STORMWATER MANAGEMENT REPORT

Dee Why RSL

932 Pittwater Road

Dee Why, NSW 2099

Eastern Development

November 2017

Prepared by:
ACOR Consultants Pty Limited
Level 1,
24 Falcon Street
CROWS NEST NSW 2065
Tel: 02 9438 5098
Fax: 02 9438 5398

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ISSUE AND REVISION RECORD

Issue	Date	Purpose	Prepared By	Checked By	Approved By
A	15/03/2017	For Approval	MB	JH	JH
B	16/03/2017	For Approval	MB	JH	JH
C	16/03/2017	For Approval	MB	JH	JH
D	20/11/2017	For Section 96 Approval	MB	JH	JH

EXECUTIVE SUMMARY

This Stormwater Management Report has been prepared by ACOR Consultants in support of the DA submission for the proposed development of the Dee Why RSL site. This report documents the methodology involved in determining the design of the proposed stormwater and water quality treatment train. The proposed methodology has been developed in consultation with Council Development Engineers.

The report finds that the installation of SPEL Storm Sack gross pollutant screens, on-site detention tanks and a SPEL BayFilter system across the site achieve the required water quality and quantity performance requirements as required by the current versions of the Warringah Council Development Control Plan and the Warringah Council On-Site Stormwater Detention Technical Specification.

1 INTRODUCTION

1.1 Purpose of Report

This Stormwater Management Report has been prepared by ACOR Consultants for the proposed development of the Dee Why RSL site.

This report documents the methodology involved in determining the design of the proposed stormwater drainage system for the proposed development, including the stormwater quantity and quality management.

1.2 Project Description

Dee Why RSL has engaged ACOR Consultants to prepare a Stormwater Management Plan and Water Quality Modelling report for the proposed development located at 932 Pittwater Road, Dee Why. The proposed development is located within the existing RSL site in Dee Why and comprises of the following:

- Demolition of a portion of the existing southern carpark
- Excavation and construction of a carpark
- Alterations and additions to the existing RSL building

The site is burdened by an existing easement to drain stormwater from the adjacent site located to the west.

1.3 Guidelines and Standards

The stormwater system is to be designed to the local authority and water authority requirements including the following:

- Warringah Council On-Site Detention Technical Specification
- Warringah Council Development Control Plan

A Pre-DA meeting with Warringah Council on 03/05/16 also established the requirements for water quantity and quality management, flood requirements and recommended design solutions. These requirements are detailed in the following sections of this report. We also note the continual consultations with Council Development Engineers regarding stormwater modelling requirements for the site. These consultations have been incorporated into the proposed design and are detailed in subsequent sections of this report.

2 EXISTING CONDITIONS

2.1 Existing Site Description

The proposed site is part of the Dee Why RSL site, in Dee Why, NSW.

The site is bound by Clarence Avenue to the East, the existing Dee Why RSL site to the North, a childcare centre to the South and Oceangrove retirement village to the West. Both the childcare centre and the retirement village sites are owned by Dee Why RSL.

The subject site is currently occupied by a number of structures including a carpark that will be partially demolished and replaced as part of the proposed development. The southern portion of the carpark will be retained to provide car parking facilities for the child care centre and club patrons.

2.2 Existing Stormwater Drainage

The site has a stormwater drainage system to the existing carpark which discharges to a kerb inlet pit along Clarence Avenue. The existing car park to be retained will re-direct stormwater drainage from the carpark and roof to a new stormwater inlet pit in the north eastern corner, which will then direct flows to Clarence Avenue as per the previous system.

In addition, there is an existing drainage pipe and overland flow path running through the site within an easement benefiting the retirement village to the West (Oceangrove). It is proposed to divert the drainage pipe through the retained section of existing carpark. Further details are shown on the accompanying stormwater management plan in Appendix A.

3 PROPOSED DEVELOPMENT

3.1 Proposed Site Development

The proposed development will include the construction of a new carpark, including a new vehicular crossing to Clarence Street. New access will be provided to the portion of existing carpark retained to facilitate car parking for the club patrons and neighbouring child care.

We note that the site area of the proposed car park re-development is 3,900 m^2, which has been utilised in the corresponding site catchment analysis for on-site detention and water quality calculations.

Further details of the proposed layout will be as shown in Appendix A.

3.2 Proposed Stormwater Drainage Layout

Stormwater is to be conveyed from the roof of the proposed re-development into the 81 cubic metre volume on-site detention (OSD) system located under the raised loading dock structure. Provision for OSD overflow has been considered, with three 150mm diameter pipe outlets from the OSD at high level connecting to a separate outlet pipe capable of conveying the 100 year ARI flows. The high level overflow pipes have been modelled in DRAINS modelling software through an overflow path with a stage-discharge relationship. The OSD outlet and overflow pipes connect to a surcharge pit external to the building at the property boundary which will direct flows into the Council kerb inlet pit along Clarence Avenue.

The site is to incorporate SPEL gross pollutant screens to all pits directly upstream of the OSD tank to provide primary screening of runoff. SPEL Bayfilter cartridges within the OSD system will further treat stormwater flows to meet Warringah Council water quality targets.

The existing stormwater drainage pipe and overland flow path running through the site within an existing easement benefiting Oceangrove will be altered as part of the re-development works for the carpark and will improve on existing drainage and overland flow conditions. The stormwater drainage pipe from Oceangrove will be re-directed through the retained portion of the car park to the south and discharge to the existing Council stormwater system along Clarence Avenue.

In the event of stormwater surcharge from the existing drainage system to Oceangrove, a new overland flow path has been designed capable of conveying the 100 year ARI flows from the upstream catchment via a channel along the interface of proposed and existing carparks prior to free discharge to Clarence Avenue.

3.3 Design of Proposed Water Quality Treatment System

3.3.1 Stormwater Quality Management

The proposed drainage system has been designed in accordance with the requirements set out by Warringah Council.

The following water quality targets are to be achieved as set by the council guidelines:

- 90% reduction in the post development mean annual load of total gross pollutant (greater than 5 mm).
- 80% reduction in the post development mean annual load of Total Suspended Solids (TSS).
- 60% reduction in the post development mean annual load of Total Phosphorus (TP).
- 45% reduction in the post development mean annual load of Total Nitrogen (TN).

3.3.2 Stormwater Quality Treatment Train

The post-development site was modelled as a single urban catchment draining into Clarence Avenue.

It is proposed to install in-line SPEL StormSack gross pollutant screen traps to the stormwater pits directly upstream of the OSD tank, as well as a two-cartridge SPEL BayFilter system within the proposed on-site detention tank. Stormwater runoff enters the system via the roof downpipes and drains through in-line SPEL StormSack systems fitted within sealed junction pits before discharging into the High Early Discharge (HED) chamber of the on-site detention (OSD) tank over the SPEL Bayfilter system. The site stormwater drains through the SPEL Bayfilter system and out of the OSD during low flows and overflows into the OSD storage chamber during high flows.

3.3.3 MUSIC Modelling

The MUSIC software package has been used to model the water quality for the post-developed site to calculate the pollutant loads from the development as well as the effectiveness of the proposed treatment train. The perviousness of catchment areas is based on the design as detailed in Appendix A. Roofs, roads and pathways were all designated as 100% impervious.

The model was run to calculate the reduction in the mean annual loads for the proposed development. A summary of the results are shown below in Table 3.1. Full MUSIC results are attached in Appendix B.

Table 3.1 – MUSIC Output – Post Developed Mean Annual Loads for Total Treatment System

Parameter	In	Out	% Removal Required	% Removal Achieved
Total Suspended Solids (kg/yr)	146	28.1	80%	80.8%
Total Nitrogen (kg/yr)	12.6	6.42	45%	49.0%
Total Phosphorous (kg/yr)	0.847	0.226	60%	73.3%
Gross Pollutants (kg/yr)	173141	0.00	90%	100%

As can be seen in Table 3.1 above, the Suspended Solids, Nitrogen and Phosphorus are all reduced by the treatment train proposed for this development. These results meet the requirements as set by the Warringah Council within the pre-DA meeting.

3.3.4 Maintenance Plan

Provision for litter bins, signage, education and regular sweeping of the accessible drainage catchments will help to reduce litter loads generated by the site.

The recommended maintenance regime designed for the SPEL products by the manufacturer shall be instigated by the property manager to ensure suitable pollutant removal efficiencies of the gross pollutant screens and the BayFilter systems.

3.4 Design of Proposed Water Quantity Management System

3.4.1 Stormwater Quantity Management

The proposed drainage system is required to meet the guidelines set out within the Warringah Council On-site Stormwater Detention Technical Specification.

This guideline required that the OSD system should be designed to restrict flows from the post-development site to the 'greenfields condition' (100% pervious) site for the 5, 20 and 100 year ARI storm events. Furthermore, the total piped flow for the site must not exceed the maximum 5 year ARI pre-development runoff.

3.4.2 On-Site Detention

The site has one on-site detention tank for the proposed development. DRAINS modelling of the OSD tank for the above Council requirements calculates a minimum required volume of 71m^3. The proposed OSD tank will be positioned under the raised loading dock structure and will have total volume of 81m^3, above the minimum required volume calculated in DRAINS. All roof areas and carpark surface drainage will be directed to this tank. The proposed layout will be as shown in Appendix A.

The proposed detention tank utilises a high early discharge (HED) outlet structure. All inlet pipes are to discharge into the HED pit above the BayFilter System.

3.4.3 DRAINS Modelling

The site stormwater discharges were modelled in the DRAINS hydraulic modelling program using an ILSAX hydrological model. Refer to Appendix C for more information.

Table 3.2 – DRAINS Output

Storm	Predevleopment 'Greenfields Condition' Outflow (m^3/s)	Post- development Outflow (m^3/s)
5 Year Storm	0.092	0.091
20 Year Storm	0.132	0.092
100 Year Storm	0.201	0.163 (including piped overflow)
Piped flow into Council System	0.092 (Pre-dev 5-Year flow)	0.091

As can be seen in table 3.1 above, the post development water flow is reduced by the detention tank proposed for this development. These results meet the requirements as set by the Warringah Council within their On-Site Detention Technical Specification.

4 CONCLUSION

The proposed Dee Why RSL development incorporates SPEL Storm Sack gross pollutant screens in conjunction with SPEL BayFilters and an on-site detention tank to improve stormwater quality and limit site discharge before it discharges into the kerb inlet pit or via overland flow along Clarence Avenue.

The above measures achieve the requirements as set out by Warringah Council within their development documentation and specifications as well as reflecting consultation with Council's stormwater Engineers.

APPENDIX A - DRAWINGS

ACOR Consultants Drawings:

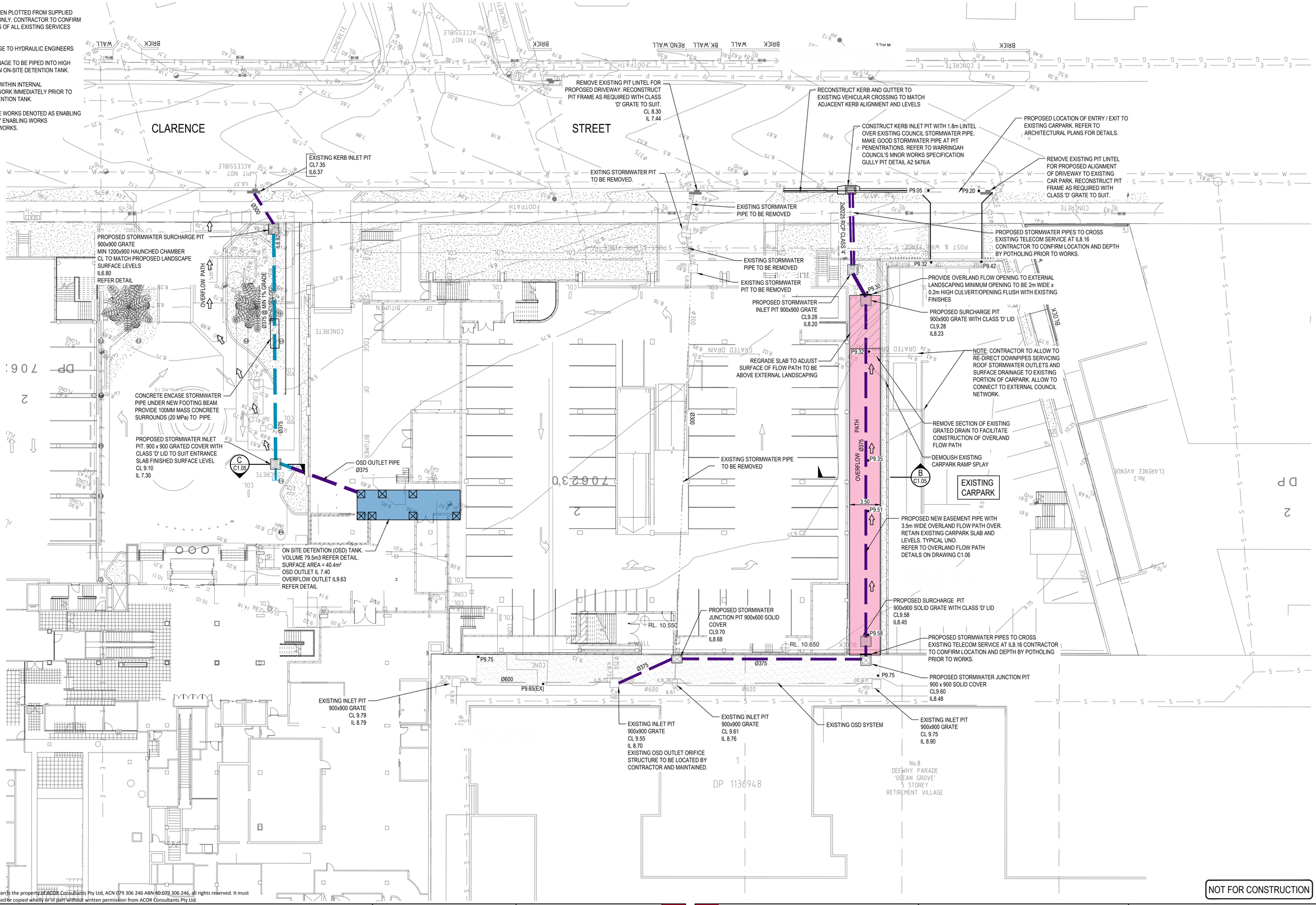
- C2.01 – Stormwater Drainage Site Plan
- C1.06 – Stormwater Drainage Details Sheet 2

NOTE:
1. EXISTING SERVICES HAVE BEEN PLOTTED FROM SUPPLIED DATA AND ARE APPROXIMATE ONLY. CONTRACTOR TO CONFIRM LOCATIONS, DEPTHS AND SIZES OF ALL EXISTING SERVICES PRIOR TO CONSTRUCTION.

2. INTERNAL CARPARK DRAINAGE TO HYDRAULIC ENGINEERS DETAIL.
ALL INTERNAL CARPARK DRAINAGE TO BE PIPED INTO HIGH EARLY DISCHARGE CHAMBER IN ON-SITE DETENTION TANK.

3. PROVIDE SPEL STORMSACK WITHIN INTERNAL STORMWATER DRAINAGE NETWORK IMMEDIATELY PRIOR TO DISCHARGE INTO ON SITE DETENTION TANK.

4. ALL STORMWATER DRAINAGE WORKS DENOTED AS ENABLING WORKS TO BE UNDERTAKEN BY ENABLING WORKS CONTRACTOR PRIOR TO MAIN WORKS.



NOT FOR CONSTRUCTION

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E	ISSUE FOR REQUEST FOR TENDER	18.07.17	GP	MB
D	ISSUE FOR COORDINATION	07.07.17	KR	MB
C	RE-ISSUE FOR DEVELOPMENT APPLICATION	20.03.17	DW	MB

0 1cm at full size 10cm 20cm

North

Client
DEE WHY RSL CLUB
9321 PITTWATER ROAD
DEE WHY NSW 2099

Architect
ALTIS architecture
SUITE 123/26-32 PIRRAMA ROAD
PYRMONT NSW 2009
PHONE : 02 9364 9000

ACOR CONSULTANTS
ACOR Consultants Pty Ltd
Level 1, 24 Falcon Street
Crows Nest NSW 2065
T +61 2 9438 5098
ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

Project
PROPOSED CLUB REFURBISHMENT
DEE WHY RSL
932 PITWATER ROAD
DEE WHY NSW 2099

Drawing Title
STORMWATER MANAGEMENT PLAN

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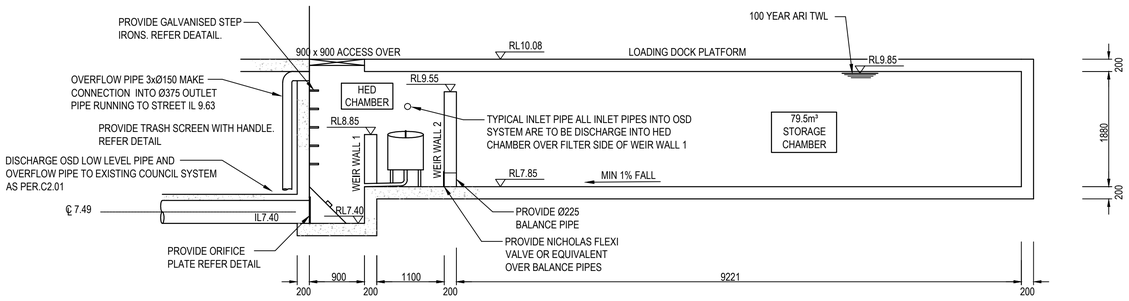

SECTION A
C2.00

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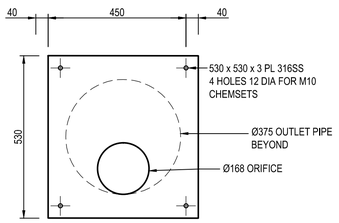
NOTES:
1. ALL WATER PROOFING TO STRUCTURAL DETAIL.
2. ALL CONCRETE AND REINFORCIING TO STRUCTURAL ENGINEERS DETAIL.
3. ALL INLET PIPES TO DISCHARGE INTO HIGH EARLY DISCHARGE (HED) CHAMBER ON FILTER SIDE OF WEIR WALL 1.



ORIFICE PLATE DETAIL
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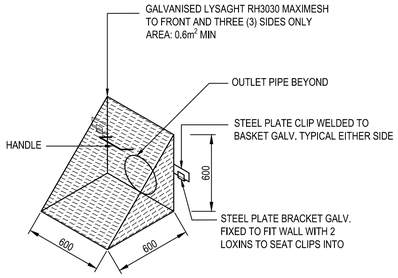

TRASH SCREEN DETAIL
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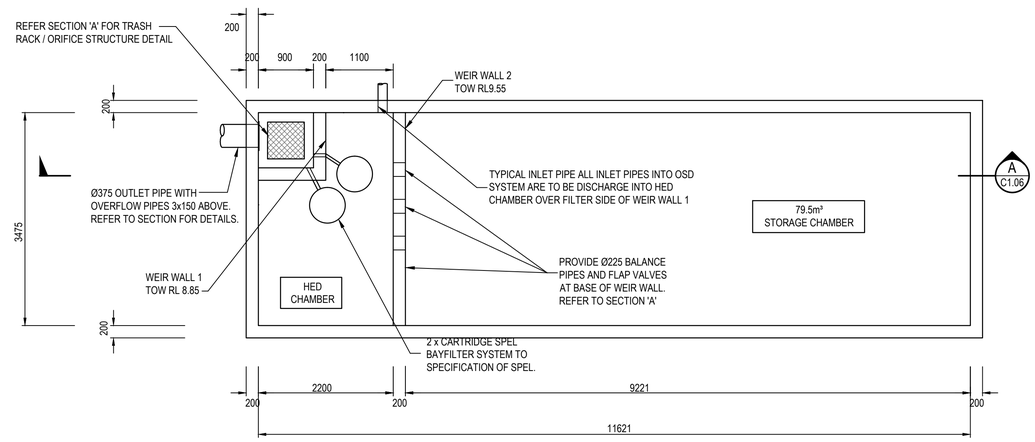

OSD PLAN
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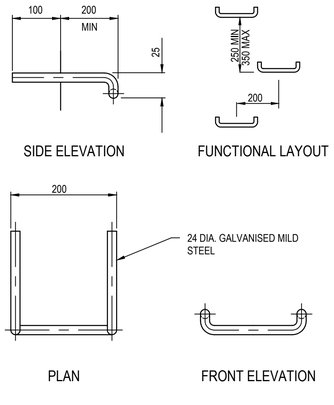
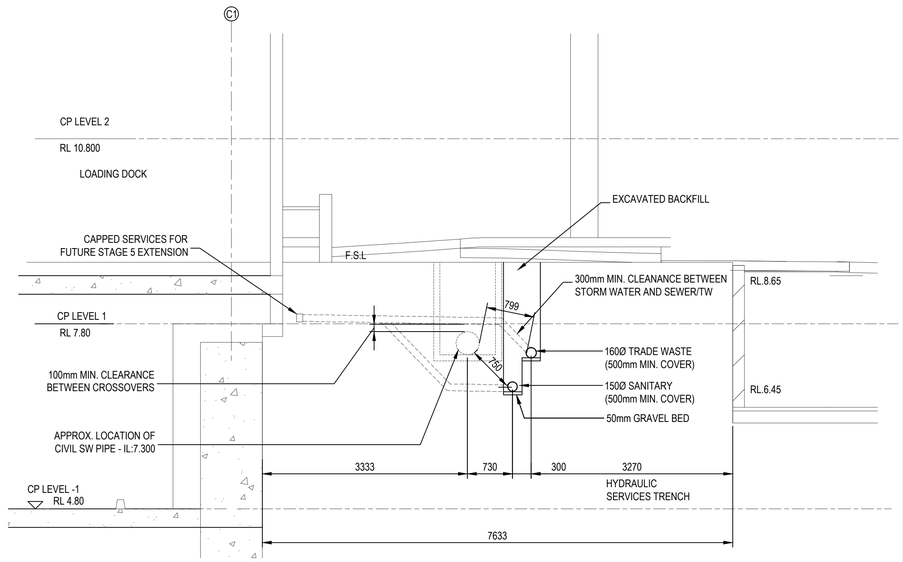


STEP IRON DETAIL
NTS



TYPICAL SHARED TRENCH DETAIL C
C2.01

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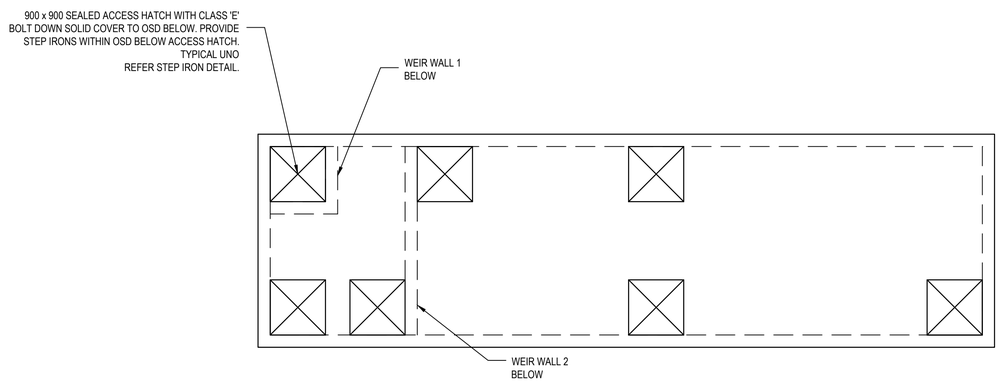
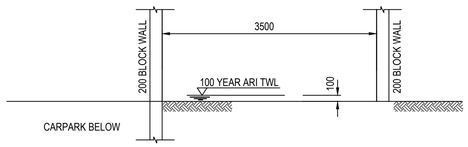


OSD ACCESS HATCH PLAN
SCALE 1:50

DESIGN CRITERIA

TOTAL SITE AREA =	3900 m²
DESIGN METHOD =	ILSAX
PRE-DEVELOPED IMPERVIOUS AREA =	0 %
POST-DEVELOPED IMPERVIOUS AREA =	90 %
POST DEVELOPED FLOWS (l/s) =	Q_5 = 84 Q_{20} = 85 Q_{100} = 157
PRE DEVELOPED FLOWS (l/s) =	Q_5 = 85 Q_{20} = 132 Q_{100} = 178
PORTION OF SITE THROUGH OSD SYSTEM =	100 %
REQUIRED STORAGE VOLUME =	71 m³
ACTUAL STORAGE VOLUME =	79.5 m³



OVERLAND FLOW CHANNEL 1.3m WIDE
SECTION B
C2.00

SCALE = 1:50

FLOWS THROUGH SWALE FROM UPSTREAM CATCHMENT.

Q = C.I.A. / 3600

C = 1.0
I = 206mm/hr (100yr , 10min)
A = 5252m²

Q = 300L/S

CAPACITY OF SECTIONS.
2m x 0.2, CULVERT = 932L/S
SECTION B = 510L/S @ 0.1m deep

TENDER ISSUE
NOT FOR CONSTRUCTION

This drawing has been assigned an electronic code that signifies the drawing has been checked and approved by:

Issue	Description	Date	Drawn	Approved
D	ISSUE FOR REQUEST FOR TENDER	18.07.17	GP	MB
C	ISSUE FOR COORDINATION	07.07.17	KR	MB
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A	ISSUE FOR DA	14.03.17	DW	MB

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0 5cm at full size 10cm 20cm

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ACOR Consultants Pty Ltd
Level 1, 24 Falcon Street
Crows Nest NSW 2065
T +61 2 9438 5098
ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

Project
PROPOSED CLUB REFURBISHMENT
DEE WHY RSL
932 PITWATER ROAD
DEE WHY NSW 2099

Drawing Title
DETAILS SHEET 2

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APPENDIX B – MUSIC MODEL

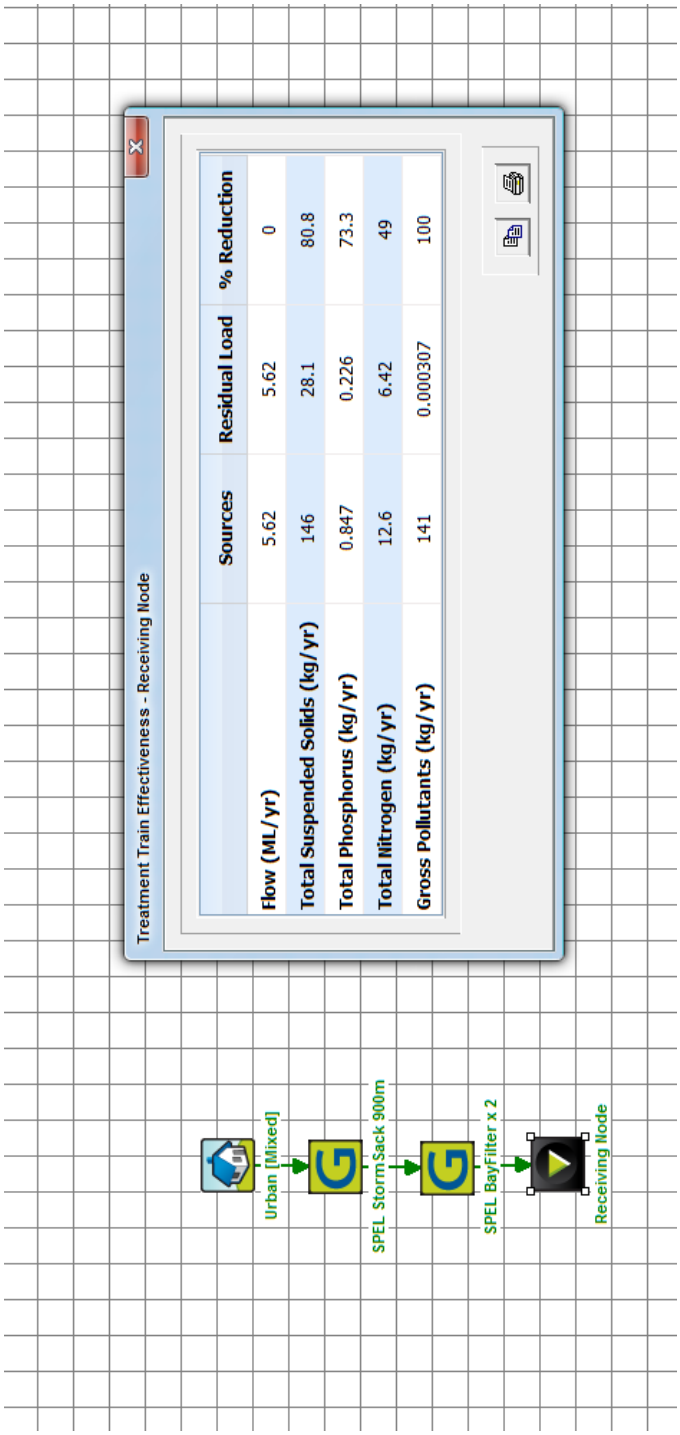

Figure 1 - MUSIC Model Layout and Results

APPENDIX C – DRAINS MODEL

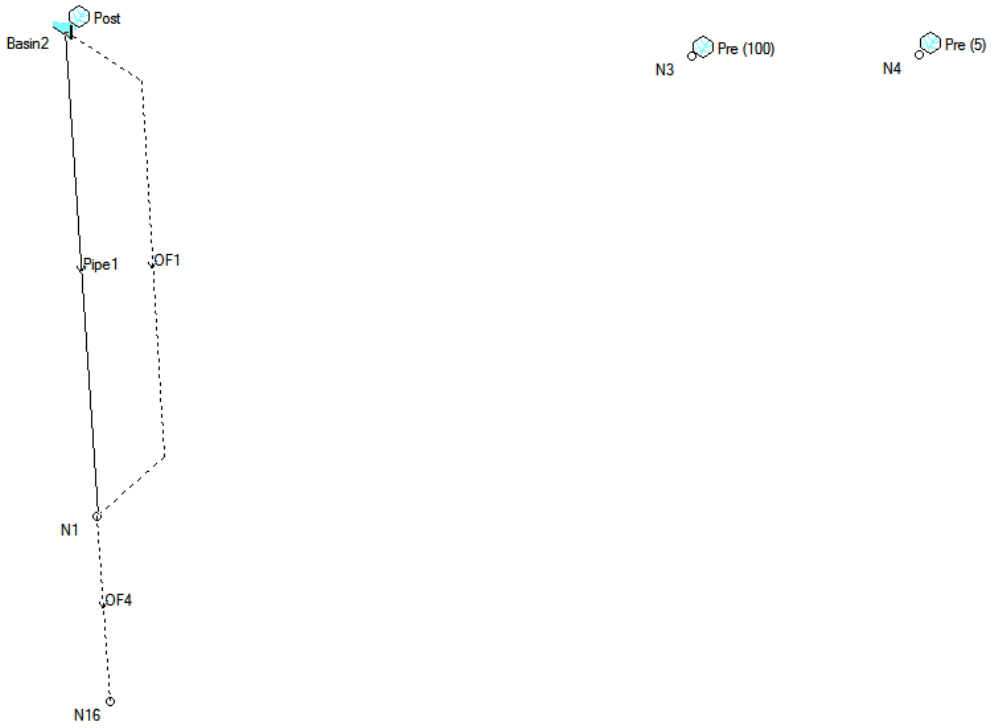

Figure 2 - DRAINS Model Layout and Results