

INTEGRATED WATER CYCLE MANAGEMENT REPORT

RESIDENTIAL DEVELOPMENT

3 CENTRAL ROAD, AVALON

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Prepared for: Avalon Central Pty Ltd C/o Cottee Parker
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Document Control

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1. EXECUTIVE SUMMARY

Sparks & Partners have been engaged by Avalon Central Pty Ltd to provide civil engineering services to support the proposed Development Application for 3 Central Avenue, Avalon Beach. The engineering services include the design and documentation of the stormwater drainage infrastructure for the proposed development.

Northern Beaches Council being the approval authority for the proposed development, require an Integrated Water Cycle Management Plan be prepared that takes into consideration the objectives and controls under the relevant DCP and engineering guidelines. In response to this requirement Sparks and Partners has undertaken modelling of the proposed integrated water management measures and prepared this report to demonstrate that the proposed residential development identifies and incorporates water conservation and stormwater management measures into its design and operation in accordance with the requirements of the Northern Beaches Council DCP and Pittwater Council DCP.

2. INTRODUCTION

2.1 Existing Site

The site is situated within the former Pittwater area within Northern Beaches Council. The site currently contains a two storey residential unit building of masonry construction and associated driveway pavement, lawns and landscaping. The site perimeter is lined by a mix of timber, cyclone and aluminum fencing. The site falls steeply to the southern rear boundary at an average of 8.9% grade. A Sydney water sewer main traverses the rear and western boundaries in a east/west alignment.

2.2 Proposed Development

The proposed development occupies a total site area of 1,418m² and consists of two basement carparks, two residential unit buildings two stories above ground level, pedestrian pavement and landscaping. The development consists of roofed area occupying 726m², pavement area occupying 294m² and the landscaping occupies 398m². The site is bounded by Central Road on the northern boundary, Patterson Lane on the eastern boundary, 5 Central Road on the western boundary and Dunbar Park along the northern boundary.

3. INTEGRATED WATER MANAGEMENT

3.1 General

The objective of integrated water management is to provide a strategy that brings together the different aspects of the water cycle as a whole rather than an ad hoc approach to water management. This includes the management aspects of freshwater, wastewater and stormwater. The following integrated water management strategies have been considered and addressed for the proposed development:

1. Employ an integrated water collection and recycling system for capturing and recycling roofwater;
2. Control the quality of stormwater that is disposed from the site;
3. Control the quantity of stormwater that is discharged for the site.

To demonstrate the above concept stormwater drainage plans and associated details have been prepared along with detailed modelling using the Council endorsed MUSIC software package. The concept stormwater drainage plans detail the location of the water management infrastructure including pits, pipes, on-site detention (OSD) tank, rainwater tanks (RWT), enviropods and stormfilter cartridges, and are included in Appendix A.

3.2 Rainwater Reuse

Through the reuse of collected roofwater for non-potable reuse the proposed demand on potable water resources is reduced. The proposed development will capture roof water from part of the building roof area (718m²). This collected roofwater will be conveyed to two 10,000 Litre tanks for storage and reuse throughout the development. Re-use purposes will primarily include toilet flushing and irrigation uses. Rainwater tanks have been sized according to the table provided within Clause B5.5 of Pittwater Council's DCP for a development less than 1000m².

A water balance of the proposed reuse system has been completed to model the effectiveness and efficiency of the system. The water balance model was constructed using the MUSIC software package with the following inputs:

- Sydney Observatory rainfall data station 066062 from 1981 to 1985.
- Total approximate non-potable reuse of is based on:
 - Allowing 0.1kL/day per toilet, with 16 toilet facilities provided, equates to approx. 1.6kL per day.
 - 396m² or irrigated area requiring 20mm rainfall per week equates to approx. 434L per day.

Using the above determined non-potable demand the MUSIC model determines the rainwater tank has an approximate efficiency of 70.50%. This efficiency results in an approximate reduction in the proposed demand on potable water supplies of 520,000 litres per year.

3.3 Stormwater Quality

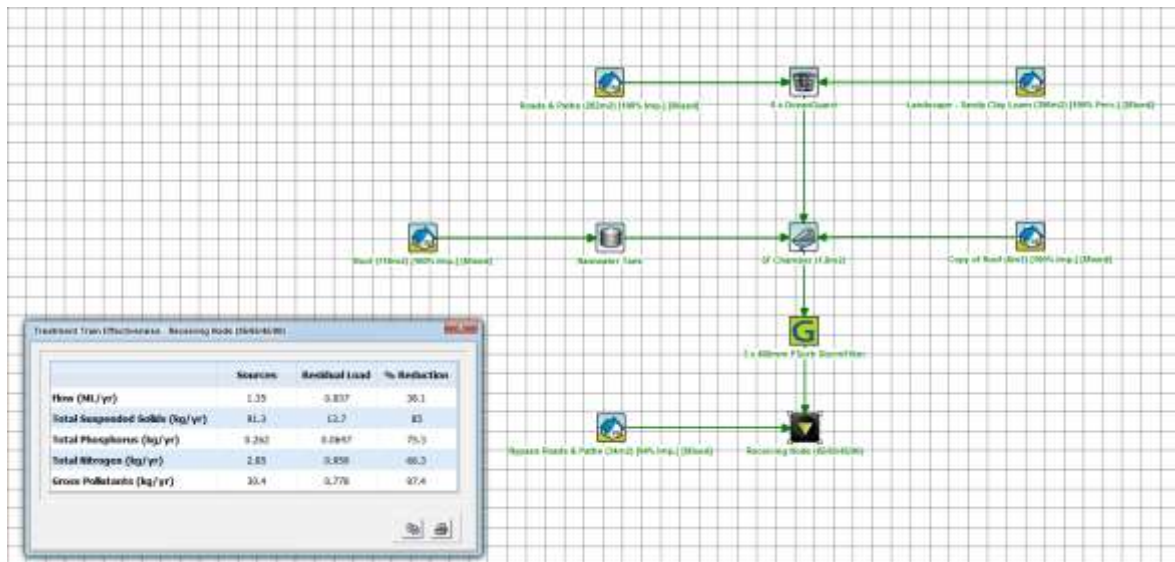
To ensure the quality of stormwater leaving the site is acceptable and meets council's requirements specific water quality treatment measures are to be employed. These treatment measures are to treat the collected stormwater runoff prior to discharge to the council drainage system located in Patterson Lane. The treatment measures consist of Ocean Protect Enviropods within inlet pits, two 10kL rainwater tanks for reuse and three 460mm PSorb StormFilter Cartridges. The combination of these measures provides a treatment train approach to the treatment of stormwater runoff.

Alternate treatment measures such as swales and infiltration basins have been considered in the design. The steep slope of the site and layout of landscaping area available make these measures prohibitive to practically implement with sufficient capacity to meet council's reduction targets, drain adequately, and meet the requirement to capture all impervious area. The existing council drainage pit within Patterson Lane has been utilised as the site discharge point, in lieu of infiltration.

Modelling of the proposed treatment measures has been undertaken using the MUSIC software package version 6. The modelling inputs have been based on the source node parameters outlined in Northern Beaches Council WSUD & MUSIC Modelling Guidelines. The modelling results of the water quality achieved for the site is detailed in Table 1 – MUSIC Model Results below, along with a figure of the prepared model.

	Source Load	Residual Load	% Reduction Achieved	NBC % Reduction Requirement	Compliance with NBC Requirement
Total Suspended Solids (kg/yr)	91.3	13.7	85	85	YES
Total Phosphorus (kg/yr)	0.262	0.0647	75.3	65	YES
Total Nitrogen (kg/yr)	2.85	0.959	66.3	45	YES
Gross Pollutants (kg/yr)	30.4	0.778	97.4	90	YES

Table 1. MUSIC Model Results



3.4 Stormwater Quantity

The proposed development requires the implementation of on-site detention (OSD) as per the Council DCP to control stormwater discharge from the site. The proposed development has an approximate area of 1,384m² (97.6%) draining to the proposed on-site detention (OSD) facility which includes pavement (262m²), roof (726m²) and landscaped (396m²) areas. A catchment plan of the proposed development is included in the Appendix A.

Pittwater Council's DCP Clause B5.7 has been utilised to determine the required volume and discharge for the proposed development. Based on the above catchment areas the storage required for the proposed development is approx. 60m³ with a maximum discharge of 30L/sec. The On-Site Detention Checklist is located in the Appendix B for review.

3.5 Maintenance and Monitoring

To ensure the continued efficient and correct operation of the proposed integrated water management infrastructure a 'maintenance and monitoring schedule' is included in the Appendix C of this plan. The schedule details the frequency of inspections, what is to be inspected and what rectifications to make if required for the water management infrastructure located within the proposed development. The schedule is to be implemented upon commissioning of the water management infrastructure and remain in place for the life of the development; with all records kept on site for inspection should the approval authority deem it necessary.

CONCLUSION

Based on the preparation of the concept stormwater drainage plans and MUSIC modeling results it is demonstrated that the principles of integrated water management have been incorporated into the design and operation of the proposed development at 3 Central Avenue, Avalon Beach in accordance with Northern Beaches Council DCP and Pittwater Council DCP. It is demonstrated that the proposed development achieves reductions in potable water import by capturing rainwater on site and reusing this for non-potable uses including irrigation and toilet flushing, achieves pollution reduction targets set by council, and employs OSD for the control of stormwater discharge from the site in accordance with targets set by council. It is also demonstrated that the proposed developments employed water conservation measures will continue to operate effectively and efficiently through the implementation and use of a monitoring and maintenance schedule ensuring the integrity of the system is maintained.

APPENDIX A. CONCEPT DRAINAGE PLANS

3 CENTRAL ROAD, AVALON BEACH

CONCEPT STORMWATER MANAGEMENT

SITE WORKS - GENERAL

1. ALL WORKS ARE TO BE UNDERTAKEN IN ACCORDANCE WITH LOCAL COUNCIL, AUSTRALIAN AND AUTHORITY STANDARDS.
2. ALL TRENCHING WORKS ARE TO BE RESTORED TO ORIGINAL CONDITION.
3. THE INTEGRITY OF ALL EXISTING AND NEW SERVICES IS TO BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD.
4. ALL PLANS ARE TO BE READ IN CONJUNCTION WITH APPROVED ARCHITECTS, STRUCTURAL ENGINEERS AND OTHER CONSULTANT'S PLANS. ANY DISCREPANCIES ARE TO BE NOTIFIED TO THE ENGINEER FOR CLARIFICATION.
5. THE ENGINEER SHALL BE GIVEN A MIN. OF 48 HOURS NOTICE FOR ALL STORMWATER DRAINAGE AND PAVEMENT INSPECTIONS. CONCRETE SHALL NOT BE DELIVERED UNTIL ENGINEERS APPROVAL IS OBTAINED.

SITE WORKS - ACCESS AND SAFETY

1. ALL WORKS ARE TO BE UNDERTAKEN IN A SAFE MANNER IN ACCORDANCE WITH ALL STATUTORY AND INDUSTRIAL RELATION REQUIREMENTS.
2. ACCESS TO ADJACENT BUILDINGS AND PROPERTIES SHALL BE MAINTAINED AT ALL TIMES.
3. WHERE NECESSARY SAFE PASSAGE SHALL BE PROVIDED FOR VEHICLES AND PEDESTRIANS THROUGH OR ADJACENT TO THE SITE.

SEDIMENT AND EROSION CONTROL

1. THE CONTRACTOR SHALL INSTIGATE ALL SEDIMENT AND EROSION CONTROL MEASURES IN ACCORDANCE WITH NORTHERN BEACHES COUNCIL AND THE "BLUE BOOK" (MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION, PRODUCED BY THE DEPARTMENT OF HOUSING). THESE MEASURES ARE TO BE REGULARLY INSPECTED AND MAINTAINED.
2. 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 COUNCIL'S DESIGN, AND ALL OTHER REGULATORY AUTHORITY REQUIREMENTS.
3. 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:
 - a. INSTALL ALL TEMPORARY SEDIMENT FENCES AND BARRIER FENCES, WHERE FENCES ARE ADJACENT TO EACH OTHER THE SEDIMENT FENCE CAN BE INCORPORATED INTO THE BARRIER FENCE.
 - b. CONSTRUCT TEMPORARY STABILISED SITE ACCESS, INCLUDING SHAKE DOWN AND WASH PAD.
 - c. INSTALL SEDIMENT CONTROL MEASURES AS OUTLINED ON THESE SEDIMENT AND CONTROL PLANS (ONCE APPROVED)
4. THE CONTRACTOR SHALL UNDERTAKE SITE DEVELOPMENT WORKS SO THAT LAND DISTURBANCE IS CONFINED TO AREAS OF MINIMUM WORKABLE SIZE.
5. AT ALL TIMES AND IN PARTICULAR DURING WINDY AND DRY WEATHER, LARGE, UNPROTECTED AREAS WILL BE KEPT MOIST (NOT WET) BY SPRINKLING WITH WATER TO KEEP DUST UNDER CONTROL. TACIFIERS MAY BE USED TO CONTROL DUST DURING EXTENDED PERIODS OF DRY WEATHER.
6. 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.
7. WATER SHALL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS THE CATCHMENT AREA HAS BEEN STABILISED AND/OR ANY LIKELY SEDIMENT HAS BEEN FILTERED OUT.
8. TEMPORARY SOIL AND WATER MANAGEMENT STRUCTURES SHALL BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE STABILISED / REHABILITATED.
9. THE CONTRACTOR SHALL ALLOW FOR THE ESTABLISHMENT OF ANY OTHER EROSION PROTECTION MEASURES. (IF APPLICABLE).
10. THE CONTRACTOR SHALL REGULARLY INSPECT (MINIMUM TWICE PER WEEK) ALL EROSION AND SEDIMENT CONTROL MEASURES TO ENSURE THEY ARE OPERATING EFFECTIVELY. REPAIRS AND/OR MAINTENANCE SHALL BE UNDERTAKEN REGULARLY AND AS REQUIRED, PARTICULARLY FOLLOWING STORM EVENTS.
11. ACCEPTABLE RECEPTORS SHALL BE USED FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER. WASTE FROM THESE RECEPTORS SHALL BE DISPOSED OF IN ACCORDANCE WITH REGULATORY AUTHORITY REQUIREMENTS. PAY ALL FEES AND PROVIDE EVIDENCE OF SAFE DISPOSAL.

STORMWATER

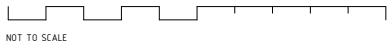
1. ALL WORKS ARE TO BE UNDERTAKEN IN ACCORDANCE WITH THE FOLLOWING AUSTRALIAN STANDARDS AS2032, AS3500 AND AS3725 AS A MINIMUM.
2. REFER TO INTEGRATED WATER CYCLE MANAGEMENT REPORT (I) (DATED: 12/12/19) FOR FURTHER DETAILS ON STORMWATER SYSTEM
3. ALL PIPES LESS THAN OR EQUAL TO Ø300mm IN SIZE ARE TO BE SOLVENT WELD-JOINTED UPVC CLASS S16 U.N.O.
4. ALL PIPES Ø375mm OR GREATER IN SIZE ARE TO BE MIN. CLASS 2 REINFORCED CONCRETE PIPE (RCP) WITH SPIGGOT AND SOCKETED JOINT OR VANTAGE PIPE PLUS (VPIPE+) FIBRE REINFORCED CONCRETE (FRC) WITH VANTAGE PIPE PLUS JOINT U.N.O.
5. ALL PIPES ARE TO BE LAID AT MIN. 10% GRADE U.N.O.
6. PIPE BEDDING IS TO BE H2 UNDER ROADS AND TRAFFICKED AREAS AND SHALL BE H2 IN LANDSCAPED AND PEDESTRIAN TRAFFICKED AREAS U.N.O.
7. ALL PIPE BENDS AND JUNCTIONS ARE TO BE MADE WITH EITHER PURPOSE MADE FITTINGS OR STORMWATER DRAINAGE PITS.
8. MINIMUM COVER FROM THE OBVERT OF THE STORMWATER PIPE OF 300mm IS TO BE PROVIDED IN LANDSCAPED AREAS AND 600mm IN VEHICULAR TRAFFICKED AREAS U.N.O.
9. WHERE MINIMUM COVER CANNOT BE ACHIEVED CONCRETE ENCASEMENT OF THE AFFECTED PIPE IS MAY BE UNDERTAKEN WITH 20MPa CONCRETE WITH A MIN. COVER OF 150mm TO ALL SIDES OF THE PIPE. THE CONTRACTOR SHALL CONFIRM THIS REQUIREMENT WITH THE ENGINEER OR SUPERINTENDENT.
10. LAID PIPELINES ARE TO HAVE THE FOLLOWING CONSTRUCTED TOLERANCES:
 - a. HORIZONTAL-1:300 ANGULAR DEVIATION FROM REQUIRED ALIGNMENT;
 - b. VERTICAL-1:300 ANGULAR DEVIATION FROM REQUIRED ALIGNMENT.
10. ALL DRAINAGE PITS ARE TO BE CAST IN-SITU, PRECAST DRAINAGE PITS MAY BE USED WITH APPROVAL FROM THE ENGINEER. THE CONTRACTOR SHALL SUBMIT A PRECAST PIT INSTALLATION WORK METHOD STATEMENT FOR ASSESSMENT BY THE ENGINEER FOR APPROVAL.
11. DRAINAGE PIT COVERS ARE TO BE EITHER GALVANISED STEEL OR CAST IRON CLASS 'B' IN LANDSCAPED AND PEDESTRIAN TRAFFICKED AREAS AND CLASS 'D' IN ALL VEHICULAR TRAFFICKED AREAS U.N.O.
12. DRAINAGE PIT COVERS ARE TO BE 'HEELSAFE' TYPE IN ALL PEDESTRIAN TRAFFICKED AREAS U.N.O.
13. EXISTING STORMWATER PIT LOCATIONS AND INVERT LEVELS TO BE CONFIRMED PRIOR TO COMMENCING WORKS ON SITE.
14. PROVIDE CLEANING EYES (RODDING POINTS) TO PIPES AT ALL CORNERS AND T-JUNCTIONS WHERE NO PITS ARE PRESENT.
15. DOWN PIPES CONNECTED DIRECT TO PIPES TO BE CONNECTED AT 45° TO THE FLOW DIRECTION WITH A CLEANING EYE PROVIDED AT GROUND LEVEL.


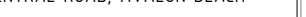


DRAWING SCHEDULE

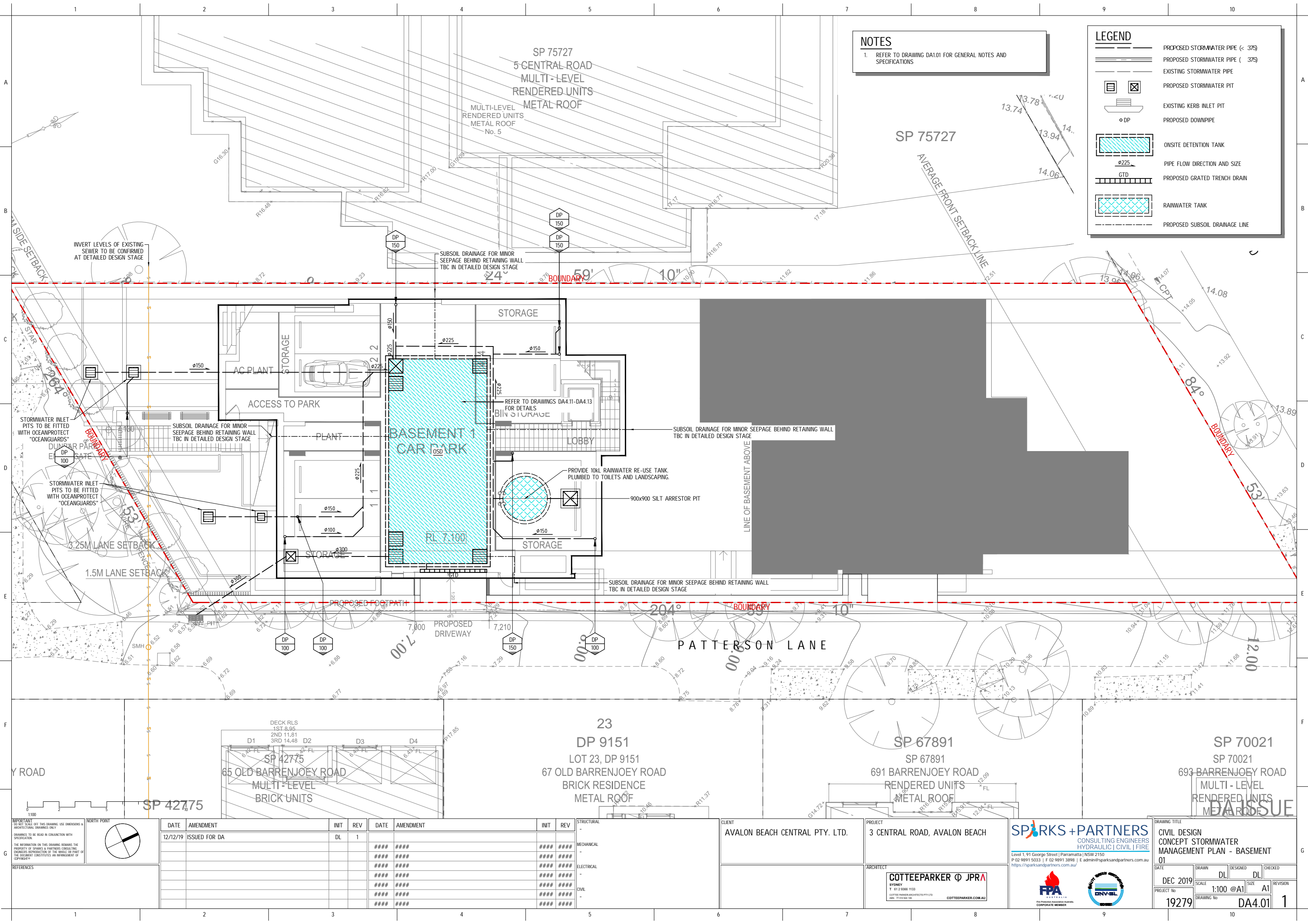
- DA1.01 COVER SHEET, DRAWING SCHEDULE & LOCALITY PLAN
- DA2.01 CONCEPT SEDIMENT & EROSION CONTROL PLAN & DETAILS
- DA4.01 CONCEPT STORMWATER MANAGEMENT PLAN - BASEMENT 01
- DA4.02 CONCEPT STORMWATER MANAGEMENT PLAN - LOWER GROUND
- DA4.03 CONCEPT STORMWATER MANAGEMENT PLAN - GROUND
- DA4.10 CONCEPT STORMWATER CATCHMENT PLAN
- DA4.11 STORMWATER MANAGEMENT DETAILS SHEET 1
- DA4.12 STORMWATER MANAGEMENT DETAILS SHEET 2



LOCALITY PLAN
NOT TO SCALE - COURTESY OF SIX MAPS



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NOTES

1. REFER TO DRAWING DA1.01 FOR GENERAL NOTES AND SPECIFICATIONS

LEGEND

- PROPOSED STORMWATER PIPE (< 375)
- PROPOSED STORMWATER PIPE (375)
- EXISTING STORMWATER PIPE
- PROPOSED STORMWATER PIT
- EXISTING KERB INLET PIT
- PROPOSED DOWNPIPE
- ONSITE DETENTION TANK
- PIPE FLOW DIRECTION AND SIZE
- PROPOSED GRATED TRENCH DRAIN
- RAINWATER TANK
- PROPOSED SUBSOIL DRAINAGE LINE

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ENVIRONMENTAL & WATER SERVICES

DRAWING TITLE
CIVIL DESIGN
CONCEPT STORMWATER
MANAGEMENT PLAN - BASEMENT

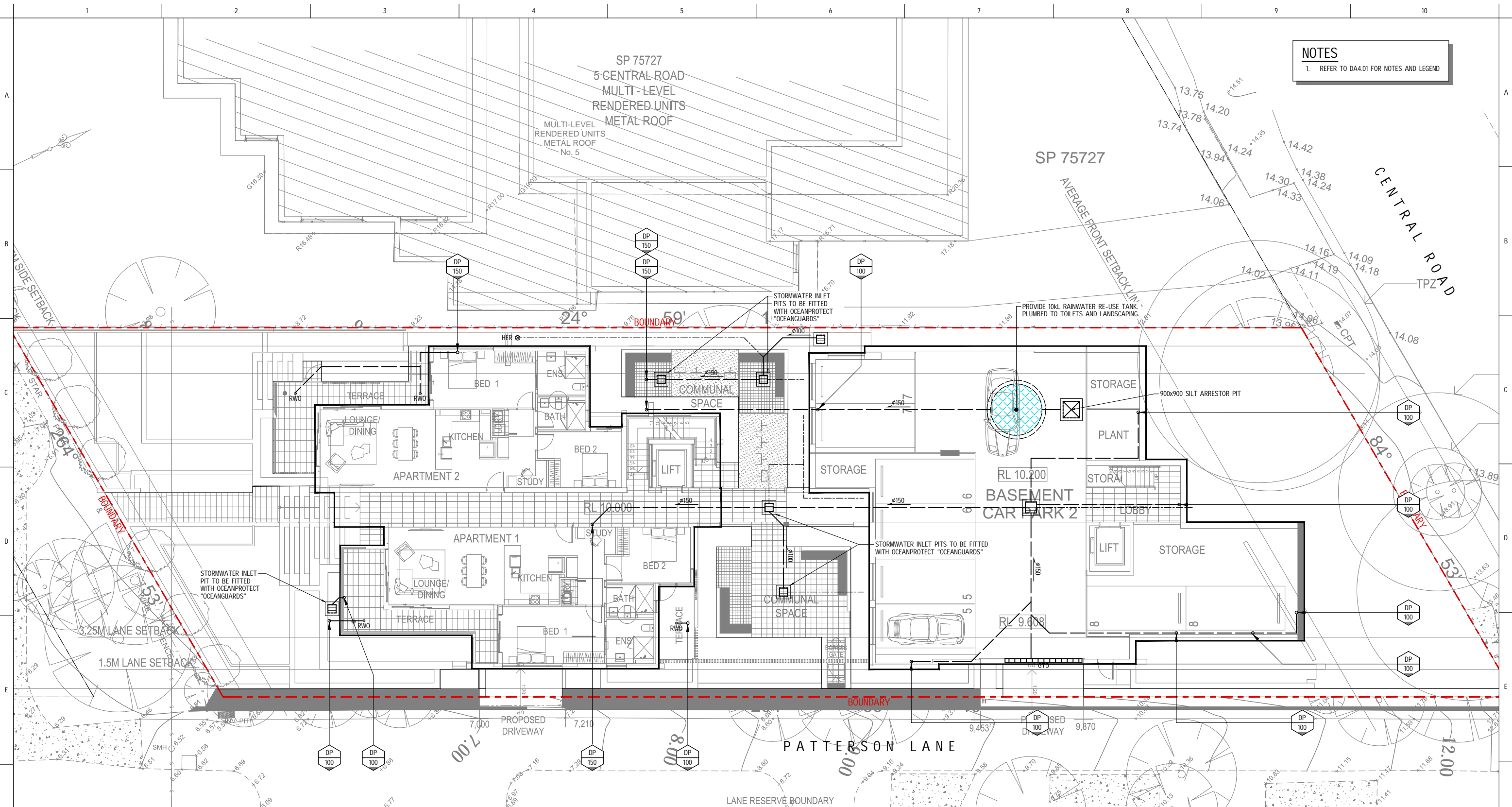
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NOTES
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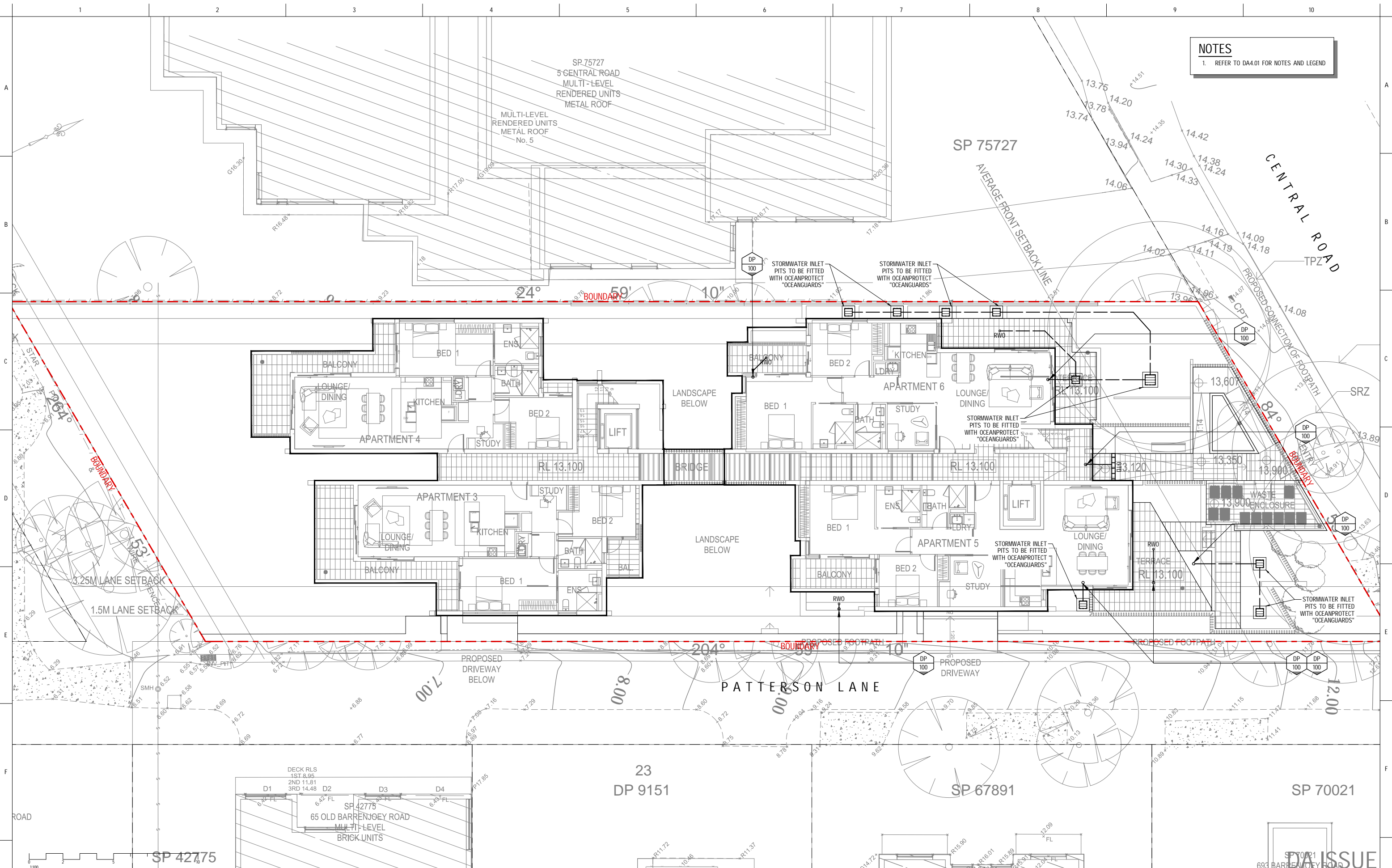
CIVIL

DRAWING TITLE
CIVIL DESIGN
CONCEPT STORMWATER
MANAGEMENT PLAN - LOWER
GROUND

DATE	DRAWN	DL	DESIGNED	DL	CHECKED
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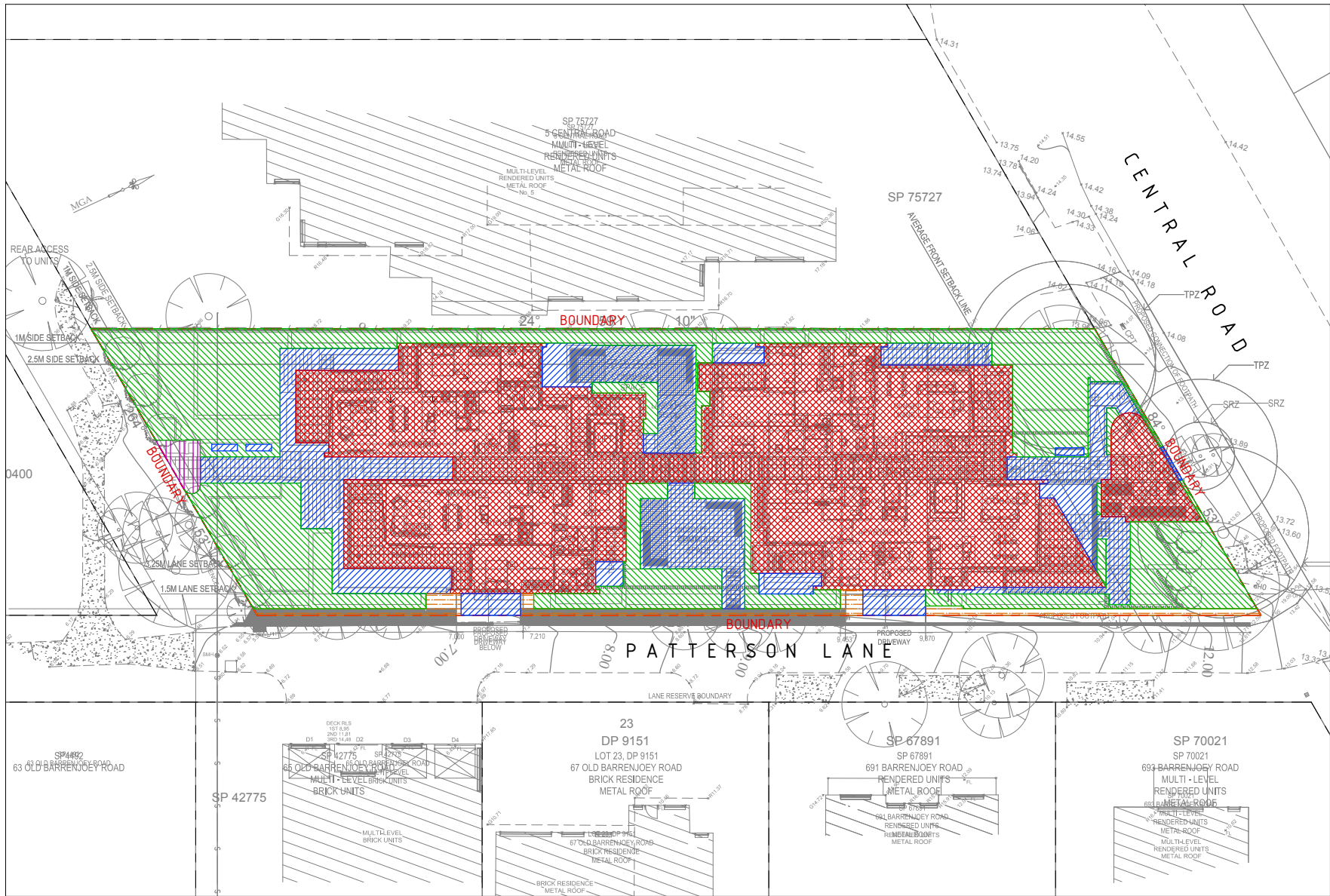
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DA ISSUE
CIVIL DESIGN
CONCEPT STORMWATER
MANAGEMENT PLAN - GROUND

DATE	DRAWN	DL	DESIGNED	DL	CHECKED
DEC 2019					
PROJECT No	19279	SCALE	1:100 @A1	SIZE	A1
DRAWING No	DA4.03	REVISION			1

W:\2 - PROJECTS\2019\19279 - 3 CENTRAL RD. AVALON BEACH - DESIGN\DRAWINGS\B - DESIGN\DRAWINGS\B - CIVIL\19279_DA4.03.DWG



LEGEND

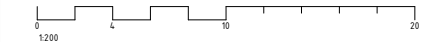
IMPERVIOUS CATCHMENT AREA = 262m²

PERVIOUS CATCHMENT AREA = 396m²

NOTES

1. REFER TO DRAWING DA1.01 FOR GENERAL NOTES AND SPECIFICATIONS

CONCEPT STORMWATER CATCHMENT PLAN
SCALE 1:200



IMPORTANT

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REFERENCES

DATE	AMENDMENT	INIT	REV	DATE	AMENDMENT	INIT	REV
12/12/19	ISSUED FOR DA	DL	1				

STRUCTURAL	-
MECHANICAL	-
ELECTRICAL	-
CIVIL	-

CLIENT

AVALON BEACH CENTRAL PTY. LTD.

PROJECT

3 CENTRAL ROAD, AVALON BEACH

ARCHITECT

COTTEEPARKER & JPR

SYDNEY

T: 61 2 9386 1133

COTTEEPARKERARCHITECTS PTY LTD

ABN: 77 010 000 100

COTTEEPARKER.COM.AU

SPARKS+PARTNERS

CONSULTING ENGINEERS

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FPA

Fire Protection Association Australia

CORPORATE MEMBER

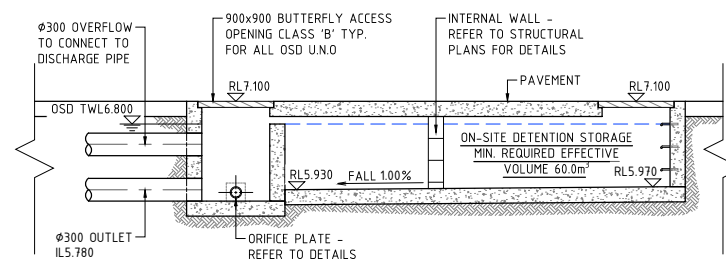
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ENVIRONMENTAL

CORPORATE MEMBER

DRAWING TITLE			
CIVIL DESIGN CONCEPT STORMWATER CATCHMENT PLAN			
DATE	DRAWN	DESIGNED	CHECKED
DEC 2019	DL	DL	DL
PROJECT No	SCALE	SIZE	REVISION
19279	1:200 @A1	A1	
DRAWING No			
DA4.10			1

OSD & RWT BASE PLAN
SCALE 1:50



OSD TANK SECTION

SCALE 1:50

B

DA4.11



DA ISSUE

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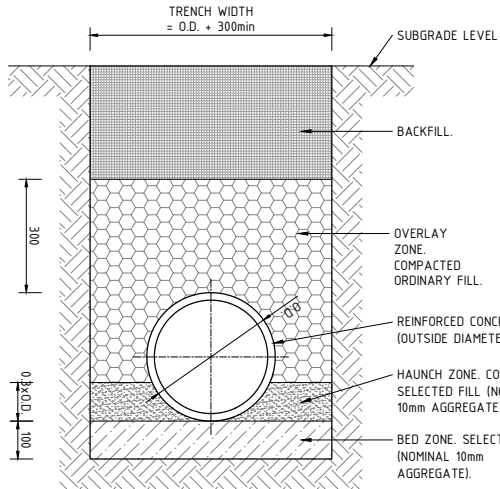
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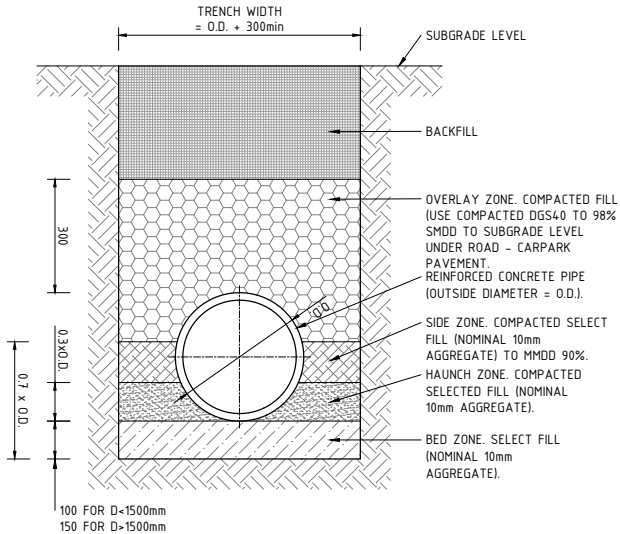
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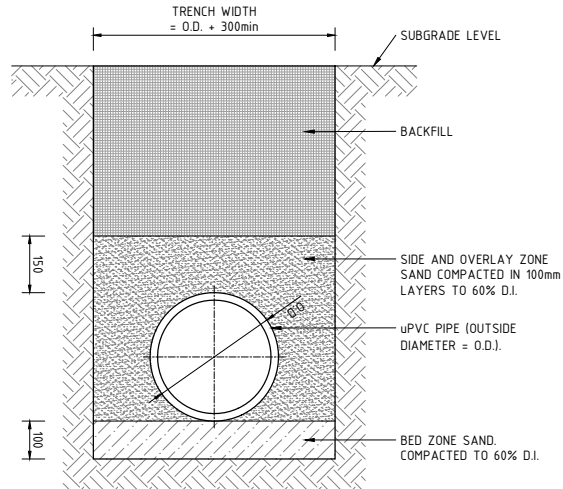
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- NOTES**
1. TRENCH WIDTH MAY NEED TO BE INCREASED SUBJECT TO ACHIEVING ADEQUATE COMPACTION.
 3. THE CONTRACTOR SHALL ENSURE THAT THE SHORING OF TRENCHES IS INSTALLED AS REQUIRED BY STATUTORY REQUIREMENTS.
 4. ENSURE BACKFILLING COMPACTION MEETS THE FOLLOWING STANDARDS
- 90% SMD



- NOTES**
1. TRENCH WIDTH MAY NEED TO BE INCREASED SUBJECT TO ACHIEVING ADEQUATE COMPACTION.
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 3. ENSURE BACKFILLING COMPACTION MEETS THE FOLLOWING STANDARDS
- 100% SMD

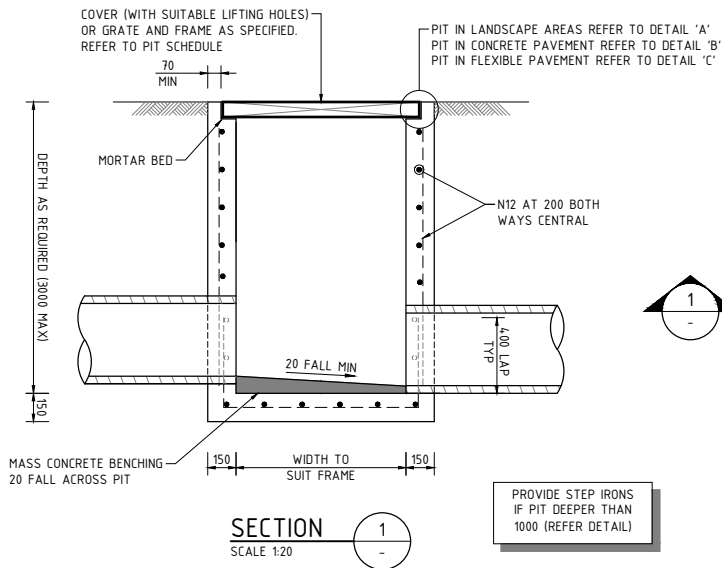


- NOTES**
1. TRENCH WIDTH MAY NEED TO BE INCREASED SUBJECT TO ACHIEVING ADEQUATE COMPACTION.
 2. THE CONTRACTOR SHALL ENSURE THAT THE SHORING OF TRENCHES IS INSTALLED AS REQUIRED BY STATUTORY REQUIREMENTS.
 3. ENSURE BACKFILLING COMPACTION MEETS THE FOLLOWING STANDARDS
- 60% D.I.

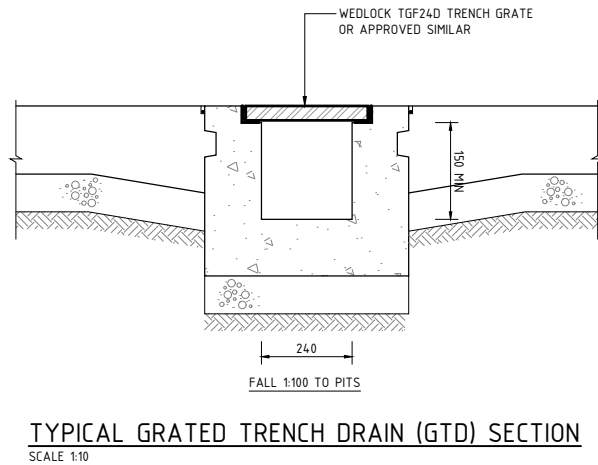
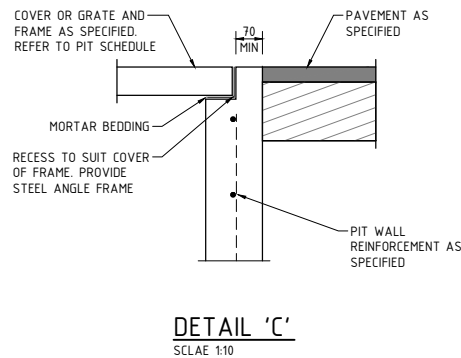
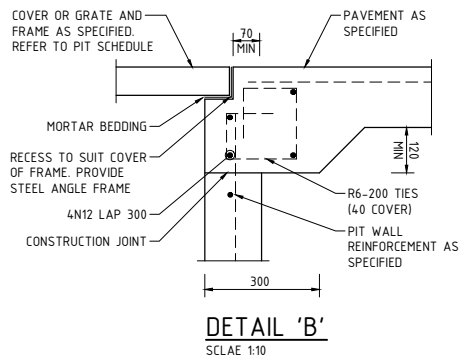
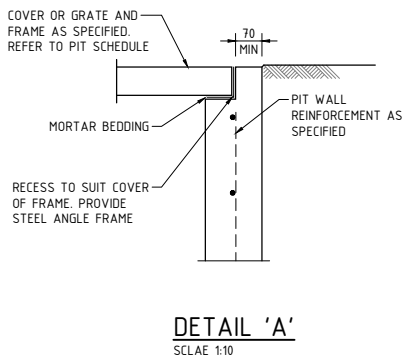
CONCRETE PIPE TRENCHING IN LANDSCAPING
SCALE 1:10

CONCRETE PIPE TRENCHING IN PAVED AREAS
SCALE 1:10

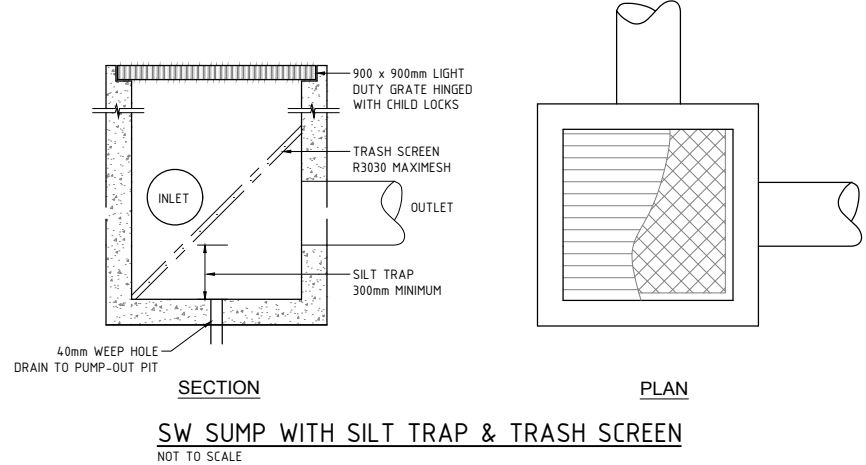
PIPE TRENCHING FOR uPVC PIPE
SCALE 1:10



SURFACE INLET / JUNCTION PIT
(PIPE SIZES ≤ Ø450)



TYPICAL GRATED TRENCH DRAIN (GTD) SECTION
SCALE 1:10



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APPENDIX B. ON-SITE DETENTION CHECKLIST

Appendix 16 – On-site Detention Checklist

This checklist is to be used to determine the on-site stormwater disposal requirement for developments and must be completed and included with the submission of any development application for these works. Please read this form carefully for its notes, guidelines, definition and relevant policies.

For assistance and support, please contact Council's Development Engineering and Certification team on 1300 434 434.

Part 1 Location of the Property			
House Number	3	Legal Property Description	
Street	Central Road	Lot	27
Suburb	Avalon Beach	Section	Null
Postcode	2107	DP	DP9151

Part 2 Site Details			
Northern Beaches Stormwater Regions (refer to Map 2 of Northern Beaches Council's Water Management for Development policy)	1	Total Site Area	1,418m ²
Pre-Development Impervious Area	465m ²	Post-Development Impervious Area	1,020m ²
Is the site of the development located within an established Flood Prone Land as referred to Council's Local Environmental Plans? If yes, On-site stormwater Detention system (OSD) is not required and please proceed to part 5 of this checklist If no, please proceed to part 3 of this checklist.			Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

Part 3: Northern Beaches Stormwater Regions (refer to Map 2 of Northern Beaches Council's Water Management for Development policy)
If the site of the development located within Region 1, please proceed to the part 4.1 of this checklist
If the site of the development located within Region 2, please proceed to the part 4.2 of this checklist
If the site of the development located within Region 3, please proceed to the part 4.3 of this checklist
If the site of the development located within Region 4, please refer to Council's Warriewood Valley Water Management Specification.

Part 4 Determination of OSD Requirements

Part 4.1 Northern Beaches Stormwater Region 1

Is the additional impervious area of the development more than 50 m² on a cumulative basis since February 1996?

Yes ☒ No ☐

If yes, OSD is required and please refer to section 9.3.1 of Council's Water Management for Development Policy

If no, OSD is not required and please proceed to the part 5 of this checklist

Part 4.2 Northern Beaches Stormwater Region 2

Part 4.2.1 Description of Work

Residential flat building, commercial, industrial, multiple occupancy development and subdivisions resulting in the creation of three lots or more, will require OSD in all case. Please provide a design in accordance with the section 9.3.2 of Council's Water Management for Development Policy.
Any single residential building development, please proceed to part 4.2.2 of this checklist.

Part 4.2.2 Exemption

Is the site area less than 450m²?

Yes ☐ No ☐

Does the site of the development drain directly to the ocean without the need to pass through a drainage control structure such as pipe, bridge, culvert, kerb and gutter or natural drainage system?

Yes ☐ No ☐

Is it an alternation and addition development to the existing dwellings?

Yes ☐ No ☐

If yes to any of the above questions, OSD is not required.
If no to all the above questions, proceed to part 4.2.3

Part 4.2.3 Determination of OSD Requirements

Calculation

a) Site area m² x 0.40 (40%) = m²
b) Post- development impervious area = m²

OSD will not be required when (a) is greater than (b)

Is OSD required for this development (tick one only) Yes ☐ No ☐

If yes, provide a design in accordance with the section 9.3.2 of Council's Water Management for Development Policy.

If no, OSD is not required and please proceed to part 5 of this checklist.

Part 4.3 Northern Beaches Stormwater Region 3	
Part 4.3.1 Stormwater Zone	
In the region, the method of stormwater control to be applied shall depend on the location of the site. Please refer to Map 3 of Northern Beaches Council's Water Management for Development policy.	
If the site of the development located within stormwater zone 1, please proceed to the part 4.3.2 of this checklist	
If the site of the development located within stormwater zone 2, please provide a design in accordance with the section 9.3.3.3 of Council's Water Management for Development Policy.	
If the site of the development located within stormwater zone 3, please provide a design in accordance with the section 9.3.3.4 of Council's Water Management for Development Policy.	
If the site of the development located within stormwater zone 4, please provide a design in accordance with the section 9.3.3.5 of Council's Water Management for Development Policy.	
Part 4.3.2 Determination of OSD requirements in Stormwater Zone 1	
Part 4.3.2.1 For A New Building	
1) Exemption	<p>a) Is the site area less than 400? Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>b) Is the post-development impervious area less than 190 m²? Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>If yes to both questions, OSD is not required. If no to any of the above questions, please process to calculation</p>
2) Calculation	<p>a) Site area _____ m² x 0.35 = _____ m² + 50 = _____ m²</p> <p>b) Post- development impervious area _____ m²</p> <p>OSD will not be required when (b) is less than 250 m² and (a) is greater than (b) Is OSD required for this development? Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>If yes, provide a design in accordance with the section 9.3.3.2 of Council's Water Management for Development Policy. If no, OSD is not required and please proceed to part 5.</p>
Part 4.3.2.2 For Alterations and Additions	
If the current impervious area of the site is more than 60% of the site area, OSD will be required. Alternatively, please proceed to the next calculation section.	
1) Calculation	<p>Is the post development impervious area increased by less than 50 m²? Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>Is the post development impervious area less than 60% of the site area? Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>If yes to both questions, OSD is not required. If no to any of the above questions, provide a design in accordance with section 9.3.3.2 of Council's Water Management for Development Policy</p>

Part 5 Disposal of Stormwater

Does the site fall naturally towards the street?

Yes ☒ No ☐

If yes, provide a design in accordance with section 5.1 of Council's Water Management for Development Policy.

If no, provide a design in accordance with section 5.5 of Council's Water Management for Development Policy.

Definitions

Designed to help you fill out this application

Site area: This refers to the area of the land bounded by its existing or proposed boundaries.

Impervious area: This refers to driveways, parking spaces, pathways, paved areas, hardstand areas, roofed areas, garages and outbuildings.

Pre Development Impervious area: This refers all impervious areas of the site before the development.

Post Development Impervious areas: This refers all the impervious areas within the site after the development is completed.

APPENDIX C. MAINTENANCE & MONITORING SCHEDULE

Job No.:

Date: Click or tap to enter a date.

Author Name:

Signature:

PROJECT ADDRESS: 3 Central Road, Avalon Beach**General Notes:**

1. Maintenance is to be carried out with regard to relevant occupational health and safety guidelines and standards. This includes all confined space, traffic management, fall arrest and other requirements.
2. Initial monitoring and inspections of the stormwater system post commissioning are to be carried out every 3 months for the first year of operation. The amount and type of debris is to be noted and recorded. This information shall be used to determine if modification of the frequency of inspections is required.
3. The frequency of inspections shown in the stormwater maintenance schedule are the maximum periods. Inspection frequencies may be reduced upon completion of the initial monitoring and inspection program as noted in note 2.
4. Blank copies of the maintenance schedule are to be made and filled out during each subsequent inspection with the details kept on site for future reference.

Inspected by:

Date of Inspection:

Date of Next Inspection:

Item to be Inspected	Frequency	Performed by	Inspected	Maintenance Required	Maintenance Procedure	Maintenance Completed
			Yes/No	Yes/No		Date
General						
Eaves/Box Guttering System and Downpipes	Six Monthly/ After Major Storm	Owner / Maintenance Contractor			Inspect and remove any build up of sediment, debris, litter and vegetation within gutter system.	
Stormwater surface inlet and junction pits	Four Monthly/ After Major Storm	Owner / Maintenance Contractor			Remove grate and inspect internal walls and base, repair where required. Remove any collected sediment, debris, litter and vegetation. (e.g. Vacuum/eductor truck) Inspect and ensure grate is clear of sediment, debris, litter and vegetation. Ensure flush placement of grate on refitment	
General inspection of complete stormwater drainage system (that's visible)	Bi-annually	Owner / Maintenance Contractor			Inspect all drainage structures noting any dilapidation, carry out required repairs.	

Rainwater Tank						
First Flush Device	6 Monthly	Owner / Maintenance Contractor			Inspect first flush device to ensure correct operation. Remove accumulated litter & debris. If device is not functioning properly repair or replace.	
Internal Inspection	6 Monthly	Owner / Maintenance Contractor			Check for evidence of access by animals, birds or insects including the presence of mosquito larvae. If present, identify access point and close. If evidence of algal growth, find and close points of light entry.	
Tank and tank roof	6 Monthly	Owner / Maintenance Contractor			Check structural integrity of tank including roof and access covers. Any dilapidation including holes or gaps are to be noted and repaired.	
Proprietary Treatment Devices						
OceanProtect OceanGuard	Refer Manufactures Manual	Maintenance / Specialised Contractor			Refer to manufacturers operation and maintenance manual.	
OceanProtect PSorb StormFilter Cartridges	Refer Manufactures Manual	Maintenance / Specialised Contractor			Refer to manufacturers operation and maintenance manual.	
On-Site Detention Tank						
Trash Screen	Six Monthly/ After Major Storm	Owner / Maintenance Contractor			Inspect trash screen to ensure correct operation. Remove accumulated litter & debris. If device is not functioning properly repair or replace.	
Orifice Plate	Six Monthly/ After Major Storm	Owner / Maintenance Contractor			Inspect orifice plate to ensure correct operation. Check orifice diameter size is correct and no damage is present to orifice edge. Check orifice plate is securely fastened to wall with no gaps present between plate and face of wall. If gaps are present fill with sealant or mortar to provide water tight seal.	
Weep Holes in base of sump	Six Monthly/ After Major Storm	Owner / Maintenance Contractor			Inspect weep holes in base of sump. Ensure weep holes are able to drain effectively and remove accumulated sediment and debris if present.	
Tank and tank roof	6 Monthly	Owner / Maintenance Contractor			Check structural integrity of tank including roof and access covers. Any dilapidation including holes or gaps are to be noted and repaired.	