TAYLOR

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CONSULTING ENGINEERS
Civil
Structural
Stormwater & Flood

12 April 2024

Gareth David
Planner - Development Assessment
Northern Beaches Council
725 Pittwater Road
Dee Why NSW 2099

Address of the Project: **431 Pittwater Road, North Manly**

Description of Project: **Engineering Referal Response - DA2023/1708**

With reference to the Development Application for the above property and Council's email response dated 20 February 2024, please find attached:

Plans by Taylor Consulting Engineers: Stormwater Management Plan, STORM-1/A, Stormwater Management Details, STORM-2/A for your perusal.

The response to your points are provided below and shown on drawings as follows:

Natural Environmental Referral Response

1. *Outlet cross-section with relevant outlet and creek levels*

    - The Stormwater Management Plan has been updated with additional topographic levels to show the existing creek bed & water surface levels (Refer to STORM-1/A & STORM-2/A attached).

    - Headwall outlet & scour protection detail has been updated to show proposed outlet levels (Refer to STORM-2/A attached).

2. *Flow information to confirm appropriate scour protection sizing & dimensions, including justification of the angle of the outlet connection (ideally 45 degree angle downstream)*

    - The Stormwater Management Plan has been updated to show both headwall outlets at a 45-degree angle to downstream flow (Refer to STORM-1/A attached).

    - The use of two outlets have been used due to the unsafe outlet flows in large storm events (See image 3).

- Scour protection & sizing were designed in accordance with the Austroads - Guide to Road Design Part 5B: Drainage-Open Channels, Culverts & Floodway Crossings. Specifically, Figure 3.15: Single pipe outlet minimum rock size and length of apron. (See image 4)

Water Management Referral Response

1. *Stormwater Plan is not supported by a water quality model, and the design is lacking water sensitive urban design features.*

   The plan incorporates Stormsacks and Ecocepters per Water Quality Management requirements stated in Table 5 of Northern Beaches Council Water Management for Development Policy (See MUSIC model attached). Northern Beaches Councils Stormwater quality objectives are also met through the combined use of scour protection measures and water quality management devices.

Should you require any further information, please contact the undersigned.

Yours faithfully
TAYLOR CONSULTING

J P LEIGH – Principal Consulting Engineer
B.E. (Civil) M.I.E. Aust. C.P. Eng N.E.R.
TAYLOR CONSULTING CIVIL & STRUCTURAL ENGINEERS

Appendix

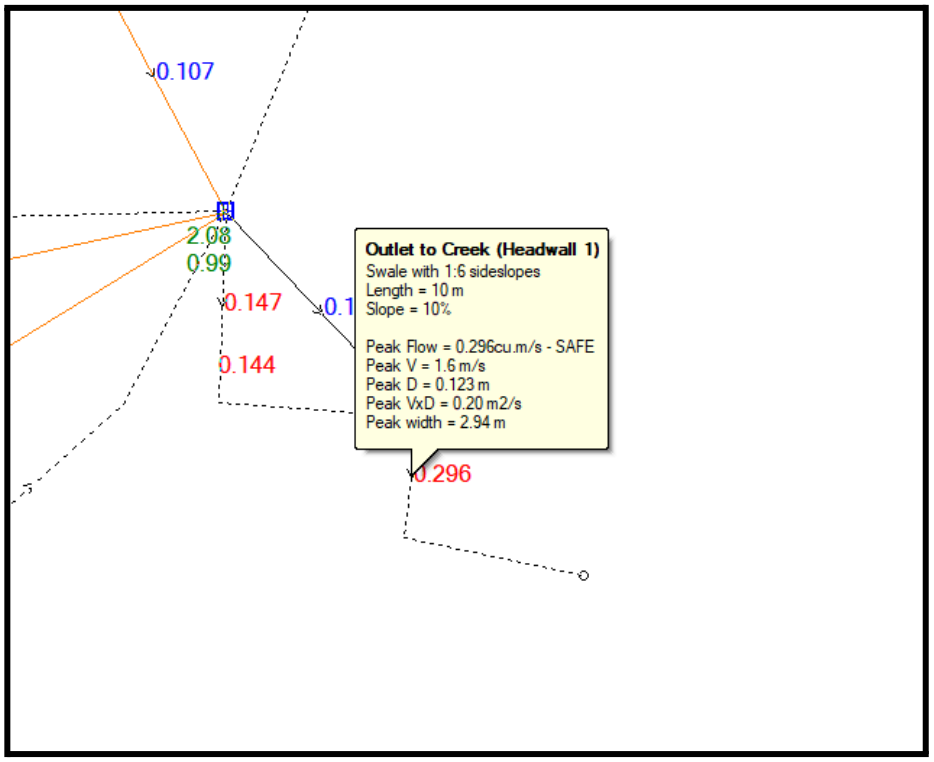


Image 1: 1% AEP (Outlet to Creek Headwall 1)

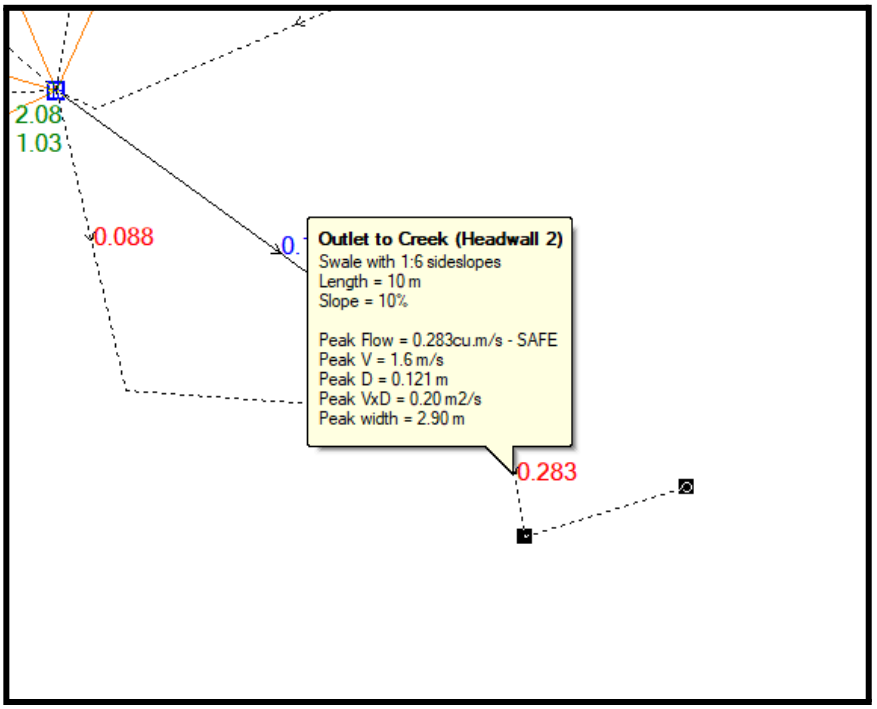


Image 2: 1% AEP (Outlet to Creek Headwall 2)

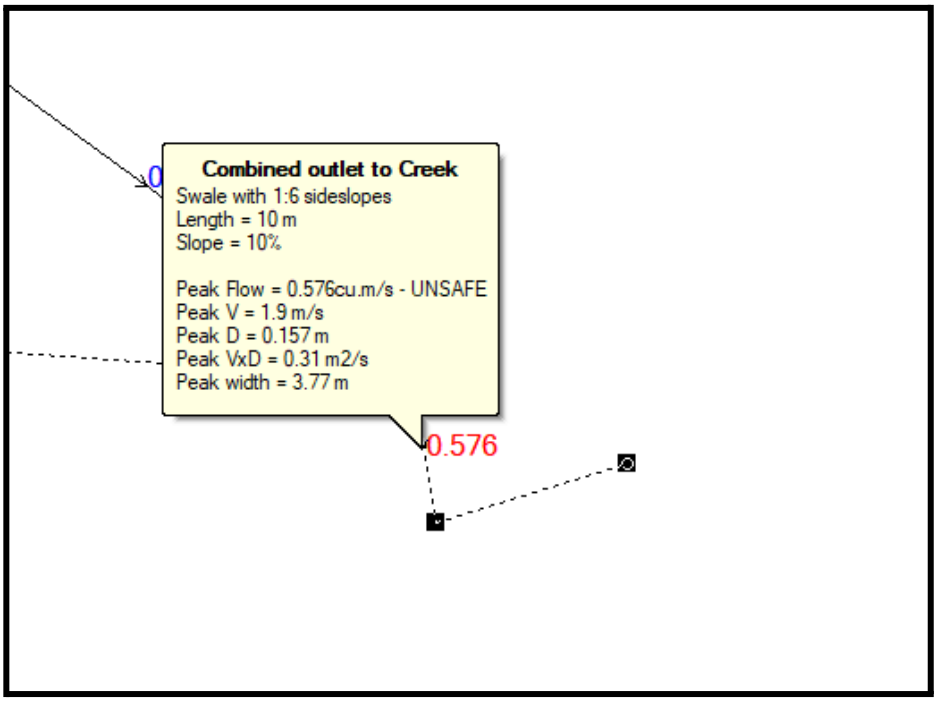


Image 3: 1% AEP (Combined outlet to Creek)

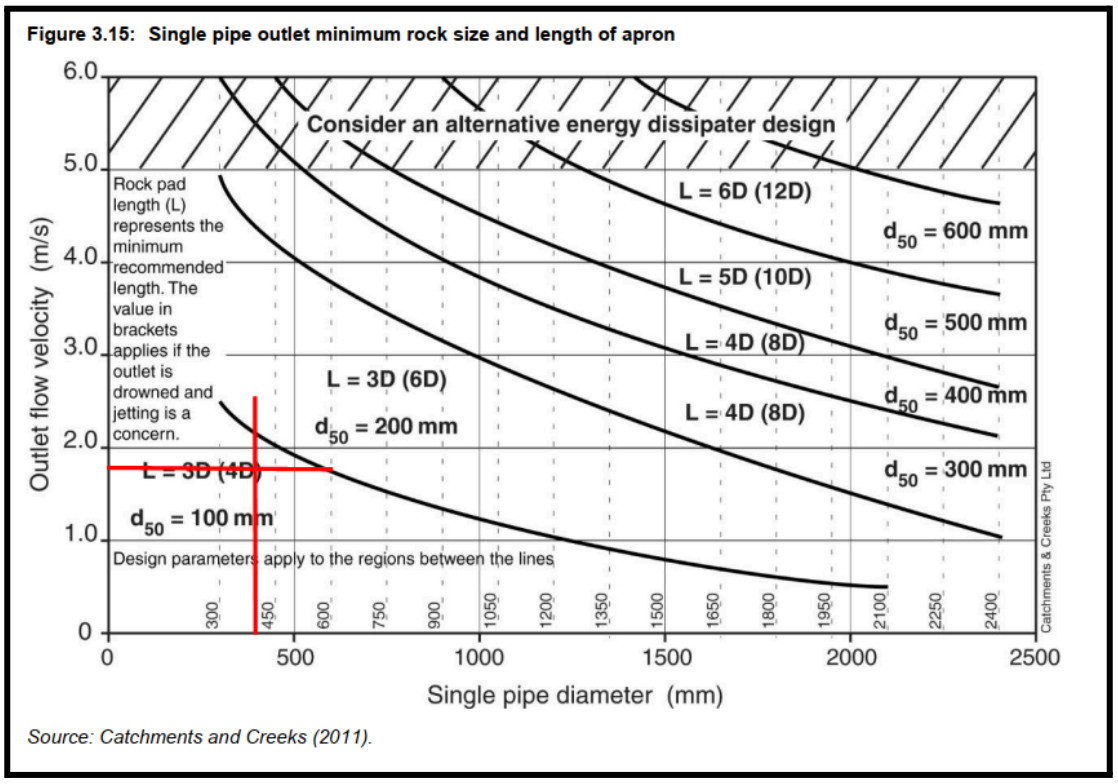


Image 4: Figure 3.15 - Single pipe outlet minimum rock size and length of apron.

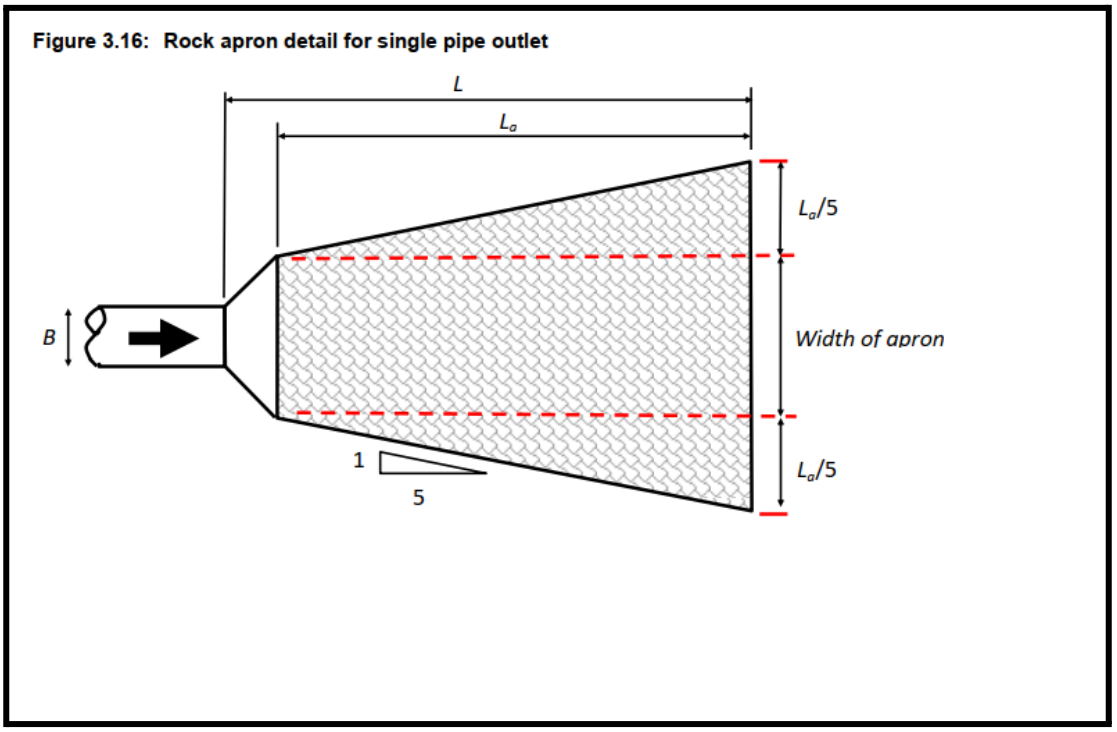


Image 5: Figure 3.16 - Rock apron detail for single pipe outlet.

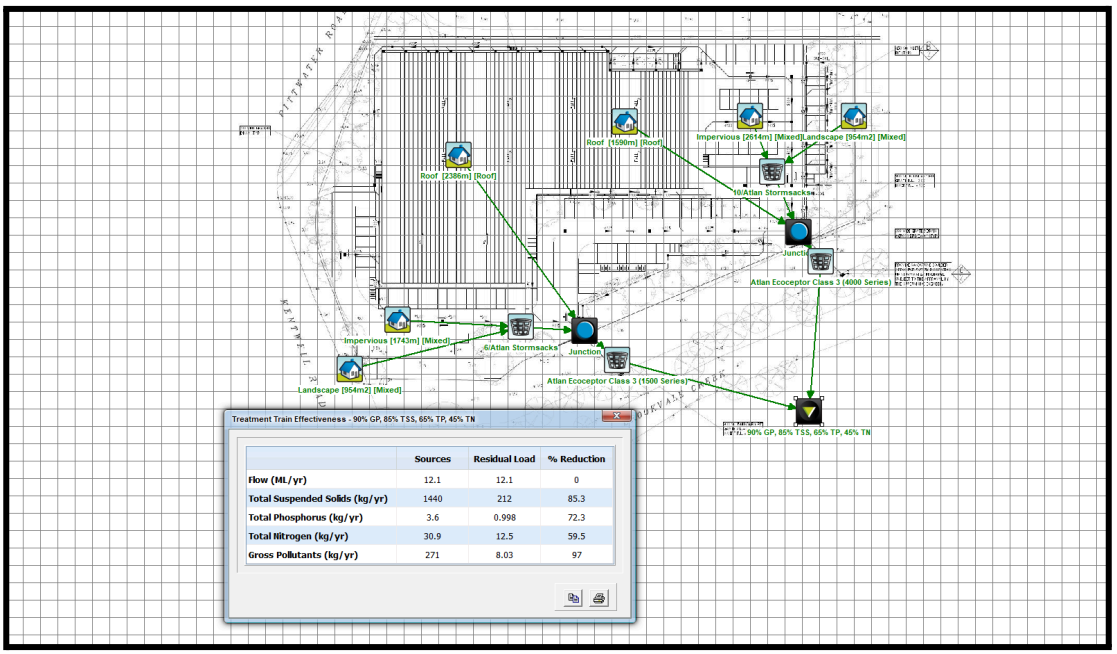
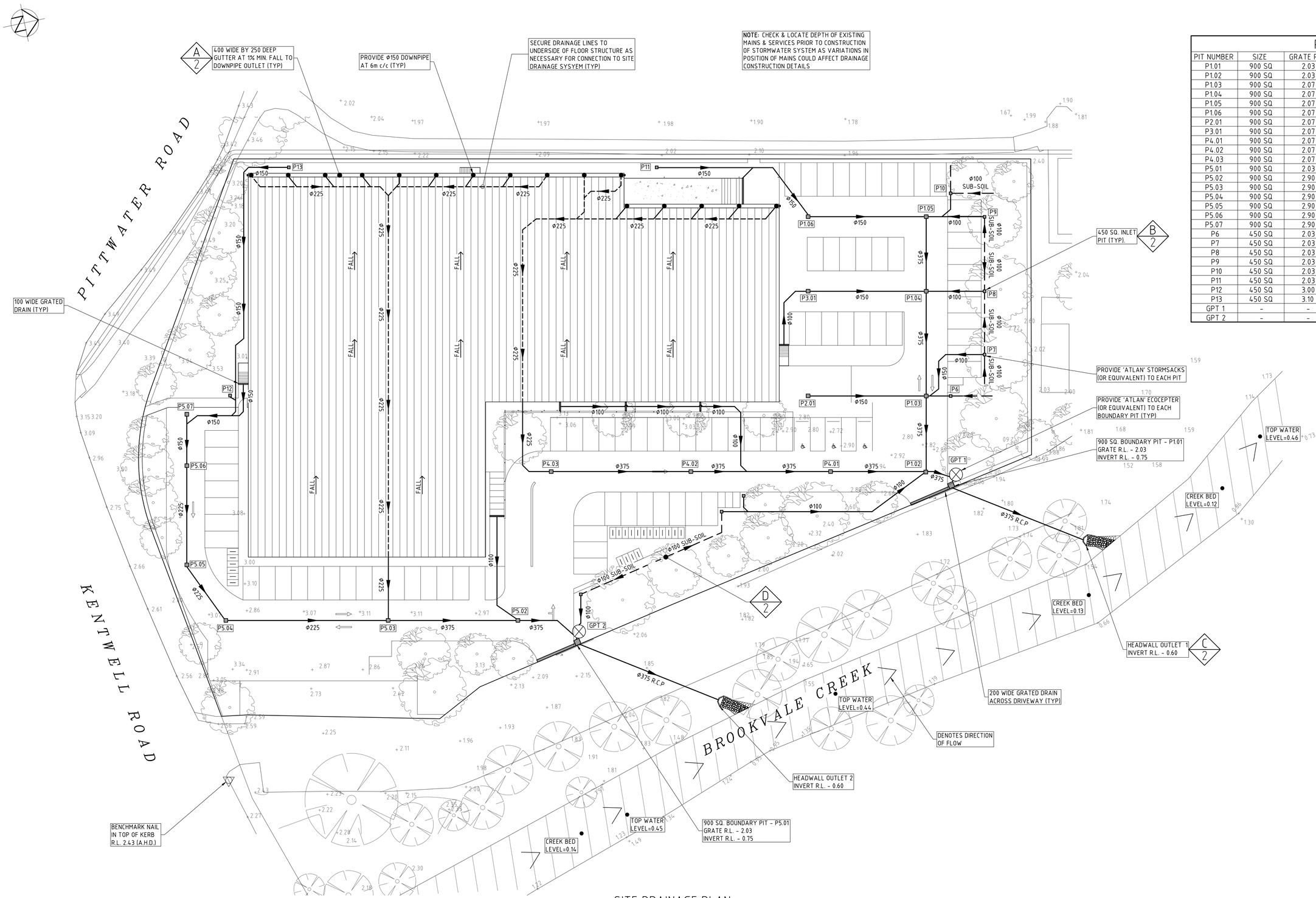


Image 6: 431 Pittwater Road - MUSIC Model



SITE DRAINAGE PLAN

SCALE 1:300

NOTE: PROVIDE 'ATLAN' STORMSACKS (OR EQUIVALENT) TO EACH INLET PIT

PIT SCHEDULE

PIT NUMBER	SIZE	GRATE R.L	INVERT R.L	TYPE	POLLUTION CONTROL
P1.01	900 SQ	2.03	0.75	INLET PIT	STORMSACK
P1.02	900 SQ	2.03	0.80	INLET PIT	STORMSACK
P1.03	900 SQ	2.07	0.85	INLET PIT	STORMSACK
P1.04	900 SQ	2.07	1.00	INLET PIT	STORMSACK
P1.05	900 SQ	2.07	1.14	INLET PIT	STORMSACK
P1.06	900 SQ	2.07	1.26	INLET PIT	STORMSACK
P2.01	900 SQ	2.07	1.00	INLET PIT	STORMSACK
P3.01	900 SQ	2.07	1.12	INLET PIT	STORMSACK
P4.01	900 SQ	2.07	0.90	INLET PIT	STORMSACK
P4.02	900 SQ	2.07	1.10	INLET PIT	STORMSACK
P4.03	900 SQ	2.07	1.30	INLET PIT	STORMSACK
P5.01	900 SQ	2.03	0.75	INLET PIT	STORMSACK
P5.02	900 SQ	2.90	1.21	INLET PIT	STORMSACK
P5.03	900 SQ	2.90	1.46	INLET PIT	STORMSACK
P5.04	900 SQ	2.90	1.67	INLET PIT	STORMSACK
P5.05	900 SQ	2.90	1.76	INLET PIT	STORMSACK
P5.06	900 SQ	2.90	2.00	INLET PIT	STORMSACK
P5.07	900 SQ	2.90	2.10	INLET PIT	STORMSACK
P6	450 SQ	2.03	1.43	INLET PIT	STORMSACK
P7	450 SQ	2.03	1.43	INLET PIT	STORMSACK
P8	450 SQ	2.03	1.43	INLET PIT	STORMSACK
P9	450 SQ	2.03	1.43	INLET PIT	STORMSACK
P10	450 SQ	2.03	1.43	INLET PIT	STORMSACK
P11	450 SQ	2.03	1.43	INLET PIT	STORMSACK
P12	450 SQ	3.00	2.40	INLET PIT	STORMSACK
P13	450 SQ	3.10	2.70	INLET PIT	STORMSACK
GPT 1	-	-	-	-	ECOCEPTER
GPT 2	-	-	-	-	ECOCEPTER

STORMWATER SYSTEM DESIGN DATA

SITE DATA

SITE AREA = 10,240 m² (100%)
PROPOSED IMPERVIOUS AREA = 8,333 m² (81.4%)
PROPOSED LANDSCAPED AREA = 1,907 m² (18.6%)

ISSUE DATE	REVISION
9 APRIL 2024	HEADWALL LOCATIONS UPDATED

TITLE
STORMWATER MANAGEMENT PLAN
431 PITTWATER ROAD, NORTH MANLY

DRAWN	DATE	CHECKED	SCALE @ A1
JBP	03 NOVEMBER 2023	BE Civil (Hons) MIE Aust	1:300
ENGINEER: R B			

TAYLOR CONSULTING
CIVIL & STRUCTURAL ENGINEERS

DRAWING NO: STORM-1/A

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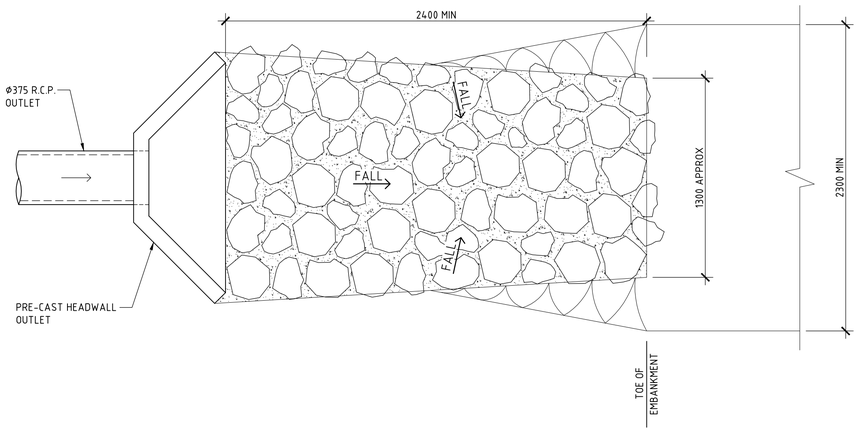
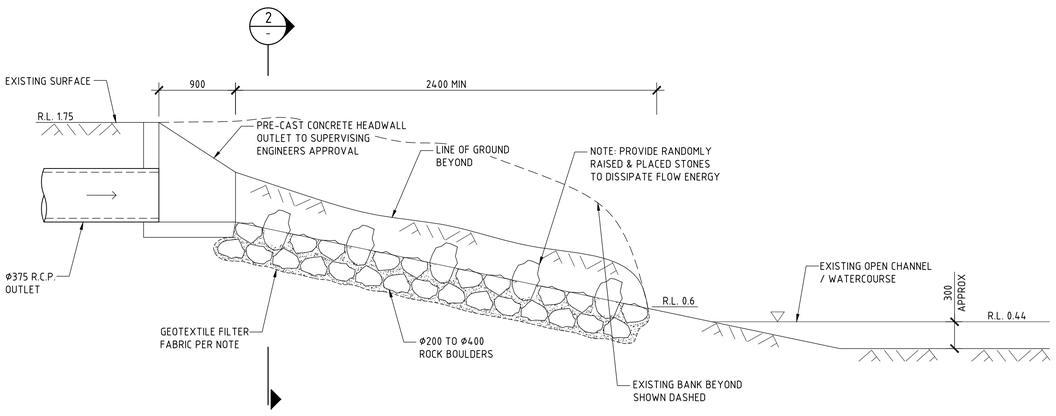


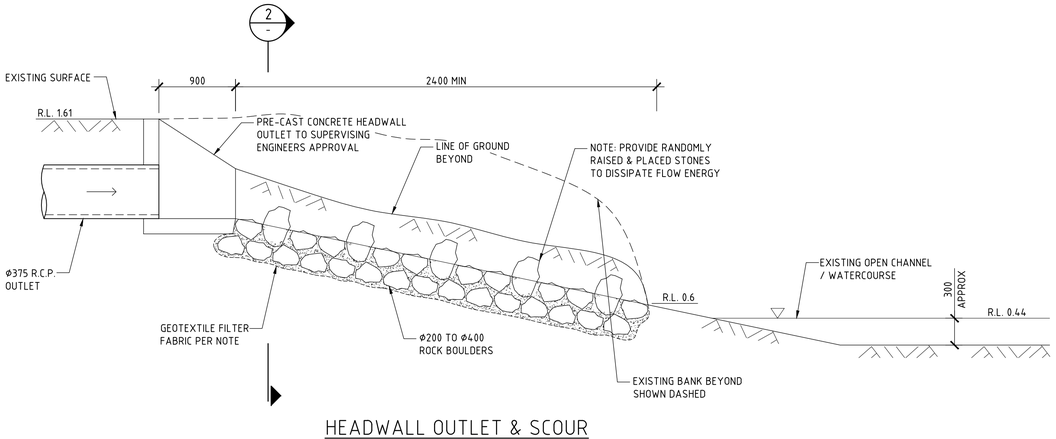
HEADWALL OUTLET & SCOUR PROTECTION - PLAN VIEW

DETAIL C/1
SCALE 1:20



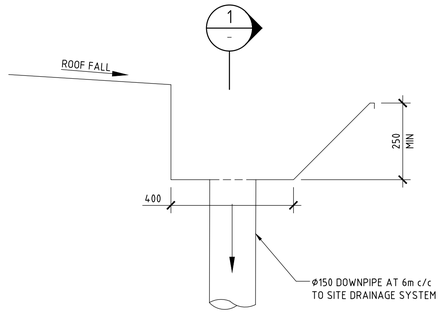
HEADWALL OUTLET & SCOUR PROTECTION - SECTION VIEW

SCALE 1:20
SHOWING HEADWALL OUTLET 1



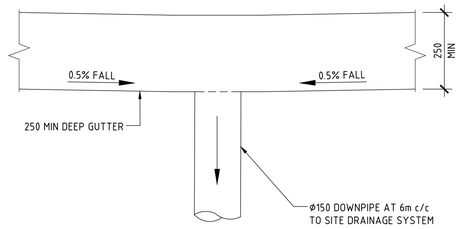
HEADWALL OUTLET & SCOUR PROTECTION - SECTION VIEW

SCALE 1:20
SHOWING HEADWALL OUTLET 2



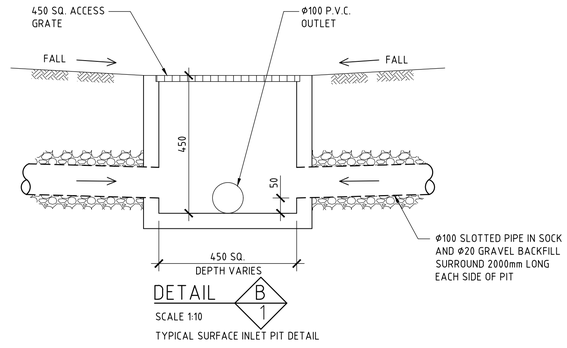
DETAIL A/1
SCALE 1:10

SHOWING GUTTER PROFILE & TYPICAL OUTLET SECTION



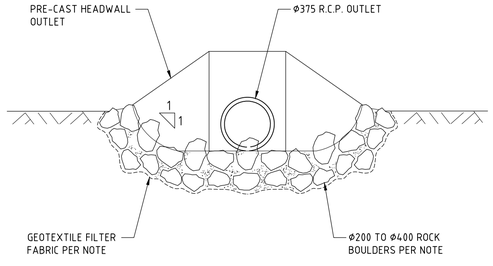
SECTION 1/-
SCALE 1:10

SHOWING LONGITUDINAL GUTTER PROFILE AT DOWNPIPE

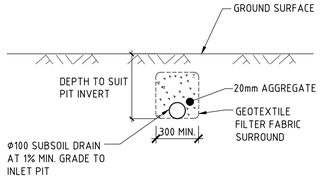


DETAIL B/1
SCALE 1:10

TYPICAL SURFACE INLET PIT DETAIL



SECTION 2/-
SCALE 1:20



DETAIL D/1
SCALE 1:20

TYPICAL SUB-SOIL DRAINAGE LINE

HEADWALL NOTES:

MATERIALS (ROCK PADS)

- ROCK : HARD, ANGULAR, DURABLE,WEATHER RESISTANT AND EVENLY GRADED WITH 50% BY WEIGHT LARGER THAT THE SPECIFIED NOMINAL ROCK SIZE AND SUFFICIENT SMALL ROCK TO FILL VOIDS BETWEEN THE LARGER ROCK. THE DIAMETER OF THE LARGEST ROCK SIZE SHOULD BE NO LARGER THAN 1.5 TIMES THE NOMINAL ROCK SIZE. SPECIFIC GRAVITY TO BE AT LEAST 2.5.
- GEOTEXTILE FABRIC: HEAVY-DUTY, NEEDLE-PUNCHED, NON-WOVEN FILTER CLOTH, MINIMUM 'BIDIM' A24 OR EQUIVALENT.

INSTALLATION (ROCK PADS)

1. REFER TO APPROVED PLANS FOR LOCATION AND CONSTRUCTION DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, DIMENSION OR METHOD OF INSTALLATION CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
2. THE DIMENSIONS OF THE OUTLET STRUCTURE MUST ALIGN WITH THE DOMINANT FLOW DIRECTION.
3. EXCAVATE THE OUTLET PAD FOOTPRINT TO THE SPECIFIED DIMENSION SUCH THE WHEN THE ROCK IS PLACED IN THE EXCAVATED PIT THE TOP OF THE ROCKS WILL BE LEVEL WITH THE SURROUNDING GROUND, UNLESS OTHERWISE DIRECTED.
4. IF THE EXCAVATED SOILS ARE DISPERSIVE, OVER-EXCAVATED THE ROCK PAD BY AT LEAST 300MM AND BACKFILL WITH STABLE, NON-DISPERSIVE MATERIAL.
5. LINE THE EXCAVATED PIT WITH GEOTEXTILE FILTER CLOTH, PREFERABLY USING A SINGLE SHEET. IF JOINTS ARE REQUIRED, OVERLAP THE FABRIC AT LEAST 300MM.
6. ENSURE THE FILTER CLOTH IS PROTECTED FROM PUNCHING OR TEARING DURING INSTALLATION OF THE FABRIC AND THE ROCK. REPAIR ANY DAMAGE BY REMOVING THE ROCK AND PLACING ANOTHER PIECE OF FILTER CLOTH OVER THE DAMAGED AREA OVERLAPPING THE EXISTING FABRIC A MINIMUM OF 300MM.
7. ENSURE THERE ARE AT LEAST TWO LAYERS OF ROCKS. WHERE NECESSARY, REPOSITION THE LARGER ROCKS TO ENSURE TWO LAYERS OF ROCKS ARE ACHIEVED WITHOUT ELEVATING THE UPPER SURFACE ABOVE THE PIPE INVERT.
8. ENSURE THE ROCK IS PLACED IN A MANNER THAT WILL ALLOW WATER TO DISCHARGE FREELY FROM THE PIPE.
9. ENSURE THE UPPER SURFACE OF THE ROCK PAD DOES NOT CAUSE WATER TO BE DEFLECTED AROUND THE EDGE OF THE ROCK PAD.
10. IMMEDIATELY AFTER CONSTRUCTION, APPROPRIATELY STABILISE ALL DISTURBED AREAS.

MAINTENANCE

1. WHILE CONSTRUCTION WORKS CONTINUE ON THE SITE, INSPECT THE OUTLET STRUCTURE PRIOR TO FORECAST RAINFALL, DAILY DURING EXTENDED PERIODS OF RAINFALL, AFTER SIGNIFICANT RUNOFF PRODUCING RAINFALL, AND ON AT LEAST A WEEKLY BASIS.
2. REPLACE ANY DISPLACED ROCK WITH ROCK OF A SIGNIFICANTLY (MINIMUM 110%) LARGER SIZE THAN DISPLACED ROCK.

REMOVAL

1. TEMPORARY OUTLET STRUCTURES SHOULD BE COMPLETELY REMOVED, OR WHERE APPROPRIATE, REHABILITATED SO AS NOT TO CAUSE ONGOING ENVIRONMENTAL NUISANCE OR HARM.
2. FOLLOWING REMOVAL OF THE DEVICE, THE DISTURBED AREA MUST BE APPROPRIATELY REHABILITATED SO AS NOT TO CAUSE ONGOING ENVIRONMENTAL NUISANCE OR HARM.
3. REMOVE MATERIALS AND COLLECTED SEDIMENTS AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.

DRAINAGE NOTES

1. DENOTES EXISTING GROUND LEVEL
2. FALL STORMWATER PIPES AT 1% MIN. UNLESS OTHERWISE NOTED.
3. SUB-SOIL DRAINAGE TO BE CONNECTED TO THE SITE DRAINAGE SYSTEM AS NECESSARY.
4. SURFACE GRATES 300 SQ. UNLESS OTHERWISE NOTED.
5. ALL STORMWATER PIPES TO HAVE SOLVENT CEMENT WATERTIGHT JOINTS.
6. CHECK & LOCATE DEPTH OF EXISTING MAINS & SERVICES PRIOR TO CONSTRUCTION OF STORMWATER SYSTEM AS VARIATIONS IN POSITION OF MAINS COULD AFFECT DRAINAGE CONSTRUCTION DETAILS.
7. INSPECTIONS MUST BE UNDERTAKEN BY THIS OFFICE (BY PRIOR ARRANGEMENT WITH ENGINEER) DURING CONSTRUCTION TO ENABLE FULL CERTIFICATION UPON COMPLETION OF WORKS.
8. ALL CONSTRUCTION OF COUNCIL DRAINAGE WORKS TO COMPLY WITH COUNCIL STANDARD.
9. REMOVE REDUNDANT DRAINAGE PITS AND SEAL PIPES.
10. PIT BENCHING TO BE HALF THE OUTGOING PIPE DIAMETER. CONCRETE FOR BENCHING TO BE 20 MPa MASS CONCRETE.
11. APPROVED PRE-CAST PITS MAY BE USED.
12. ALL PIPES TO BE LAID ON COMPACTED FINE CRUSHED ROCK OR SAND BEDDING 75mm THICK & PIPES BACKFILLED WITH COMPACTED SAND TO 300mm ABOVE TOP OF PIPE, ELSE ATTACHED TO UNDERSIDE OF STRUCTURE AT 600mm c/c AS NECESSARY
13. PIPE ROUTES SHOWN ARE INDICATIVE ONLY AND SHOULD BE AS NECESSARY ACCORDING TO SITE CONDITIONS, TREE POSITIONS ETC. CONFIRM SIGNIFICANT CHANGES IN PIPES SYSTEM DETAILS WITH SUPERVISING ENGINEER PRIOR TO COMMENCEMENT OF DRAINAGE CONSTRUCTION WORKS.
14. CONTRACTOR SHALL ENSURE THAT SERVICES TO BUILDINGS NOT AFFECTED BY THE WORKS ARE NOT DISRUPTED. CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES TO MAINTAIN EXISTING SUPPLY TO BUILDINGS WHERE REQUIRED. ONCE WORKS ARE COMPLETE AND COMMISSIONED THE CONTRACTOR SHALL REMOVE ALL TEMPORARY SERVICES AND MAKE GOOD ALL DISTURBED AREAS.
15. STORMWATER SYSTEM REQUIRES SIGNIFICANT MAINTENANCE DUE TO POTENTIAL HIGH POLLUTANT LOAD. FILTERS AND POLLUTANT TRAPS SHOULD BE CHECKED AFTER LARGE STORM EVENTS AND CLEANED EVERY 6 MONTHS.
16. PLUMBING AND DRAINAGE WORKS TO COMPLY WITH AS-3500, THE NATIONAL DRAINAGE & PLUMBING CODE.
17. WHERE POSSIBLE DRAINAGE LINES SHALL BE LAID IN AREAS PREVIOUSLY DISTURBED BY OTHER SITE WORKS AND FOLLOW TOPOGRAPHICAL FEATURES TO REDUCE IMPACT AND AVOID TREE ROOTS
18. THIS STORMWATER MANAGEMENT PLAN HAS BEEN PREPARED FOR SUBMISSION TO COUNCIL/CERTIFEIR AND DOES NOT NECESSARILY CONTAIN ALL APPROPRIATE INFORMATION TO ENABLE FOR ISSUE TO PLUMBER/BUILDER FOR CONSTRUCTION. CONTACT TAYLOR CONSULTING FOR MORE INFORMATION.

ISSUE DATE	REVISION
9 APRIL 2024	HEADWALL DETAIL UPDATED

TITLE
STORMWATER MANAGEMENT DETAILS
431 PITTWATER ROAD, NORTH MANLY

DRAWN	DATE	CHECKED	SCALE @ A1
JBP	03 NOVEMBER 2023		1:20 1:10
ENGINEER R B		BE Civil (Hons) MIE Aust.	

TAYLOR CONSULTING
CIVIL & STRUCTURAL ENGINEERS

DRAWING NO STORM-2/A

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