Stormwater Quality Report for 28-32 Evan Street, Penrith, NSW 2750

For Morson Group Pty Ltd

Reference: 180276.R2

17/04/2019

DOCUMENT HISTORY

REVISION	DATE	DESCRIPTION	PREPARED BY	AUTHORISED BY
1	11/04/19	Review	Tasnim Mostafiz	Kamyar Eivazzadeh
2	17/04/19	Review	Tasnim Mostafiz	Kamyar Eivazzadeh

DISCLAIMER

1. Content of this report have been based on available information as noted in the report and its appendices, thus this report should be read in conjunction with the referenced reports.
2. The limitations present in any of the referenced reports will be inherent in this report.
3. This report and associated documents have been prepared for the proposed development at 28-32 Evan street, Penrith. No responsibility will be accepted for the use of any part of this report in any other context or for any other purposes.
4. This report shall not be construed as relieving any other party of their responsibilities, liabilities or contractual obligations.
5. The results are subject to the scope, assumptions and limitations as set out in this report and the information that has been disclosed by the client.
6. The authors best professional opinion is represented in the conclusions drawn and is based on his experience and on previous results from other investigations on similar materials. The conclusions and any recommendations made are based on the condition of the item(s) in question as portrayed in the data provided by the client.

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1. Introduction

1.1 Purpose of Document

LAM consulting has been engaged by the Morson Group to provide civil engineering consultancy services for the proposed 28-32 Evan Street, Penrith. This report has been prepared in support of the proposed stormwater quality management components of works.

This report contained reference information, standards addresses the proposed stormwater quality treatment proposed for the development.

1.2 References and Input

The following reports, guidelines and information were used in the stormwater quality analysis and in the compilation of the report.

- Penrith DCP C3 Water Management
- Penrith Council Stormwater Drainage Policy
- Penrith WSUD Technical Guidelines
- Architectural Drawing Package by Morson Group – 05-02-2019 - DA05, DA12 and DA13
- Managing Urban Stormwater: Soils and Construction, 4th Edition, Landcom

1.3 Proposed Development

The proposed development is a residential flat building consisting of two basement car parking levels, six levels of residential apartments and a roof. The site occupies 1632m^2. The locality plan of the development is shown below in figure 1.

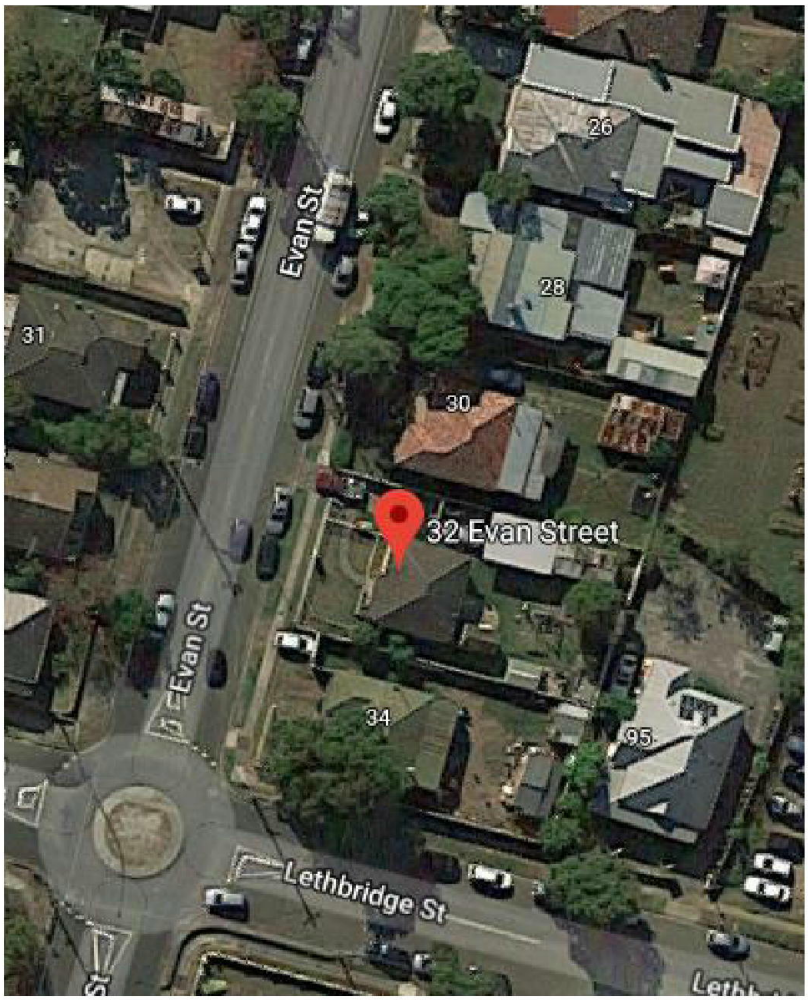


Figure 1: Project site: 28-32 Evan Street, Penrith

2. Site Characteristics

2.1 Existing site and Point of Discharge

The site's pre-development usage was for residential purposes. In its existing state, the site comprises of three separate dwellings. These dwellings each discharge to the back of the kerb. The proposed development will discharge to a proposed new kerb inlet pit at the frontage of the site. The water which cannot be drained to the frontage of the site shall fall into an absorption pit and be managed on site.

3. Stormwater Quality Assessment

3.1 Erosion and Sediment Control

To maintain the water quality during the construction stage, erosion and sediment control measure are to be put into place. These control measures are in accordance with Landcom's guidelines – Managing Urban Stormwater Runoff: Soils and Construction and the City of Penrith's Guidelines.

The proposed measures include:

- Sediment fences around stockpiles and construction zones where soil is exposed

- Sediment protection devices on existing and proposed inlet pits (sand bags)
- Pump and stilling pond to remove stormwater and ground water during excavation

3.2 Water Sensitive Urban Design (WSUD)

A stormwater quality assessment is to be undertaken for the development using the MUSIC software. The assessment is to determine the quality of stormwater discharging from the site in the post-development scenario. These discharges are to meet the objectives outlined in Section 3.2.1 via a treatment train approach as described in 3.2.2.

3.2.1 Water Quality Reduction Targets

All stormwater runoff generated from the development is to pass through a Stormwater Quality Improvement Device (SQID). The SQID's are to meet the water quality reduction targets as outlined in the Penrith WSUD Technical Guidelines and summarised in the table below:

Pollutant	Target (% Reduction)
Gross Pollutants	90
Total Suspended Solids (TSS)	85
Total Phosphorous (TP)	55
Total Nitrogen (TN)	40

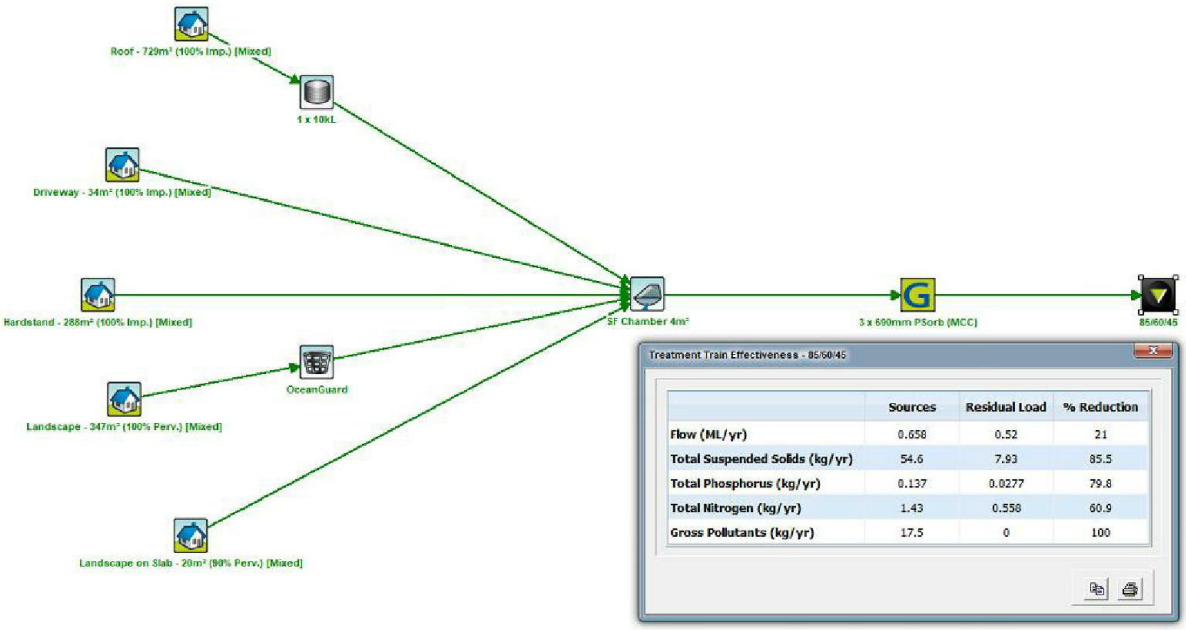
3.2.2 Treatment Train

The stormwater quality reduction targets are to be achieved via a treatment train approach. This treatment train will incorporate the following:

- Pit filter baskets: In-pit proprietary devises such as Ocean Protect's Ocean Guards are an easily maintained inlet pit insert which is effective at removing litter, debris and other pollutants generated from urban runoff. 8 Ocean Guards will be used in the pits capturing the runoff from the landscaping area for this site.
- Proprietary Device: A proprietary SQID is to be utilised to treat the catchment discharge. A system such as the Ocean Protect's Stormfilter Cartridges are to be installed which is effective at removing TSS, TP, and TN to reach the reduction targets in accordance with Council's requirements. The OSD tank will be fit with 3 of the 690Psorb filter Cartridges

3.2.3 Water Quality Treatment Train Performance

The MUSIC model was used to evaluate the performance of the water quality treatment devices for a range of rainfall conditions. The results for the proposed treatment arrangement are summarised in figure 2.



	Sources	Residual Load	% Reduction
Flow (ML/yr)	0.658	0.52	21
Total Suspended Solids (kg/yr)	54.6	7.93	85.5
Total Phosphorus (kg/yr)	0.137	0.0277	79.8
Total Nitrogen (kg/yr)	1.43	0.558	60.9
Gross Pollutants (kg/yr)	17.5	0	100

Figure 2: MUSIC model water quality treatment train performance.

As can be seen from figure 2 and the MUSIC link report (Appendix 5.2), all targets have been met by the proposed stormwater quality measures.

4. Conclusion

The methods to be used in the stormwater quality management of the development at 28-32 Evan Street, Penrith are in accordance with Penrith Council's guidelines and the proposed stormwater quality measures that are to be put in place will achieve the required targets for pollution reduction.

5. Appendix

5.1 Concept Stormwater Plans

RESIDENTIAL FLAT BUILDING, PENRITH

CONCEPT STORMWATER DRAWINGS
FOR 28-32 EVAN STREET, PENRITH

SYMBOLS

RL	PIT SURFACE LEVEL
IL	INVERT LEVEL
TK	TOP OF KERB
B.O.W	BOTTOM OF WALL
T.O.W	TOP OF WALL
SW	STORMWATER DRAINAGE PIPE
RWT	DOWNPIPE TO RAINWATER TANK
SW	OVERFLOW PIPE FROM RAINWATER TANK
	Ø100 SUBSOIL PIPE
FW	FLOOR WASTE 150X150
FW	FLOOR WASTE 150Ø
RWO	RAINWATER OUTLET 300Ø
PG	PLANTER GRATE
DP	DOWN PIPE
CO	CLEAN OUT
IO	INSPECTION OPENING
VD	VERTICAL DROP
VR	VERTICAL RISER
	CONCRETE COVER JUNCTION PIT
	GRATED INLET PIT
	WIDE GRATED DRAIN
	OVERLAND FLOW PATH
	CAST IN SLAB PIPE

NOTES

1. ALL LINES ARE TO BE MIN. 100Ø UPVC @ MIN 1.0% GRADE UNLESS NOTED OTHERWISE.
2. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE & LEVEL ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY EARTHWORKS. ALL DESIGN LEVELS SHOWN ON PLAN SHALL BE VERIFIED ON SITE PRIOR TO THE COMMENCEMENT OF ANY WORK.
3. ALL PIPES TO HAVE MIN 200mm COVER IF LOCATED WITHIN PROPERTY.
4. ALL PITS IN DRIVEWAYS BE HEAVY DUTY GRATES. DIRECT SURFACE FLOW TO ALL GRATED SURFACE INLET PITS.
5. ALL WORK DO BE DONE IN ACCORDANCE WITH AS/NZ 3500.3.2:1998 AND COUNCIL SPECIFICATIONS.
6. LOCATION OF DOWNPIPES & FLOOR WASTES ARE INDICATIVE ONLY. DOWNPIPE & FLOOR WASTE SIZE, LOCATION & QUANTITY TO BE DETERMINED BY BUILDER & IN ACCORDANCE WITH RELEVANT AUSTRALIAN STANDARDS.
7. THIS PLAN IS TO BE READ IN CONJUNCTION WITH THE ARCHITECTURAL, LANDSCAPE AND STRUCTURAL PLANS.
8. ANY DISCREPANCIES OR OMISSIONS SHALL BE REFERRED TO THE DESIGN ENGINEER FOR RESOLUTION.
9. ALL PITS OR GRATES IN TRAFFICABLE AREAS TO BE HEAVY DUTY.
10. ALL GUTTERS WILL BE FITTED WITH LEAF GUARDS AND SHOULD BE INSPECTED AND CLEANED TO ENSURE LEAF LITTER CANNOT ENTER THE DOWNPIPES
11. PROVIDE EMERGENCY OVERFLOW TO ALL PLANTER BOX AND BALCONIES.
12. ALL PITS WITH DEPTH MORE THAN 1M MUST HAVE IRON STEPS.
13. PROVIDE STORMWATER GRATE 200Wx200D AT THE BASE OF ALL MECHANICAL SHAFTS AND UNCOVERED STAIRS OR OPENINGS.
14. ENSURE ALL DRAINAGE WORKS ARE AWAY FROM TREE ROOTS

LEGEND

REFER TO AS 3500 PART 3 TABLE 7.2
P1 : 100Ø UPVC PIPE AT 1.0% MIN. GRADE
P2 : 150Ø UPVC PIPE AT 1.0% MIN. GRADE
P3 : 225Ø UPVC PIPE AT 0.5% MIN. GRADE
P4 : 300Ø UPVC PIPE AT 0.4% MIN. GRADE
P5 : 375Ø UPVC PIPE AT 0.4% MIN. GRADE

AS 3500.3- TABLE 8.2
SIZE OF MINIMUM INTERNAL DIMENSIONS FOR STORMWATER AND INLET PITS

DEPTH OF INVERT OF OUTLET	MINIMUM INTERNAL DIMENSIONS (mm)		
	RECTANGULAR		CIRCULAR
	WIDTH	LENGTH	DIAMETER
≤600	450	450	600
>600 ≤900	600	600	900
>900 ≤1200	600	900	1000
>1200	900	900	1000

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DRAWING LIST	
DRAWING NUMBER	DRAWING NAME
D00	COVER SHEET, LEGEND & DRAWING SCHEDULE
D01	BASEMENT 2 STORMWATER DRAINAGE PLAN
D02	BASEMENT 1 STORMWATER DRAINAGE PLAN
D03	GROUND FLOOR STORMWATER DRAINAGE PLAN
D09	CATCHMENT AND MUSIC MODEL RESULTS
D10	STORMWATER DRAINAGE SECTIONS AND DETAILS SHEET 1
D11	STORMWATER DRAINAGE SECTIONS AND DETAILS SHEET 2
D12	STORMWATER DRAINAGE SECTIONS AND DETAILS SHEET 3
D15	EROSION AND SEDIMENT CONTROL PLAN SHEET 1
D16	EROSION AND SEDIMENT CONTROL PLAN SHEET 2

Issue	Date	Description	Appd
B	11.04.19	FOR D.A.	K.E.
A	26.02.19	FOR D.A.	K.E.

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Job Title

RESIDENTIAL FLAT BUILDING
28-32 EVAN STREET
PENRITH NSW 2750

Drawing Title

COVER SHEET, LEGEND & DRAWING SCHEDULE

Scale
NTS

Drawing Status

Job No	Drawn	Checked	Approved
180276	T.M.	K.E.	K.E.

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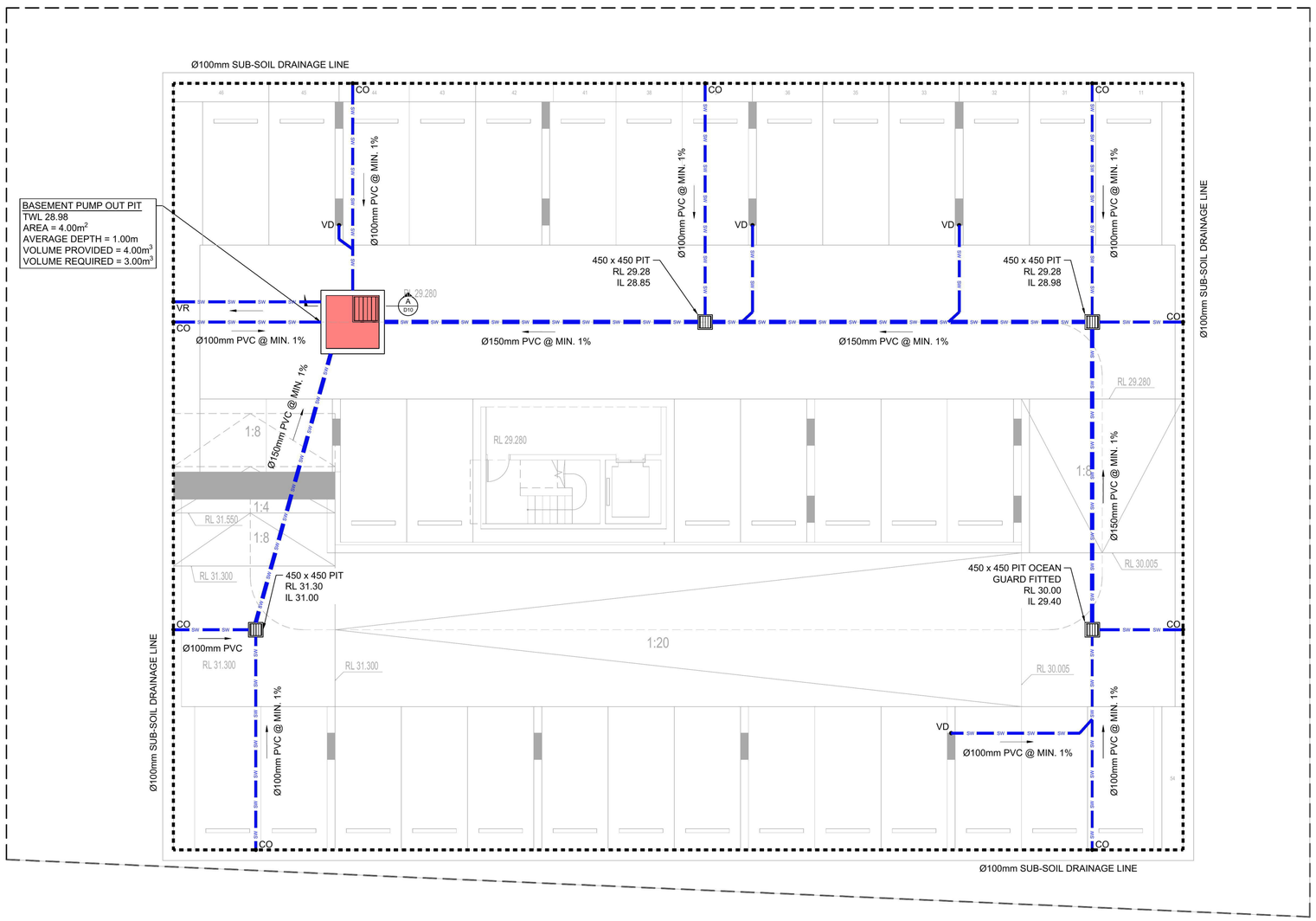
RESIDENTIAL FLAT BUILDING, PENRITH



BASEMENT 2 STORMWATER DRAINAGE PLAN
SCALE 1:100

LEGEND

DENOTES EXTENT OF PROPOSED PUMP OUT PIT

NOTES:

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BASEMENT 2 STORMWATER DRAINAGE PLAN

Scale
AS SHOWN

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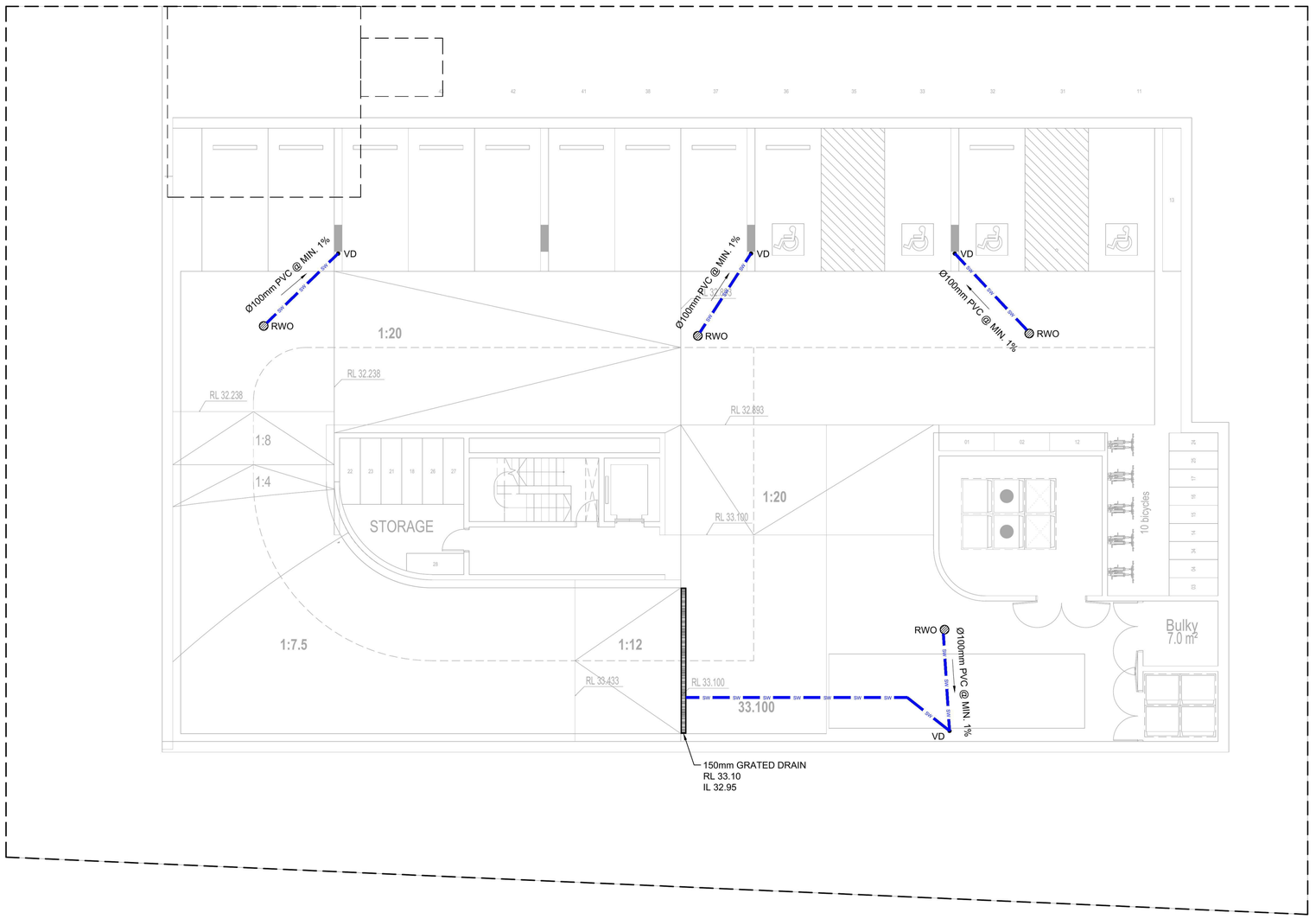

BASEMENT 1 STORMWATER DRAINAGE PLAN
SCALE 1:100

NOTES:

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BASEMENT 1 STORMWATER DRAINAGE PLAN

Scale
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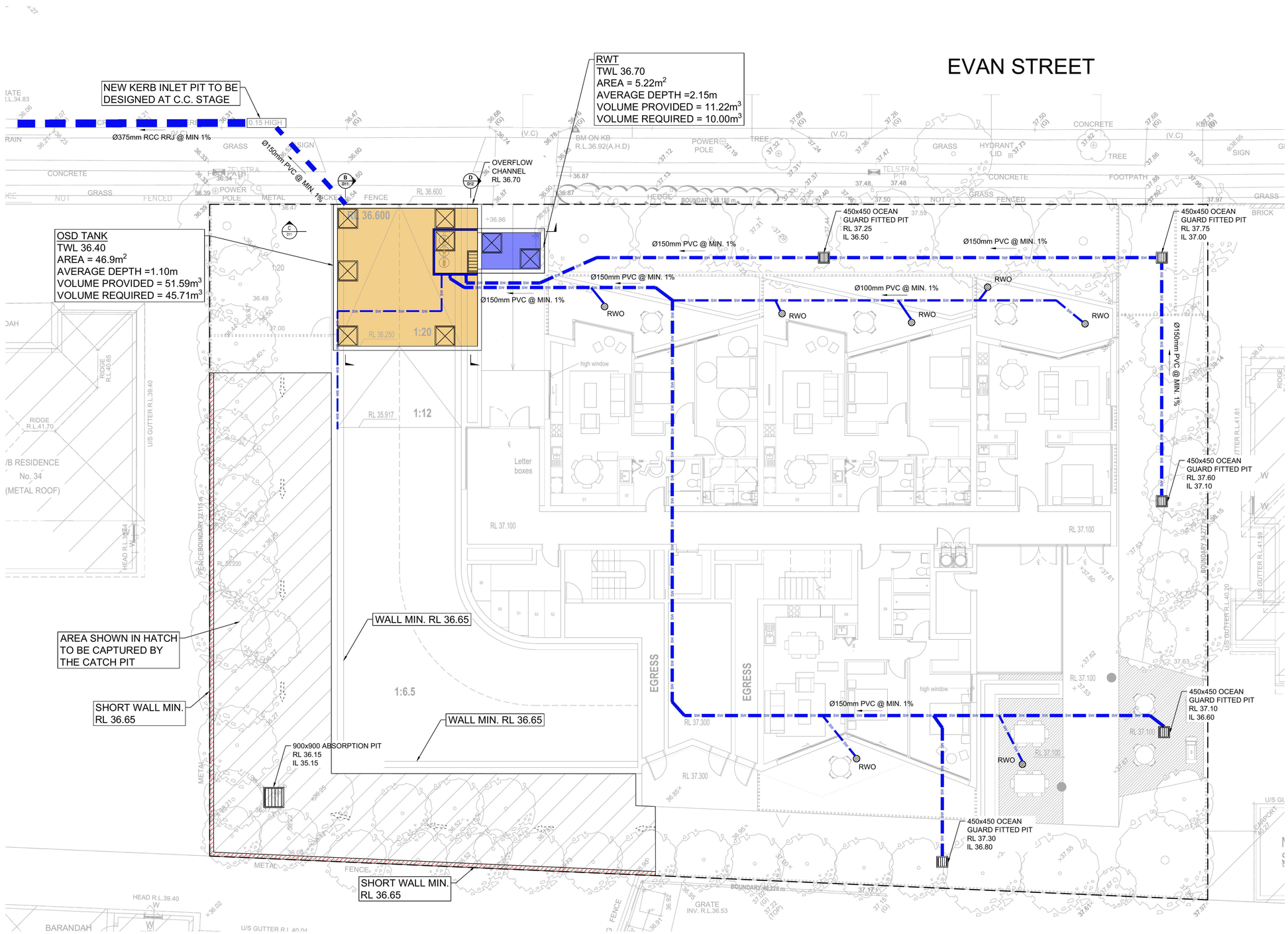

GROUND FLOOR STORMWATER DRAINAGE PLAN
SCALE 1:100

LEGEND

- DENOTES EXTENT OF PROPOSED RWT
- DENOTES EXTENT OF PROPOSED OSD

NOTES:
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Drawing Title

GROUND FLOOR STORMWATER DRAINAGE PLAN

Scale
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Drawing Status

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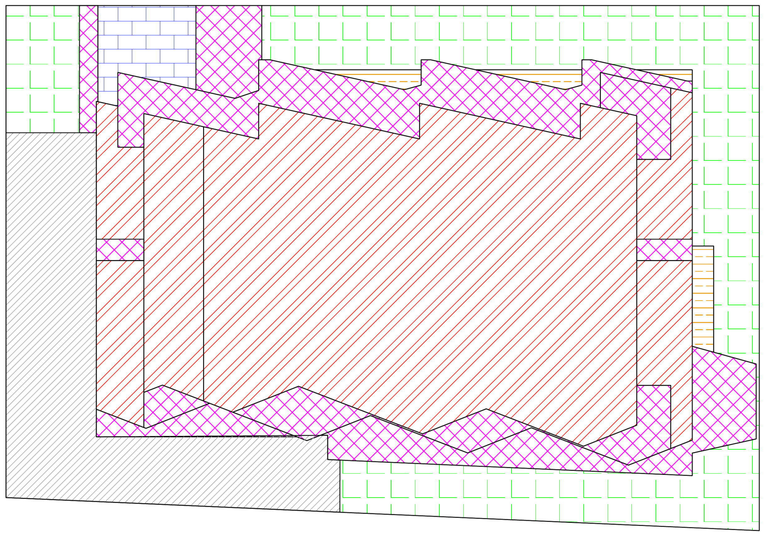
EVAN STREET



CATCHMENT PLAN
SCALE 1:200

CATCHMENT AREA

TOTAL SITE AREA : 1632.6m^2

ROOF : 729.6m^2

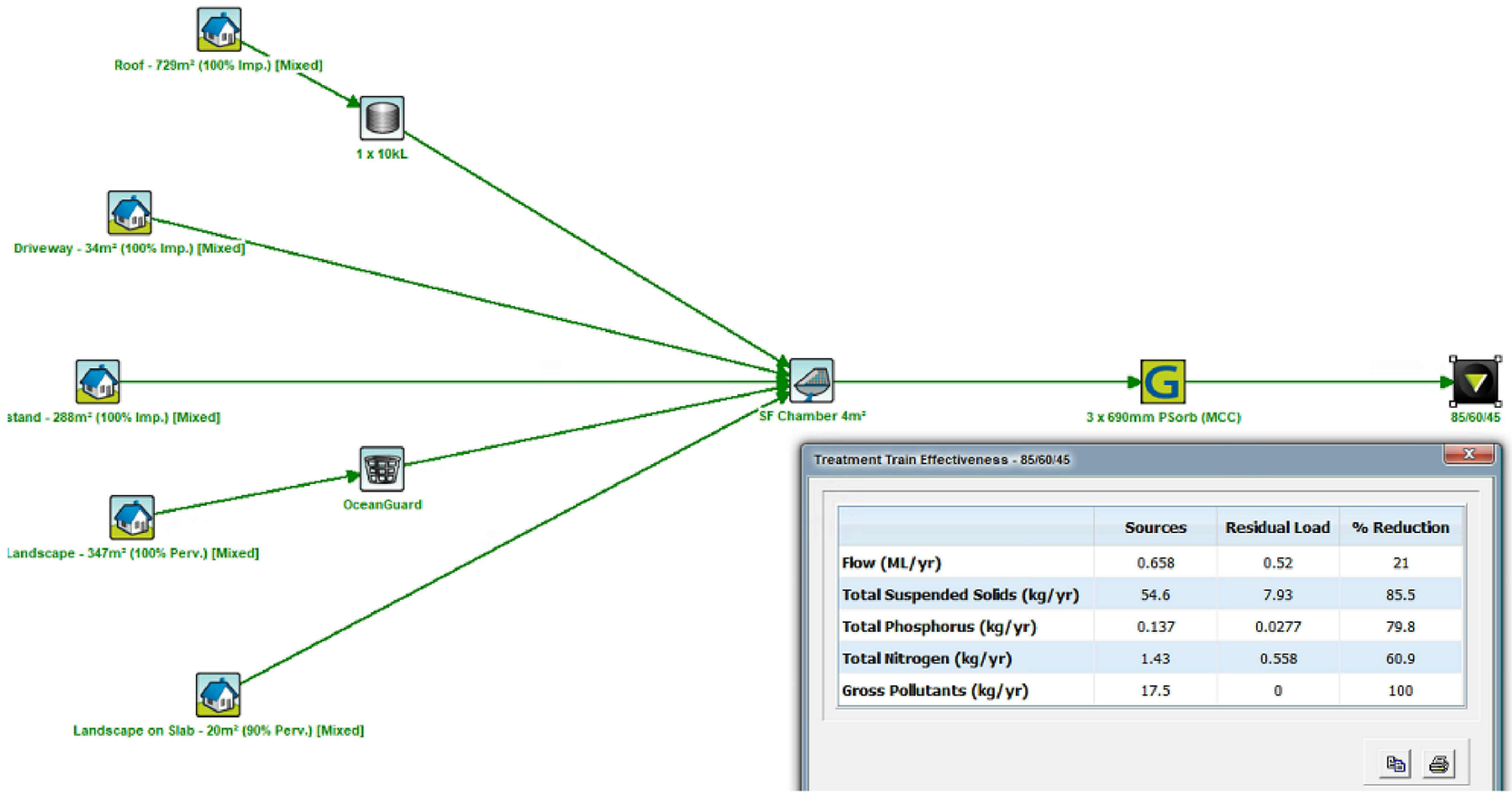
TRAFFICABLE/DRIVEWAY : 33.5m^2

HARDSTAND : 288.2m^2

LANDSCAPE : 346.7m^2

LANSCAPE ON SUSPENDED SLAB: 20.9m^2

AREA TO CATCH PIT: 213.6m^2



Treatment Train Effectiveness - 85/60/45

	Sources	Residual Load	% Reduction
Flow (ML/yr)	0.658	0.52	21
Total Suspended Solids (kg/yr)	54.6	7.93	85.5
Total Phosphorus (kg/yr)	0.137	0.0277	79.8
Total Nitrogen (kg/yr)	1.43	0.558	60.9
Gross Pollutants (kg/yr)	17.5	0	100

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CATCHMENT PLAN AND MUSIC MODEL RESULTS

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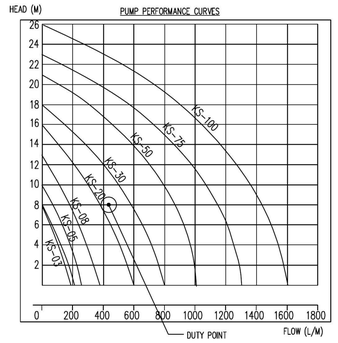
D09		C

RESIDENTIAL FLAT BUILDING, PENRITH

PUMP SPECIFICATIONS
STANDARD PUMP-OUT NOTES

THE PUMP-OUT SYSTEM IS DESIGNED TO WORK IN THE FOLLOWING MANNER -

1. A LOW LEVEL FLOAT SHALL BE PROVIDED TO ENSURE THAT THE MINIMUM REQUIRED WATER LEVEL IS MAINTAINED WITHIN THE SUMP AREA OF THE BELOW GROUND TANK. IN THIS REGARD THIS FLOAT WILL FUNCTION AS AN OFF SWITCH FOR THE PUMP.
2. A SECOND FLOAT SHALL BE PROVIDED AT A HIGHER LEVEL, APPROXIMATELY 300mm ABOVE THE MINIMUM WATER LEVEL, WHEREBY THE PUMP WILL OPERATE & DRAIN THE TANK TO THE LEVEL OF THE LOW LEVEL FLOAT.
3. A THIRD FLOAT SHALL BE PROVIDED AT A HIGH LEVEL, WHICH IS APPROXIMATELY THE ROOF LEVEL OF THE BELOW GROUND TANK. THIS FLOAT SHOULD ACTIVATE THE ALARM.
4. AN ALARM SYSTEM SHALL BE PROVIDED WITH A FLASHING STROBE LIGHT & A PUMP FAILURE WARNING SIGN WHICH ARE TO BE LOCATED AT THE DRIVEWAY ENTRANCE TO THE BASEMENT LEVEL. THE ALARM SYSTEM SHALL BE PROVIDED WITH A BATTERY BACK-UP IN CASE OF POWER FAILURE.



PUMP WELL DETAILS

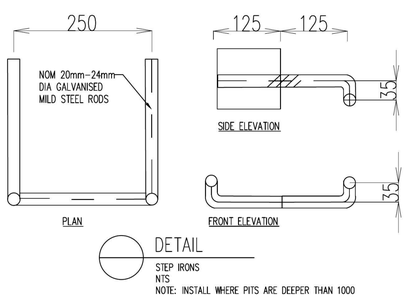
AREA DRAINING TO SUMP= 33.50m^2

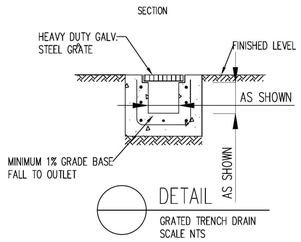
SUMP SIZE BASED ON 100 YEAR 2 HR STORM, I= 44.4 mm/hr,
Q=CIA/3600= 1 x 44.4 x 33.5 /3600 = 0.41 L/sec
VOLUME REQUIRED = 0.41x(2x60x60) = 2.95 m^3
MIN. VOLUME REQUIRED = 3.00 m^3
STORAGE PROVIDED 2.0x2.0x1.0m= 4.00 m^3

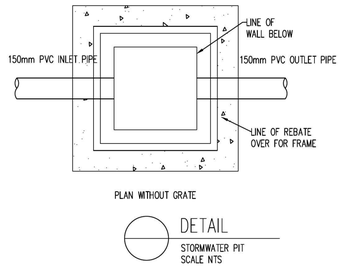
PUMP OUT RATE BASED ON 100YR 5MIN STORM, I=220 mm/hr
Q=CIA/3600= 1x220x33.5/3600 = 2.05 L/sec
MIN. PUMP OUT RATE REQUIRED BY AS 3500.3 = 10.0 L/sec

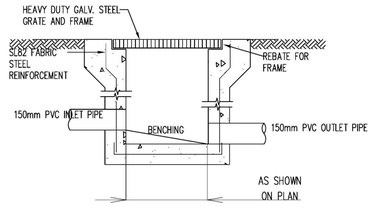
DUAL KS-30 PUMP OR EQUIVALENT TO BE INSTALLED IN SUMP AND CONNECTED TO CONTROL PANEL WHICH WILL ALLOW FOR THE PUMPS TO OPERATE SIMULTANEOUSLY ON HIGH LEVEL ALARMS AT 5.0L/sec (PER PUMP) AT 11.0m HEAD

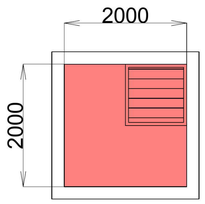
Type	Output		Outlet		Rated Head Capacity		Maximum Head	Maximum Capacity	Weigh	Dimension		
	HP	kW	mm	Inch	M	LPM	M	LPM	Kg	L(mm)	W(mm)	H(mm)
KS-03	1/3	0.25	40	1 1/2"	3	130	8	180	9	188	141	305
KS-04	1/2	0.4	50	2"	5	150	8	220	11	208	140	359
KS-05	1/2	0.4	50	2"	5	160	10	260	14	230	156	375
KS-08	1	0.75	50	2"	6	240	13	380	21	290	180	425
KS-20	2	1.5	80	3"	10	300	16	600	31	278	182	475
KS-30	3	2.2	80	3"	10	500	18	800	42	390	250	450
KS-50	5	3.7	100	4"	10	800	21	1100	48	450	240	530
KS-75	7 1/2	5.6	100	4"	15	800	23	1300	60	550	310	590
KS-100	10	7.5	150	6"	18	900	25	1600	70	550	310	610





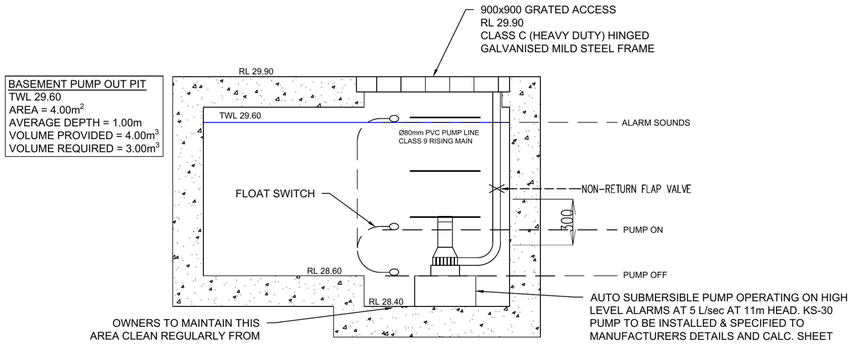




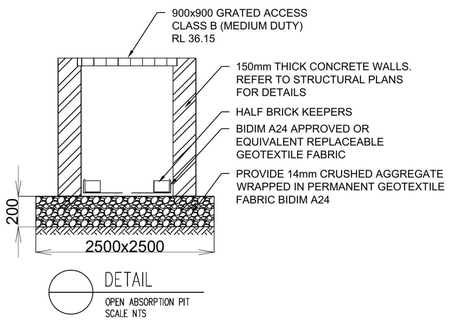


PUMP OUT PIT PLAN VIEW
(BASEMENT & TRUCK RAMP)
SCALE NTS

BASEMENT PUMP OUT PIT
TWL 29.60
AREA = 4.00m^2
AVERAGE DEPTH = 1.00m
VOLUME PROVIDED = 4.00m^3
VOLUME REQUIRED = 3.00m^3



SECTION THROUGH BASEMENT PUMP OUT PIT (A / D01)
SCALE NTS



Issue	Date	Description	Appd
C	17.04.19	FOR D.A.	K.E.
B	11.04.19	FOR D.A.	K.E.
A	26.02.19	FOR D.A.	K.E.

AMENDMENTS

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ACN 159 480 056, ABN 41 159 480 056
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PO Box 170, Potts Point, NSW 1335

Job Title
RESIDENTIAL FLAT BUILDING
28-32 EVAN STREET
PENRITH NSW 2750

Drawing Title
STORMWATER DRAINAGE SECTIONS AND DETAILS SHEET 1

Scale
AS SHOWN

Drawing Status

Job No	Drawn	Checked	Approved
180276	T.M.	K.E.	K.E.

DRAWING NO.		Issue
D10		C

RESIDENTIAL FLAT BUILDING, PENRITH

OSD CALCULATION NOTES:

IN ACCORDANCE WITH PENRITH COUNCIL STORMWATER DRAINAGE POLICY THIS TYPE OF DEVELOPMENT (RESIDENTIAL FLAT BUILDING) IS REQUIRED TO MEET THE FOLLOWING PSD AND SSR REQUIREMENTS:

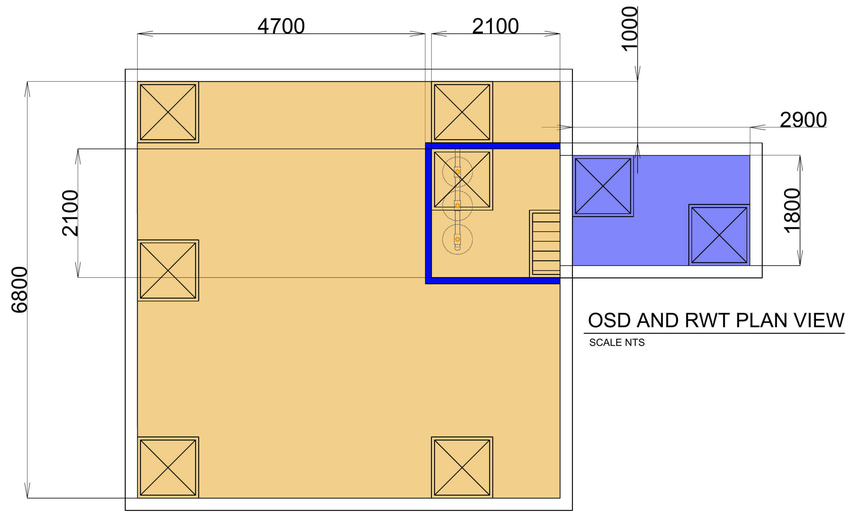
SSR = 280m^3/HA
PSD = 120L/s/HA

THE TOTAL SITE AREA IS 1632.6m^2
THE STORAGE REQUIRED FOR THE SITE = 280 x .16326 = 45.71m^3
THE PSD ALLOWED = 120 x .16326 = 19.59L/s

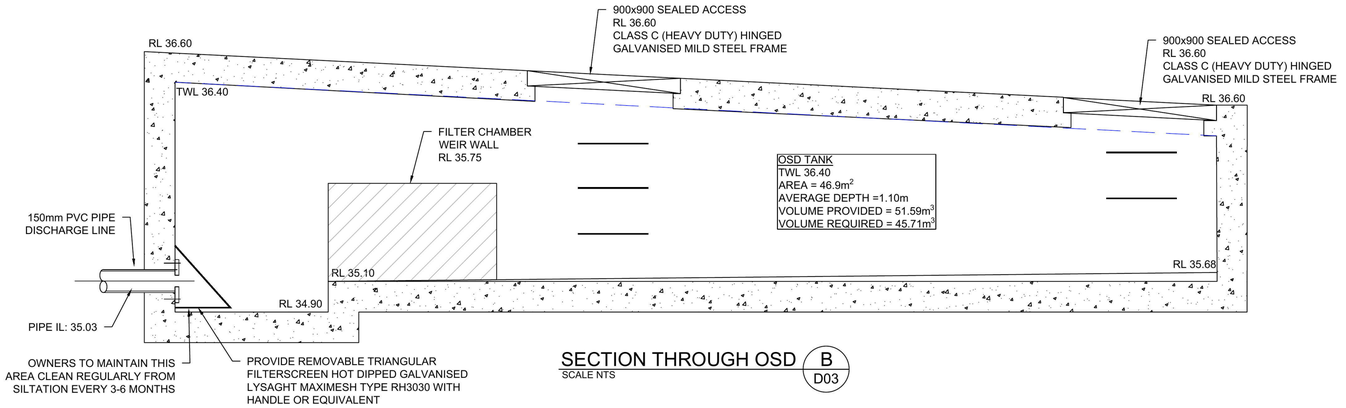
CALCULATING ORIFICE DIAMETER

g = acceleration from gravity (9.81 m/s/s)
h = head acting on the centreline (m)

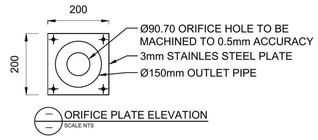
Q (l/s)=	***19.590***
Q (m^3/s)=	***0.019590***
C_d=	***0.6***
g=	***9.81***
TWL=	***36.4***
ORIFICE CL=	***35.1***
h=	***1.3***
A (m^2)=	0.006464903
d (m)=	0.090726898
d (mm)=	***90.7***



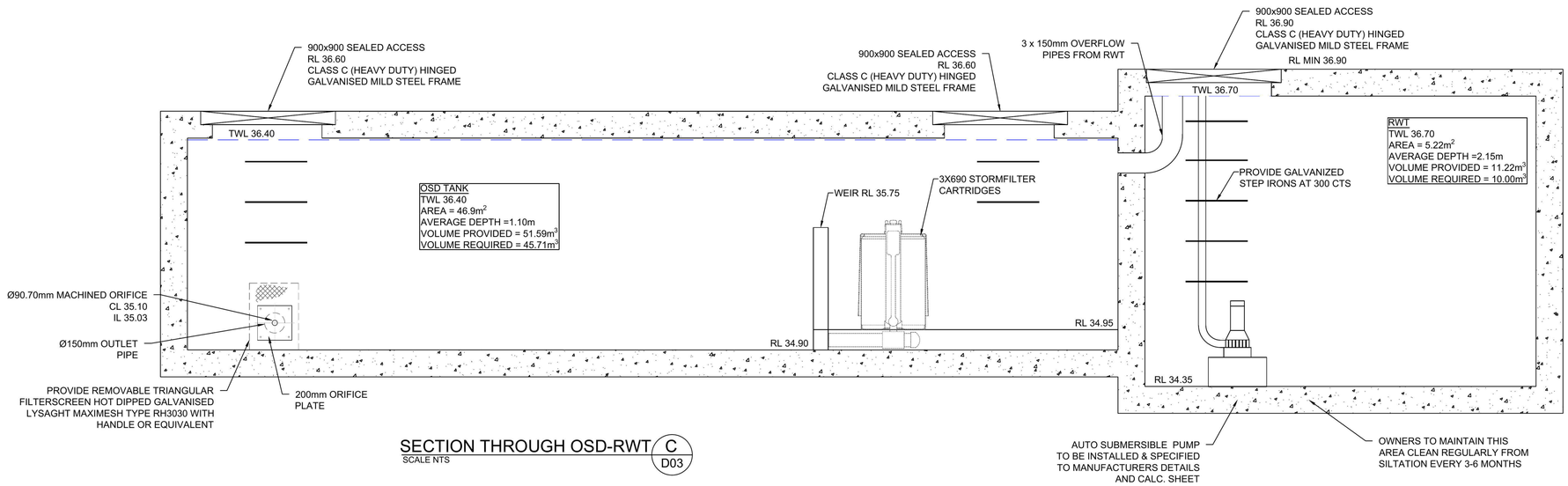
OSD AND RWT PLAN VIEW
SCALE NTS



SECTION THROUGH OSD B D03
SCALE NTS



ORIFICE PLATE ELEVATION
SCALE NTS



SECTION THROUGH OSD-RWT C D03
SCALE NTS

Issue	Date	Description	Appd
C	17.04.19	FOR D.A.	K.E.
B	11.04.19	FOR D.A.	K.E.
A	26.02.19	FOR D.A.	K.E.

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Job Title

RESIDENTIAL FLAT BUILDING
28-32 EVAN STREET
PENRITH NSW 2750

Drawing Title

STORMWATER DRAINAGE SECTIONS AND DETAILS SHEET 2

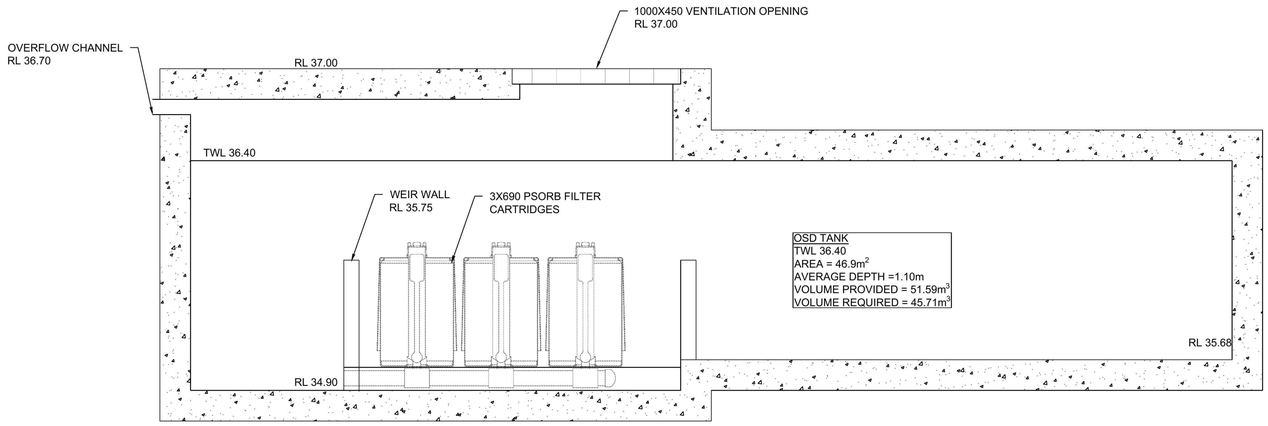
Scale
AS SHOWN

Drawing Status

Job No	Drawn	Checked	Approved
180276	T.M.	K.E.	K.E.

DRAWING NO.	Issue
D11	C

RESIDENTIAL FLAT BUILDING, PENRITH



SECTION THROUGH OSD (D / D03)
SCALE NTS

Issue	Date	Description	Appd
A	11.04.19	FOR D.A.	K.E.

AMENDMENTS

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Job Title

RESIDENTIAL FLAT BUILDING
28-32 EVAN STREET
PENRITH NSW 2750

Drawing Title

STORMWATER DRAINAGE SECTIONS AND DETAILS SHEET 3

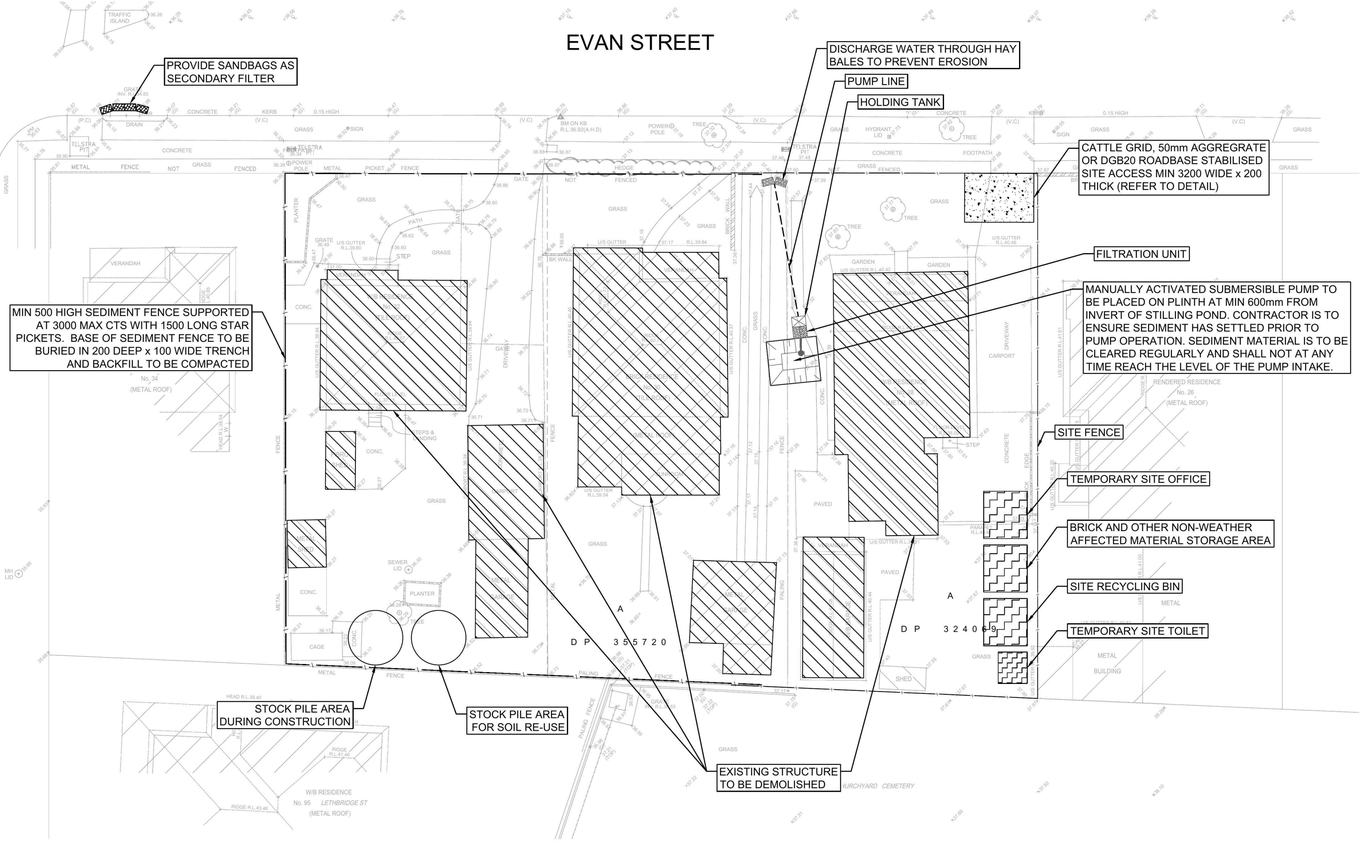
Scale: **AS SHOWN**

Drawing Status

Job No	Drawn	Checked	Approved
180276	T.M.	K.E.	K.E.

DRAWING NO.	Issue
D12	A

RESIDENTIAL FLAT BUILDING, PENRITH



EROSION AND SEDIMENT CONTROL PLAN
SCALE 1:200

EROSION CONTROL NOTES

1. ALL EROSION & SEDIMENT CONTROL MEASURES ARE TO BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH 'MANAGING URBAN STORMWATER, 3RD EDITION' PRODUCED BY THE NSW DEPARTMENT OF HOUSING.
2. ALL EROSION AND SILTATION CONTROL DEVICES ARE TO BE PLACED PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION AND REMOVED REGULARLY DURING CONSTRUCTION
3. ALL TREES ARE TO BE PRESERVED UNLESS INDICATED OTHERWISE ON THE ARCHITECT'S OR LANDSCAPE ARCHITECT'S DRAWINGS. EXISTING GRASS COVER SHALL BE MAINTAINED EXCEPT IN AREAS CLEARED FOR BUILDINGS, PAVEMENTS ETC- CONTRACTOR TO MINIMISE DISTURBED AREAS.
4. INSTALL TEMPORARY SEDIMENT BARRIERS TO ALL INLET PITS LIKELY TO COLLECT SILT LADDEN WATER
5. NOT WITHSTANDING DETAILS SHOWN, IT IS THE CONTRACTORS SOLE RESPONSIBILITY TO ENSURE THAT ALL SITE ACTIVITIES COMPLY WITH THE REQUIREMENTS OF THE CLEAN WATERS ACT.
6. ALL DISTURBED AREAS AND STOCKPILES TO BE STABILISED WITHIN 14 DAYS. ALL STOCKPILES TO BE CLEAR FROM DRAINS, GUTERS AND FOOTPATHS.
7. TOPSOIL TO BE STRIPPED, STOCKPILED AND RE-SPREAD ON COMPLETION OF EARTHWORKS. NONE TO BE REMOVED.
8. NO DISTURBANCE OF SITE PERMITTED OTHER THAN IMMEDIATE AREA OF THE WORKS.
9. DRAINAGE IS TO BE CONNECTED TO STORMWATER SYSTEM AS SOON AS POSSIBLE.

NON-COMPLIANCE MAY RESULT IN A $1500 FINE

SYMBOLS

31.09TK — EXISTING LEVELS

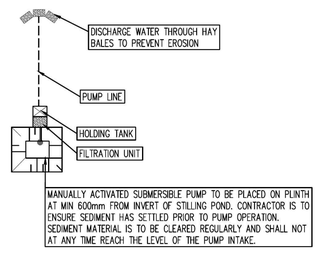
SILT FENCE

WIRE MESH FENCE

STABILISED SITE ACCESS

Ø50 PUMP LINE

EXISTING STRUCTURE TO BE DEMOLISHED



NOTES THIS DRAWING

1. ALL DOCUMENTS WILL BE SUBMITTED TO COUNCIL FOR APPROVAL.
2. ALL SEDIMENT CONTROL MEASURES ARE TO BE IN PLACE.
3. INSTALLATION OF SILT FENCING, SEDIMENTATION BARRIERS AROUND DRAINS.
4. FENCING IS TO BE 1.8m(min) HEIGHT, PLACED AROUND THE SITE UNTIL THE WORK COMPLETE.
5. THE SITE GATES WILL BE LOCATED AT EVAN STREET.
6. THE HARDSTAND AREAS OR CATTLE GRIDS WILL BE PLACED AT THE SITE ENTRANCES AND EXITS. TO REMOVE THE BULK OF DIRT AND MUD THAT MAY ACCUMULATE ON TRUCK TYRES.
7. CONTRACTOR WILL CONDUCT REGULAR STREET SWEEPS ALONG THE ACCESS ROUTE TO ENSURE THE ROADS ADJACENT TO THE SITE ENTRANCES ARE KEPT CLEAN OF ANY DIRT AND DEBRIS.
8. REGULAR ENVIRONMENTAL INSPECTIONS WILL BE CARRIED OUT BY CONTRACTOR'S PERSONNEL TO ENSURE COMPLIANCE WITH THIS PLAN.

General Instructions:

SWM01
These plans present a conceptual soil and water management plan (SWMP) only and shows a possible way of managing soil and erosion. The contractor shall be responsible for the establishment and management of the site and preparing a detailed plan and obtaining approval from the relevant authority prior to the commencement of any works.

SWM02
This plan is to be read in conjunction with the engineering plans and any other plans, written instructions, specification or documentation that may be issued and relating to development of the subject site.

SWM03
The contractor will ensure that all soil and water management works are consistent with ' Managing Urban Stormwater - Soils and Construction' - also known as ' The Blue Book'.

SWM04
All builders and sub-contractors shall be informed of their responsibilities in minimising the potential for soil erosion and pollution to downslope lands and waterways.

Erosion Control:

SWM05
Water shall be prevented from entering the permanent drainage system until sediment concentration is less then or equal to 50mg/L, ie the catchment area has been permanently landscaped and/ or any likely sediment has been filtered through and approved structure.

SWM06
Any sand used in the concrete curing process (spread the surface will be removed as soon as possible and within 10 working days from placement.

SWM07
Acceptable receptors will be constructed for concrete and mortar slurries, paints, acid washings, light-weight waste materials and litter.

SWM08
'Sediment' fencing will be installed as indicated on the plans and at the direction of site superintendent to ensure containment of sediment. The sediment fencing will outlet or overflow under stabilised conditions into the sediment basin, to safely convey water into a suitable filtering system should the pores in the fabric block.

SWM09
The sediment basins will be constructed with the minimum wet sediment capacity of CUM cubic meters and designed to remain stable in at least the 1 in CDSE year critical duration storm event. Artificial flocculation of the finer particles may not be necessary in this instance.

SWM10
Stockpiles should not be located within 5m of trees and hazard areas, including likely areas of concentrated or high velocity flows such as waterways, drainage lines, paved areas and driveways. Where they are within 5m from such areas, special sediment control measures should be taken to minimise possible pollution to downstream waters. Measure should also be applied to prevent the erosion of the stockpile.

SWM11
All cut and fill batters are to be seeded and mulched within 14 days of completion of formation.

SWM12
Any existing trees which form part of the final landscaping plan will be protected from construction activities by -
a. Protecting them with barrier fencing or similar materials installed outside the drip line,
b. Ensuring that nothing is nailed to them,
c. Prohibiting paving grading sediment wash or placing of stockpiles within the drip line except under the following conditions :

1. Encroachment only occurs on one side and no closer to the trunk than either 1.5 metres or half the distance between the outer edge of the drip line and the trunk, which ever is the greater,
2. A drainage system that allows air and water to circulate through the root zone (e.g. a gravel bed) is placed under all fill layers of more than 300 millimetres depth,
3. Care is taken.

SWM13
During windy weather, large disturbed unprotected areas should be kept moist (not wet) by sprinkling with water to keep dust under control.

SWM14
Temporary protection from erosive forces will be undertaken on lands where final shaping has not been completed but works are unlikely to proceed for periods of two months or more (eg. on top soil stockpiles). This may be achieved with a vegetative cover. A recommended listing of plant species for Soil and Water Management Notes:
temporary cover is -
i) autumn/winter sowing -oats/ryecorn at 20kg/ha
-japanese millet at 10kg/ha
ii) spring/summer sowing -japanese millet at 20kg/ha
- oats/ryecorn at 10 kg/ha

SWM15
Diversion banks/ channels will be rehabilitated as soon as possible and within 5 working days from their final shaping. Other than in the winter months, suitable materials's include turf grasses such s Couch or kikuyu. During winter, or at other times when temporary rehabilitation (more than 3 months) is required, it is suggested that hessian cloth is used but only if tacked with appropriate pegs and an anionic bitumen emulsion. Foot and vehicular traffic should be kept away from these areas.

SWM16
Undertake site development works in accordance with the engineering plans. Where possible, phase development so that land disturbance is confined to areas of workable size.

Construction Sequence

SWM17
Where practical, the soil erosion hazard on the site should be kept as low as possible. To this end, works should be undertaken in the FOLLOWING SEQUENCE -
i) Install inlet sediment traps to all gully pits fronting the site,
ii) Install a 1.8m chain wire fence around the boundaries and attach hessian cloth or similar to it on the windward side (ties at the top, centre and bottom and at 1m intervals or as instructed by the superintendent),
iii) Install geofabric sediment fence and sediment traps around all permanent stormwater reticulation structures as shown on the plan,
iv) Construct stabilised construction entrance as shown on the plan or to location as determined by superintendent,
v) Install diversion banks along the boundary where required, rehabilitate disturbed lands downslope from the basins within 20 working days,
vi) Ensure that the sediment basin is directed onto a turfed area and drains to a suitable location. A temporary stormwater line may be necessary to convey the flows to this location. Construct diversion channels at the boundary to drain into the sediment basin as shown on plans.
vii) At completion stabilise site and decommission sediment basin and all erosion control devices.

SWM18
Temporary soil and water management structures will be removed only after the lands they are protecting are rehabilitated.

SWM19
Final site landscaping will be undertaken as soon as possible and within 20 working days from completion of construction activities.

Site Inspection and Maintenance

SWM 20
At least weekly and after every rain fall event, the contractor will inspect the site and ensure that -
i) Drains and all sediment control devices operate effectively and initiate repair or maintenance as required,
ii) Receptors for concrete and mortar slurries, paints, acid washings, light-wight waste materials and litter are to be emptied as necessary. Disposal of waste shall be in a manor approved by the superintendent,
iii) Spill sand (or other materials) is removed from hazard areas, including likely areas of concentrated or high velocity flows such as waterways, gutters, paved areas and driveways,
iv) Sediment is removed from basins and / or traps when less than $20m^3$ of trapping capacity remain per $1000m^2$ of distributed lands, and or less than 500 depth remains in the settling zone. Any collected sediment will be disposed in areas where further pollution to down slope lands and waterways is unlikely,
v) Rehabilitated lands have effectively reduced the erosion hazard and initiate upgrading or repair as appropriate.

SWM 21
The contractor shall provide all monitoring control and testing.

Issue	Date	Description	Appd
A	26.02.19	FOR D.A.	K.E.

AMENDMENTS

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Job Title

RESIDENTIAL FLAT BUILDING
28-32 EVAN STREET
PENRITH NSW 2750

Drawing Title

EROSION CONTROL AND SEDIMENT PLAN SHEET 1

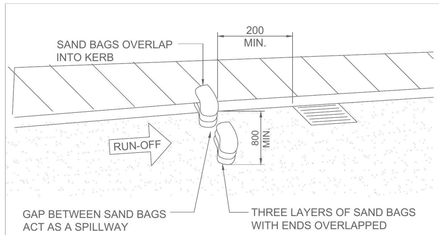
Scale
AS SHOWN

Drawing Status

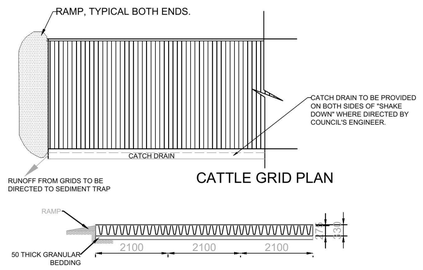
Job No	Drawn	Checked	Approved
180276	T.M.	K.E.	K.E.

DRAWING NO.	Issue
D15	A

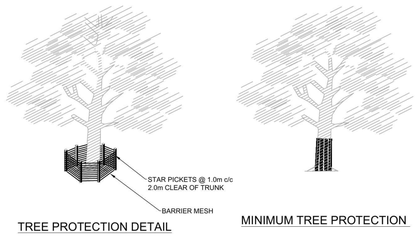
RESIDENTIAL FLAT BUILDING, PENRITH



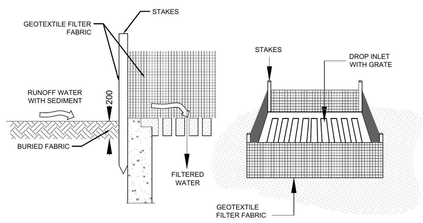
SANDBAG KERB INLET SEDIMENT TRAP



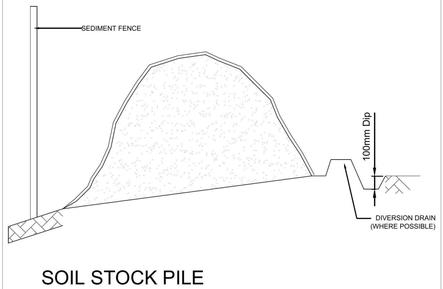
CATTLE GRID ALTERNATIVE



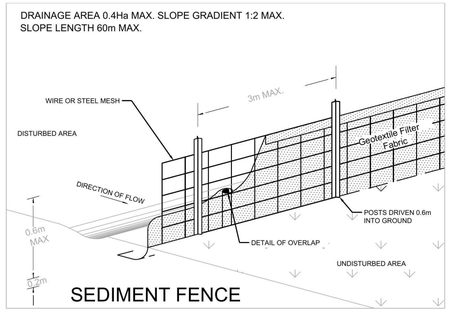
TREE PROTECTION DETAIL



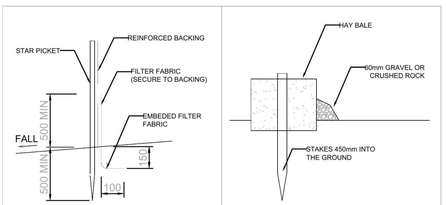
GEOTEXTILE FILTER FABRIC DROP INLET SEDIMENT TRAP



SOIL STOCK PILE

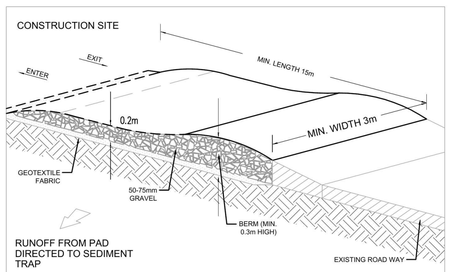


SEDIMENT FENCE

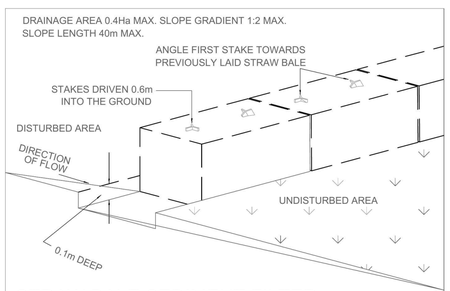


SILT FENCE DETAIL

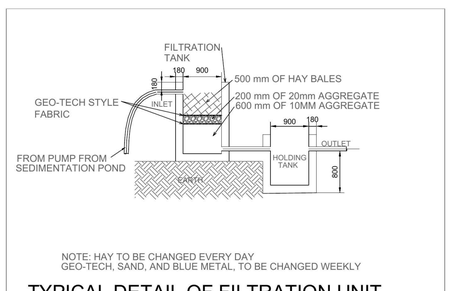
HAY BALE DETAIL



TEMPORARY CONSTRUCTION EXIT



STRAW BALE SEDIMENT FILTER



NOTE: HAY TO BE CHANGED EVERY DAY
GEO-TECH, SAND, AND BLUE METAL, TO BE CHANGED WEEKLY

TYPICAL DETAIL OF FILTRATION UNIT

NOTES:

Issue	Date	Description	Appd
A	26.02.19	FOR D.A.	K.E.

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Job Title

RESIDENTIAL FLAT BUILDING
28-32 EVAN STREET
PENRITH NSW 2750

Drawing Title

EROSION CONTROL AND SEDIMENT PLAN SHEET 2

Scale
NTS

Drawing Status

Job No	Drawn	Checked	Approved
180276	T.M.	K.E.	K.E.

DRAWING NO.	Issue
D16	A

5.2 Music Link Summary

PENRITH CITY COUNCIL

music@link

MUSIC-*link* Report

Project Details		Company Details	
Project:	28-32 Evan Street Penrith	**Company:**	Smart Structures Australia
Report Export Date:	17/04/2019	**Contact:**	Kamyar Eivazzadeh
Catchment Name:	12202 - 28-32 Evans Street	**Address:**	Suite 2.04, Building 3, 35-41 Waterloo Road, Macquarie Park
Catchment Area:	0.142ha	**Phone:**	02 9052 6466
Impervious Area*:	74.08%	**Email:**	kamyar@smartstructs.com.au
Rainfall Station:	67113 PENRITH		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1999 - 31/12/2008 11:54:00 PM		
Mean Annual Rainfall:	691mm		
Evapotranspiration:	1158mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.31		
Study Area:	Penrith		
Scenario:	Penrith Development		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node: 85/60/45	**Reduction**	**Node Type**	**Number**	**Node Type**	**Number**
Flow	21%	Sedimentation Basin Node	1	Urban Source Node	5
TSS	85.5%	Rain Water Tank Node	1		
TP	79.8%	Generic Node	1		
TN	60.9%	GPT Node	1		
GP	100%				

Comments

- Roof node base flow values are as per the MUSIC modelling guidelines which indicate base flow has no effect for impervious areas and therefore no value is needed

-The 'SF chamber' node has been modified to represent a below ground chamber. 'K' values have been set to 1 elminate any performance from the actual tank

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
GPT	OceanGuard	Hi-flow bypass rate (cum/sec)	None	99	0.02
Receiving	85/60/45	% Load Reduction	None	None	21
Receiving	85/60/45	GP % Load Reduction	90	None	100
Receiving	85/60/45	TN % Load Reduction	45	None	60.9
Receiving	85/60/45	TP % Load Reduction	60	None	79.8
Receiving	85/60/45	TSS % Load Reduction	85	None	85.5
Sedimentation	SF Chamber 4m²	High Flow Bypass Out (ML/yr)	None	None	0
Urban	Driveway - 34m² (100% Imp.)	Area Impervious (ha)	None	None	0.003
Urban	Driveway - 34m² (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	Driveway - 34m² (100% Imp.)	Total Area (ha)	None	None	0.003
Urban	Hardstand - 288m² (100% Imp.)	Area Impervious (ha)	None	None	0.029
Urban	Hardstand - 288m² (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	Hardstand - 288m² (100% Imp.)	Total Area (ha)	None	None	0.029
Urban	Landscape - 347m² (100% Perv.)	Area Impervious (ha)	None	None	0
Urban	Landscape - 347m² (100% Perv.)	Area Pervious (ha)	None	None	0.035
Urban	Landscape - 347m² (100% Perv.)	Total Area (ha)	None	None	0.035
Urban	Landscape on Slab - 20m² (90% Perv.)	Area Impervious (ha)	None	None	0.0002
Urban	Landscape on Slab - 20m² (90% Perv.)	Area Pervious (ha)	None	None	0.0018
Urban	Landscape on Slab - 20m² (90% Perv.)	Total Area (ha)	None	None	0.002
Urban	Roof - 729m² (100% Imp.)	Area Impervious (ha)	None	None	0.073
Urban	Roof - 729m² (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	Roof - 729m² (100% Imp.)	Total Area (ha)	None	None	0.073

Only certain parameters are reported when they pass validation

PENRITH CITY COUNCIL

music@link

Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Rain	1 x 10kL	% Reuse Demand Met	80	None	64.07
Sedimentation	SF Chamber 4m^2	Notional Detention Time (hrs)	8	12	0.218
Sedimentation	SF Chamber 4m^2	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Chamber 4m^2	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Chamber 4m^2	Total Suspended Solids - k (m/yr)	8000	8000	1
Urban	Roof - 729m^2 (100% Imp.)	Baseflow Total Nitrogen Mean (log mg/L)	0.11	0.11	0
Urban	Roof - 729m^2 (100% Imp.)	Baseflow Total Nitrogen Standard Deviation (log mg/L)	0.12	0.12	0
Urban	Roof - 729m^2 (100% Imp.)	Baseflow Total Phosphorus Mean (log mg/L)	-0.85	-0.85	0
Urban	Roof - 729m^2 (100% Imp.)	Baseflow Total Phosphorus Standard Deviation (log mg/L)	0.19	0.19	0
Urban	Roof - 729m^2 (100% Imp.)	Baseflow Total Suspended Solids Mean (log mg/L)	1.2	1.2	0
Urban	Roof - 729m^2 (100% Imp.)	Baseflow Total Suspended Solids Standard Deviation (log mg/L)	0.17	0.17	0

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