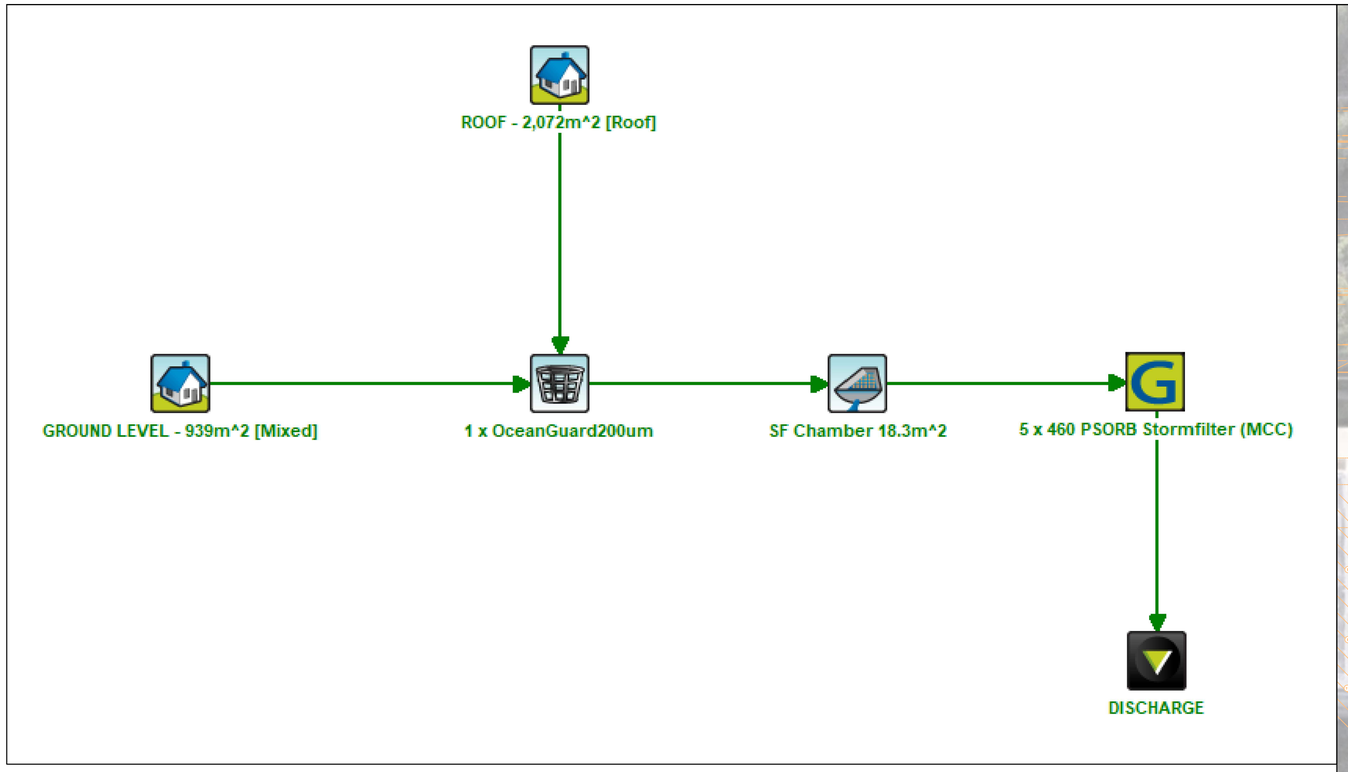
Project
PROPOSED RESIDENTIAL DEVELOPMENT
27-29 TRYON ROAD, LINDFIELD, NSW, 2070

Sheet Subject
CIVIL WORKS PLAN

| Scale at A1 | Drawn | Approved |
|---|---|---|
| 1:200 | AH | FC |
| **Job No** | **Drawing No** | **Revision** |
| 240608 | C200 | A |




STORMWATER MUSIC MODEL
SCALE N.T.S.


WSUD CATCHMENT PLAN
SCALE 1:200

## LEGEND

- SITE BOUNDARY
- SURVEY BY RYGATE, REV D & DATED 21/08/2024
- ARCHITECTURAL LAYOUT BY PTW, REV B, DATED 10/02/2025
- ROOF AREA
- LANDSCAPING AREA

**STORMWATER QUALITY - MUSIC MODEL RESULT SUMMARY**

| POLLUTANT TYPES | REDUCTION TARGETS (%) | REDUCTION TARGET ACHIEVED (%) |
|---|---|---|
| TOTAL SUSPENDED SOLIDS (TSS) | 85.0 | 85.0 |
| TOTAL PHOSPHORUS (TP) | 65.0 | 71.6 |
| TOTAL NITROGEN (TN) | 45.0 | 51.9 |
| GROSS POLLUTANTS (GP) | 70.0 | 100.0 |

## NOTES:

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# DEVELOPMENT APPLICATION

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Project
PROPOSED RESIDENTIAL DEVELOPMENT
27-29 TRYON ROAD, LINDFIELD, NSW, 2070

Sheet Subject
WATER SENSITIVE URBAN DESIGN DETAILS - SHEET 1

| Scale at A1 | Drawn | Approved |
|---|---|---|
| 1:200 | AH | FC |
| **Job No** | **Drawing No** | **Revision** |
| 240608 | C300 | A |

## LEGEND

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- RL X.XX — PROPOSED LEVELS
- V — VALLEY LINE
- OVERLAND FLOW
- VD — VERTICAL DROPPER
- ACCESS MANHOLE WITH SOLID COVER
- ACCESS MANHOLE WITH HEEL SAFE GRATED COVER
- GTD — HEEL SAFE GRATED TRENCH DRAIN
- PROPOSED MIN. Ø150mm uPVC STORMWATER PIPE @ MIN. 1% GRADE UNO.
- RM — RISING MAIN REFER TO HYDRAULIC PLANS FOR DETAILS

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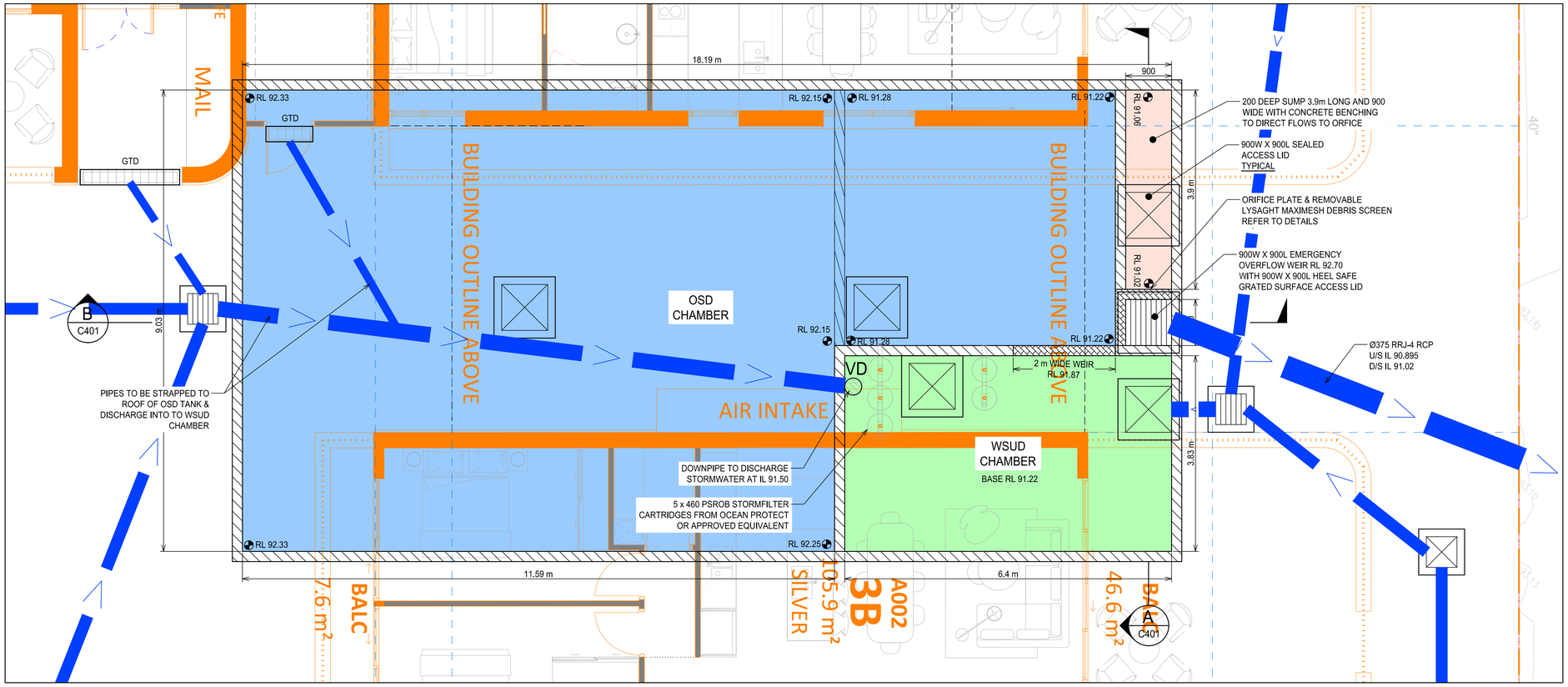
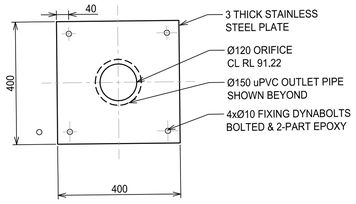
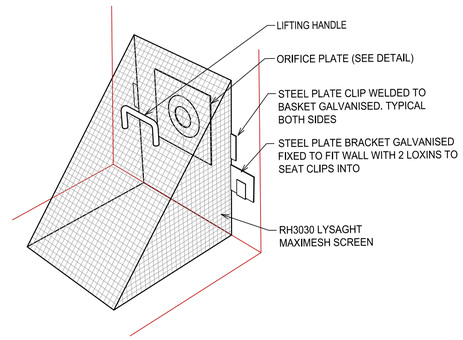



ON-SITE DETENTION TANK - PLAN
SCALE 1:50




ORIFICE PLATE DETAIL
SCALE 1:10




DEBRIS SCREEN
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# DEVELOPMENT APPLICATION

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A1 0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 1:50
A1 0 0.25 0.50 0.75 1.00 1:10

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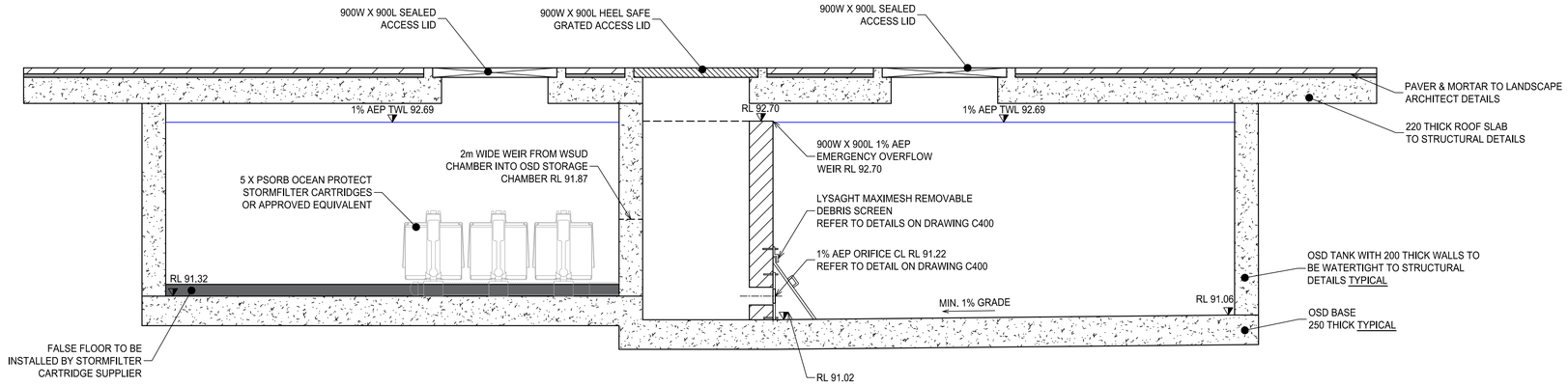
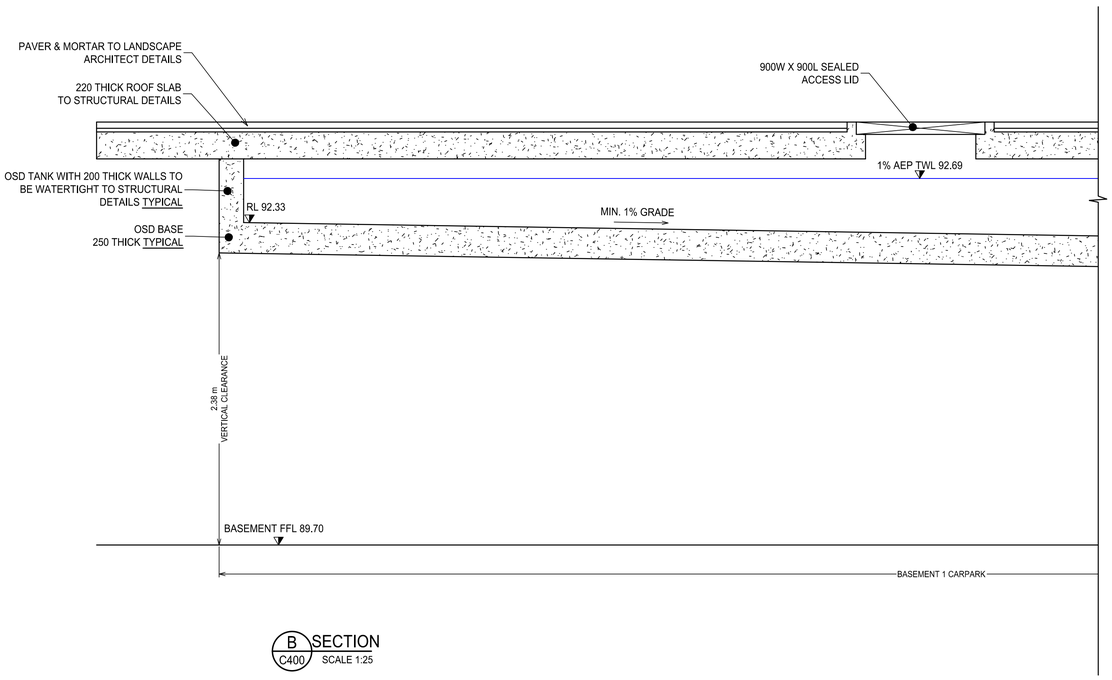
Project
PROPOSED RESIDENTIAL DEVELOPMENT
27-29 TRYON ROAD, LINDFIELD, NSW, 2070

Sheet Subject
STORMWATER ON-SITE DETENTION TANK DETAILS - SHEET 1

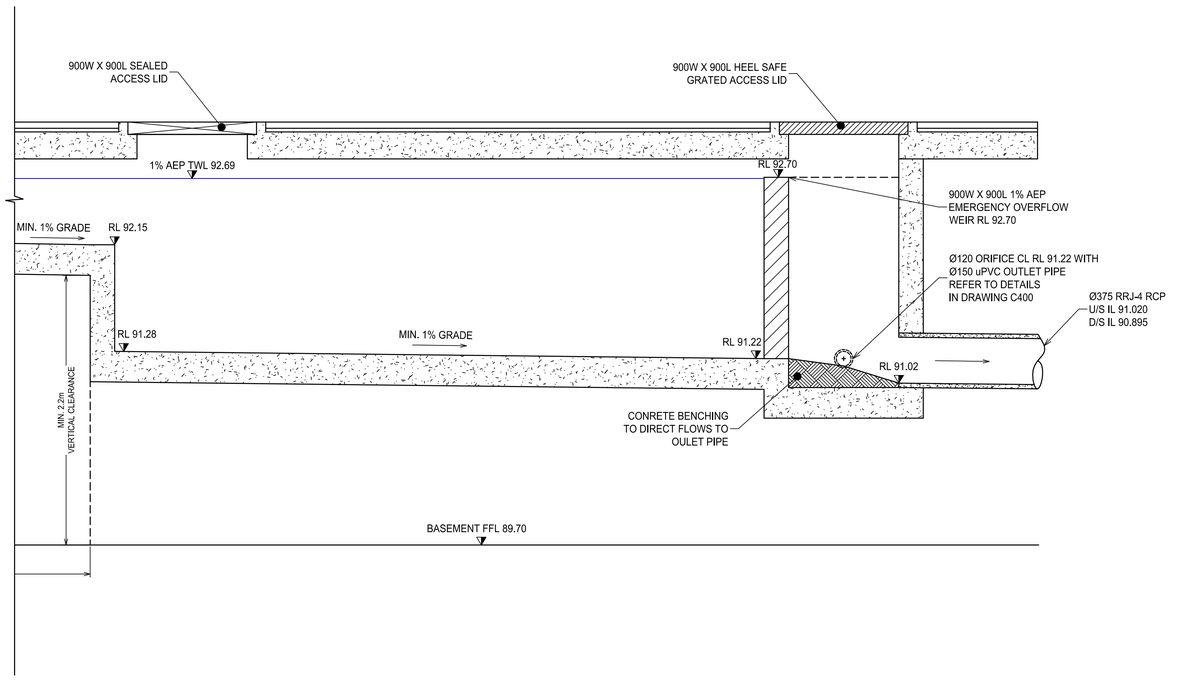
| Scale at A1 | Drawn | Approved |
|---|---|---|
| AS SHOWN | AH | FC |
| **Job No** | **Drawing No** | **Revision** |
| 240608 | C400 | A |




A C400 SECTION
SCALE 1:25




B C400 SECTION
SCALE 1:25




NOTES:

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5. ALL PIPES ARE MIN. Ø150mm uPVC SEWER GRADE U.N.O.
6. ALL PIPES TO HAVE MINIMUM 1% GRADE U.N.O.
7. ALL ACCESS LIDS DEEPER THAN 900mm TO HAVE STEP IRONS WITH VERTICAL SUPPORT WALL. TO BE DETAILED AT CC STAGE

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A1 0 0.5 1.0 1.5 2.0 2.5 1:25

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# DEVELOPMENT APPLICATION

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Project
PROPOSED RESIDENTIAL DEVELOPMENT
27-29 TRYON ROAD, LINDFIELD, NSW, 2070

Sheet Subject
STORMWATER ON-SITE DETENTION TANK DETAILS - SHEET 2

| Scale at A1 | Drawn | Approved |
|---|---|---|
| 1:25 | AH | FC |

| Job No | Drawing No | Revision |
|---|---|---|
| 240608 | C401 | A |

# APPENDIX B

**DRAINS Results**

**DRAINS Results**
**1% AEP**

XK Ref 240608
Date 17/02/25

DRAINS results prepared from Version 2024.07.8959.15835

PIT / NODE DETAILS

| Name | Max HGL |
|---|---|
| TRYON RD | 91.02 |

SUB-CATCHMENT DETAILS

| Name | Max Flow Q (cu.m/s) |
|---|---|
| C-DEV | 0.19 |

PIPE DETAILS

| Name | Max Q (cu.m/s) |
|---|---|
| P-OSD OUTLE | 0.038 |

CHANNEL DETAILS

| Name | Max Q (cu.m/s) |
|---|---|

OVERFLOW ROUTE DETAILS

| Name | Max Q U/S |
|---|---|
| OSD OF | 0 |

DETENTION BASIN DETAILS

| Name | Max WL |
|---|---|
| OSD | 92.69 |

Run Log for DRAINS Demonstration v2024.07.8959.15835 - 27-29 TRYON ROAD, LINDFIELD - XK REF 240608 V3

Flows were safe in all overflow routes.

# APPENDIX C

**MUSIC Results**

KU-RING-GAI COUNCIL

# MUSIC-*link* Report

| Project Details | | Company Details | |
|---|---|---|---|
| **Project:** | 27-29 Tryon Road, Lindfield | **Company:** | Xavier Knight |
| **Report Export Date:** | 14/02/2025 | **Contact:** | Asif Haider |
| **Catchment Name:** | 27-29 TRYON ROAD | **Address:** | Level 7, 210 Clarence Street, Sydney, NSW, 2000 |
| **Catchment Area:** | 0.301ha | **Phone:** | 02-7801-3888 |
| **Impervious Area*:** | 78.14% | **Email:** | asif@xavierknight.com.au |
| **Rainfall Station:** | 66062 SYDNEY | | |
| **Modelling Time-step:** | 6 Minutes | | |
| **Modelling Period:** | 1/01/1963 - 31/12/1993 11:54:00 PM | | |
| **Mean Annual Rainfall:** | 1275mm | | |
| **Evapotranspiration:** | 1261mm | | |
| **MUSIC Version:** | 6.4.0 | | |
| **MUSIC-link data Version:** | 6.40 | | |
| **Study Area:** | Ku-ring-gai Council | | |
| **Scenario:** | Ku-ring-gai | | |

* 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: DISCHARGE** | **Reduction** | **Node Type** | **Number** | **Node Type** | **Number** |
| **Flow** | -0.037% | Sedimentation Basin Node | 1 | Urban Source Node | 2 |
| **TSS** | 85% | GPT Node | 1 | | |
| **TP** | 71.6% | Generic Node | 1 | | |
| **TN** | 51.9% | | | | |
| **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 | None | 0.02 |
| Receiving | DISCHARGE | % Load Reduction | None | None | -0.037 |
| Receiving | DISCHARGE | GP % Load Reduction | 70 | None | 100 |
| Receiving | DISCHARGE | TN % Load Reduction | 45 | None | 51.9 |
| Receiving | DISCHARGE | TP % Load Reduction | 65 | None | 71.6 |
| Receiving | DISCHARGE | TSS % Load Reduction | 85 | None | 85 |
| Sedimentation | SF Chamber 18.3m^2 | % Reuse Demand Met | None | None | 0 |
| Sedimentation | SF Chamber 18.3m^2 | High Flow Bypass Out (ML/yr) | None | None | 0 |
| Urban | GROUND LEVEL - 939m^2 | Area Impervious (ha) | None | None | 0.028 |
| Urban | GROUND LEVEL - 939m^2 | Area Pervious (ha) | None | None | 0.065 |
| Urban | GROUND LEVEL - 939m^2 | Total Area (ha) | None | None | 0.094 |
| Urban | ROOF - 2_072m^2 | Area Impervious (ha) | None | None | 0.207 |
| Urban | ROOF - 2_072m^2 | Area Pervious (ha) | None | None | 0 |
| Urban | ROOF - 2_072m^2 | Total Area (ha) | None | None | 0.207 |

Only certain parameters are reported when they pass validation

## Failing Parameters

| Node Type | Node Name | Parameter | Min | Max | Actual |
|---|---|---|---|---|---|
| Sedimentation | SF Chamber 18.3m^2 | Notional Detention Time (hrs) | 8 | 12 | 0.907 |
| Sedimentation | SF Chamber 18.3m^2 | Total Nitrogen - k (m/yr) | 500 | 500 | 1 |
| Sedimentation | SF Chamber 18.3m^2 | Total Phosphorus - k (m/yr) | 6000 | 6000 | 1 |
| Sedimentation | SF Chamber 18.3m^2 | Total Suspended Solids - k (m/yr) | 8000 | 8000 | 1 |

Only certain parameters are reported when they pass validation

NOTE: A successful self-validation check of your model does not constitute an approved model by Ku-ring-gai Council
MUSIC-*link* now in MUSIC by eWater – leading software for modelling stormwater solutions