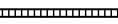
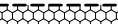


PROPOSED DEVELOPMENT

No.1 & 3 ALFRED STREET AND No.315 WEST STREET, UMINA BEACH

STORMWATER MANAGEMENT PLANS

LEGEND	
	DENOTES ON-SITE DETENTION TANK
	DENOTES ON-SITE RETENTION TANK
	DENOTES DWELLING FOOTPRINT
	DENOTES 100mm DIA. STORMWATER/SURFACE WATER SYSTEM PIPE AT 1% MIN. GRADE U.N.O.
	DENOTES 100mm DIA. FULLY SEALED RAINWATER SYSTEM PIPE U.N.O.
	DENOTES RAINWATER PIPE AND DIA. WHEN PIPE EXCEEDS 100mm DIA.
	DENOTES STORMWATER/SURFACE WATER PIPE AND DIA. WHEN PIPE EXCEEDS 100mm DIA.
	DENOTES RISING MAIN AND PIPE DIA. U.N.O.
	DENOTES SUBSOIL DRAINAGE LINE AND DIA. WRAPPED IN GEOFABRIC U.N.O.
	DENOTES DOWNPIPE
	DENOTES INSPECTION OPENING WITH SCREW DOWN LID AT FINISHED SURFACE LEVEL
	DENOTES INSPECTION OPENING WITH SCREW DOWN LID AT FINISHED SURFACE LEVEL FOR SYSTEM FLUSHING PURPOSES
	STORMWATER PIT - SOLID COVER
	STORMWATER PIT - GRATED INLET
	DENOTES GRATED DRAIN
	DENOTES ABSORPTION TRENCH
	NON RETURN VALVE
	PUMP
	STOP VALVE (ISOLATION VALVE)
	240v REQUIRED
	DENOTES LEVEL OF INLET /OUTLET OF STORMWATER PIPE. NOTE: UNLESS NOTED OTHERWISE, THE BASE OF THE PIT IS THE SAME AS THE PIPE INLET/OUTLET.

DIAL BEFORE YOU DIG



IMPORTANT: THE CONTRACTOR IS TO MAINTAIN A CURRENT SET OF "DIAL BEFORE YOU DIG" DRAWINGS ON SITE AT ALL TIMES.

GENERAL NOTES	
1.	THESE PLANS SHALL BE READ IN CONJUNCTION WITH OTHER RELEVANT CONSULTANTS' PLANS, SPECIFICATIONS, CONDITIONS OF DEVELOPMENT CONSENT AND CONSTRUCTION CERTIFICATE REQUIREMENTS. WHERE DISCREPANCIES ARE FOUND ACOR CONSULTANTS (CC) MUST BE CONTACTED IMMEDIATELY FOR VERIFICATION
2.	WHERE THESE PLANS ARE NOTED FOR DEVELOPMENT APPLICATION PURPOSES ONLY, THEY SHALL NOT BE USED FOR OBTAINING A CONSTRUCTION CERTIFICATE NOR USED FOR CONSTRUCTION PURPOSES
3.	SUBSOIL DRAINAGE SHALL BE DESIGNED AND DETAILED BY THE STRUCTURAL ENGINEER. SUBSOIL DRAINAGE SHALL NOT BE CONNECTED INTO THE STORMWATER SYSTEM IDENTIFIED ON THESE PLANS UNLESS APPROVED BY ACOR CONSULTANTS (CC)

STORMWATER CONSTRUCTION NOTES	
1.	ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH AS/NZS 3500 (CURRENT EDITION) AND THE REQUIREMENTS OF THE LOCAL COUNCIL'S POLICIES AND CODES
2.	THE MINIMUM SIZES OF THE STORMWATER DRAINS SHALL NOT BE LESS THAN DN90 FOR CLASS 1 BUILDINGS AND DN100 FOR OTHER CLASSES OF BUILDING OR AS REQUIRED BY THE REGULATORY AUTHORITY
3.	THE MINIMUM GRADIENT OF STORMWATER DRAINS SHALL BE 1%, UNLESS NOTED OTHERWISE
4.	COUNCIL'S TREE PRESERVATION ORDER IS TO BE STRICTLY ADHERED TO. NO TREES SHALL BE REMOVED UNTIL PERMIT IS OBTAINED
5.	PUBLIC UTILITY SERVICES ARE TO BE ADJUSTED AS NECESSARY AT THE CLIENT'S EXPENSE
6.	ALL PITS TO BE BENCHED AND STREAMLINED. PROVIDE STEP IRONS FOR ALL PITS OVER 1.2m DEEP
7.	MAKE SMOOTH JUNCTION WITH ALL EXISTING WORK
8.	VEHICULAR ACCESS AND ALL SERVICES TO BE MAINTAINED AT ALL TIMES TO ADJOINING PROPERTIES AFFECTED BY CONSTRUCTION
9.	SERVICES SHOWN ON THESE PLANS HAVE BEEN LOCATED FROM INFORMATION SUPPLIED BY THE RELEVANT AUTHORITIES AND FIELD INVESTIGATIONS AND ARE NOT GUARANTEED COMPLETE NOR CORRECT. IT IS THE CLIENT & CONTRACTOR'S RESPONSIBILITY TO LOCATE ALL PRIOR TO CONSTRUCTION
10.	ANY VARIATION TO THE WORKS AS SHOWN ON THE APPROVED DRAWINGS ARE TO BE CONFIRMED BY ACOR CONSULTANTS (CC) PRIOR TO THEIR COMMENCEMENT

RAINWATER RE-USE SYSTEM NOTES	
1.	RAINWATER SUPPLY PLUMBING TO BE CONNECTED TO OUTLETS WHERE REQUIRED BY BASIX CERTIFICATE (BY OTHERS)
2.	TOWN WATER CONNECTION TO RAINWATER TANK TO BE TO THE SATISFACTION OF THE REGULATORY AUTHORITY. THIS MAY REQUIRE PROVISION OF: 2.1. PERMANENT AIR GAP 2.2. BACKFLOW PREVENTION DEVICE
3.	NO DIRECT CONNECTION BETWEEN TOWN WATER SUPPLY AND THE RAIN WATER SUPPLY
4.	AN APPROVED STOP VALVE AND/OR PRESSURE LIMITING VALVE AT THE RAINWATER TANK
5.	PROVIDE APPROPRIATE FLOAT VALVES AND/OR SOLENOID VALVES TO CONTROL TOWN WATER SUPPLY INLET TO TANK IN ORDER TO ACHIEVE THE TOP-UP INDICATED ON THE TYPICAL DETAIL
6.	ALL PLUMBING WORKS ARE TO BE CARRIED OUT BY LICENSED PLUMBERS IN ACCORDANCE WITH AS/NZS3500.1 NATIONAL PLUMBING AND DRAINAGE CODE
7.	PRESSURE PUMP ELECTRICAL CONNECTION TO BE CARRIED OUT BY A LICENSED ELECTRICIAN
8.	ONLY ROOF RUN-OFF IS TO BE DIRECTED TO THE RAINWATER TANK. SURFACE WATER INLETS ARE NOT TO BE CONNECTED
9.	PIPE MATERIALS FOR RAINWATER SUPPLY PLUMBING ARE TO BE APPROVED MATERIALS TO AS/NZS3500 PART 1 SECTION 2 AND TO BE CLEARLY AND PERMANENTLY IDENTIFIED AS 'RAINWATER'. THIS MAY BE ACHIEVED FOR BELOW GROUND PIPES USING IDENTIFICATION TAPE (MADE IN ACCORDANCE WITH AS2648) OR FOR ABOVE GROUND PIPES BY USING ADHESIVE PIPE MARKERS (MADE IN ACCORDANCE WITH AS1345)
10.	EVERY RAINWATER SUPPLY OUTLET POINT AND THE RAINWATER TANK ARE TO BE LABELED 'RAINWATER' ON A METALLIC SIGN IN ACCORDANCE WITH AS1319
11.	ALL INLETS AND OUTLETS TO THE RAINWATER TANK ARE TO HAVE SUITABLE MEASURES PROVIDED TO PREVENT MOSQUITO AND VERMIN ENTRY

SHEET INDEX	
COVER SHEET & NOTES	SHEET C1
STORMWATER MANAGEMENT PLAN BASEMENT	SHEET C2
STORMWATER MANAGEMENT PLAN GROUND FLOOR	SHEET C3
STORMWATER MANAGEMENT DETAILS SHEET No.1	SHEET C4
STORMWATER MANAGEMENT DETAILS SHEET No.2	SHEET C5
STORMWATER DETENTION SUMMARY	SHEET C6
WATER QUALITY REPORT SHEET 1 OF 3	SHEET C7
WATER QUALITY REPORT SHEET 2 OF 3	SHEET C8
WATER QUALITY REPORT SHEET 3 OF 3	SHEET C9

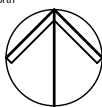
COUNCIL REQUIREMENTS	
1.	REFER TO STORMWATER DETENTION REPORT ON SHEET D6
2.	REFER TO WATER QUALITY REPORT ON SHEETS D7 TO D9
3.	REFER TO OSD /OSR TANK CONFIGURATION SUMMARY ON SHEET D6



DEVELOPMENT APPLICATION ISSUE
NOT FOR CONSTRUCTION

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North	
	
B	ISSUED FOR DEVELOPMENT APPLICATION
A	ISSUED FOR DEVELOPMENT APPLICATION
Issue	Description
Date	Drawn
Approved	

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Project

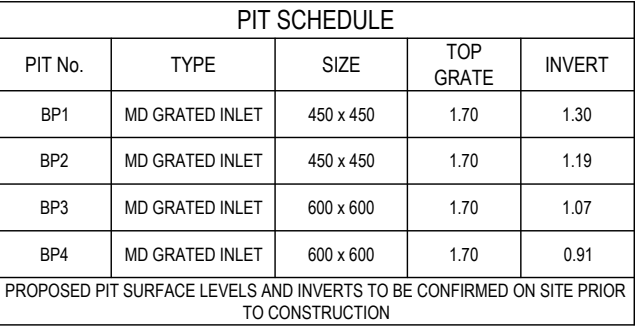
PROPOSED DEVELOPMENT

No.1 & 3 ALFRED STREET AND
No.315 WEST STREET
UMINA BEACH

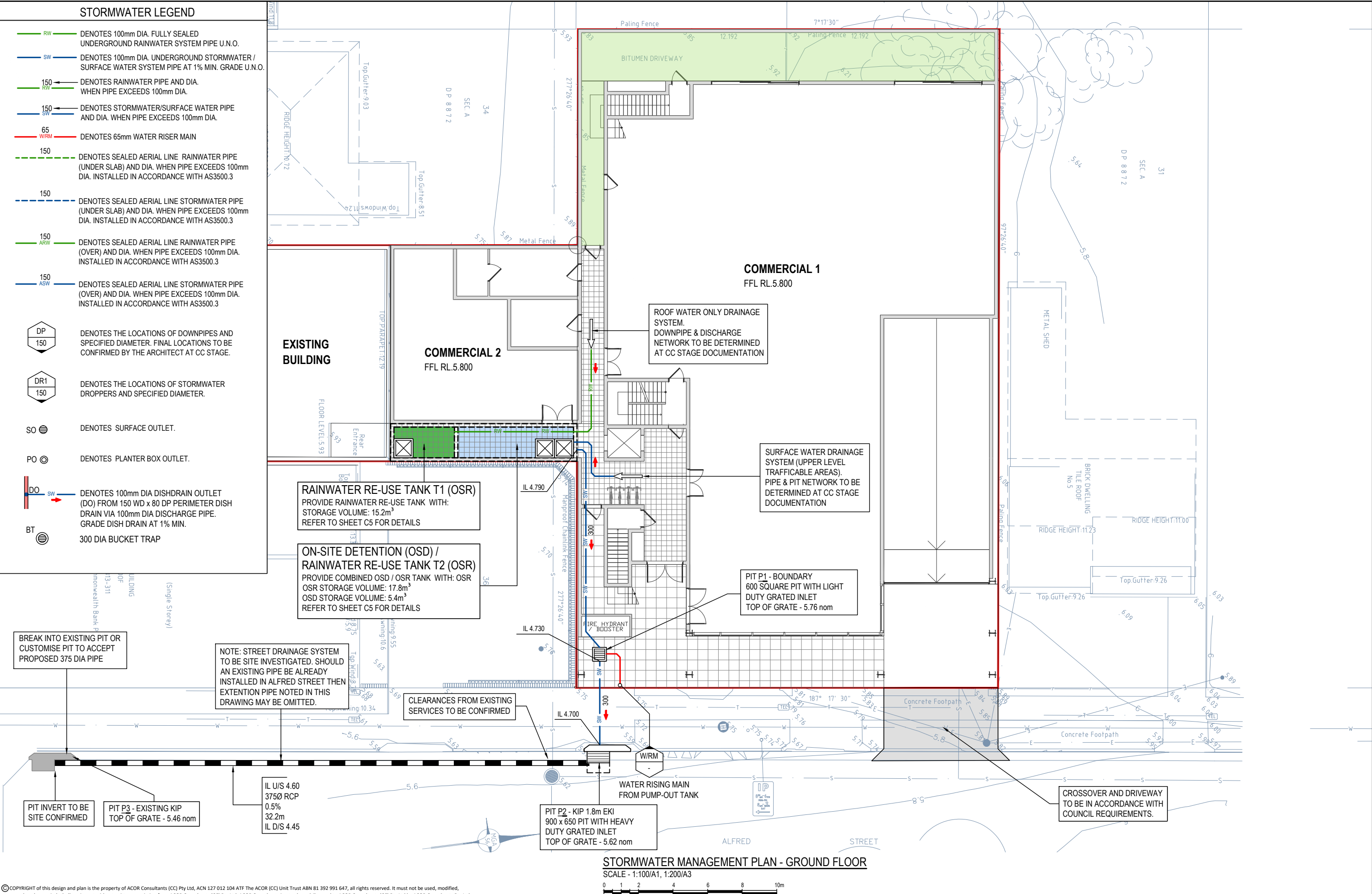
Drawing Title
COVER SHEET & NOTES

Drawn	Date	Scale	A1	Q.A. Check	Date
SJ	25.10.18	AS NOTED	-	-	-
Designed	Project No.	Dwg. No.	Issue		
BK	CC180408	C1	B		

STORMWATER LEGEND	
	DENOTES 100mm DIA. FULLY SEALED UNDERGROUND RAINWATER SYSTEM PIPE U.N.O.
	DENOTES 100mm DIA. UNDERGROUND STORMWATER / SURFACE WATER SYSTEM PIPE AT 1% MIN. GRADE U.N.O.
	DENOTES RAINWATER PIPE AND DIA. WHEN PIPE EXCEEDS 100mm DIA.
	DENOTES STORMWATER/SURFACE WATER PIPE AND DIA. WHEN PIPE EXCEEDS 100mm DIA.
	DENOTES 65mm WATER RISER MAIN
	DENOTES SEALED AERIAL LINE RAINWATER PIPE (UNDER SLAB) AND DIA. WHEN PIPE EXCEEDS 100mm DIA. INSTALLED IN ACCORDANCE WITH AS3500.3
	DENOTES SEALED AERIAL LINE STORMWATER PIPE (UNDER SLAB) AND DIA. WHEN PIPE EXCEEDS 100mm DIA. INSTALLED IN ACCORDANCE WITH AS3500.3
	DENOTES SEALED AERIAL LINE RAINWATER PIPE (OVER) AND DIA. WHEN PIPE EXCEEDS 100mm DIA. INSTALLED IN ACCORDANCE WITH AS3500.3
	DENOTES SEALED AERIAL LINE STORMWATER PIPE (OVER) AND DIA. WHEN PIPE EXCEEDS 100mm DIA. INSTALLED IN ACCORDANCE WITH AS3500.3
	DENOTES THE LOCATIONS OF DOWNPIPES AND SPECIFIED DIAMETER. FINAL LOCATIONS TO BE CONFIRMED BY THE ARCHITECT AT CC STAGE.
	DENOTES THE LOCATIONS OF STORMWATER DROPPERS AND SPECIFIED DIAMETER.
	DENOTES SURFACE OUTLET.
	DENOTES PLANTER BOX OUTLET.
	DENOTES 100mm DIA DISHDRAIN OUTLET (DO) FROM 150 WD x 80 DP PERIMETER DISH DRAIN VIA 100mm DIA DISCHARGE PIPE. GRADE DISH DRAIN AT 1% MIN.
	300 DIA BUCKET TRAP



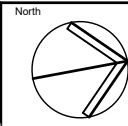
PUMPOUT TANK
 PROVIDE 1 x 3,000 litre UNDERGROUND
 PUMPOUT TANK. INSTALL IN ACCORDANCE
 WITH MANUFACTURER'S SPECIFICATION.
 REFER TO SECTION A ON SHEET C4 FOR
 DETAILS.



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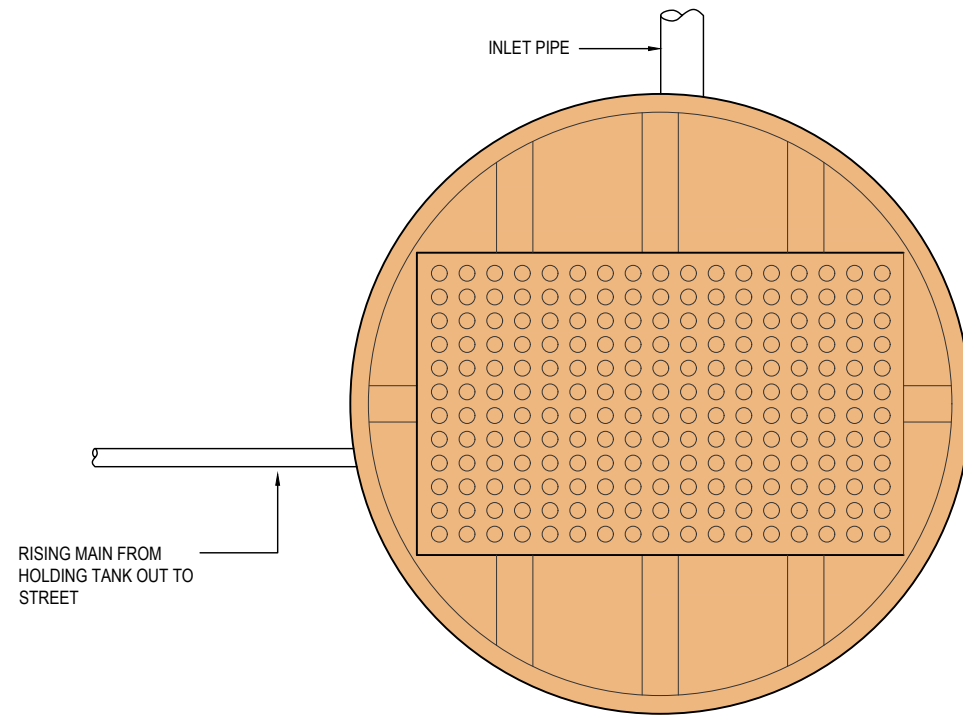
AcOR
CONSULTANTS

ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

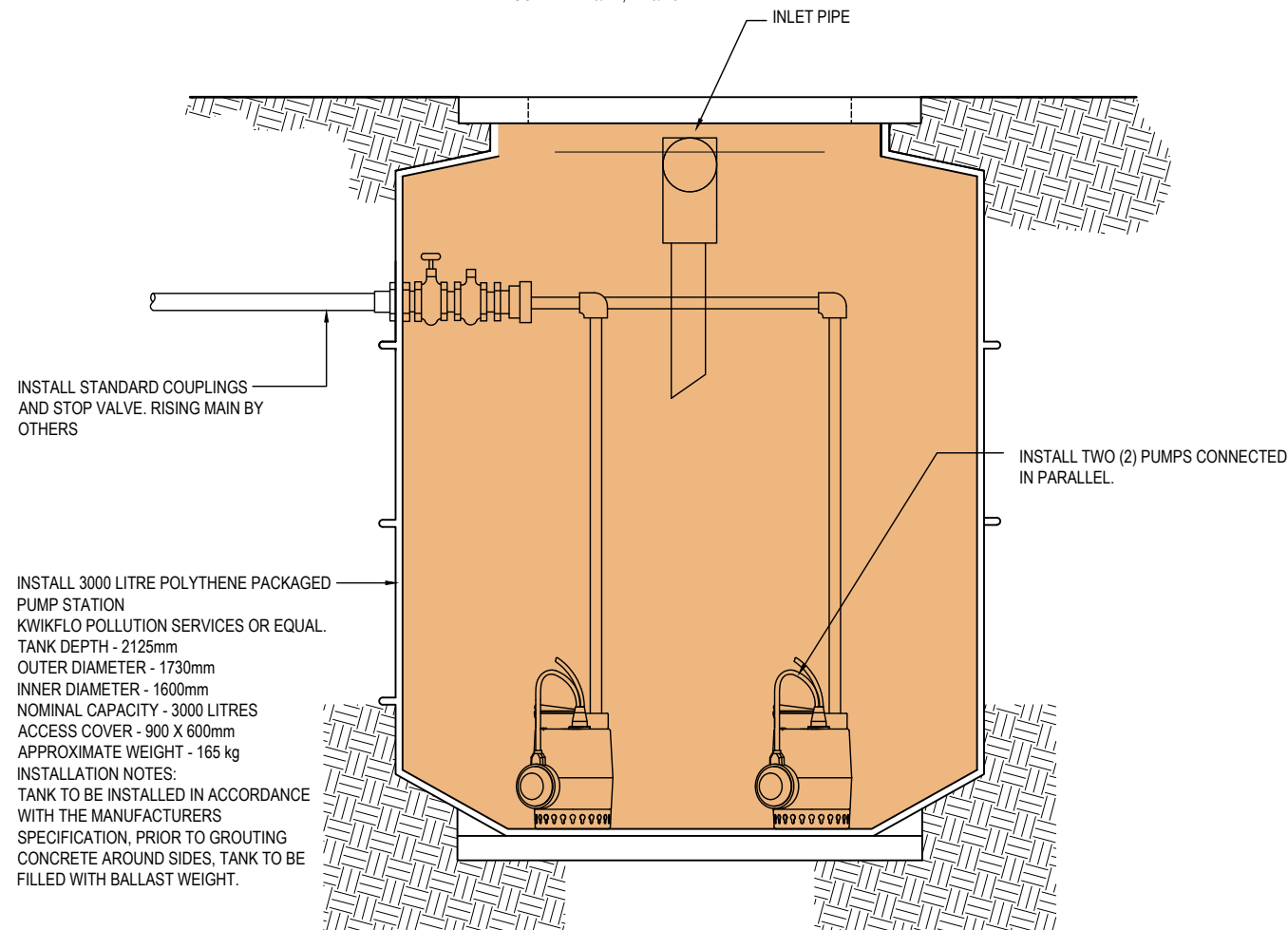
Project
PROPOSED DEVELOPMENT

No.1 & 3 ALFRED STREET AND
No.315 WEST STREET
UMINA BEACH

Drawing Title		Project		Scale		Q.A. Check		Date	
STORMWATER MANAGEMENT PLAN - GROUND FLOOR		CC180408		A1		AS NOTED		25.10.18	
Drawn	SJ	Date	25.10.18	Scale	A1	Q.A. Check	-	Date	-
Designed	BK	Project No.	CC180408	Dwg. No.	C3	Issue	B		



PUMP-OUT TANK SYSTEM - PLAN
SCALE - 1:10/A1, 1:20/A3



PUMP-OUT TANK SYSTEM - SECTION
SCALE - 1:10/A1, 1:20/A3

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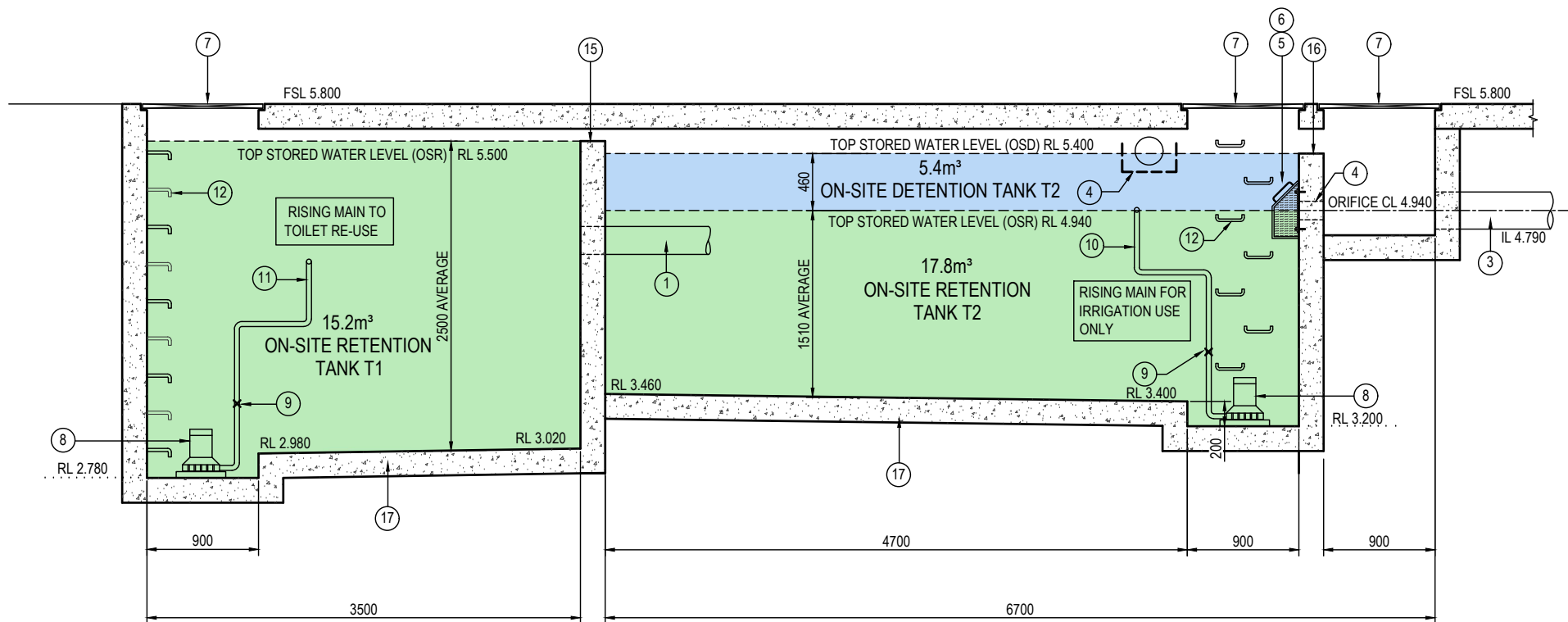


Project
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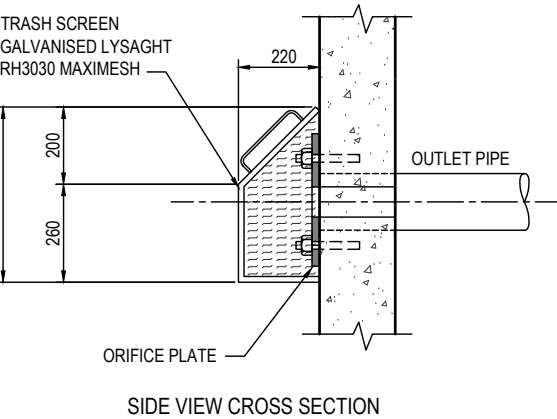
No.1 & 3 ALFRED STREET AND
No.315 WEST STREET
UMINA BEACH

Drawing Title
**STORMWATER MANAGEMENT
DETAILS SHEET 1**

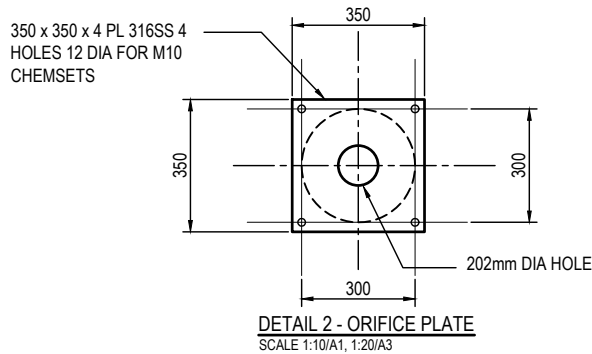
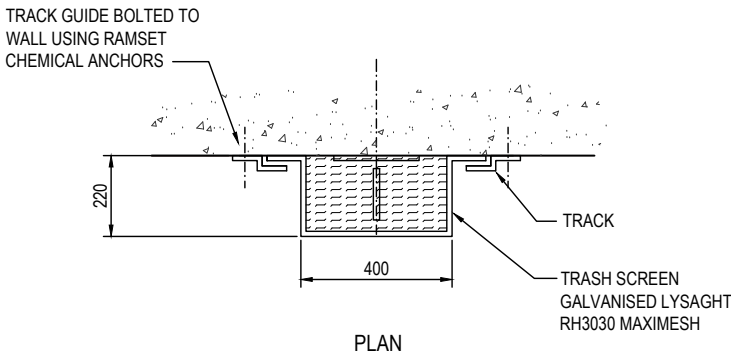
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SJ	25.10.18	AS NOTED	-	-	-
Designed	Project No.	Dwg. No.		Issue	
BK	CC180408	C4		B	



ON-SITE RETENTION / DETENTION TANK SECTION
SCALE - 1:25/A1, 1:50/A3



DETAIL 1 - TRASH SCREEN
SCALE 1:10/A1, 1:20/A3



DETAIL 2 - ORIFICE PLATE
SCALE 1:10/A1, 1:20/A3

LEGEND	
①	ROOFWATER INLET PIPE
②	SURFACE WATER INLET PIPE
③	300 DIA DISCHARGE PIPE
④	150 DIA LINK PIPE
⑤	350 x 350 x 4 PL 316SS 4 HOLES 12 DIA FOR M10 CHEMSETS
⑥	TRASH SCREEN LYSAGHT RH3030 GALV. REMOVABLE WITH HANDLE
⑦	900 x 900 SOLID COVER BOLTED DOWN
⑧	RE-USE PUMP TO MANUFACTURERS SPECIFICATIONS
⑨	NON-RETURN VALVE
⑩	50 DIA PVC PIPE CLASS '16' RISING MAIN TO LANDSCAPE IRRIGATION
⑪	50 DIA PVC PIPE CLASS '16' RISING MAIN TO TOILET RE-USE
⑫	PROVIDE GALVANISED STEP IRONS AT 300mm CENTRES WHERE DEPTH EXCEEDS 1100mm IN ACCORDANCE WITH THE AUST. STANDARDS AT ALL ACCESS POINTS OF THE TANK, TYP.
⑬	
⑭	SPEL STORMSACK AND FRAME FIXED TO SIDE WALL TO MANUFACTURER'S RECOMMENDATIONS
⑮	OSR OVERFLOW WEIR (TANK T1)
⑯	HIGH LEVEL OVERFLOW WEIR (TANK T2)
⑰	TANK STRUCTURE TO STRUCTURAL ENGINEERS DETAILS



PROVIDE CONFINED SPACE SIGNAGE
AT ENTRY POINTS INTO TANK.

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A	ISSUED FOR DEVELOPMENT APPLICATION	25.10.18	SJ BK
Issue	Description	Date	Drawn Approved

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Project
PROPOSED DEVELOPMENT

No.1 & 3 ALFRED STREET AND
No.315 WEST STREET
UMINA BEACH

Drawing Title
**STORMWATER MANAGEMENT
DETAILS SHEET 2**

Drawn SJ	Date 25.10.18	Scale AS NOTED	A1	Q.A. Check -	Date -
Designed BK	Project No. CC180408	Dwg. No. C5	Issue B		

ON-SITE STORMWATER DETENTION REPORT

PRE-DEVELOPED AREA 1064m² 100% PERVIOUS)

POST DEVELOPED AREA 1064m² (91% IMPERVIOUS)

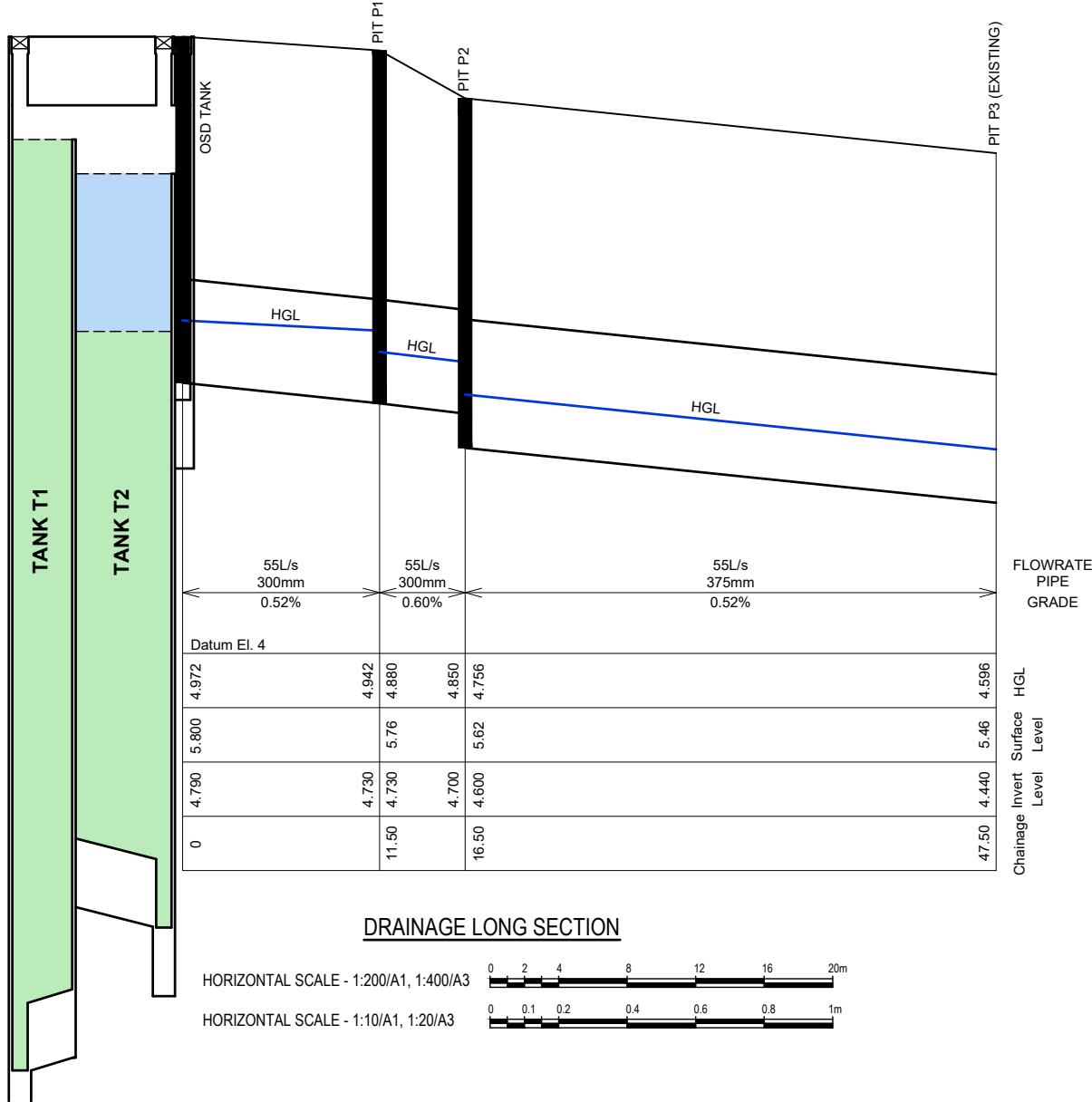
PRE-DEVELOPED FLOW RATES (REFER TO DRAINS MODEL CC180408.drm)

ARI (YEARS)	PEAK FLOWRATE (L/s)
1	19
2	27
5	36
10	42
20	49
50	53
100	60

POST DEVELOPED FLOW RATES & REQUIRED STORAGE VOLUMES

ARI (YEARS)	PEAK FLOWRATE (L/s)	STORAGE VOLUME (m³)	STORED WATER SURFACE LEVEL	COMMENT
1	25	3.5	4.98	NOTE 1
2	31	4	5.04	NOTE 1
5	38	6	5.12	NOTE 1
10	42	6.5	5.2	
20	48	7.5	5.26	
50	51	8	5.30	
100	55	10	5.38	

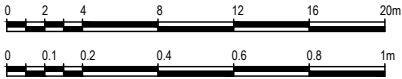
NOTE 1: MINOR INCREASE IN POST DEVELOPED SITE DISCHARGE IS DEEMED ACCEPTABLE WITHIN THE TOLERANCE OF THE MODEL AND SITE CONSTRAINTS. MODELLING HAS NOT ACCOUNTED FOR THE ON-SITE RETENTION STORAGE VOLUME OF 33m³



DRAINAGE LONG SECTION

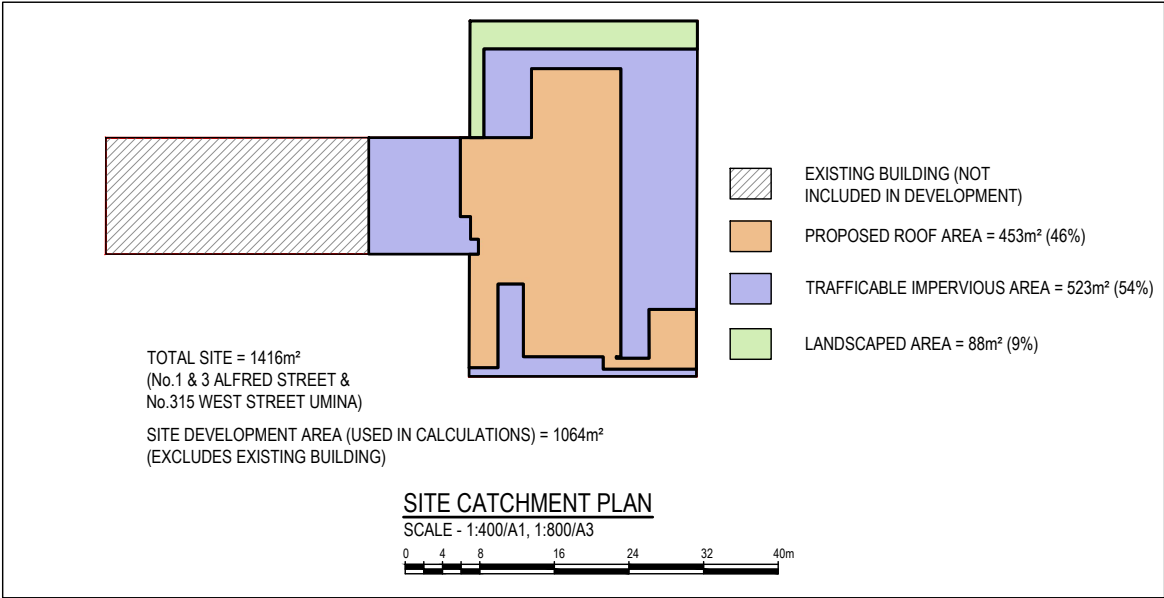
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HORIZONTAL SCALE - 1:10/A1, 1:20/A3



1.5 OSD / OSR SUMMARY

1.5.1 REFER TO DIAGRAM 1.5 BELOW FOR SITE CATCHMENT PLAN



1.5.2 TOTAL IMPERVIOUS AREA PERCENTAGE = 976 / 1064 = 91%

1.5.3 REQUIRED RETENTION VOLUME FROM COUNCIL'S TABLE 2 = 33m³

1.5.4 RETENTION VOLUME SPLIT FOR 2 CATCHMENTS:
CATCHMENT 1 (ROOF AREA)
(ROOF AREA / TOTAL IMPERVIOUS AREA) x RETENTION VOLUME
(453 / 1064) x 33 = 15.2m³

CATCHMENT 2 (TRAFFICABLE IMPERVIOUS AREA (TIA))
(TIA AREA / TOTAL IMPERVIOUS AREA) x RETENTION VOLUME
(523 / 1064) x 33 = 17.8m³

1.5.5 ON-SITE DETENTION VOLUME = 10m³ (REFER DRAINS MODEL CC180408.drm)

1.5.6 ON-SITE DETENTION VOLUME SPLIT FOR 2 CATCHMENTS
CATCHMENT 1 (ROOF AREA)
(ROOF AREA / TOTAL IMPERVIOUS AREA) x DETENTION VOLUME
(453 / 1064) x 10 = 4.6m³
NOTE: SECTION 13 OF COUNCIL'S WATER MANAGEMENT GUIDELINES STATES THAT 50% OF THE VOLUME OF RAINWATER RETENTION TANKS CAN BE CLAIMED AS PART OF THE OSD VOLUME.
50% x 15.2 = 7.6 WHICH IS GREATER THAN THE REQUIRED OSD OF 4.6. THEREFORE OSD NOT REQUIRED FOR CATCHMENT 1 IE TANK T1.

CATCHMENT 2 (TRAFFICABLE IMPERVIOUS AREA (TIA))
(TIA AREA / TOTAL IMPERVIOUS AREA) x DETENTION VOLUME
(523 / 1064) x 10 = 5.4m³

NOTE: RE-USE VOLUME IS BEING USED TO IRRIGATE LANDSCAPED AREAS THEREFORE NOT ACCEPTABLE FOR 50% REDUCTION.

1.5.7 SUMMARY
TANK 1 - ON-SITE REUSE VOLUME = 15.2m³ (USED IN TOILETS)
ON-SITE DETENTION = 0m³
TANK 2 - ON-SITE REUSE VOLUME = 17.8m³ (USED IN LANDSCAPE)
ON-SITE DETENTION = 5.4m³

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					North
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Project
PROPOSED DEVELOPMENT

No.1 & 3 ALFRED STREET AND
No.315 WEST STREET
UMINA BEACH

Drawing Title
STORMWATER DETENTION REPORT

Drawn	Date	Scale	A1	Q.A. Check	Date
SJ	25.10.18	AS NOTED	-	-	-
Designed	Project No.	Dwg. No.	Issue		
BK	CC180408	C6	B		

WATER QUALITY REPORT

1. INTRODUCTION

A CATCHMENT BASED WATER QUALITY MODEL WAS DEVELOPED TO INVESTIGATE STORMWATER RUNOFF QUALITY FROM THE SUBJECT SITE IN ACCORDANCE WITH GOSFORD CITY COUNCIL'S DEVELOPMENT CONTROL PLAN 2013 PART 6.7 "WATER CYCLE MANAGEMENT." THE REQUIREMENTS ARE TABLED FOLLOWING AS EXTRACTED FROM CLAUSE 6.7.7.3.2:

POLLUTANT	% RETENTION OF THE ANNUAL AVERAGE LOAD (kg/ha/yr)
GROSS POLLUTANTS	80%
TOTAL SUSPENDED SOLIDS	80%
TOTAL PHOSPHORUS	45%
TOTAL NITROGEN	45%

1.1 ON - SITE RETENTION TARGET

THE TABLE BELOW IDENTIFIES THE REQUIRED STORMWATER RETENTION TARGET UNDER THE GOSFORD CITY COUNCIL DCP 2013.

Table 2 Stormwater Retention Volume Target (m³)												
Total Site Area (m²)	50000	0	20	80	180	320	500	720	980	1280	1620	2000
	10000	0	4.0	16	36	64	100	144	196	256	324	400
	5000	0	2.0	8.0	18	32	50	72	98	128	162	200
	2000	0	0.8	3.2	7.2	13	20	29	39	51	65	80
	1500	0	0.6	2.4	5.4	9.6	15	22	29	38	49	60
	1000	0	0.4	1.6	3.6	6.4	10	14	20	26	32	40
	900	0	0.4	1.4	3.2	5.8	9.0	13	18	23	29	36
	800	0	0.3	1.3	2.9	5.1	8.0	12	16	20	26	32
	700	0	0.3	1.1	2.5	4.5	7.0	10	14	18	23	28
	600	0	0.2	1.0	2.2	3.8	6.0	8.6	12	15	19	24
	500	0	0.2	0.8	1.8	3.2	5.0	7.2	9.8	13	16	20
	400	0	0.2	0.6	1.4	2.6	4.0	5.8	7.8	10	13	16
		0	10	20	30	40	50	60	70	80	90	100
Fraction Impervious (%)												

RESPONSE: TOTAL RETENTION REQUIRED FOR SITE AREA OF 1064 m² WHICH IS 91% IMPERVIOUS EQUALS 33 m³
TOTAL RETENTION PROVIDED FROM RAINWATER TANKS.

2. STUDY METHODOLOGY

THE OBJECTIVES OF THIS REPORT ARE TO:

- ASSESS THE STORMWATER QUALITY FOR THE POST DEVELOPMENT SCENARIO AND PROVIDE RECOMMENDATIONS TO ENSURE THE DEVELOPMENT MEETS FLOOD RUNOFF QUALITY STANDARDS WHERE REQUIRED.

THE REPORT IS BASED ON THE APPLICATION OF MUSIC (MODEL FOR URBAN STORMWATER IMPROVEMENT CONCEPTUALISATION) MODELLING WHICH INCLUDED THE FOLLOWING:

- A STORMWATER QUALITY MODEL TO CONVERT RAINFALL AND EVAPOTRANSPIRATION ON THE CATCHMENT INTO RUNOFF.
- ESTIMATE STORMWATER FLOW AND POLLUTION GENERATION BY SIMULATING THE PERFORMANCE OF STORMWATER TREATMENT DEVICES INDIVIDUALLY AND AS PART OF A TREATMENT TRAIN.

THE MODEL DEFINES WATER QUALITY PROFILES FOR THE POST DEVELOPED TREATED AND UNTREATED SCENARIOS. THE TREATED POST DEVELOPED MODEL INCLUDES POLLUTANT REDUCTION PERCENTAGES, WHICH REFLECT WORKS THAT ARE ESSENTIAL TO MEET THE RELEVANT REQUIREMENTS SCRIBED BY COUNCIL FOR A PROJECT OF THIS NATURE.

3. RAINFALL AND EVAPOTRANSPIRATION DATA

FOR THE PURPOSE OF THIS REPORT DATA HAS BEEN OBTAINED FROM CENTRAL COAST COUNCIL'S MUSIC LINK VERSION 6.33 FOR A SITE LOCATED WITH THE LOWLAND REGION.

4. STORMWATER QUALITY MODELLING

4.1 GENERAL

THE FOLLOWING PARAMETERS WERE ASSESSED IN THE HYDROLOGICAL MODELLING ASSOCIATED WITH THE CATCHMENT.

- RAINFALL/RUNOFF AND EVAPOTRANSPIRATION.
- SUB CATCHMENT DIVERSIONS.
- LAND USE (PERVIOUS AND IMPERVIOUS)

4.2 RAINFALL/RUNOFF AND EVAPOTRANSPIRATION

THE DEFAULT MONTHLY AVERAGE POTENTIAL EVAPOTRANSPIRATION PROVIDED BY CENTRAL COAST COUNCIL'S MUSIC LINK VERSION 6.33 WAS UTILISED IN THIS STUDY.

THE DETAILS ARE SUMMARISED IN TABLE 4.1 AND 4.2 FOLLOWING:

TABLE 4.1 - DETAILS OF DAILY RAINFALL DATA			
STATION	NAME	PERIOD	TIMESTEP
066062	SYDNEY OBSERVATORY HILL	01/01/1974-01/01/1994	6 min

TABLE 4.2 - SUMMARY OF POTENTIAL EVAPOTRANSPIRATION (PET)					
JAN	FEB	MAR	APR	MAY	JUN
180.11	134.96	128.03	84.90	57.97	42.90
JUL	AUG	SEP	OCT	NOV	DEC
43.09	57.97	87.90	127.10	152.10	163.06

4.3 CATCHMENT DEFINITION

THE CATCHMENT AREA UNDER POST DEVELOPMENT SCENARIO IS DIVIDED INTO TWO SUB-CATCHMENTS, WHICH WERE DEFINED BASED ON FUNCTIONAL AREAS AND ANTICIPATED OVERLAND FLOW PATHS. THE DETAILS OF THE SUB-CATCHMENTS ARE SUMMARISED IN FOLLOWING TABLE 4.3.

TABLE 4.3 - POST DEVELOPMENT SUB CATCHMENT DETAILS			
SUB CATCHMENT ID	SUB CATCHMENT AREA (ha)	% IMPERVIOUS AREA	% PERVIOUS AREA
ROOF AREA TO TANK 1	0.045	100	0
IMPERVIOUS AREA TO TANK 2	0.052	100	0

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Project

PROPOSED DEVELOPMENT

No.1 & 3 ALFRED STREET AND
No.315 WEST STREET
UMINA BEACH

Drawing Title

WATER QUALITY REPORT
SHEET 1 OF 3

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5. MUSIC MODEL

THE MUSIC MODEL WAS CREATED BASED ON A 6 min RAINFALL-RUNOFF MODEL IN CONJUNCTION WITH RESENTATIVE BASEFLOW AND STORMFLOW EVENT MEAN CONCENTRATION (EMCs).

5.1 WATER QUALITY PARAMETERS

THE ADOPTED VALUES OF VARIOUS MUSIC RAINFALL AND RUNOFF PARAMETERS BASED ON COUNCIL'S MUSIC LINK VERSION 6.33 AND ARE SUMMARISED IN TABLE 5.1.

TABLE 5.1 - ADOPTED MUSIC RAINFALL/RUNOFF PARAMETERS	
PARAMETER	VALUE
IMPERVIOUS AREA PROPERTIES	
RAINFALL THRESHOLD (mm/DAY)	1.0 (0.3 ROOFS)
PERVIOUS AREA PROPERTIES	
SOIL STORAGE CAPACITY (mm)	250
SOIL INITIAL STORAGE (% OF CAPACITY)	30
FIELD CAPACITY (mm)	100
INFILTRATION CAPACITY COEFFICIENT - a	200
INFILTRATION CAPACITY EXPONENT - b	1
GROUNDWATER PROPERTIES	
INITIAL DEPTH (mm)	10
DAILY RECHARGE RATE (%)	4
DAILY BASEFLOW RATE (%)	2
DAILY DEEP SEEPAGE RATE (%)	0.4

STORMWATER QUALITY IS CHARACTERISED USING EVENT MEAN CONCENTRATION (EMCs) UNDER STORM AND BASE FLOW CONDITIONS. THE VALUE OF WATER QUALITY PARAMETERS ADOPTED IN THIS STUDY IS SUMMARISED IN TABLE 5.2

TABLE 5.2 - ADOPTED MUSIC WATER QUALITY PARAMETERS							
LAND-USE CATEGORY		Log ₁₀ TSS (mg/L)		Log ₁₀ TP (mg/L)		Log ₁₀ TN (mg/L)	
		STORM FLOW	BASE FLOW	STORM FLOW	BASE FLOW	STORM FLOW	BASE FLOW
GENERAL URBAN	MEAN	2.15	1.20	-0.60	-0.85	0.30	0.11
	STD DEV	0.32	0.17	0.25	0.19	0.19	0.12
ROADS	MEAN	2.43	*	-0.3	*	0.34	*
	STD DEV	0.32	*	0.25	*	0.19	*
ROOFS	MEAN	1.30	*	-0.89	*	0.30	*
	STD DEV	0.32	*	0.25	*	0.19	*

* BASE FLOWS ARE ONLY GENERATED FROM PERVIOUS AREAS; THEREFORE THESE PARAMETERS ARE NOT RELEVANT.

5.2 STORMWATER TREATMENT MEASURES

THE STORMWATER TREATMENT MEASURES THAT WERE ASSESSED USING MUSIC INCLUDED ONE OSR TANK FOR TO BE CONNECTED TO TOILETS, ONE OSR/OSD TANK TO BE CONNECTED TO IRRIGATION ONLY WHICH INCLUDES A PROPRIETARY POLLUTANT REMOVAL DEVICE (STORMSACK). THE CONCEPTUAL PLAN FOR THE PROPERTY IS SHOWN ON SHEET C9. THE PROPERTIES OF THE ADOPTED DEVICES ARE LISTED IN TABLE 5.3 AND FIGURE 5.1 TO FIGURE 5.4.

TABLE 5.3 - RAINWATER AND OSD TANK SIZE	
	OSR/OSD VOLUME
COMBINED ROOF	15.2 kL
IMPERVIOUS AREAS	22.4 kL (COMBINED OSD/OSR)

5.3 MODEL DEFINITION

THE MODEL LAYOUT FOR THE POST DEVELOPED SCENARIOS IS DEPICTED IN FIGURE 5.5.

6. RESULTS & CONCLUSION

BASED ON THE FOREGOING THE PROPOSED NUTRIENT CONTROL COMPRISING ENVIROPOD MEASURES ACHIEVE THE REQUIRED NUTRIENT REMOVAL TARGET LEVELS. THE RESULTS OF MUSIC MODELLING ARE SUMMARISED IN TABLE 6.1 FOLLOWING

TABLE 6.1 - SUMMARY OF MUSIC RESULTS				
PARAMETER	SOURCE RUNOFF	DISCHARGE FROM SITE	REDUCTION	
POST-DEVELOPMENT (TREATED)				REDUCTION TARGET
FLOW (ML/y)	1.14	0.714	37.4%	
TSS (kg/y)	127	17.8	86%	80%
TP (kg/y)	0.261	0.101	61.2%	45%
TN (kg/y)	2.51	1.04	58.4%	45%
GROSS POLLUTANTS (kg/y)	27.8	0	100%	80%

Properties of OSR tank 1 (15.2 kL)

Location: OSR tank 1 (15.2 kL) Products >>

Inlet Properties

Low Flow By-pass (cubic metres per sec): 0.000000

High Flow By-pass (cubic metres per sec): 0.050000

Individual Tank Properties

Number of Tanks: 1

Total Tank Properties

Storage Properties

Volume below overflow pipe (kL): 15.20

Depth above overflow (metres): 0.20

Surface Area (square metres): 10.0

Initial Volume (kL): 10.00

Outlet Properties

Overflow Pipe Diameter (mm): 225

☐ Use Custom Outflow and Storage Relationship

Define Custom Outflow and Storage: Not Defined

Re-use Fluxes... Notes... More

Cancel Back Finish

FIGURE 5.1 - RAINWATER TANK 1 PROPERTIES

Properties of Rainwater Tank 2 for irrigation (17.8 ...)

Location: Tank 2 for irrigation (17.8 kL) Products >>

Inlet Properties

Low Flow By-pass (cubic metres per sec): 0.000000

High Flow By-pass (cubic metres per sec): 0.050000

Individual Tank Properties

Number of Tanks: 1

Total Tank Properties

Storage Properties

Volume below overflow pipe (kL): 17.80

Depth above overflow (metres): 0.20

Surface Area (square metres): 11.9

Initial Volume (kL): 10.00

Outlet Properties

Overflow Pipe Diameter (mm): 225

☐ Use Custom Outflow and Storage Relationship

Define Custom Outflow and Storage: Not Defined

Re-use Fluxes... Notes... More

Cancel Back Finish

FIGURE 5.2 - INFILTRATION TANK PROPERTIES

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Properties of OSD (5.4 kL)

Location: OSD (5.4 kL)

Inlet Properties

Low Flow By-pass (cubic metres per sec)	0.00000
High Flow By-pass (cubic metres per sec)	100.0000

Storage Properties

Surface Area (square metres)	11.9
Extended Detention Depth (metres)	0.46
Exfiltration Rate (mm/hr)	0.00
Evaporative Loss as % of PET	0.00

Outlet Properties

Low Flow Pipe Diameter (mm)	100
Overflow Weir Width (metres)	2.0
Notional Detention Time (hrs)	96.2E-3

☐ Use Custom Outflow and Storage Relationship

Define Custom Outflow and Storage: Not Defined

Re-use... Fluxes... Notes... More

Cancel Back Finish

FIGURE 5.3 - OSD TANK PROPERTIES

Properties of SPEL Stormsacks (1)

Location: SPEL Stormsacks (1) Products >>

Inlet Properties

Low Flow By-pass (cubic metres per sec)	0.00000
High Flow By-pass (cubic metres per sec)	0.01100

Target Element

☒ Gross Pollutants (kg/ML) ☐ Total Phosphorus (mg/L)

☐ Total Suspended Solids (mg/L) ☐ Total Nitrogen (mg/L)

Gross Pollutants (kg/ML)

Transfer Functions

☒ Concentration Based Capture Efficiency ☐ Flow Based Capture Efficiency

☐ Both

Concentration Based Capture Efficiency

Input	Output
0.0000	0.0000
15.0000	0.0000

Flow Based Capture Efficiency

Inflow (m^3/s)	% Capture
0.0000	100.0000
1.0000	100.0000

Fluxes... Notes...

Cancel Back Finish

FIGURE 5.4 - SPEL STORMSACK PROPERTIES

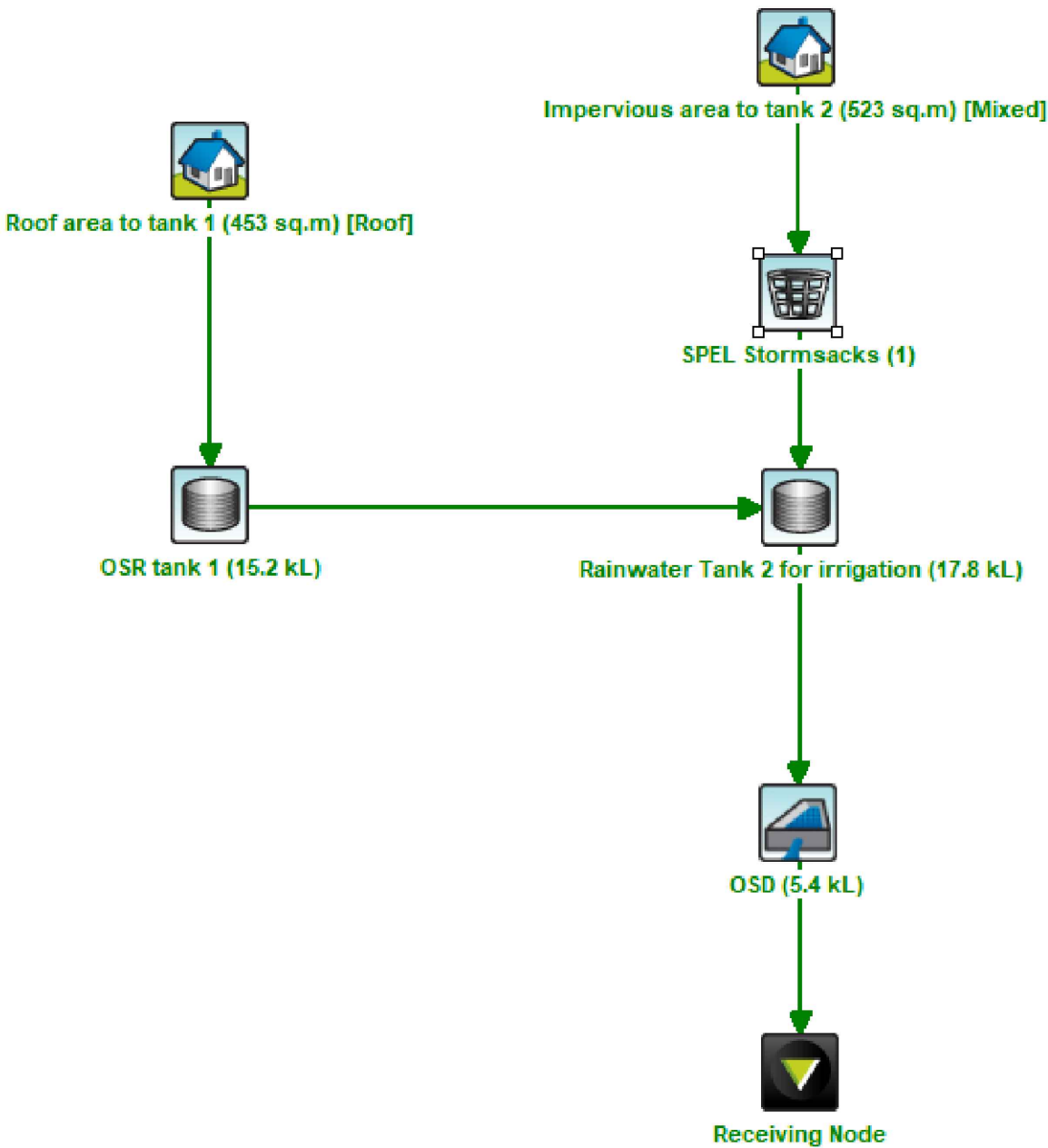


FIGURE 5.5 - POST-DEVELPMENT MUSIC MODEL SCHEMATIC

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