MEMO

ARCADIS Design & Consultancy for natural and built assets

Date	27/02/2019
To	Aubrey Chan, Jamie Gordon, Kylie Soltani and Zachary Karantonis
From	Dov Ben-Avraham
Copy to	Georgia Ashdown, Mark Kuhne, Clement Ding and Melanie Gostelow
Subject	Westfield Penrith Mondo – Development Application Memorandum

Introduction

Arcadis has been engaged by Scentre Group Limited to prepare a stormwater management strategy to support the Development Application (DA) for the proposed Westfield Penrith Mondo infill development. The development will be confined to the Westfield site and consist of landscaping upgrades, expansion of external retail spaces and the development of a new food premise building that will serve as a landmark fronting High Street.

This memorandum provides a summary of the stormwater management strategy for the proposed development and addresses the following topics as they relate to the development:

- Stormwater requirements (including stormwater drainage upgrades, WSUD and OSD requirements);
- Flooding constraints; and
- Flood planning controls and requirements.

This memorandum should be read in conjunction with the Civil DA drawings and MUSIC-link report included in Appendix A and B respectively, as well as the Penrith City Council Flood Letter (29 May 2018) supplied in Appendix C.

The overall Stormwater Management Strategy has been developed in accordance with the following:

- Penrith City Council Development Control Plan (2014);
- WSUD Technical Guidelines Version 3 (2015); and
- Stormwater Drainage Guidelines for Building Developments (2016).

Site Description

The proposed development is to be situated on an existing brownfield site located at 569 High Street, Penrith NSW 2750 (Lot 1, DP1137699) and is located within the Penrith City Council (PCC) Local Government Area (LGA). The proposed development site is approximately 0.377 hectares in area and is bounded by Westfield Penrith (North and East), High Street (South) and the Joan Sutherland Performing Arts Centre (West). The subject site and aerial is shown in Figure 1 on the next page.

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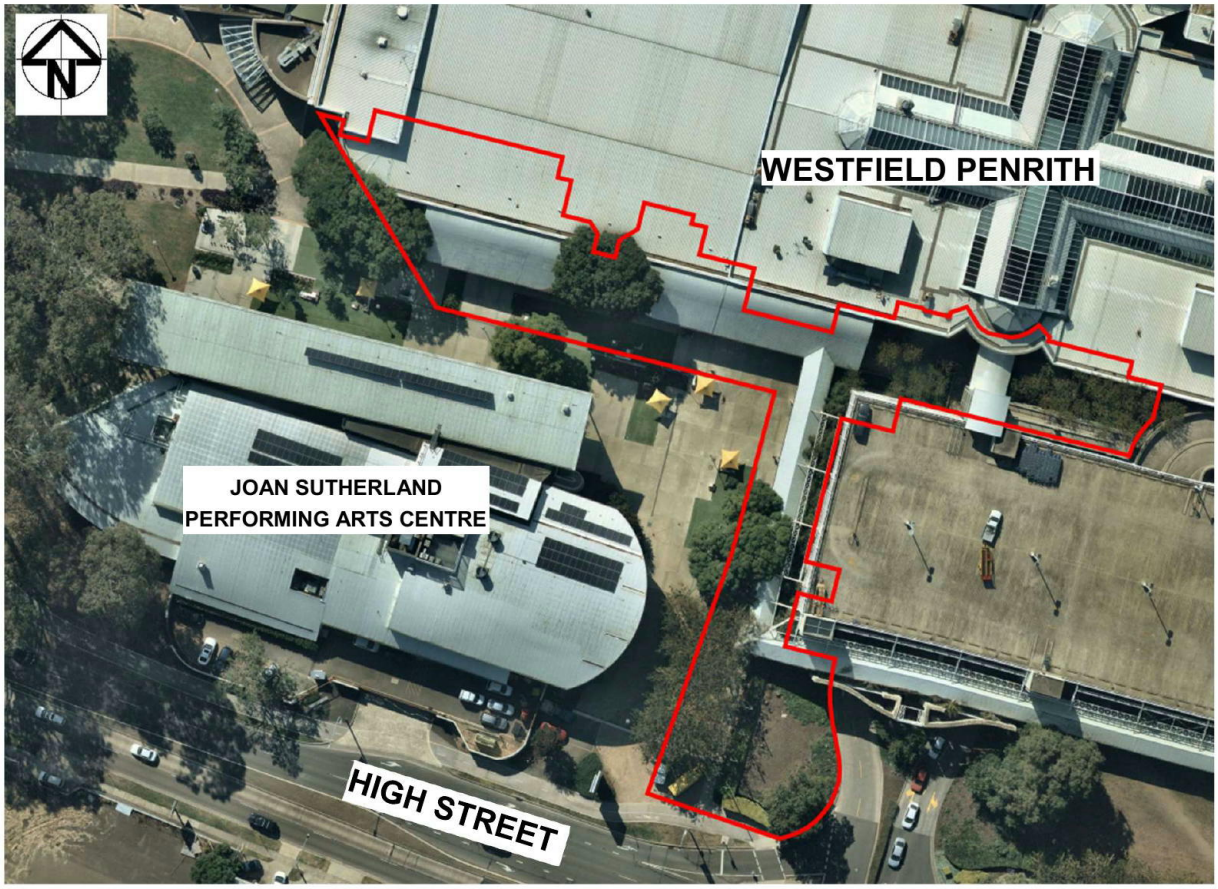

Figure 1 – Site Aerial (Source: Nearmaps, 2018)

The existing site generally grades to a sag at the centre of the Mondo community space where a series of grated trench drains and grated stormwater pits incorporated amongst the landscaping features collects stormwater runoff and conveys it into the existing twin 1350mm dia. trunk drainage pipeline (refer to Appendix A – Civil DA drawings). Furthermore, the areas fronting High Street bypass the existing stormwater drainage infrastructure within the site and are drained via road drainage along High Street.

Stormwater Requirements

Proposed Development

The surface treatments for the proposed private domain upgrades have been categorised as follows:

- Impervious (concrete paving, gravel, synthetic turf and roof); and
- Pervious (vegetated landscaping)

Referring to the Stormwater Catchment Plan (Appendix A – Drawing No. C221), the net total site imperviousness in the post-development scenario has increased by 479 m^2, which has triggered the requirement for Water Sensitive Urban Design (WSUD) and On-Site Detention (OSD) as per the guidelines and requirements of PCC.

On-Site Detention

To address stormwater detention objectives, an underground OSD tank has been designed (refer to Appendix A – Drawing No. C231) to attenuate stormwater peak flows for all stormwater events (up to

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and including the 100-year ARI event) to pre-development levels in accordance with the PCC – *Development Control Plan (2014), Section 3.6 Stormwater Management and Drainage*. Furthermore, the OSD has been designed to be in compliance with the OSD storage and Permissible Site Discharge (PSD) requirements as detailed in PCC's – *Stormwater Drainage Guidelines for Building Developments (2016), Section 4 On-Site Detention*.

The OSD storage tank is proposed to be located on the South-West corner of proposed building R9 (refer to Appendix A – Drawing No. C201) and would collect stormwater runoff from the adjacent hardstand areas as well as the entire roof and associated awnings of building R9 (Appendix A – Drawing No. C231).

Catchment modelling has been undertaken using DRAINS modelling software to analyse and confirm that the OSD storage tank designed in accordance with PCC guidelines would indeed achieve PCC peak flow targets. Key parameters used in the DRAINS analysis are summarised in Table 1 below.

Table 1 – DRAINS modelling parameters

DRAINS Parameter	Value
Rainfall IFD	AR&R1987 IFD Data in accordance with Penrith City Council's – *Stormwater Drainage Guidelines for Building Developments (2016), Appendix E*
Paved Area Depression Storage	1 mm
Supplementary Area Depression Storage	1 mm
Pervious Area Depression Storage	5 mm
Antecedent Moisture Condition	3
Soil Type	3

A summary comparison of peak flow results for the pre-development and post-development site is detailed in Table 2 below.

Table 2 – Stormwater Peak Flow Results

Storm Event	Pre-Development Peak Flow (m^3/s)	Post-Development Peak Flow Incl. OSD Tank (m^3/s)
10-year ARI	0.139	0.123
100-year ARI	0.200	0.180

The DRAINS model results indicate that the proposed OSD storage would ensure that post-development discharge would achieve PCC stormwater peak flow requirements and ensure that site discharge would not exceed pre-development levels.

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Water Sensitive Urban Design

To address stormwater quality objectives, water sensitive urban design measures have been implemented into the proposed site redevelopment in order to meet PCC load reduction targets in accordance with the PCC *WSUD Technical Guidelines Version 3 (2015)*.

A stormwater quality model was developed for the site using MUSIC modelling software (V6.3) with modelling parameters being adopted from the PCC MUSIC-Link and *WSUD Technical Guidelines Version 3 (2015)*.

A summary of the treatment measures proposed for the site are detailed in Appendix A – Drawing No. C201. Key features of the proposed treatment strategy include a proposed rainwater tank reuse scheme for toilets within food premises R2, R3, R5, R6 and R9 as well as for landscape irrigation across the site. Furthermore, it is proposed to integrate 35m^2 of bioretention within the proposed raised planter box in the North-East portion of the site (refer to Appendix A – Drawing No. C201) to treat roof runoff. An example of a planter box raingarden is shown below in Figure 2.

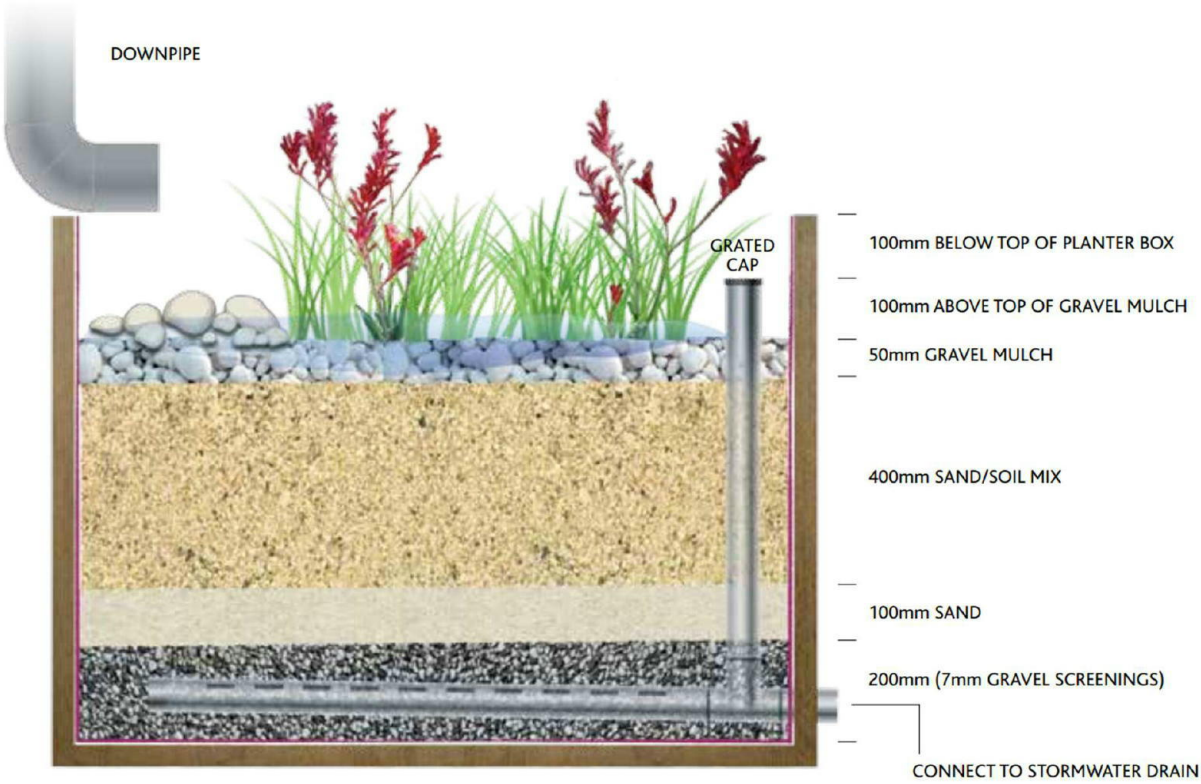

Figure 2 – Typical Cross-section of a planter box raingarden (Source: Melbourne Water - Building a planter box raingarden)

It should be noted that all existing areas within the private domain not subject to redevelopment works and any existing hardstand bypass areas were excluded from the MUSIC model as these areas will remain consistent with pre-development conditions. Table 3 on the next page summarises the achieved pollutant reductions.

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Table 3 – Stormwater Quality Pollutant Reduction Results

Key Pollutant	Penrith City Council Load Reduction Targets	Load Reduction Achieved
Total Suspended Solids (TSS)	85%	85.8%
Total Phosphorus (TP)	60%	61.6%
Total Nitrogen (TN)	45%	57.4%
Gross Pollutants	90%	100%

The MUSIC model results indicate that the proposed water quality strategy would achieve PCC pollutant load reduction targets. The PCC MUSIC-link report has been included in Appendix B for reference.

Stormwater Drainage Infrastructure

All existing stormwater drainage infrastructure within the public domain will be retained and no modifications are proposed as part the redevelopment works.

No modifications to the trunk drainage infrastructure (twin 1350mm dia. stormwater pipes) contained within the 7.5m wide easement are proposed as part of the redevelopment of the site.

Flooding Constraints

Existing Flood Conditions

PCC flood mapping indicates that there is localised overland flooding in the north-eastern corner of the development area as seen in Figure 3 below (refer to Appendix C - Flood Letter from Penrith City Council).

Figure 3 – 1% AEP Local Overland Flow Flood Map (Penrith City Council Flood Letter, 29 May 2018)

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The designated flood level is RL 27.2 and is either associated with surcharge from the local stormwater network within the site, or insufficient inlet capacity to drain runoff within the sag low point in the 1% AEP flood event (100-year ARI event).

Proposed Development

The proposed landscaping upgrades will not affect drainage capacity nor is it proposed to modify surface levels or gradients in the flood affected area.

Due to the inclusion of OSD infrastructure and Raingardens (treating roof runoff) with extended detention storage attenuating peak flows to less than existing levels, we expect there to be a minor improvement in site hydrology and flooding conditions in the proposed development scenario. Furthermore, despite the extension of the existing awning connected to the Westfield Penrith Shopping Centre, it will be extended over existing impervious areas and hence there will be no net change in site imperviousness in the flood affected private domain.

Flood Planning Controls and Requirements

Flood Planning Levels

As stated in PCC's *DCP (2014), Section 3.5 Flood Planning*, where possible, internal floor levels, access to internal stairs and lifts to basement levels shall be at least 0.5m above the 1% AEP flood event (100-year ARI event) level of RL 27.2m (refer to Appendix C – Flood Letter from Penrith City Council) Therefore, the flood planning level relevant to this site is RL 27.7m.

Scentre Group Limited have nominated extensions to the existing Westfield Penrith Shopping Centre, identified as proposed retail premises R1 and proposed food premises R2, R3, R5 and R6. These extensions will have a finished floor level (FFL) of RL 27.30 to match the existing FFL of the remaining Westfield Penrith Shopping Centre to which they are attached. Furthermore, proposed infill development building R9 will have a slightly higher FFL of RL 27.35 to account for raised levels in its proposed location, however will still be connected to the rest of the proposed extensions via a shared and continuous roof structure.

Referring to *PCC's DCP (2014), Section 3.5C (7a) Industrial/Commercial – Extensions and Infill Development*, PCC may approve of the development with floor levels below the 1% AEP flood event (100-year ARI event) if:

- *The raising of the floor levels would be out of character with adjacent buildings.*

As the proposed retail and food extensions and infill development building R9 will be connected to the existing Westfield Penrith Shopping Centre, the FFL's should remain generally consistent between the existing and proposed developments rather than apply a proposed flood planning level of RL 27.7m, which is significantly higher than the existing Westfield Penrith Shopping Centre FFL of RL 27.30 and typically applied to new developments including independent structures. Furthermore, it should be noted that the proposed FFL's will still be above the 1% AEP flood event level of RL 27.2m.

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Conclusion

Arcadis has been engaged by Scentre Group Limited to prepare a stormwater management strategy to support a DA for the proposed Mondo redevelopment at Westfield Penrith in accordance with Penrith City Council guidelines and requirements. This memorandum details existing flood conditions as well as stormwater requirements that will be applicable to the proposed development.

As the proposed redevelopment does result in a net increase in imperviousness from existing conditions, OSD and WSUD measures have been implemented to address Penrith City Council requirements and manage site runoff in terms of peak flow attenuation and water quality.

It is expected that the proposed infill development will not have an impact or worsen existing flood conditions and that existing surfaces, levels, grades and stormwater drainage infrastructure will be retained within the public domain. OSD and WSUD measures will offset increases to imperviousness and runoff within the private domain.

We trust the contents of this memorandum satisfies the requirements of our scope and objective. If you have any questions, please feel free to contact me on my number below.

Yours sincerely

Dov Ben-Avraham
Senior Engineer
(02) 8907 8286

Appendix A.	Civil DA Drawings
Appendix B.	Penrith City Council MUSIC-link Report
Appendix C.	Penrith City Council Flood Letter for Westfield Penrith (dated 29 May 2018)

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Appendix A – Civil DA Drawings

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WESTFIELD PENRITH MONDO
DEVELOPMENT APPLICATION

CIVIL DRAWING LIST

GENERAL

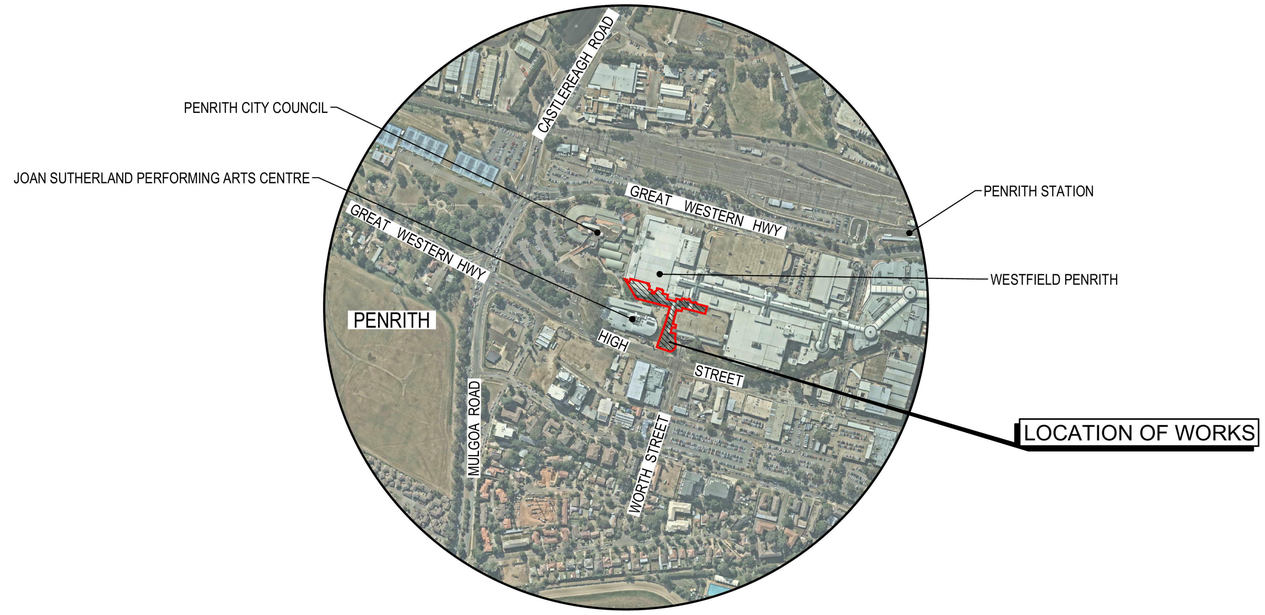
C001 COVER SHEET AND DRAWING LIST

SITE PREPARATION

C101 EROSION AND SEDIMENT CONTROL PLAN
C111 EROSION AND SEDIMENT CONTROL DETAILS

STORMWATER DRAINAGE

C201 STORMWATER MANAGEMENT PLAN
C221 STORMWATER CATCHMENT PLAN
C231 OSD TANK PLAN, CATCHMENT PLAN AND DETAILS



LOCALITY PLAN
1 : 5000

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Issue	Description	Date
03	FINAL ISSUE FOR DEVELOPMENT APPLICATION	27/02/19
02	REVISED ISSUE FOR CLIENT REVIEW	24/08/18
01	ISSUE FOR CLIENT REVIEW	06/06/18

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1 : 5000

Client
SCENTRE GROUP
Owner and Operator of Westfield in Australia and New Zealand

Status
DEVELOPMENT APPLICATION
NOT TO BE USED FOR CONSTRUCTION

		Current Issue Signatures	
Scales	1 : 5000	Drawn A.ZHAO	
Original	A1	Designed C.DING	
Height Datum	AHD	Checked D.BEN-AVRAHAM	
Grid	MGA	Approved D.BEN-AVRAHAM	

Filename: C001-10019736-04-nsd-CoverSheetAndDrawingList.dwg

Project
WESTFIELD PENRITH MONDO REDEVELOPMENT

Title
COVER SHEET AND DRAWING LIST

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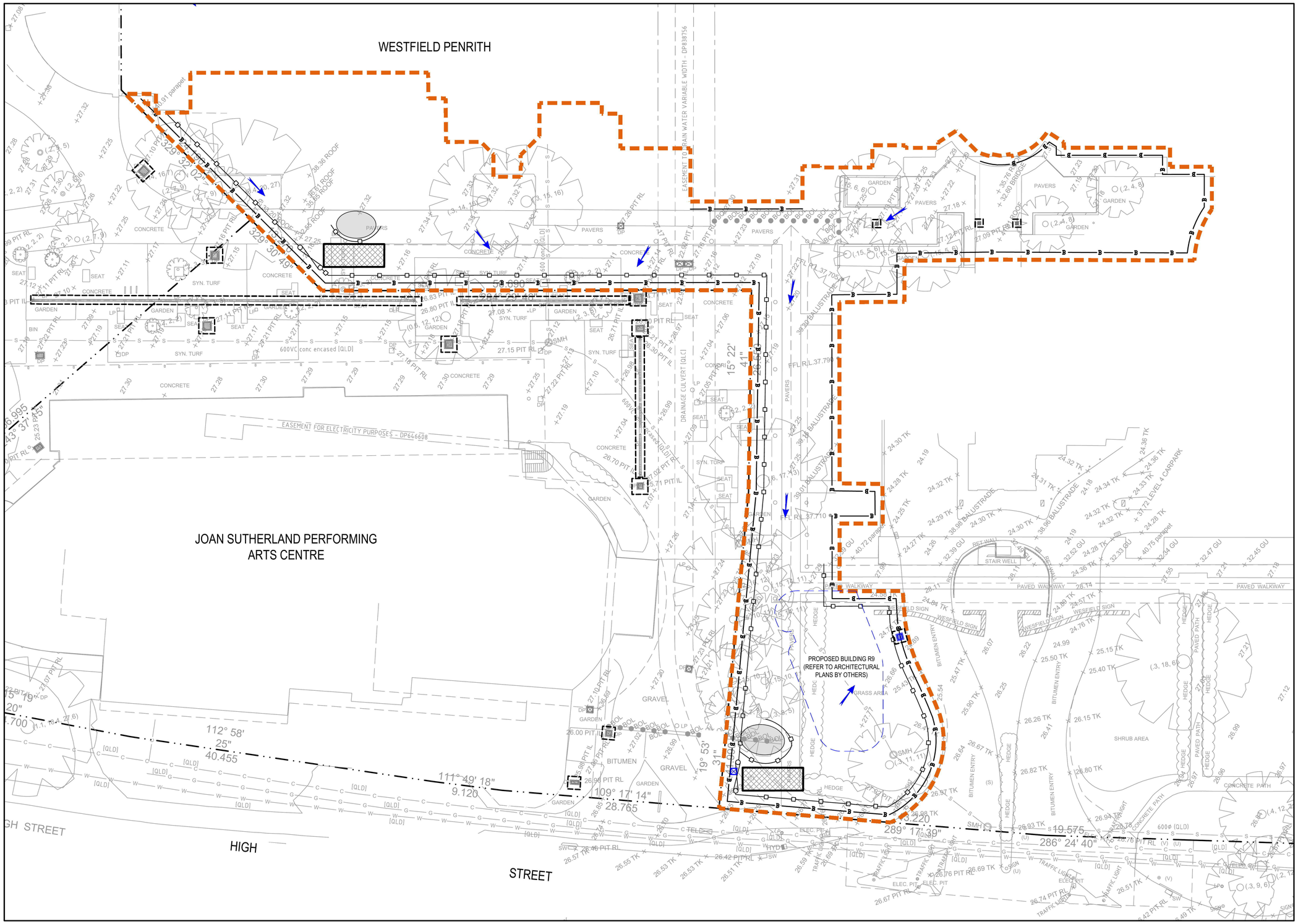
Version: 1, Version Date: 11/03/2019



LEGEND

- PROPOSED LIMIT OF WORKS BOUNDARY
- PROPOSED SEDIMENT FENCE (SD 6-8)
- PROPOSED 1.8m HIGH CHAINWIRE BARRIER FENCE (LOCATION TO BE CONFIRMED ON SITE BY CONTRACTOR)
- PROPOSED GEOTEXTILE INLET FILTER (SD 6-12)
- PROPOSED STABILISED SITE ACCESS (SD 6-14)
- PROPOSED GATE
- OVERLAND FLOW DIRECTION
- PROPOSED TEMPORARY STOCKPILE (SD 4-1)
- EXISTING GRATED STORMWATER PIT
- EXISTING SEALED STORMWATER PIT
- EXISTING GRATED TRENCH DRAIN
- PROPOSED SEALED STORMWATER PIT
- PROPOSED GRATED STORMWATER PIT

NOTES

1. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL / RELEVANT AUTHORITY SPECIFICATIONS AND DETAILS.
2. ALL SEDIMENT AND SOIL EROSION CONTROL MEASURES TO BE INSTALLED IN ACCORDANCE WITH THE "BLUE BOOK". CONTRACTOR TO ENSURE THESE MEASURES ARE IN PLACE AND MAINTAINED AT ALL TIMES DURING CONSTRUCTION WORKS.

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Filename: C101-10019736-04-nsd-ErosionAndSedimentControlPlan.dwg

Project: WESTFIELD PENRITH MONDO REDEVELOPMENT

Title: EROSION AND SEDIMENT CONTROL PLAN

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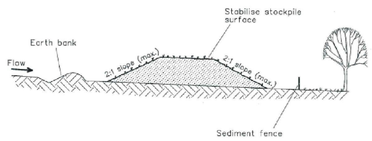
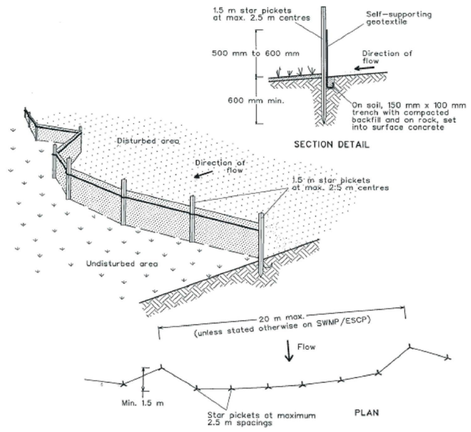


Construction Notes

1. Place stockpiles more than 2 (preferably 5) metres from existing vegetation, concentrated water flow, roads and hazard areas.
2. Construct on the contour as low, flat, elongated mounds.
3. Where there is sufficient area, topsoil stockpiles shall be less than 2 metres in height.
4. Where they are to be in place for more then 10 days, stabilise following the approved ESCP or SWMP to reduce the C-factor to less than 0.10.
5. Construct earth banks (Standard Drawing 5-5) on the upslope side to divert water around stockpiles and sediment fences (Standard Drawing 6-8) 1 to 2 metres downslope.

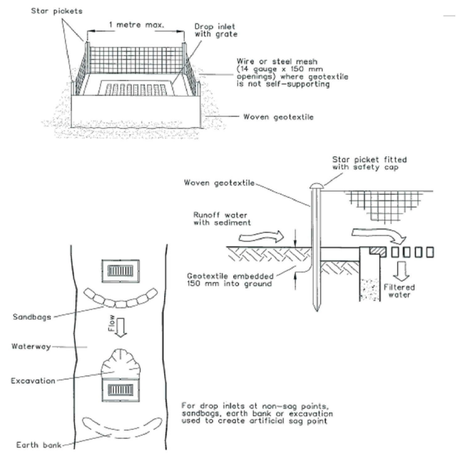
TEMPORARY STOCKPILES (SD 4-1)



Construction Notes

1. Construct sediment fences as close as possible to being parallel to the contours of the site, but with small returns as shown in the drawing to limit the catchment area of any one section. The catchment area should be small enough to limit water flow if concentrated at one point to 50 litres per second in the design storm event, usually the 10-year event.
2. Cut a 150-mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
3. Drive 1.5 metre long star pickets into ground at 2.5 metre intervals (max) at the downslope edge of the trench. Ensure any star pickets are fitted with safety caps.
4. Fix self-supporting geotextile to the upslope side of the posts ensuring it goes to the base of the trench. Fix the geotextile with wire ties or as recommended by the manufacturer. Only use geotextile specifically produced for sediment fencing. The use of shade cloth for this purpose is not satisfactory.
5. Join sections of fabric at a support post with a 150-mm overlap.
6. Backfill the trench over the base of the fabric and compact it thoroughly over the geotextile.

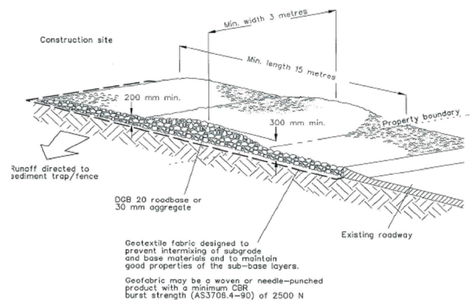
SEDIMENT FENCE (SD 6-8)



Construction Notes

1. Fabricate a sediment barrier made from geotextile or straw bales.
2. Follow Standard Drawing 6-7 and Standard Drawing 6-8 for installation procedures for the straw bales or geofabric. Reduce the picket spacing to 1 metre centres.
3. In waterways, artificial sag points can be created with sandbags or earth banks as shown in the drawing.
4. Do not cover the inlet with geotextile unless the design is adequate to allow for all waters to bypass it.

GEOTEXTILE INLET FILTER (SD 6-12)



Construction Notes

1. Strip the topsoil, level the site and compact the subgrade.
2. Cover the area with needle-punched geotextile.
3. Construct a 200-mm thick pad over the geotextile using road base or 30-mm aggregate.
4. Ensure the structure is at least 15 metres long or to building alignment and at least 3 metres wide.
5. Where a sediment fence joins onto the stabilised access, construct a hump in the stabilised access to divert water to the sediment fence

STABILISED SITE ACCESS (SD 6-14)

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Project: WESTFIELD PENRITH MONDO REDEVELOPMENT

Title: EROSION AND SEDIMENT CONTROL DETAILS

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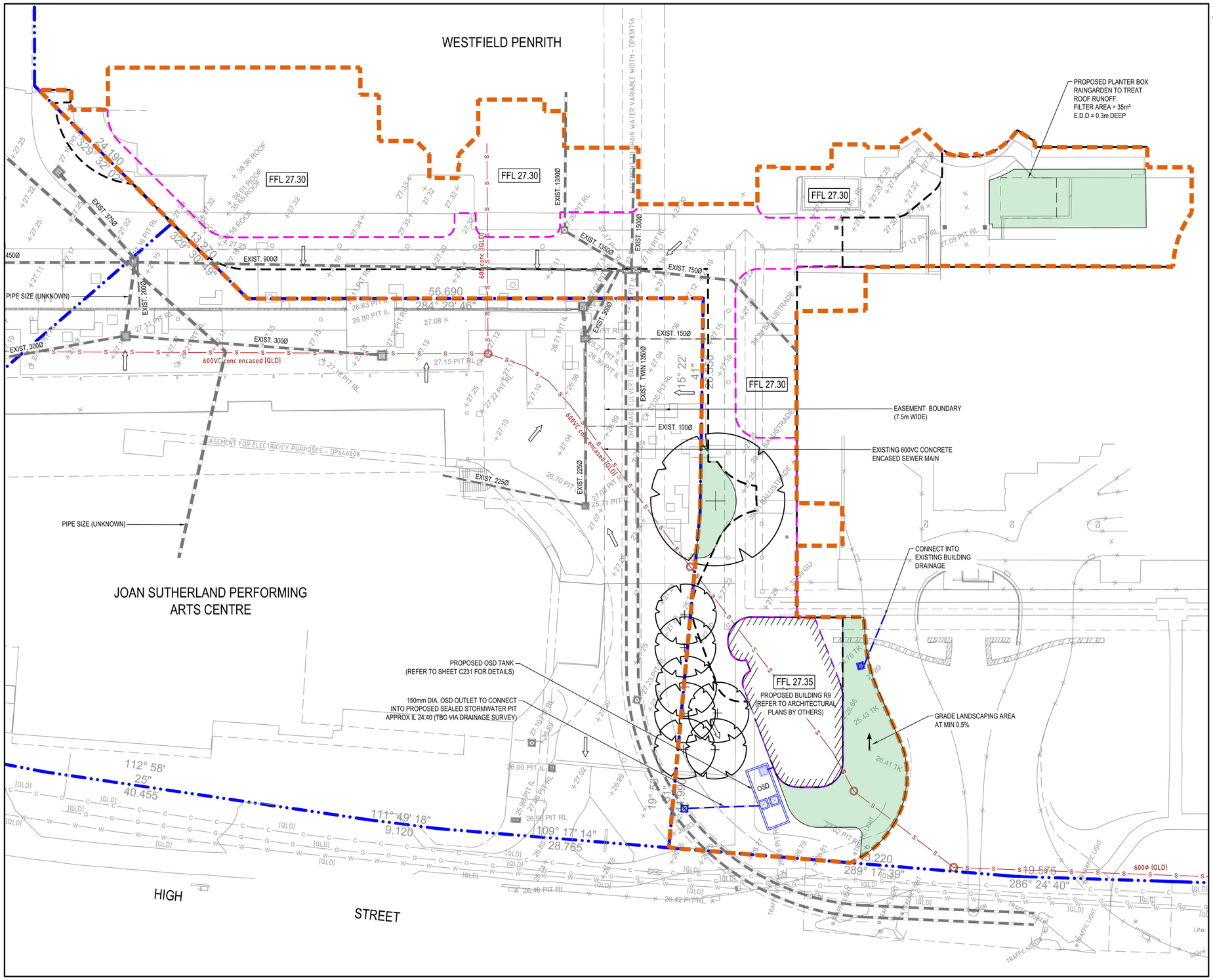


NOTES

1. ALL EXISTING STORMWATER DRAINAGE INFRASTRUCTURE TO BE RETAINED UNLESS NOTED OTHERWISE.
2. SUBSOIL DRAINAGE TO BE INCORPORATED INTO ALL LANDSCAPED AREAS.
3. SERVICES SHOWN ARE INDICATIVE ONLY AND WERE OBTAINED FROM A DBYD (QUALITY LEVEL D). DETAILED SURVEY OF ALL SERVICES TO BE CONDUCTED TO QUALITY LEVEL A PRIOR TO DETAILED DESIGN.
4. DETAILED DRAINAGE SURVEY TO BE CONDUCTED PRIOR TO DETAILED DESIGN TO CONFIRM INVERT LEVELS AND DIMENSIONS OF ALL EXISTING STORMWATER DRAINAGE INFRASTRUCTURE.
5. EXISTING STORMWATER DRAINAGE PIPES NOT DRAWN TO SCALE.

LEGEND

- PROPOSED LIMIT OF WORKS BOUNDARY
- EXISTING LOT BOUNDARY
- PROPOSED ROOF BOUNDARY
- PROPOSED BUILDING LINE
- EXIST ø375 — EXISTING STORMWATER DRAINAGE PIPE
- EXISTING GRATED STORMWATER PIT
- EXISTING SEALED STORMWATER PIT
- EXISTING GRATED TRENCH DRAIN
- PROPOSED STORMWATER DRAINAGE PIPE
- PROPOSED GRATED STORMWATER PIT
- PROPOSED SEALED STORMWATER PIT
- LANDSCAPING - REFER TO LANDSCAPE PLANS BY OTHERS
- S — S — EXISTING SEWER PIPE
- FLOW DIRECTION

WATER QUALITY TREATMENT NODES:

1. 5kL RAINWATER TANK
   - TO BE INSTALLED FOR PROPOSED FOOD PREMISE R9
2. 3kL RAINWATER TANK
   - TO BE INSTALLED FOR EACH PROPOSED FOOD PREMISES R2, R3, R5 AND R6
3. STORMWATER 360 ENVIROPOD (20L/S)
   - TO BE INSTALLED IN ALL EXISTING AND PROPOSED GRATED STORMWATER PITS
4. STORMWATER 360 PSORB FILTER CARTRIDGE (HEIGHT: 690mm)
   - TO BE INSTALLED INSIDE PROPOSED OSD TANK
5. PLANTER BOX RAINGARDEN
   - TO BE INCORPORATED WITHIN PROPOSED LANDSCAPE PLANTER BOX
   - EXTENDED DETENTION DEPTH = 300mm
   - FILTER AREA = 35m²

TREATMENT STANDARDS:

POLLUTANT	REDUCTION TARGET	REDUCTION ACHIEVED
GROSS POLLUTANTS	90%	100%
TOTAL SUSPENDED SOLIDS	85%	85.8%
TOTAL PHOSPHORUS	60%	61.6%
TOTAL NITROGEN	45%	57.4%

* MUSIC MODEL PARAMETERS AND POLLUTANT REDUCTION TARGETS IN ACCORDANCE WITH PENRITH CITY COUNCIL - WSUD TECHNICAL GUIDELINES VERSION 3 (JUNE 2015) AND MUSIC V6.3 PENRITH CITY COUNCIL MUSIC-LINK

** NOTE THAT EXISTING AREAS WITHIN THE PRIVATE DOMAIN NOT SUBJECT TO REDEVELOPMENT WORKS AND EXISTING HARDSTAND BYPASS AREAS WERE EXCLUDED FROM THE MUSIC MODEL AS THEY WILL REMAIN CONSISTENT WITH PRE-DEVELOPMENT CONDITIONS

NON-POTABLE SITE WATER DEMANDS:

USAGE	RATE	DEMAND
TOILETS WITHIN FOOD PREMISES R2, R3, R5, R6 AND R9 (ASSUME 12 TOILETS TOTAL)	0.1 kL/TOILET/DAY	438 kL/YEAR
LANDSCAPE IRRIGATION (330 m2 OF ADJACENT LANDSCAPING)	0.4 kL/m2/YEAR	132 kL/YEAR

NON-POTABLE SITE WATER DEMANDS IN ACCORDANCE WITH PENRITH CITY COUNCIL - WSUD TECHNICAL GUIDELINES VERSION 3 (JUNE 2015)

OSD TANK REQUIREMENTS:

LAND USE	PSD (L/s/ha)	SSR (m3/ha)
COMMERCIAL	120	280

PENRITH CITY COUNCIL - STORMWATER DRAINAGE GUIDELINES FOR BUILDING DEVELOPMENTS (28 NOVEMBER 2016) TABLE 7

AREA BYPASSING (% OF TOTAL OSD CATCHMENT	PERMISSIBLE OSD DISCHARGE (L/s/ha)	REQUIRED OSD STORAGE (m3/ha) FOR COMMERICAL DEVELOPMENTS
11%	52.9	429

PENRITH CITY COUNCIL - STORMWATER DRAINAGE GUIDELINES FOR BUILDING DEVELOPMENTS (28 NOVEMBER 2016) TABLE 8

CATCHMENT AREA TO OSD TANK = 0.066 ha
CATCHMENT AREA TO BYPASS = 0.008 ha
TOTAL CATCHMENT AREA = 0.074 ha
PERCENT OF TOTAL CATCHMENT AREA TO BYPASS = 11%
PSD REQUIREMENT = 8.34 L/s
SSR REQUIREMENT = 26 m³

OSD TANK AND ORIFICE DETAILS:

PSD ACHIEVED = 8.32 L/s
VOLUME ACHIEVED = 27.5 m³

REFER TO SHEET C231 FOR MORE DETAILS

Issue	Description	Date
03	FINAL ISSUE FOR DEVELOPMENT APPLICATION	27/02/19
02	REVISED ISSUE FOR CLIENT REVIEW	24/08/18
01	ISSUE FOR CLIENT REVIEW	06/06/18

100mm on Original

Client: SCENTRE GROUP
Owner and Operator of Westfield in Australia and New Zealand

Status: DEVELOPMENT APPLICATION
NOT TO BE USED FOR CONSTRUCTION

		Current Issue Signatures	
Scales	1:250	Drawn A.ZHAO	
Original	A1	Designed C.DING	
Height Datum	AHD	Checked D.BEN-AVRAHAM	
Grid	MGA	Approved D.BEN-AVRAHAM	

Filename: C201-10019736-04-nsd-StormwaterManagementPlan.dwg

Project: WESTFIELD PENRITH MONDO REDEVELOPMENT

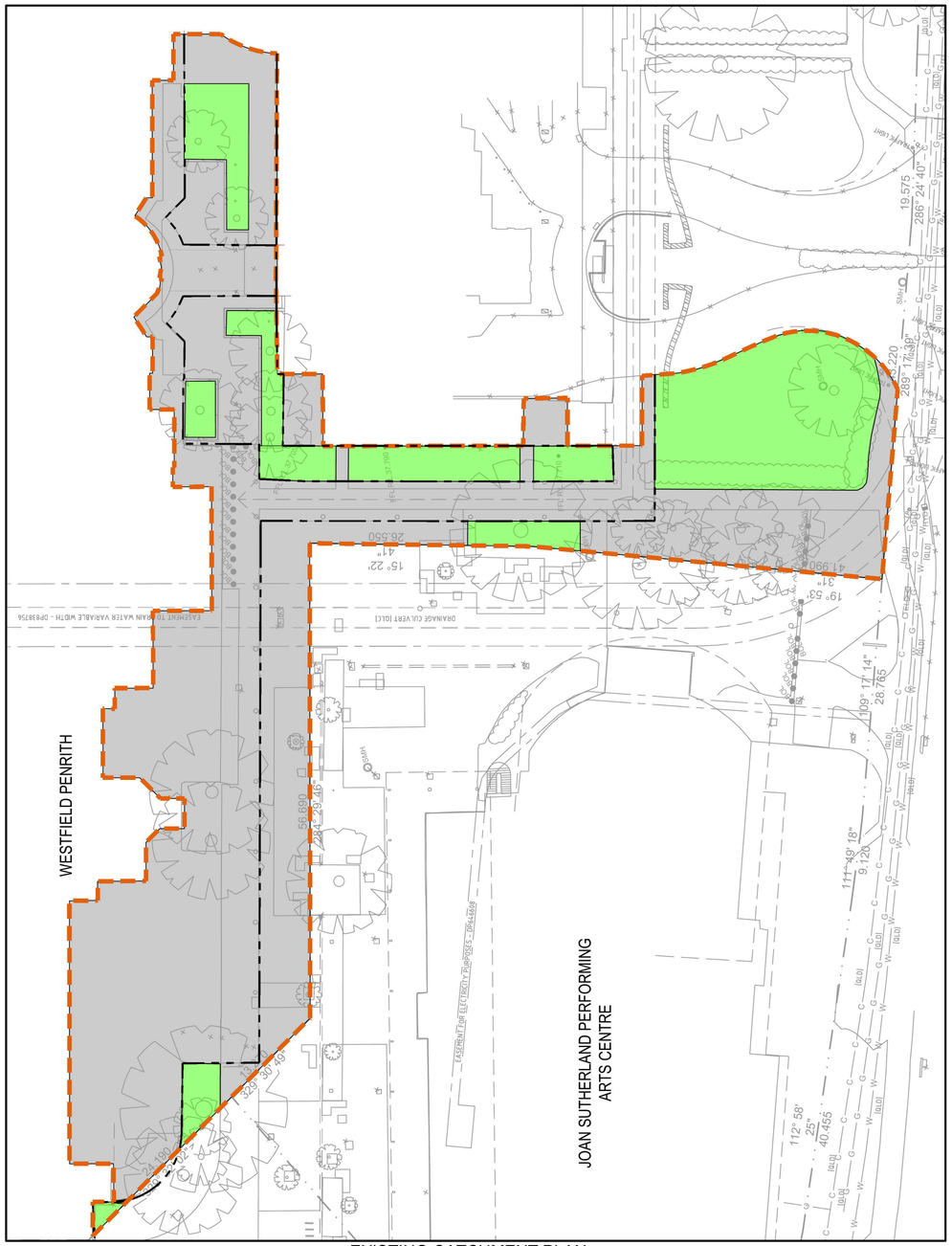
Title: STORMWATER MANAGEMENT PLAN

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George St
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
Fax No: +61 2 8907 9001
arcadis.com

Drawing No.	Project No.	Issue
C201	10019736 - 04	03

Date Plotted: 27 Feb 2019 - 01:44PM File Name: F:\10019736\10019736-04 Westfield Penrith Mondo DA\E-CAD\C-Civil\D-Final\C201-10019736-04-nsd-StormwaterManagementPlan.dwg V1

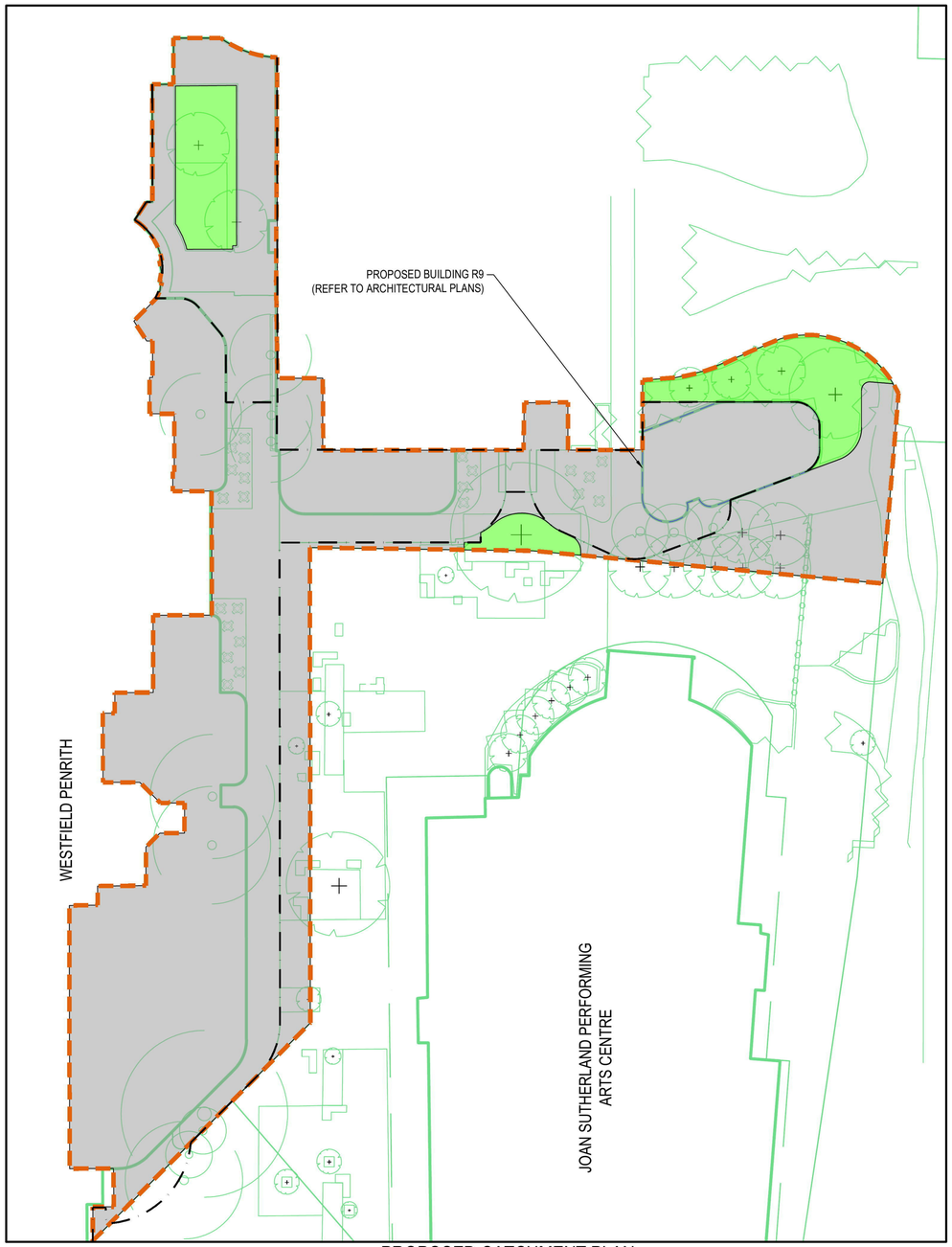
Document Set ID: 8609596
Version: 1, Version Date: 11/03/2019



EXISTING CATCHMENT PLAN

SCALE: 1:350

SURFACE TREATMENT	AREA (m2)
IMPERVIOUS	2920
PERVIOUS	849
TOTAL	3769



PROPOSED CATCHMENT PLAN

SCALE: 1:350

SURFACE TREATMENT	AREA (m2)
IMPERVIOUS	3399
PERVIOUS	370
TOTAL	3769

LEGEND

- PROPOSED LIMIT OF WORKS BOUNDARY
- EXISTING ROOF BOUNDARY
- PROPOSED ROOF BOUNDARY
- IMPERVIOUS (CONCRETE PAVING, GRAVEL, SYNTHETIC TURF AND ROOF)
- PERVIOUS (VEGETATED LANDSCAPING)

Issue	Description	Date
03	FINAL ISSUE FOR DEVELOPMENT APPLICATION	27/02/19
02	REVISED ISSUE FOR CLIENT REVIEW	24/08/18
01	ISSUE FOR CLIENT REVIEW	06/06/18

100mm on Original

0 7 14 21 28 35m

1 : 350

Client

SCENTRE GROUP

Owner and Operator of Westfield in Australia and New Zealand

Status

DEVELOPMENT APPLICATION
NOT TO BE USED FOR CONSTRUCTION

Scales	1:350	Current Issue Signatures	
		Drawn A.ZHAO	
Original	A1	Designed C.DING	
Height Datum	AHD	Checked D.BEN-AVRAHAM	
Grid	MGA	Approved D.BEN-AVRAHAM	

Filename: C221-10019736-04-nsd-StormwaterCatchmentPlan.dwg

Project

WESTFIELD PENRITH MONDO REDEVELOPMENT

Title

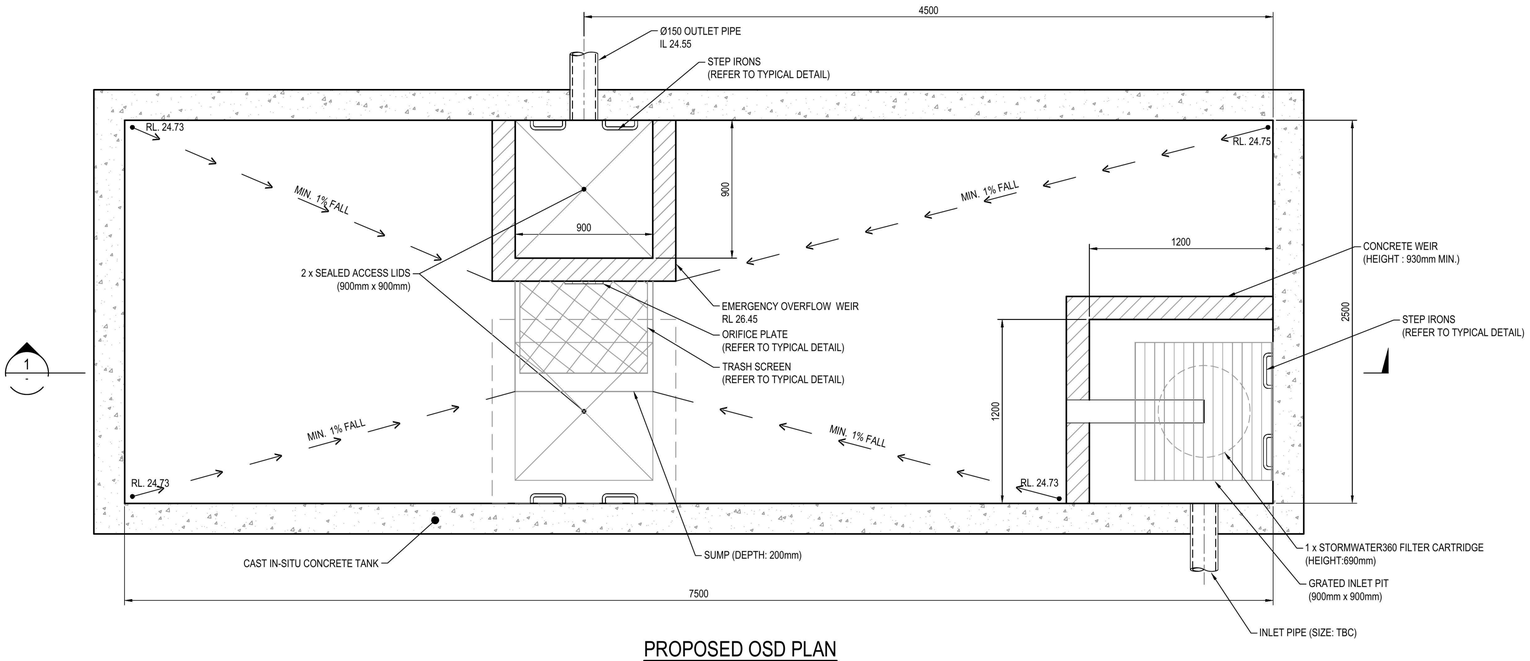
STORMWATER CATCHMENT PLAN

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George St
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
Fax No: +61 2 8907 9001
arcadis.com

Drawing No.	Project No.	Issue
C221	— 10019736 - 04 —	03

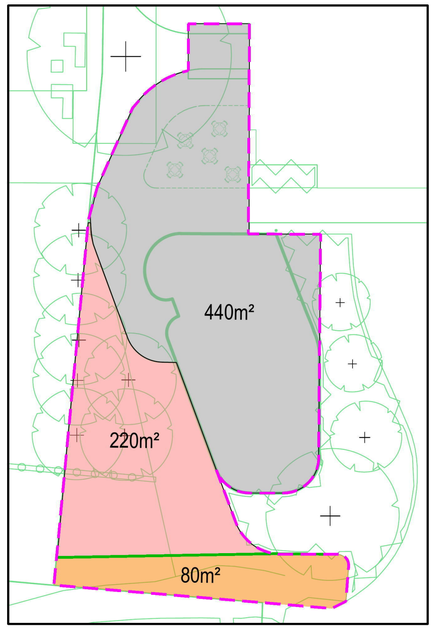
Date Plotted: 27 Feb 2019 - 10:36AM File Name: F:\10019736\10019736-04 Westfield Penrith Mondo DA\E-CAD\C-Civil\D-Final\C221-10019736-04-nsd-StormwaterCatchmentPlan.dwg

Document Set ID: 8609596
Version: 1, Version Date: 11/03/2019



PROPOSED OSD PLAN

SCALE 1 : 20



OSD CATCHMENT PLAN

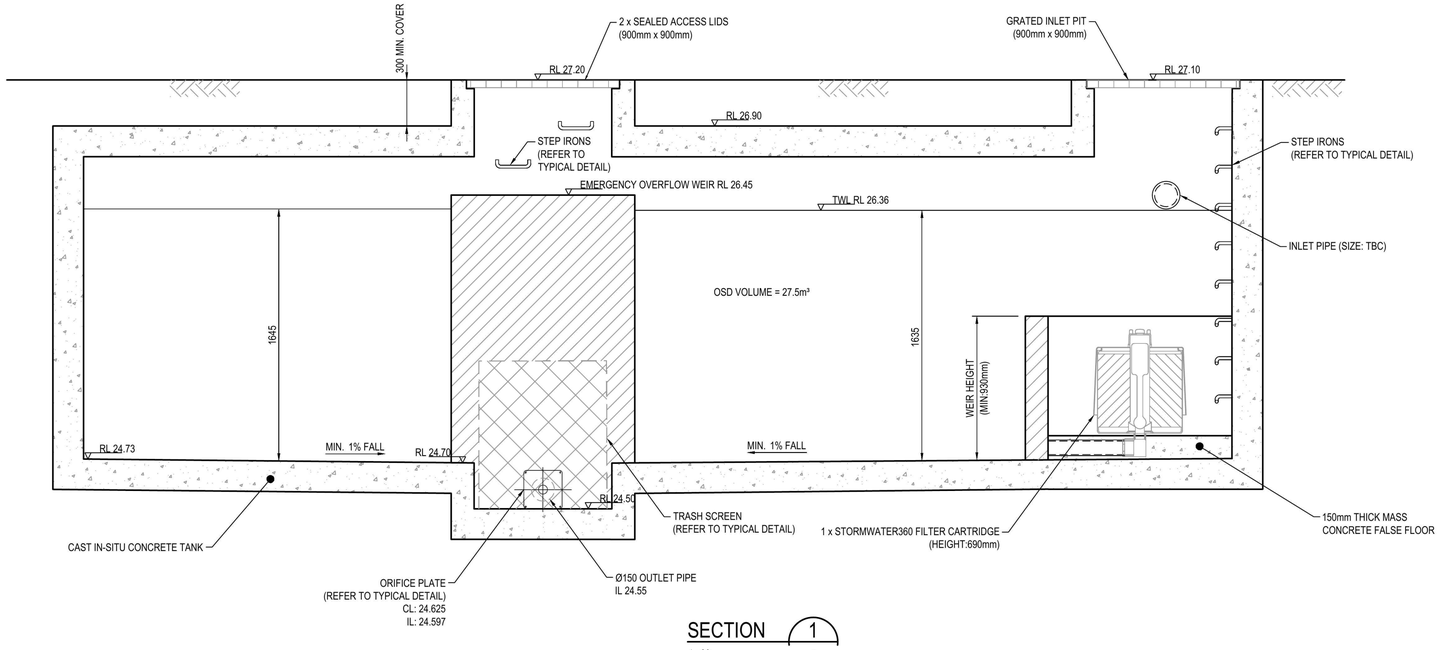
1:250

LEGEND

- PROPOSED OSD CATCHMENT BOUNDARY
- PROPOSED RIDGE
- R9 ROOF TO OSD
- EXISTING HARDSTAND AREA TO BYPASS
- HARDSTAND AREA TO OSD

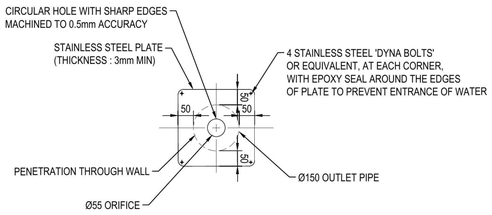
NOTES

1. DIMENSIONS OF PROPOSED OSD TANK TO BE CONFIRMED AFTER DETAILED DRAINAGE SURVEY HAS CONFIRMED INVERT LEVELS OF EXISTING STORMWATER DRAINAGE INFRASTRUCTURE
2. DETAILED DRAINAGE SURVEY TO BE COMPLETED PRIOR TO DETAILED DESIGN



SECTION 1

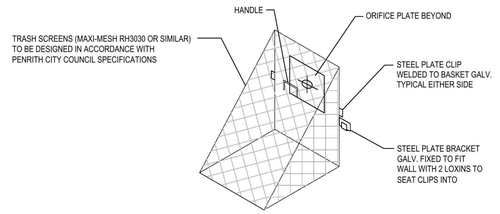
1 : 20



TYPICAL CIRCULAR ORIFICE DETAIL

SCALE 1:10

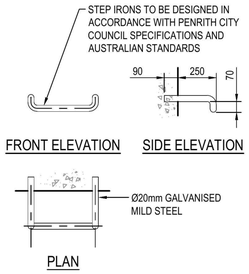
NOTES:
1. ORIFICE DIAMETER TO BE ENGRAVED ON THE PLATE SURFACE. ORIFICE TO BE FLUSH WITH PIT WALL



TRASH SCREEN DETAIL

N.T.S

NOTES:
1. TRASH SCREEN TO BE IN FRONT OF ANY ORIFICE CONTROL
2. TRASH SCREEN AREA TO BE MINIMUM 50x ORIFICE AREA



STEP IRON DETAIL

N.T.S.

Issue	Description	Date
02	FINAL ISSUE FOR DEVELOPMENT APPLICATION	27/02/19
01	ISSUE FOR CLIENT REVIEW	24/08/18

100mm on Original

0 5 10 15 20 25m
1 : 250

0 500 1000 1500 2000mm
1 : 20

0 100 200 400 600 800 1000mm
1 : 10

Client

SCENTRE GROUP

Owner and Operator of Westfield in Australia and New Zealand

Status
DEVELOPMENT APPLICATION
NOT TO BE USED FOR CONSTRUCTION

Scales	1 : 250 1 : 20 1 : 10	Current Issue Signatures	
		Drawn A.ZHAO	
Original	A1	Designed C.DING	
Height Datum	AHD	Checked D.BEN-AVRAHAM	
Grid	MGA	Approved D.BEN-AVRAHAM	
Filename:	C231-10019736-04-nsd-OSDTankPlanAndDetails.dwg		

Project
WESTFIELD PENRITH MONDO REDEVELOPMENT

Title
OSD TANK PLAN, CATCHMENT PLAN AND DETAILS

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George St
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
Fax No: +61 2 8907 9001
arcadis.com

Drawing No.	Project No.	Issue
C231	— 10019736 - 04 —	02

Document Set ID: 8609596
Version: 1, Version Date: 11/03/2019

Date Plotted: 27 Feb 2019 - 10:39AM File Name: F:\10019736\10019736-04 Westfield Penrith Mondo DA\E-CAD\C-Civil\D-Final\C231-10019736-04-nsd-OSDTankPlanAndDetails.dwg

MEMO

ARCADIS Design & Consultancy for natural and built assets

Appendix B – Penrith City Council MUSIC-link Report

Document Set ID: 8609596
Version: 1, Version Date: 11/03/2019

PENRITH CITY COUNCIL

music@link

MUSIC-*link* Report

Project Details		Company Details	
Project:	Westfield Penrith Mondo Redevelopment	**Company:**	Arcadis Australia Pacific Pty Ltd
Report Export Date:	27/02/2019	**Contact:**	Dov Ben-Avraham
Catchment Name:	Westfield Penrith Mondo - Water Quality Model - Final	**Address:**	Level 16, 580 George Street, Sydney NSW 2000, Australia
Catchment Area:	0.305ha	**Phone:**	02 8907 8286
Impervious Area*:	89.18%	**Email:**	Dov.BenAvraham@arcadis.com
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

Node: Post-Development Node	Reduction
Flow	22.6%
TSS	85.8%
TP	61.6%
TN	57.4%
GP	100%

Treatment Nodes

Node Type	Number
Rain Water Tank Node	2
Bio Retention Node	1
Generic Node	1
GPT Node	3

Source Nodes

Node Type	Number
Urban Source Node	6

Comments

A non-conformance with the proposed rainwater tank reuse demand has been identified. However, for the purposes of this model, we have simply attempted to maximise reuse potential with available end uses i.e. toilet flushing within proposed food premises and landscape irrigation. Furthermore, we have opted for rainwater tank sizes typical of similar developments and hence have opted for larger rainwater tanks that have lower reuse demand met.

Document Set ID: 8609596
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Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Bio	Planter Box Raingarden	Hi-flow bypass rate (cum/sec)	None	99	99
Bio	Planter Box Raingarden	PET Scaling Factor	2.1	2.1	2.1
GPT	1 x EnviroPod 200	Hi-flow bypass rate (cum/sec)	None	99	0.02
GPT	1 x EnviroPod 200	Hi-flow bypass rate (cum/sec)	None	99	0.02
GPT	1 x EnviroPod 200	Hi-flow bypass rate (cum/sec)	None	99	0.02
Post	Post-Development Node	% Load Reduction	None	None	22.6
Post	Post-Development Node	GP % Load Reduction	90	None	100
Post	Post-Development Node	TN % Load Reduction	45	None	57.4
Post	Post-Development Node	TP % Load Reduction	60	None	61.6
Post	Post-Development Node	TSS % Load Reduction	85	None	85.8
Urban	50% Roof	Area Impervious (ha)	None	None	0.103
Urban	50% Roof	Area Impervious (ha)	None	None	0.103
Urban	50% Roof	Area Pervious (ha)	None	None	0
Urban	50% Roof	Area Pervious (ha)	None	None	0
Urban	50% Roof	Total Area (ha)	None	None	0.103
Urban	50% Roof	Total Area (ha)	None	None	0.103
Urban	Landscaping	Area Impervious (ha)	None	None	0
Urban	Landscaping	Area Pervious (ha)	None	None	0.014
Urban	Landscaping	Total Area (ha)	None	None	0.014
Urban	R9 Hardstand	Area Impervious (ha)	None	None	0.022
Urban	R9 Hardstand	Area Pervious (ha)	None	None	0
Urban	R9 Hardstand	Total Area (ha)	None	None	0.022
Urban	R9 Landscaping	Area Impervious (ha)	None	None	0
Urban	R9 Landscaping	Area Pervious (ha)	None	None	0.019
Urban	R9 Landscaping	Total Area (ha)	None	None	0.019
Urban	R9 Roof	Area Impervious (ha)	None	None	0.044
Urban	R9 Roof	Area Pervious (ha)	None	None	0
Urban	R9 Roof	Total Area (ha)	None	None	0.044

Only certain parameters are reported when they pass validation

Document Set ID: 8609596
Version: 1, Version Date: 11/03/2019

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Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Rain	Rainwater Tank	% Reuse Demand Met	80	None	44.2041
Rain	Rainwater Tank	% Reuse Demand Met	80	None	59.3155

Only certain parameters are reported when they pass validation

Document Set ID: 8609596
Version: 1, Version Date: 11/03/2019

MEMO

ARCADIS Design & Consultancy for natural and built assets

Appendix C – Penrith City Council Flood Letter for Westfield Penrith (dated 29 May 2018)

Document Set ID: 8609596
Version: 1, Version Date: 11/03/2019

PENRITH

Our Reference: ECM 8199005
Contact: Ratnam Thilliyar
Telephone: 4732 7988

29 May 2018

Clement Ding
Level 16
580 George Street
SYDNEY NSW 2000

Dear Sir/Madam

Flood Level Enquiry
Lot 1033 DP 849297 - No. 597-599 High Street, Penrith

Please find enclosed Flood Level information for the above property.

Should you require any further information please do not hesitate to contact me on 4732 7988.

Yours sincerely

Ratnam Thilliyar
Engineering Stormwater Supervisor

Penrith City Council
PO Box 60, Penrith
NSW 2751 Australia
T 4732 7777
F 4732 7958
penrithcity.nsw.gov.au

PENRITH
CITY COUNCIL

Document Set ID: 8609596
Version: 1, Version Date: 11/03/2019

Flood Information
Lot 1033 DP 849297 No. 597-599 High Street, Penrith

Date of issue: 29 May 2018

The 1% AEP local overland flow flood level affecting the above property is estimated to be RL27.2m AHD.

Property less than 0.5m above the 1% AEP flood level is subject to Penrith Development Control Plan 2014 Section C3.5 Flood Planning. The Penrith Development Control Plan 2014 is available from Council's website www.penrithcity.nsw.gov.au.

Definitions

AEP – *Annual Exceedance Probability* – the chance of a flood of this size occurring in any one year.

AHD – *Australian Height Datum* – A standard level datum used throughout Australia, approximately equivalent to mean sea level.

Legend

	Extent of 1% AEP local catchment overland flow path. Generally depths less than 150mm is not shown.

Notes:

1. The contours shown above in yellow numbering are at 0.5m intervals and are based on Aerial Laser Scanning (ALS) Survey undertaken in 2002. The contour levels are approximate and for general information only. Accurate ground levels should be obtained by a Registered Surveyor.
2. The flood level is based on current information available to Council at the date of issue. The flood level may change in the future if new information becomes available. The 1% AEP flood is the flood adopted by Council for planning controls. Rarer and more extreme flood events will have a greater effect on the property.
3. Council's studies are reflected in flood mapping for the City which show properties potentially affected by overland flows in excess of 150mm.
4. This property is shown on Council's flood mapping as potentially so affected.
5. Council imposes flood related development controls where, in its opinion, such controls are justified. Such controls may or may not be imposed with respect to this property in the event of an application for development consent.
6. If a development proposal is submitted with respect to this property, Council will consider the possibility of flood or overland flow in the context of the application. Council may impose a requirement that the applicant for development consent carry out a detailed assessment of the possible overland water flows affecting the property (a flood study) and/or may impose other controls on any development designed to ameliorate flood risk.
7. You are strongly advised if you propose to carry out development upon the property, that you retain the assistance of an experienced flooding engineer and have carried out a detailed investigation.
8. Council accepts no liability for the accuracy of the flood levels (or any other data) contained in this certificate, having regard to the information disclosed in Notes "1" to "4". As such you should carry out and rely upon your own investigations.

Penrith City Council
PO Box 60, Penrith
NSW 2751 Australia
T 4732 7777
F 4732 7958
penrithcity.nsw.gov.au

Ratnam Thilliyar
Engineering Stormwater Supervisor

PENRITH CITY COUNCIL

Document Set ID: 8609596
Version: 1, Version Date: 11/03/2019