Doran Drive Precinct
Deicorp
10-Jun-2022

Stormwater Management Plan

Doran Drive Precinct

Stormwater Management Plan

Client: Deicorp

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Prepared by

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Quality Information

Document Stormwater Management Plan

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Date 10-Jun-2022

Prepared by Chris Roberts

Reviewed by Gijs Roeffen

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
T1	1-June-2021	Issue for Review	Gijs Roeffen Principal Civil Engineer - Urban Development	
T2	1-July-2021	Issue for Development Application	Gijs Roeffen Principal Civil Engineer - Urban Development	
T3	14-October-2021	Amended and Reissued for Development Application	Gijs Roeffen Principal Civil Engineer - Urban Development	
T4	13-April-2022	Amended and Reissued for Development Application	Gijs Roeffen Principal Civil Engineer - Urban Development	
T5	20-April-2022	Amended and Reissued for Development Application	Gijs Roeffen Principal Civil Engineer - Urban Development	
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T7	10-June-2022	Amended and Reissued for Development Application	Gijs Roeffen Principal Civil Engineer - Urban Development	

Table of Contents

1.0 Introduction

AECOM has been engaged by Deicorp to prepare a Stormwater Management Plan to support the development application for the proposed mixed-use development at Doran Drive Precinct. The proposed scheme has been developed in accordance with Part D Section 19 – Showground Station Precinct of the Hills Shire Council Development Control Plan (DCP) - Control 4.5.3 and the Integrated Water Cycle Management Strategy (WSP, Rev 7).

2.0 Reference Information

The following reference information was used in compiling this report:

Drawing	Title	Revision (Date)	Originator
DA-110-007	GA Plans – Basement 01	22 (21.04.22)	Turner Studios
DA-110-008	GA Plans – Ground Level	29 (21.04.22)	Turner Studios
DA-110-009	GA Plans – Upper Level	26 (21.04.22)	Turner Studios
DA-110-010 to DA 110-021	GA Plans – Level 01 to Level 21	30 (21.04.22)	Turner Studios
DA-110-220	GA Plans – Roof Level	09 (21.04.22)	Turner Studios
PS109693-WSP-REP-01 Rev 7	Hills Showground Station Precinct - Integrated Water Cycle Management Strategy	Rev 7, 09/06/2020	WSP
N/A	Part D Section 19 Showground Station Precinct	Hills DCP 2012	Hills Shire Council
N/A	Design Guidelines Subdivision/Developments	Hills DCP 2012 (Sep, 2011)	Hills Shire Council
5042-20 Detail Survey	Detail Survey @ 2 Mandala Parade, Castle Hill	Rev 3, 19/05/2021	Daw and Walton

3.0 Site Overview

3.1 Site Description

The development site, Lot 55 DP 1253217, 2 Mandala Parade Castle Hill, forms part of the Hills Showground Station Precinct. The site is approximately 7,969 m^2 and bounded by De Clambe Drive to the north, Andalusian Way to the east, Doran Drive to the West and Mandala Parade to the south. The abounding roads and drainage infrastructure were recently constructed as part of the Hills Showground Precinct as seen in Figure 1 and Figure 2.

Figure 1 De Clambe Drive looking south-east

Figure 2 Doran Drive looking north-east

Deicorp is proposing a mixed-use development incorporating 6 levels of basement carparking, commercial tenancies, internal-communal podium area and residential floors between Levels 3-20. For more information on the architectural plans, refer to Turner Studios for documentation.

3.2 Existing Stormwater Behaviour

The site is currently undeveloped with slopes of up to 8 percent falling from east to west towards Doran Drive (Figure 3). The crossfall from north to south is relatively flat.

The existing landform features depressed swales along both northern and southern boundaries of the site, with inlet pits (Figure 4) situated within these swales to collect runoff. There are currently four pits in total which discharge to the drainage in the road. Two of these pits sit within the northern swale and the other two within the southern swale and connect into public drainage infrastructure (part of Hills Showground Station Precinct works) on De Clambe Drive and Mandala Parade respectively.

Figure 3 Existing landform and depressed swale

Figure 4 Inlet pit within swale

The remaining uncaptured catchment predominantly exhibits overland sheet flow to the western boundary and appears to be collected by inlet pits located within a dish drain on the western side of Doran Drive.

The downstream network from the south side of the site extends west from Mandala Parade and north along Doran Drive, then west on De Clambe Drive. The downstream network from the north side of the site extends one pipe segment west from De Clambe Drive before crossing to the trunkline under the northern side of road. Further downstream, a junction pit connects both the lines from Doran Drive and De Clambe Drive. The network continues west to daylight to a headwall outlet within a vegetated swale, behind the northern kerb treatment on De Clambe Drive. This swale connects into the regional basin which ultimately discharges to Cattai Creek, a tributary of the Hawkesbury River.

Refer to Figure 7 for an illustration of Council GIS drainage network and Figure 5 and Figure 6 for site photos of the headwall outlet and downstream regional basin.

Figure 5 Headwall Outlet to Swale upstream Basin

Figure 6 Regional Detention Basin

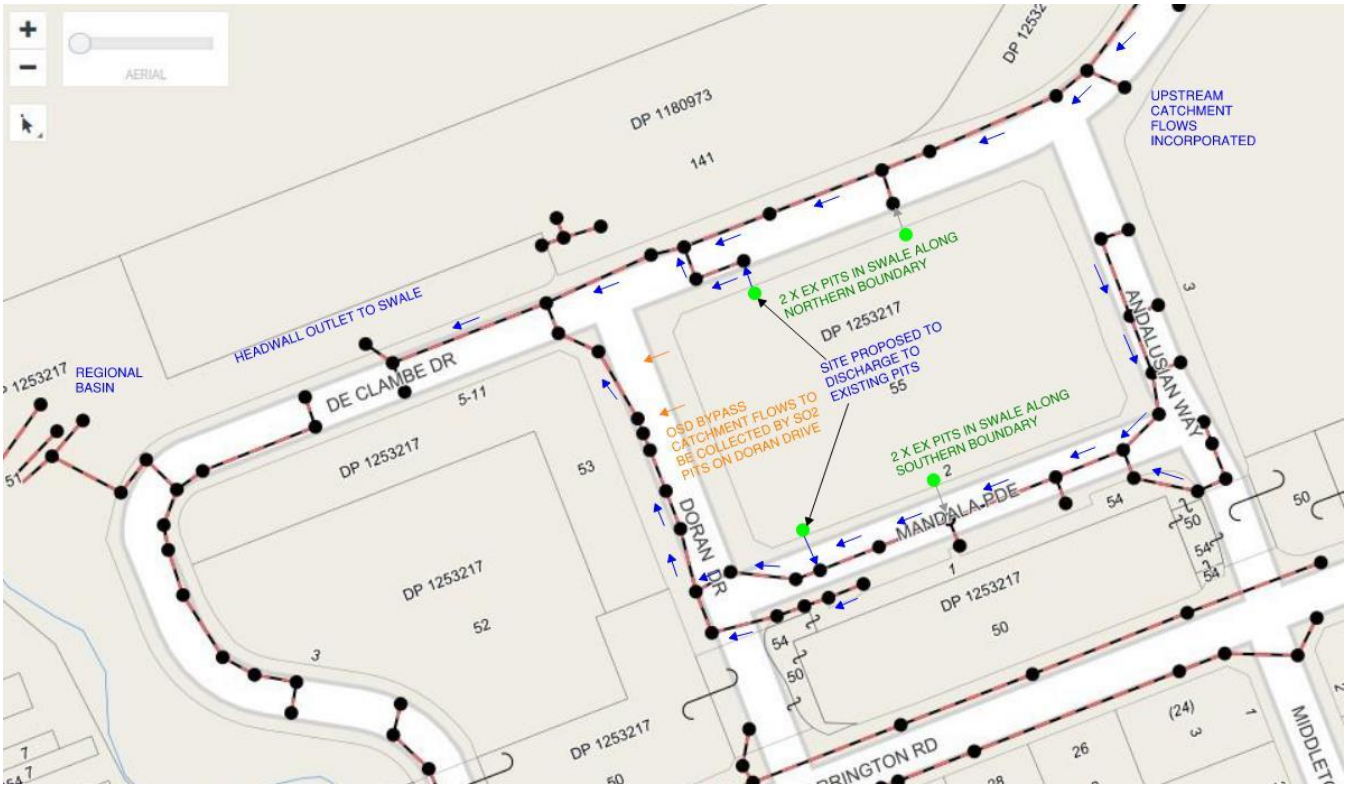

Figure 7 Council GIS Network

4.0 Stormwater Management Plan

4.1 Proposed Stormwater Management

Roof water from Buildings A, B, C and D will be collected via the internal building drainage system, with buildings B and C discharging to a proposed rainwater tank below ground level. The rainwater tank will provide re-use for irrigation and planting areas. Basement drainage and overflow from the rainwater tank will be directed to the OSD system before being conveyed to existing drainage infrastructure. The overflow system, internal/building reticulation, basement drainage and rainwater tank design are to be further coordinated the hydraulic consultant during detailed design.

The communal podium catchment area located in the Upper Level will bypass the rainwater tank collection and convey directly to the outlet facilities, either Oceanguard splitter pits or direct to OSD. At the ground level, surface pits in the proposed plaza will capture perimeter runoff and direct surface flows into the OSD. The arrangement of the split systems and catchment directions is presented below in Figure 8.

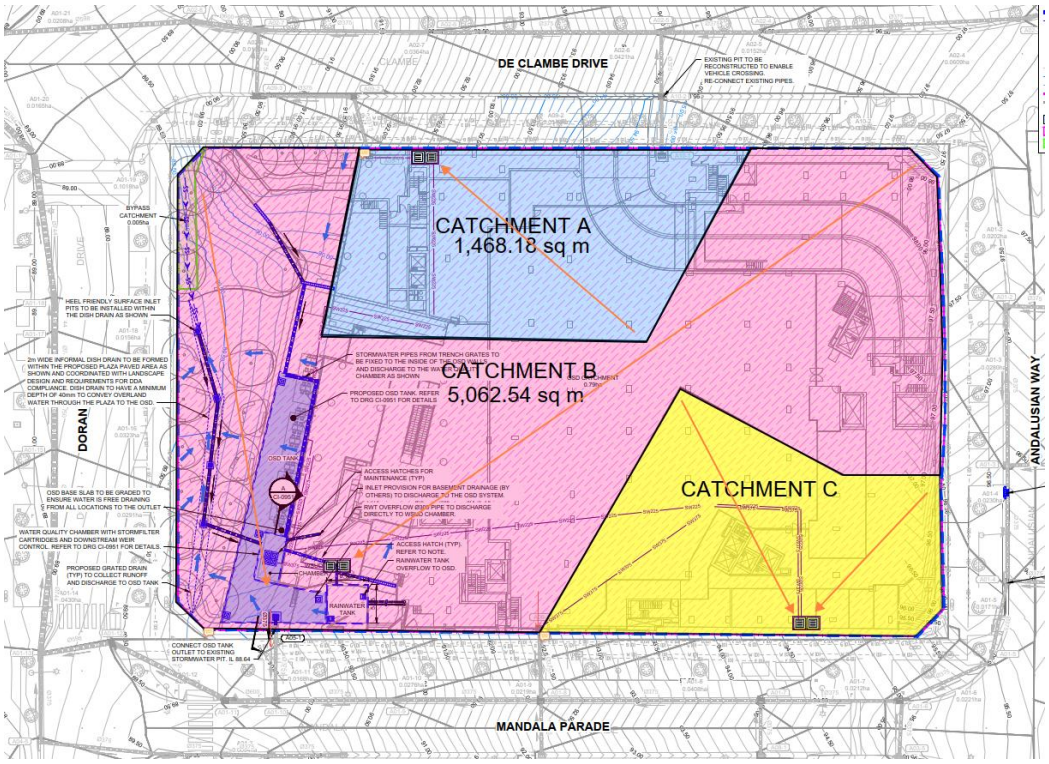

Figure 8 Proposed stormwater network split catchment

As the subject site is located within the Hills Showground Precinct which is serviced by an existing regional basin (depicted in Figure 10); additional on-site detention was confirmed to be not required by Hills Shire Council. Correspondence indicating the in-principle agreement is attached in Appendix A.

DRAINS hydraulic modelling was undertaken to substantiate the capacity of the existing drainage system and its ability to accommodate site flows at existing discharge points on Mandala Parade and De Clambe Drive.

Amplification works within the recently completed public roadworks was not preferred by the project team and as such, OSD has been proposed as part of the stormwater strategy to limit peak site discharge flows only to the level such that the downstream network can accommodate the discharge for events up to the 1% AEP storm. As the stormwater network is intended to be capable of managing the discharge from the lot, the nature of the OSD is to be further coordinated at a later design stage.

4.2 Hydraulic Modelling

A DRAINS hydraulic model was prepared to estimate the capacity in the existing drainage network and incorporates detailed survey of pipe sizes and invert levels. The hydraulic assessment quantifies the developed site flows and ensure that these can be conveyed and accommodated by the existing system without pits surcharging in the major storm event. See Figure 9 for an illustration of the DRAINS model schematic. Flows from external upstream catchments in accordance with the IWCM (WSP, 2020) were also considered. An excerpt of the catchment plan from the IWCM is referenced in Figure 10.

Both the downstream overland flow and external network discharge further downstream along De Clambe Drive to a developed swale and regional basin. The longitudinal fall along De Clambe drive is approximately 4% for more than 100m of road length. As the fall and length to the regional basin is quite significant, tailwater control at the outlet points of the development site have been assumed to be generated from upstream flows rather than downstream water surface levels.

Design Intensity-Frequency-Duration (IFD) Rainfall for the Hawkesbury catchment area in accordance with Table 4.5 of the Design Guidelines Subdivision/Developments (Hills Shire Council, September 2011) was adopted for the model hydrology.

The hydraulic model incorporated roughness coefficients for pipes and blockage provisions for pits in accordance with Table 4.11 and Table 4.10 respectively of Council's Design Guidelines. Pit loss coefficients were refined using QUDM charts within the hydraulic model package.

Table 1 Recommended Pipe Roughness – Hills DCP

Pipe Material	Recommended K Value (mm)
UPVC	0.03
RCP	0.3

Table 2 Provision for Blockage – Hills DCP

Condition	Pit Type	Theoretical Capacity Allowed
Continuous Grade	Kerb Inlet Pit	90%
Sag	Kerb Sag Pit	80%
Surface Inlet Pit Cover	Surface Inlet Pit	50%

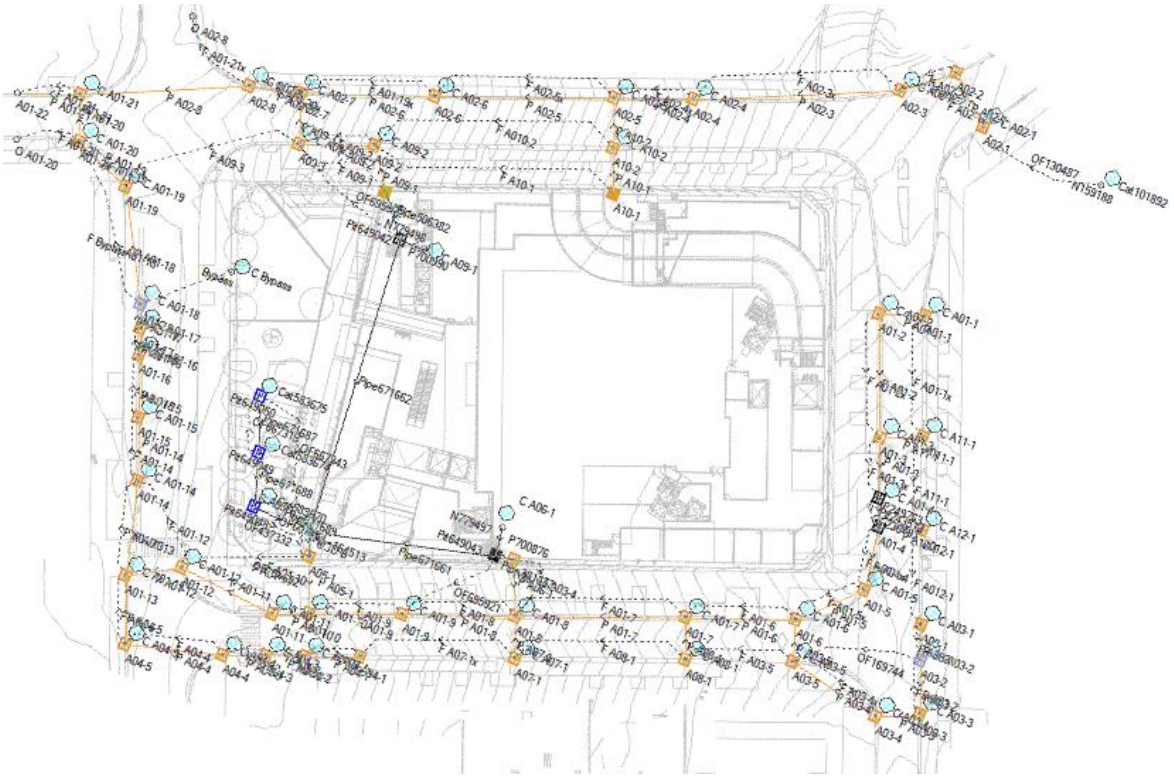

Figure 9 Doran Drive DRAINS Model Schematic

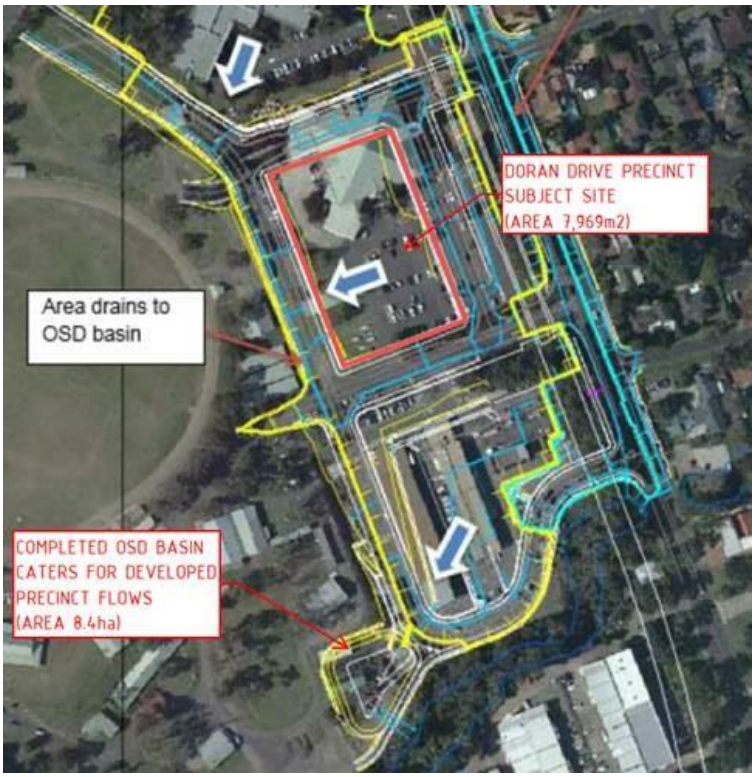

Figure 10 Precinct Catchment Plan – (source: IWCM - WSP, 2020)

4.3 OSD Catchment and Bypass

The site area draining to the proposed On-Site Detention (OSD) system is approximately 7,905 m². The requirement to interface with existing footpath levels at Doran Drive will generate approximately

70 m² of bypass in the north-western portion which can be collected by a combination of subsoil drainage and surface inlet grates to discharge directly to the kerb subject to design development. A catchment plan of the site and bounding roads are depicted in Appendix D.

The external plaza to the west of the OSD is to grade to an informal dish drain formed from locally graded pavers to create a dish 2m wide and 40mm in total depth. Natural grading towards this dish on either side of the plaza will result in this dish capacity being greater than 2m wide and 40mm deep but these limits have been chosen for hydraulic control to limit surface ponding in the plaza. This dish drain will follow the natural topography of the site and flow to the north and will include a series of surface inlet pits that connect to the OSD as shown in Figure 10. The dish drain is to be coordinated with the landscape design of the plaza during detailed design as well as coordinated with requirements for DDA compliance.

The dish drain is nominally sized to capture and contain overland flow across the plaza in the 1% AEP storm event, with the pit and pipe system designed to ensure no surcharge is directed to the street and is instead discharged into the OSD. In the event of surface inlets becoming blocked or inability to drain to the OSD system, overflow from the dish drain will be towards the Doran Drive road reserve. A non-return flap valve at the discharge pit to the OSD will prevent water from the OSD backflowing to the plaza.

4.4 On-Site Detention System

An on-site detention tank is to be installed at the lower south-western portion of the site. It will comprise a total internal footprint area of 274.5 m^2, comprising of 250 m^2 for detention storage and 24.5 m^2 for a water quality chamber. The tank will be situated below ground level with the internal tank base invert level at RL 88.95. The tank will provide sufficient storage volume (approximately 220 m^3) for attenuation to ensure developed site for events up to the 1% AEP event are piped without pits surcharging. Structural elements, filter cartridges, internal weir walls and base screed of the OSD tank is expected to take up some of the internal volume and can be confirmed in detailed design. Contingency to the expected loss of storage has been provided via additional capacity above the resultant 1% AEP water surface level.

A DRAINS schematic of the post-developed hydraulic grade line demonstrates available freeboard in the existing network and is illustrated in plan in Figure 11 and section in Figure 12.

It is expected that the roof of the OSD will need to be amended to allow for plaza pavement and modelling indicates there is room for the OSD roof to be lowered to meet this requirement. Further hydraulic modelling will be required at a later design phase to confirm this.

Resulting comparison of pre and post peak site discharges for minor and major systems are summarised in the table below.

Table 3 Peak flow comparison (minor and major systems)

Peak Flow (L/s)			
10% AEP		1% AEP	
Pre	Post	Pre	Post
179	183	310	276

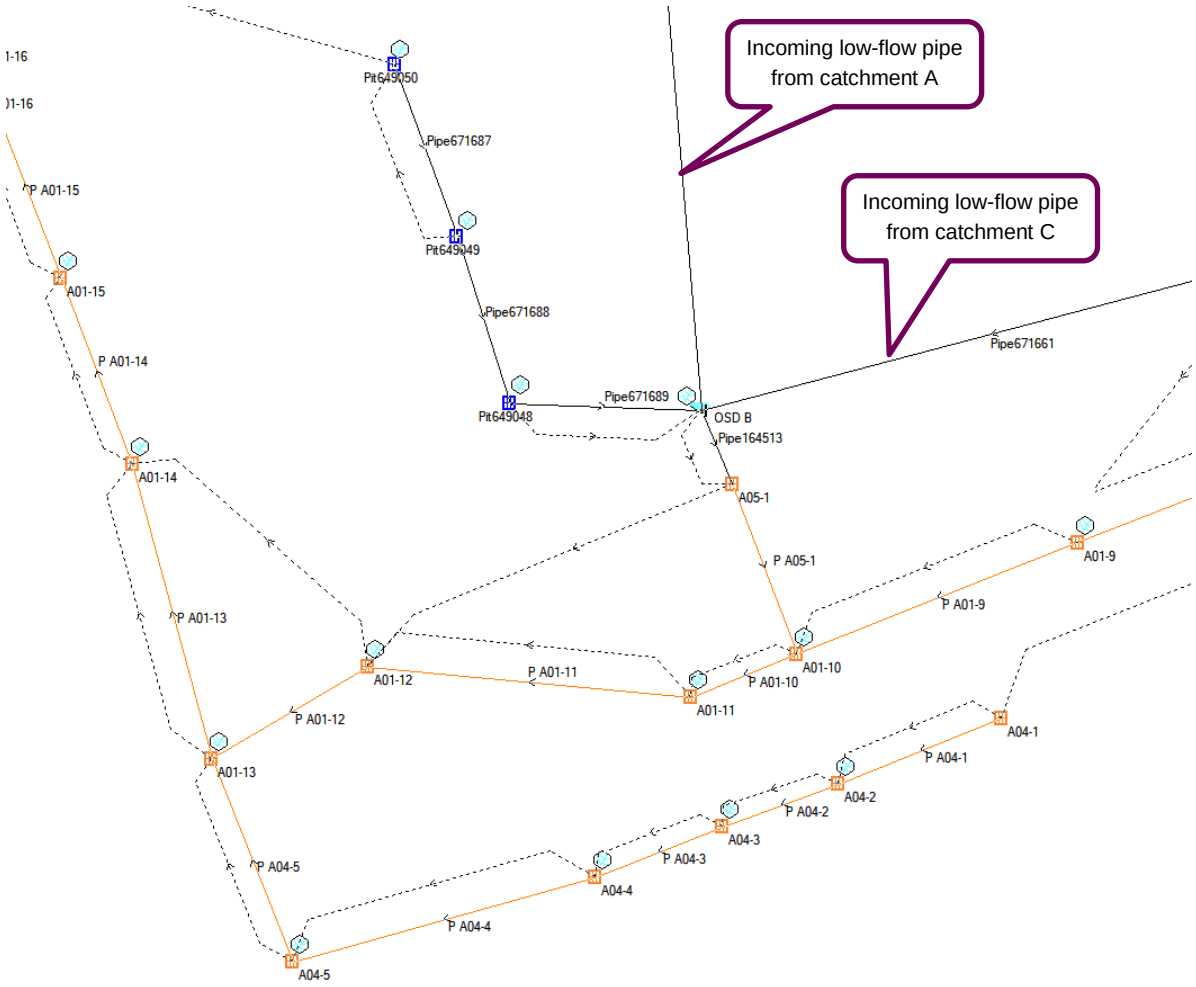

Figure 11 OSD Outflow in the 1% AEP Event – DRAINS Model Plan

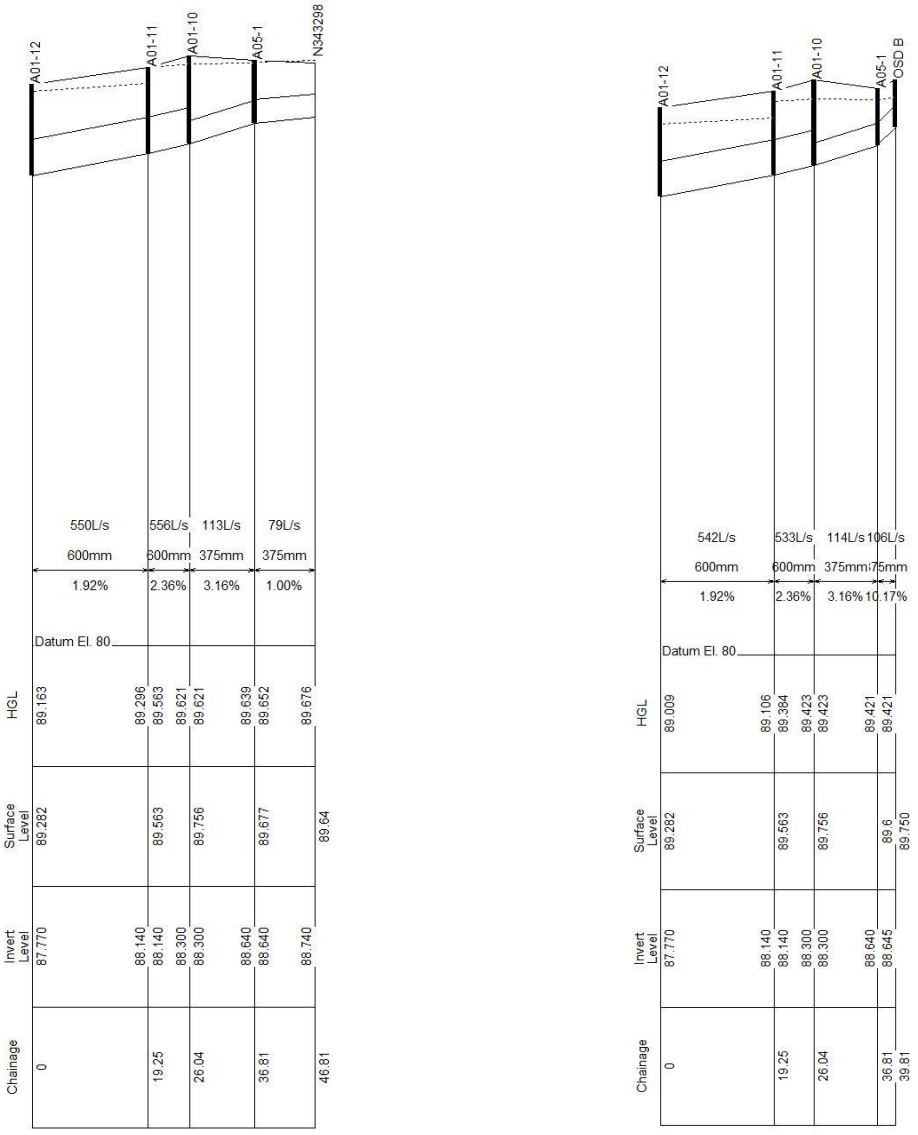

Figure 12 OSD Outflow in the 1% AEP Event (Pre-development = Left, Post-development = Right) – DRAINS Model Long Section

An additional water quality treatment chamber is to be built within the OSD footprint. Details of the treatment chamber are discussed in Section 5.3.

The outlet configuration of the detention tank will incorporate a 375 mm outlet pipe with a 250mm diameter orifice for flow control. This outlet pipe will connect to an existing pit within the south-western low point of the site. This pit discharges to an existing 375 mm diameter pipe crossing under the Council verge which immediately continues into a 600 mm RCP trunkline within the road in Mandala Parade.

A non-return valve will be required to be installed on all outlet points, including the OSD pipe, to ensure the site discharges freely to the existing road drainage system without being excessively burdened by downstream tailwater or hydraulic grade conditions.

For rainfall events in excess of the major storm; emergency overflows will escape from the tank access hatches located and be conveyed over the verge to be collected by the Doran Drive drainage infrastructure and road network.

Refer to Appendix D for OSD, and stormwater plan drawings including nominated point of discharge.

5.0 Water Sensitive Urban Design Strategy

5.1 WSUD Strategy

A Water Sensitive Urban Design Strategy has been prepared to support the development application in accordance with Part D Section 19 – Showground Station Precinct of the Hills Shire Council Development Control Plan (DCP) – Controls 4.5.7 to 4.5.12. The strategy takes into the account prescribed water quality objectives and adopts modelling parameters as recommended by the guidance in the DCP.

The proposed stormwater treatment train will incorporate a combination of rainwater reuse, gross litter baskets, treatment chamber including filter cartridges, and tree pits. Stormwater runoff will be captured, reticulated, and treated within the development site before discharging to the public drainage system. Details of the treatment devices are discussed in Section 5.3.

The system is based on a low-flow/high-flow splitter method with all site catchments being diverted to the centralised WSUD chamber treatment train and high-flow bypasses discharging excess clean stormwater in higher storm events direct to the existing road drainage system. This allows for minimising OSD storage while providing treatment in a central location for ease of maintenance.

The specific locations for each of these splitter pit systems will need to be coordinated further with architectural and building hydraulics at a later design phase as they have only been notionally positioned for ease of access.

Water quality modelling has been undertaken utilizing the MUSIC version 6.3 and in line with the Draft NSW MUSIC Modelling Guidelines, Sydney Metropolitan Catchment Management Authority, 2010. Modelling parameters have been adopted as per the *Hills DCP 2012 – Showground Precinct*, details of which are discussed in Section 5.3.

5.2 Pollutant Reduction Targets

The water quality performance objectives with reference to Table 3 of the Showground Station DCP are summarised in the table below:

Table 4 Water Quality Performance Objective – Showground Station DCP

	Water Quality % Reduction in Pollution Loads			
	Gross Pollutants (>5mm)	Total Suspended Solids	Total Phosphorus	Total Nitrogen
Stormwater Management Objective	90	85	65	45

5.3 Proposed Treatment Train

A variety of treatment devices have been proposed to formulate the treatment train strategy and achieve the required pollutant reduction. These devices are discussed below:

- Water Quality Chamber and Stormfilter Cartridges

A water quality chamber with approximately 20 x 310mm PSorb filter cartridges will be situated within the OSD tank bounded by an internal weir of approximately 540 mm height and controlled by low-flow outlet. This chamber is intended to provide water treatment for the runoff captured from the hardstand and roof areas prior to discharging to the broader detention facility.

- Rainwater Tanks and Re-use

Rainwater Re-use rates provided by the hydraulic consultant have been incorporated into the water quality model to conceptualize the rainwater tank sizing requirements from a water quality perspective.

A typical estimate of 0.4 kL/year/m^2 for planting areas and 0.1 kL/year/m^2 for turf or watered landscape areas has been assumed.

- Pit Inserts and Trash rack

Trash racks and litter baskets will be installed where there is sufficient depth to invert at pits and within the OSD to provide pre-treatment of stormwater via enabling the filtering out of gross pollutants.

5.4 MUSIC Modelling

Water quality modelling has been undertaken using the latest model of MUSIC (version 6.3) and demonstrates that the proposed treatment train is able to achieve the pollutant reduction targets as identified in Table 3 of the Showground Station DCP.

The MUSIC model incorporates rainfall and potential evapotranspiration data from 1984-2010 (Sydney). Pollutant and catchment parameters have been adopted in accordance with those outlined in Tables 4 and 5 of the Showground Station DCP. Catchment delineations for types roof, hardstand and landscaped areas were refined and input into the model. Rainwater re-use rates for irrigation of landscape and planting areas provided by the hydraulic consultant were incorporated into the re-use demand parameters of the model. A sensitivity check of the rainwater tank with 10% less storage volume has also been included as part of the assessment.

Table 5 and Table 6 summarises the model parameters adopted for the water quality assessment. A schematic of MUSIC model is illustrated in Figure 13.

Table 5 Soil/Groundwater parameters recommended for adoption in MUSIC Modelling – Showground Station DCP

	Units	Urban	Non-Urban
Impervious area parameters			
Rainfall threshold	Mm/day	1.4	1.4
Pervious area parameters			
Soil Storage capacity	mm	170	210
Initial Storage	% of capacity	30	30
Field Capacity		70	80
Infiltration capacity coefficient - a		210	175
Infiltration capacity coefficient - a		4.7	3.1
Groundwater properties			
Initial depth	mm	10	10
Daily recharge rate	%	50	35
Daily baseflow rate	%	4	20
Daily deep seepage rate	%	0	0

Table 6 Recommended Stormwater Quality Parameters for MUSIC Modelling – Showground Station DCP

Land use	Storm Flow						Base Flow					
	TSS		TP		TN		TSS		TP		TN	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
General Urban	2.15	0.32	-0.60	0.25	0.30	0.19	1.20	0.17	-0.85	0.19	0.11	0.12
Residential												
Industrial												
Commercial												
Roads	2.43	0.32	-0.30	0.25	0.34	0.19	-	-	-	-	-	-
Roofs	1.30	0.32	-0.89	0.25	0.30	0.19	-	-	-	-	-	-
Forest/Natural	1.60	0.32	-1.10	0.25	-0.05	0.19	0.78	0.17	-1.52	0.19	-0.52	0.12

*All values in log_{10}mg/l

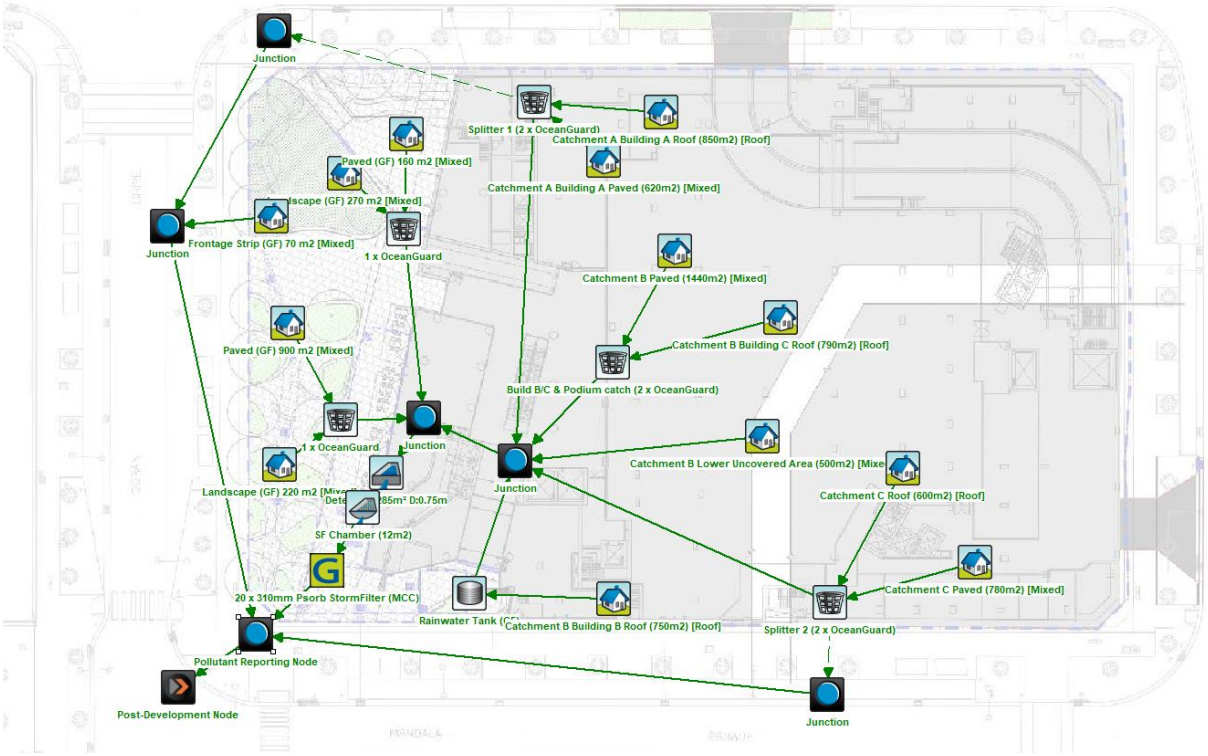

Figure 13 MUSIC Model Schematic

The model results of the proposed treatment train pollutant reduction is summarised in Table 7.

Table 7 Pollutant Reduction Model Results

Pollutant (kg/yr)	Source Load	Residual Load	Reduction in Pollutant Sources (%)	Reduction Target (%)	Reduction Target Achieved
Total Suspended Solids	666	91.7	86.2	85	Yes
Total Phosphorus	1.32	0.397	69.9	65	Yes
Total Nitrogen	12.1	5.86	51.7	45	Yes
Gross Pollutants	142	0.573	99.6	90	Yes

5.5 Erosion and Sediment Control Plan

An Erosion and Sediment Control Plan has been prepared in accordance with “Managing Urban Stormwater – Soils and Construction”, to minimise land disturbance and sediment pollution control of downstream waterways. Refer to Appendix D for the civil drawings.

Appendix A

On-Site Stormwater Detention Requirements & IFD Data

Ou, Benson

From: Rashad Abboud <rabboud@thehills.nsw.gov.au>
Sent: Tuesday, 18 May 2021 3:09 PM
To: Ou, Benson
Cc: Roeffen, Gijs; Cynthia Dugan
Subject: [EXTERNAL] Email to consultant - Doran Drive Precinct - Confirmation of Regional OSD and site requirements - 2 Mandala Parade CASTLE HILL

Importance: High

Hi Ben,

As we have discussed on the phone last week, in principle; I agree with the context of your email below. Where a regional basin has been designed/sized to cater for the entire contributing catchment including the subject site, then OSD is not required to be provided with the future development for this subject site. However, the capacity of the stormwater system into which stormwater from the development discharges into, must be checked/analysed. Please note that the check/analysis shall be carried out to the legal point of discharge to ensure that the street pits will not surcharged.

Please let me know if you need any further clarification.

Kind regards

Rashad Abboud
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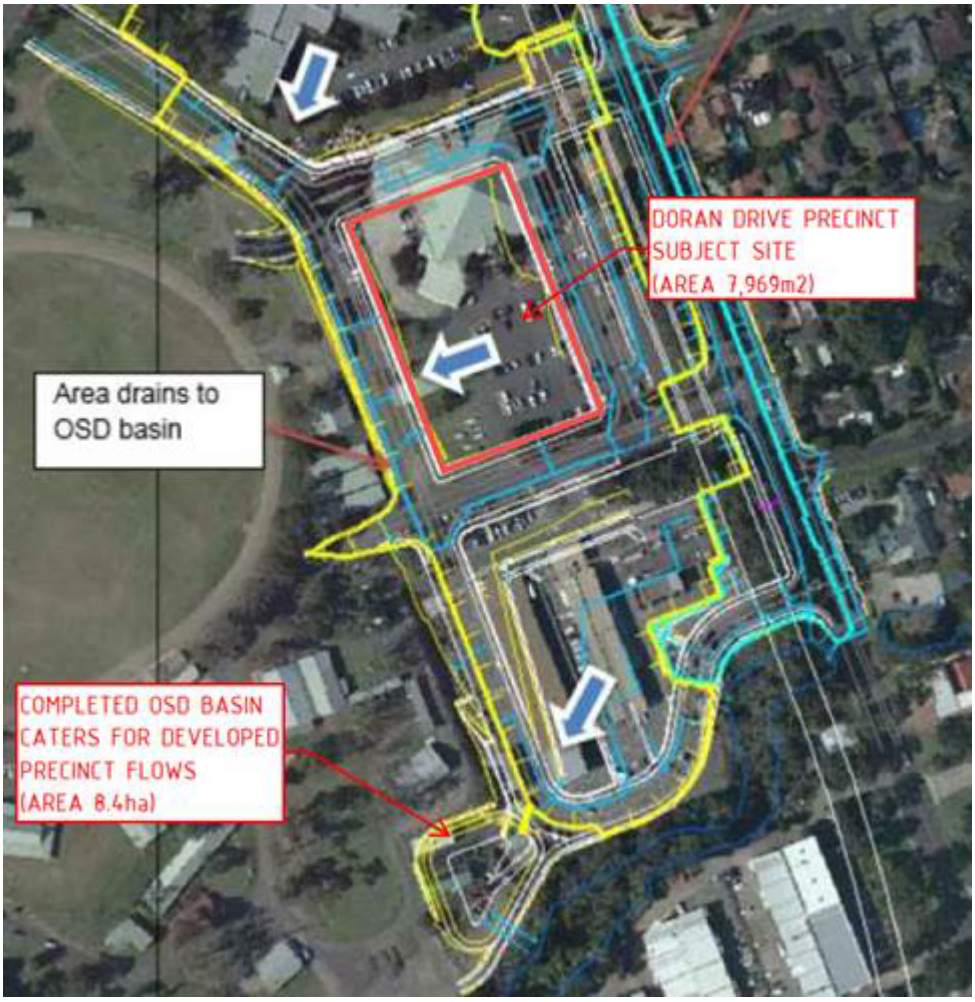
From: Ou, Benson [mailto:Benson.Ou@aecom.com]
Sent: Friday, 14 May 2021 1:56 PM
To: Rashad Abboud
Cc: Roeffen, Gijs; Cynthia Dugan
Subject: Doran Drive Precinct - Confirmation of Regional OSD and site requirements

Good afternoon Rashad,

Thanks for your time on the phone. Glad we are on the same page. As discussed; we are developing the stormwater management strategy for thew Doran Drive lot at the Showgrounds precinct and are hoping you can provide some information prior to finalisation of our submission. If we could get your confirmation in writing come Monday/Tuesday we can progress to an agreed approach and documentation.

Specifically we are hoping to confirm the OSD requirements for the site in accordance with the IWCM. As part of the Stage 1 DA documentation; we note that the Integrated Water Cycle Management Report as prepared by WSP for the site in 2020 (**link to report)** finds that the constructed regional basin for the precinct has been sized to cater for the entire Hills Showground Precinct site (8.4 ha) before discharging to Cattai Creek. (OSD called out in bottom left red below and also Figure 3.2 of the report)



Two excerpts of the IWCM report is snipped in below:
Section 4.2.1.

4.2.1 ON SITE DETENTION

Council's Design Guidelines Subdivision/Developments (September 2011) provide methods for calculating the permissible site discharge (PSD) and site storage volume (SSV) requirements for development sites. An OSD basin was designed and constructed on site as part of the NRT works (NRT, 2016). The NRT Design Report shows the basin has been designed to have a volume of 2135m^3 and sized to cater for the entire site (8.4ha) including the station (section 6.4.3.7 and 6.4.3.12, NRT design report, 2016). No further DA Areas would be connected to the private drainage channel and OSD basin.

Section 4.2 of the WSP Report informs that concentrated flows from the proposed buildings and hardstand surfaces to be collected by the piped stormwater drainage system.

A piped stormwater drainage system will be provided to collect all concentrated flows from the proposed buildings and hardstand surfaces. Most of the Site will drain to the existing OSD basin on the north western boundary before discharge to Cattai Creek, except for a section at the eastern most point of the Site which drains towards Showground Road and Carrington Road and will be captured by two proposed new OSD basins in this DA Area. Consideration will be given to the potential upgrades undertaken by RMS on the drainage system in consequence of the civil and any drainage upgrading works completed within Showground Road. Rock rip rap, gravel and vegetation are provided at the outlet of the drainage system to act as energy dissipators to reduce scour potential.

Furthermore, in the Hills DCP 2012 for the sites within the Hawkesbury River catchment (of which Doran Precinct lies within):

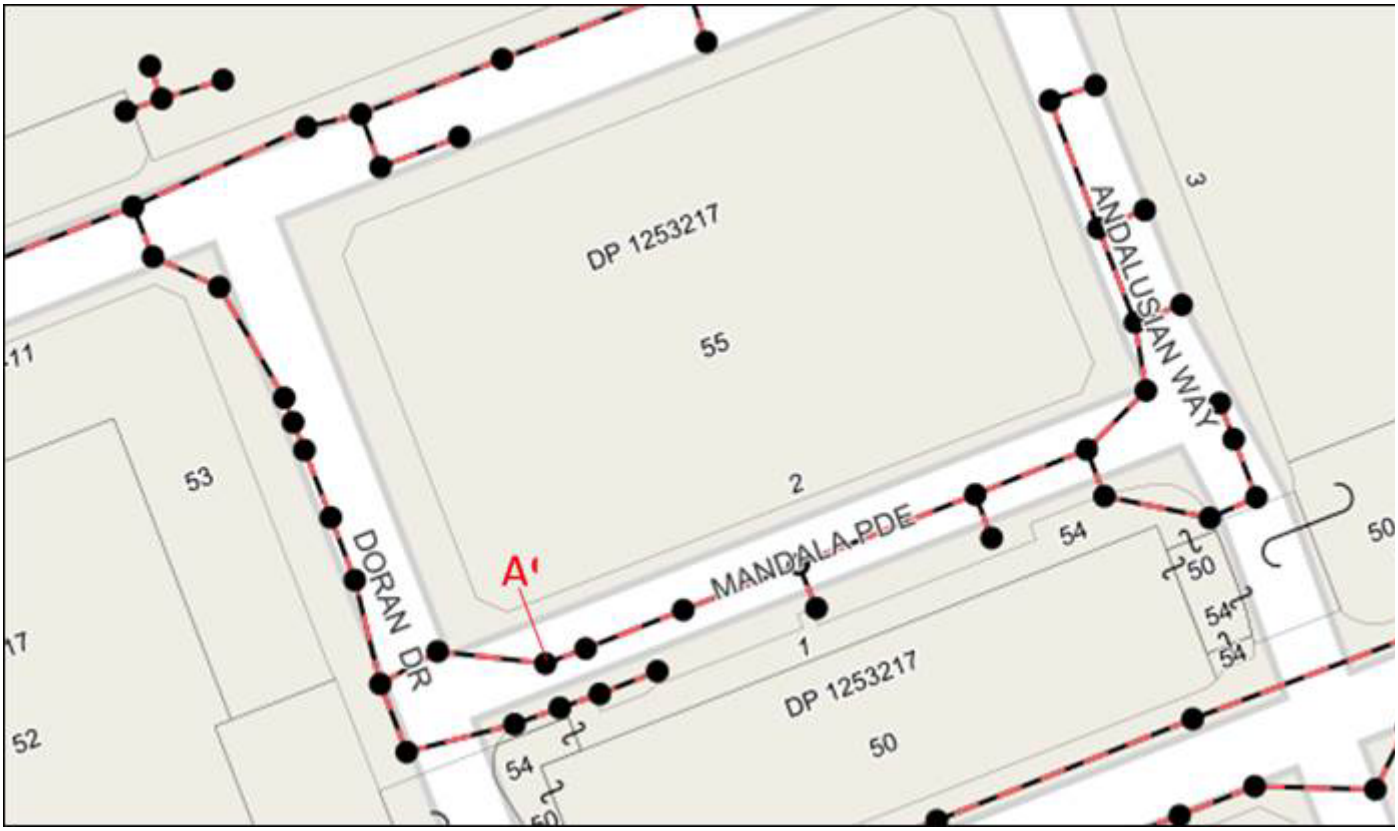
Table 4.14 - PSD and SSV Requirements for the Hawkesbury River Catchment

On-site stormwater detention shall not be provided in catchment areas that drain to an approved detention system. This generally includes new release areas. Council's Subdivision & Development Certification section can advise which catchment applies to the proposed development and the requirement for on-site detention.

Prior to finalising our OSD approach we want to confirm with Council whether the site:

1. **does not require OSD. Noting that the information in the Stage 1 DA is demonstrating that the regional basin will already cater for the developed flows of the subject site.**

We understand that discharging concentrated flows may require an assessment of the downstream drainage capacity to ensure that it has capacity for the design storm. For reference, we expect the overall site discharge to be in the southwestern corner. Likely through an existing pipe within the property boundary (marked up as 1 below). We will assess the flows and check if the D/S network needs to be amplified or alternative methods.



Cheers,

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Appendix B

DRAINS Modelling Data

PIT / NODE DETAILS Version 15

Name	Type	Family	Size	Ponding Volume (cu.m)	Pressure Change Coeff. Ku	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down lid	id	Part Full Shock Los	Inflow Hydrograph	Pit is	Internal Width (mm)	Inflow is Misaligned	Minor Safe Pond Dept (m)	Major Safe Pond Depth (m)
A01-1	OnGrade	NSW RTA	Single SO1	Pit	5.9	97.116		0	0.1	313567.8	6266312	No	46343995	1 x Ku	No	Existing		No		
A01-2	OnGrade	NSW RTA	Single SO1	Pit	0.5	97.101		0	0.1	313559.8	6266309	No	46343996	1 x Ku	No	Existing		Yes		
A01-3	OnGrade	NSW RTA	Single SO1	Pit	2.1	96.393		0	0.1	313568.6	6266288	No	46343997	1 x Ku	No	Existing		No		
Pit243512	OnGrade	NSW RTA	Single SO1	Pit	2.1	96.025		0	0.1	313572.7	6266277	No	93687333	1 x Ku	No	New				
A01-4	OnGrade	Dished Cro	DCG96D		1.2	95.841		0	0.1	313574.7	6266272	No	46343998	1 x Ku	No	New		No		
A01-5	OnGrade	NSW RTA	SA1		0.9	95.446		0	0.1	313576.7	6266260	No	46343999	1 x Ku	No	Existing		No		
A01-6	OnGrade	NSW RTA	SA2		2	94.844		0	0.1	313566.7	6266250	No	46344000	1 x Ku	No	Existing				
A01-7	OnGrade	NSW RTA	Single SO1	Pit	0.2	93.959		0	0.1	313547.4	6266242	No	46344001	1 x Ku	No	Existing		No		
A01-8	OnGrade	NSW RTA	Single SO1	Pit	0.8	92.095		0	0.1	313517.3	6266231	No	46344002	1 x Ku	No	Existing		No		
A01-9	OnGrade	NSW RTA	Single SO1	Pit	0.3	90.683		0	0.1	313497.5	6266223	No	46344003	1 x Ku	No	Existing		No		
A01-10	OnGrade	NSW RTA	Single SO1	Pit	0	89.756		0	0.1	313480.9	6266216	No	46344004	1 x Ku	No	Existing		No		
A01-11	OnGrade	NSW RTA	SA2		1.6	89.563		0	0.1	313474.6	6266214	No	46344005	1 x Ku	No	Existing		Yes		
A01-12	OnGrade	NSW RTA	SA1		0.8	89.282		0	0.1	313455.4	6266216	No	46344006	1 x Ku	No	Existing		No		
A01-13	OnGrade	NSW RTA	SA2		2.6	89.047		0	0.1	313446.2	6266210	No	46344007	1 x Ku	No	Existing				
A01-14	OnGrade	NSW RTA	Single SO1	Pit	0	88.958		0	0.1	313441.5	6266228	No	46344008	1 x Ku	No	Existing		No		
A01-15	OnGrade	NSW RTA	Single SO1	Pit	0.3	88.863		0	0.1	313437.3	6266239	No	46344009	1 x Ku	No	Existing		No		
A01-16	OnGrade	NSW RTA	Single SO1	Pit	0.3	88.781		0	0.1	313433	6266250	No	46344010	1 x Ku	No	Existing		No		
A01-17	OnGrade	NSW RTA	Single SO1	Pit	0.3	88.749		0	0.1	313431.2	6266255	No	46344011	1 x Ku	No	Existing		No		
A01-18	Sag	NSW RTA	Double SO		0.3	0.3	88.715	0.1	0	0.2	313429.6	6266259	No	46344012	1 x Ku	No	Existing		No	0.2	0.15
A01-19	OnGrade	NSW RTA	Single SO1	Pit		1	88.971		0	0.1	313418.6	6266278	No	46344013	1 x Ku	No	Existing		No		
A01-20	OnGrade	NSW RTA	SA1			0.7	88.775		0	0.1	313407.2	6266283	No	46344014	1 x Ku	No	Existing		No		
A01-21	OnGrade	NSW RTA	SA2			1	88.725		0	0.1	313404	6266291	No	46344015	1 x Ku	No	Existing		No		
A01-22	Node						88.307		0		313393	6266287		46344016		No					
A02-1	OnGrade	Unlimited	Unlimited			2.1	97.939		0	0.1	313564.8	6266349	No	46344017	1 x Ku	No	Existing		No		
A02-2	OnGrade	NSW RTA	SA2			1.5	97.6		0	0.1	313556.3	6266357	No	46344018	1 x Ku	No	Existing		Yes		
A02-3	OnGrade	NSW RTA	SA2			1.4	97.306		0	0.1	313547.7	6266350	No	46344019	1 x Ku	No	Existing		No		
A02-4	OnGrade	NSW RTA	SA2			1.1	95.35		0	0.1	313512	6266334	No	46344020	1 x Ku	No	Existing		No		
A02-5	OnGrade	NSW RTA	SA2			1.6	94.299		0	0.1	313498	6266328	No	46344021	1 x Ku	No	Existing		No		
A02-6	OnGrade	NSW RTA	SA2			1	91.869		0	0.1	313466.4	6266316	No	46344022	1 x Ku	No	Existing		No		
A02-7	OnGrade	NSW RTA	SA2			0	90.091		0	0.1	313442.7	6266307	No	46344023	1 x Ku	No	Existing		No		
A02-8	OnGrade	NSW RTA	SA2			1.6	89.517		0	0.1	313433.2	6266305	No	46344024	1 x Ku	No	Existing		Yes		
A03-1	OnGrade	NSW RTA	SA2			5.8	95.626		0	0.1	313589.1	6266258	No	46344025	1 x Ku	No	Existing		No		
A03-2	Sag	NSW RTA	SA2		0.3	5.9	95.52	0.09	0	0.2	313591.6	6266252	No	46344026	1 x Ku	No	Existing		No	0.2	0.15
A03-3	OnGrade	NSW RTA	SA2			2	95.635		0	0.1	313595.3	6266242	No	46344027	1 x Ku	No	Existing		Yes		
A03-4	OnGrade	NSW RTA	SA2			1.1	95.589		0	0.1	313587.6	6266238	No	46344028	1 x Ku	No	Existing		No		
A03-5	OnGrade	NSW RTA	SA2			1.7	94.82		0	0.1	313569.3	6266242	No	46344029	1 x Ku	No	Existing		No		
A04-1	OnGrade	NSW RTA	Single SO1	Pit		5.5	90.146		0	0.1	313493	6266212	No	46344030	1 x Ku	No	Existing		No		
A04-2	OnGrade	NSW RTA	Single SO1	Pit		5.9	89.699		0	0.1	313483.4	6266209	No	46344031	1 x Ku	No	Existing		No		
A04-3	OnGrade	NSW RTA	SA2			0.8	89.529		0	0.1	313476.5	6266206	No	46344032	1 x Ku	No	Existing		No		
A04-4	OnGrade	NSW RTA	SA2			1.7	89.46		0	0.1	313468.9	6266203	No	46344033	1 x Ku	No	Existing		No		
A04-5	OnGrade	NSW RTA	SA2			1.8	89.111		0	0.1	313451	6266198	No	46344034	1 x Ku	No	Existing		Yes		
A07-1	OnGrade	NSW RTA	Single SO1	Pit		5.7	92.154		0	0.1	313520.3	6266223	No	46344037	1 x Ku	No	Existing		No		
A08-1	OnGrade	NSW RTA	Single SO1	Pit		5.9	93.964		0	0.1	313550.3	6266235	No	46344038	1 x Ku	No	Existing		No		
A10-1	OnGrade	Junction Pi	Junction Pit or Manhol			3.3	94.595		0	0.5	313504.7	6266312	Yes	46344042	1 x Ku	No	Existing		No		
A10-2	OnGrade	NSW RTA	Single SO1	Pit		2.7	94.573		0	0.1	313501.4	6266320	No	46344043	1 x Ku	No	Existing		No		
A011-1	OnGrade	NSW RTA	Single SO1	Pit		5.9	96.38		0	0.1	313576.2	6266291	No	46344044	1 x Ku	No	Existing		No		
A012-1	OnGrade	NSW RTA	Single SO1	Pit		5.9	95.823		0	0.1	313582.5	6266275	No	46344045	1 x Ku	No	Existing		No		
O A01-20	Node						88.775		0		313396.2	6266279		46344046		No					
O A02-8	Node						89.517		0		313418.2	6266313		46344048		No					
N159188	Node								0		313589.4	6266348		46671224		No					
Bypass	Node						89.9		0		313443.1	6266271		76451740		No					
Pit649042	OnGrade	Downpipe	Downpipe			1.5	91.5		0	0.1	313470.4	6266288	No	2.27E+08	1 x Ku	No	New				
A05-1	OnGrade	Unlimited	Unlimited			0.6	89.6		0	0.5	313477.1	6266226	No	46344035	1 x Ku	No	Existing		No		
Pit649043	OnGrade	Downpipe	Downpipe			1.5	91.6		0	0.1	313509.6	6266240	No	2.27E+08	1 x Ku	No	New				
Pit649050	Sag	Hinged Pit	HPG6060		3	1.5	89.5	0.1	0	0.5	313457	6266251	No	2.27E+08	1 x Ku	No	New			0.1	
Pit649049	Sag	Hinged Pit	HPG6060		3	1.5	89.55	0.1	0	0.5	313460.8	6266241	No	2.27E+08	1 x Ku	No	New			0.1	
Pit649048	Sag	Hinged Pit	HPG6060		3	1.5	89.6	0.1	0	0.5	313463.9	6266231	No	2.27E+08	1 x Ku	No	New			0.1	
A09-1	OnGrade	Junction Pi	Junction Pit or Manhol			5.9	91.505		0	0.5	313464.6	6266296	Yes	46344039	1 x Ku	No	Existing		No		
A09-2	OnGrade	NSW RTA	Single SO1	Pit		5.9	91.338		0	0.1	313459.3	6266303	No	46344040	1 x Ku	No	Existing		No		
A09-3	OnGrade	NSW RTA	SA2			0.5	90.324		0	0.1	313446	6266298	No	46344041	1 x Ku	No	Existing		Yes		
A06-1	OnGrade	Unlimited	Unlimited			3.3	92.2		0	0.5	313513.1	6266240	No	46344036	1 x Ku	No	Existing		No		

DETENTION BASIN DETAILS

Name	Elev	Surf. Area	Not Used	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Leng	id
OSD B	88.95	273		Orifice		260	88.88			313475.2	6266231	No			1.64E+08
	89.75	273													

SUB-CATCHMENT DETAILS

Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Supp Area %	Paved Time (min)	Grass Time (min)	Supp Time (min)	Paved Length (m)	Grass Length (m)	Supp Length (m)	Paved Slope(%)	Grass Slope %	Supp Slope %	Paved Rough	Grass Rough	Supp Rough	Lag Time or Factor	Gutter Length (m)	Gutter Slope %	Gutter FlowFactor	Rainfall Multiplier
C A01-1	A01-1	0.0409	100	0	0	5	10	0														1
C A01-2	A01-2	0.0202	100	0	0	5	10	0														1
C A01-3	A01-3	0.028	100	0	0	5	10	0														1
C A01-4	Pit243512	0.023	100	0	0	5	10	0														1
C A01-5	A01-5	0.0171	100	0	0	5	10	0														1
C A01-6	A01-6	0.0221	100	0	0	5	10	0														1
C A01-7	A01-7	0.0212	100	0	0	5	10	0														1
C A01-8	A01-8	0.0408	100	0	0	5	10	0														1
C A01-9	A01-9	0.0219	100	0	0	5	10	0														1
C A01-10	A01-10	0.0276	100	0	0	5	10	0														1
C A01-11	A01-11	0.0168	100	0	0	5	10	0														1
C A01-12	A01-12	0.0218	100	0	0	5	10	0														1
C A01-13	A01-13	0.0828	100	0	0	5	10	0														1
C A01-14	A01-14	0.043	100	0	0	5	10	0														1
C A01-15	A01-15	0.0291	100	0	0	5	10	0														1
C A01-16	A01-16	0.0323	100	0	0	5	10	0														1
C A01-17	A01-17	0.0143	100	0	0	5	10	0														1
C A01-18	A01-18	0.0156	100	0	0	5	10	0														1
C A01-19	A01-19	0.1018	100	0	0	5	10	0														1
C A01-20	A01-20	0.0165	100	0	0	5	10	0														1
C A01-21	A01-21	0.0208	100	0	0	5	10	0														1
C A02-1	A02-1	0.1062	100	0	0	5	10	0														1
C A02-3	A02-3	0.0179	100	0	0	5	10	0														1
C A02-4	A02-4	0.0609	100	0	0	5	10	0														1
C A02-5	A02-5	0.0152	100	0	0	5	10	0														1
C A02-6	A02-6	0.0421	100	0	0	5	10	0														1
C A02-7	A02-7	0.0364	100	0	0	5	10	0														1
C A02-8	A02-8	0.0168	100	0	0	5	10	0														1
C A03-1	A03-1	0.1001	100	0	0	5	10	0														1
C A03-2	A03-2	0.0648	100	0	0	5	10	0														1
C A03-3	A03-3	0.1047	100	0	0	5	10	0														1
C A03-4	A03-4	0.0286	100	0	0	5	10	0														1
C A03-5	A03-5	0.0255	100	0	0	5	10	0														1
C A04-2	A04-2	0.0854	100	0	0	5	10	0														1
C A04-3	A04-3	0.0094	100	0	0	5	10	0														1
C A04-4	A04-4	0.0668	100	0	0	5	10	0														1
C A04-5	A04-5	0.0231	100	0	0	5	10	0														1
C A07-1	A07-1	0.0951	100	0	0	5	10	0														1
C A08-1	A08-1	0.0154	100	0	0	5	10	0														1
C A10-2	A10-2	0.0329	100	0	0	5	10	0														1
C A11-1	A011-1	0.0882	100	0	0	5	10	0														1
C A12-1	A012-1	0.054	100	0	0	5	10	0														1
Cat101892	N159188	1.08	100	0	0	8.5	10	0														1
C Bypass	Bypass	0.007	100	0	0	5	5	2											0			1
C A09-1	Pit649042	0.147	100	0	0	5	10	0														1
C A05-1	OSD B	0.4518	100	0	0	7.5	10	0														1
C A06-1	Pit649043	0.1412	100	0	0	5	10	0														1
Cat583675	Pit649050	0.023	80	20	0	5	7.5	2											0			1
Cat583674	Pit649049	0.016	80	20	0	5	7.5	2											0			1
Cat583670	Pit649048	0.014	80	20	0	5	7.5	2											0			1
C A09-2	A09-2	0.0348	100	0	0	5	10	0														1
C A09-3	A09-3	0.0072	100	0	0	5	10	0														1

PIPE DETAILS

Name	From	To	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Type	Dia (mm)	I.D. (mm)	Rough	Pipe Is	No. Pipes	Chg From	At Chg	Chg (m)	Rl (m)	Chg (m)	RL (m)	etc (m)
P A01-1	A01-1	A01-2	8.499	95.86	95.73	1.53	Concrete,	375	375	0.3	Existing	1	A01-2	0					
P A01-2	A01-2	A01-3	23.387	95.73	94.97	3.25	Concrete,	375	375	0.3	Existing	1	A01-3	0					
P A01-3	A01-3	Pit243512	10.947	94.97	94.667	2.77	Concrete,	375	375	0.3	Existing	1	Pit243512	0					
P249763	Pit243512	A01-4	6	94.66	94.5	2.67	Concrete,	375	375	0.3	Existing	1	A01-4	0					
P A01-4	A01-4	A01-5	12.197	94.5	94.06	3.61	Concrete,	375	375	0.3	Existing	1	A01-5	0					
P A01-5	A01-5	A01-6	14.184	94.06	93.32	5.22	Concrete,	375	375	0.3	Existing	1	A01-6	0					
P A01-6	A01-6	A01-7	20.769	93.32	92.33	4.77	Concrete,	375	375	0.3	Existing	1	A01-7	0					
P A01-7	A01-7	A01-8	32.298	92.33	90.48	5.73	Concrete,	375	375	0.3	Existing	1	A01-8	0					
P A01-8	A01-8	A01-9	21.169	90.48	89.15	6.28	Concrete,	375	375	0.3	Existing	1	A01-9	0					
P A01-9	A01-9	A01-10	17.901	89.15	88.3	4.75	Concrete,	375	375	0.3	Existing	1	A01-10	0					
P A01-10	A01-10	A01-11	6.791	88.3	88.14	2.36	Concrete,	600	600	0.3	Existing	1	A01-11	0					
P A01-11	A01-11	A01-12	19.249	88.14	87.77	1.92	Concrete,	600	600	0.3	Existing	1	A01-12	0					
P A01-12	A01-12	A01-13	10.699	87.77	87.48	2.71	Concrete,	600	600	0.3	Existing	1	A01-13	0					
P A01-13	A01-13	A01-14	18.075	87.48	87.31	0.94	Concrete,	600	600	0.3	Existing	1	A01-14	0					
P A01-14	A01-14	A01-15	11.834	87.31	87.13	1.52	Concrete,	750	750	0.3	Existing	1	A01-15	0					
P A01-15	A01-15	A01-16	11.938	87.13	87.02	0.92	Concrete,	750	750	0.3	Existing	1	A01-16	0					
P A01-16	A01-16	A01-17	5.116	87.02	86.94	1.56	Concrete,	750	750	0.3	Existing	1	A01-17	0					
P A01-17	A01-17	A01-18	4.46	86.94	86.87	1.57	Concrete,	750	750	0.3	Existing	1	A01-18	0					
P A01-18	A01-18	A01-19	22.421	86.87	86.69	0.8	Concrete,	750	750	0.3	Existing	1	A01-19	0					
P A01-19	A01-19	A01-20	12.319	86.69	86.5	1.54	Concrete,	750	750	0.3	Existing	1	A01-20	0					
P A01-20	A01-20	A01-21	8.889	86.5	86.39	1.24	Concrete,	750	750	0.3	Existing	1	A01-21	0					
P A01-21	A01-21	A01-22	11.825	86.39	86	3.3	Concrete,	750	750	0.3	Existing	1	A01-22	0					
P A02-1	A02-1	A02-2	11.477	96.464	95.95	4.48	Concrete,	375	375	0.3	Existing	1	A02-2	0					
P A02-2	A02-2	A02-3	11.129	95.95	95.73	1.98	Concrete,	375	375	0.3	Existing	1	A02-3	0					
P A02-3	A02-3	A02-4	39.237	95.73	93.57	5.51	Concrete,	375	375	0.3	Existing	1	A02-4	0					
P A02-4	A02-4	A02-5	14.996	93.57	92.57	6.67	Concrete,	375	375	0.3	Existing	1	A02-5	0					
P A02-5	A02-5	A02-6	33.903	92.57	90.28	6.75	Concrete,	375	375	0.3	Existing	1	A02-6	0					
P A02-6	A02-6	A02-7	25.327	90.28	88.28	7.9	Concrete,	375	375	0.3	Existing	1	A02-7	0					
P A02-7	A02-7	A02-8	9.827	88.28	87.73	5.6	Concrete,	600	600	0.3	Existing	1	A02-8	0					
P A02-8	A02-8	A01-21	32.144	87.73	86.39	4.17	Concrete,	600	600	0.3	Existing	1	A01-21	0					
P A03-1	A03-1	A03-2	6.812	94.148	94.08	1	Concrete,	375	375	0.3	Existing	1	A03-2	0					
P A03-2	A03-2	A03-3	10.299	94.06	93.957	1	Concrete,	375	375	0.3	Existing	1	A03-3	0					
P A03-3	A03-3	A03-4	8.534	93.937	93.852	1	Concrete,	375	375	0.3	Existing	1	A03-4	0					
P A03-4	A03-4	A03-5	18.662	93.832	93.44	2.1	Concrete,	375	375	0.3	Existing	1	A03-5	0					
P A03-5	A03-5	A01-6	8.09	93.44	93.32	1.48	Concrete,	375	375	0.3	Existing	1	A01-6	0					
P A04-1	A04-1	A04-2	10.43	88.74	88.41	3.16	Concrete,	375	375	0.3	Existing	1	A04-2	0					
P A04-2	A04-2	A04-3	7.333	88.41	88.1	4.23	Concrete,	375	375	0.3	Existing	1	A04-3	0					
P A04-3	A04-3	A04-4	8.133	88.1	87.85	3.07	Concrete,	375	375	0.3	Existing	1	A04-4	0					
P A04-4	A04-4	A04-5	18.602	87.85	87.636	1.15	Concrete,	375	375	0.3	Existing	1	A04-5	0					
P A04-5	A04-5	A01-13	12.954	87.616	87.48	1.05	Concrete,	375	375	0.3	Existing	1	A01-13	0					
P A07-1	A07-1	A01-8	8.018	90.63	90.48	1.87	Concrete,	375	375	0.3	Existing	1	A01-8	0					
P A08-1	A08-1	A01-7	7.982	92.57	92.33	3.01	Concrete,	375	375	0.3	Existing	1	A01-7	0					
P A10-1	A10-1	A10-2	8.749	93.33	93.09	2.74	Concrete,	375	375	0.3	Existing	1	A10-2	0					
P A10-2	A10-2	A02-5	9.432	93.09	92.57	5.51	Concrete,	375	375	0.3	Existing	1	A02-5	0					
P A11-1	A011-1	A01-3	8.231	95.052	94.97	1	Concrete,	375	375	0.3	Existing	1	A01-3	0					
P A12-1	A012-1	A01-4	8.246	94.582	94.5	0.99	Concrete,	375	375	0.3	Existing	1	A01-4	0					
Pipe67166	Pit649042	OSD B	51.6	90.6	89.4	2.33	uPVC, not	100	105	0.03	NewFixed	1	OSD B	0					
Pipe50638	Pit649042	A09-1	10	90.7	90.28	4.2	uPVC, und	375	386	0.03	NewFixed	1	A09-1	0					
Pipe16451	OSD B	A05-1	3	88.95	88.645	10.17	Concrete,	375	375	0.3	NewFixed	1	A05-1	0					
P A05-1	A05-1	A01-10	10.768	88.64	88.3	3.16	Concrete,	375	375	0.3	Existing	1	A01-10	0					
Pipe67166	Pit649043	OSD B	37.8	90.9	89.15	4.63	uPVC, not	100	105	0.03	NewFixed	1	OSD B	0					
Pipe39145	Pit649043	A06-1	10	91	90.9	1	uPVC, und	375	386	0.03	NewFixed	1	A06-1	0					
Pipe67168	Pit649050	Pit649049	10	89.09	89.04	0.5	uPVC, not	225	242	0.03	New	2	Pit649049	0					
Pipe67168	Pit649049	Pit649048	9	89.04	88.995	0.5	uPVC, not	225	242	0.03	New	2	Pit649048	0					
Pipe67168	Pit649048	OSD B	9	88.995	88.95	0.5	uPVC, not	225	242	0.03	NewFixed	2	OSD B	0					
P A09-1	A09-1	A09-2	9.062	90.28	90.01	2.98	Concrete,	375	375	0.3	Existing	1	A09-2	0					
P A09-2	A09-2	A09-3	14.298	90.01	88.89	7.83	Concrete,	375	375	0.3	Existing	1	A09-3	0					
P A09-3	A09-3	A02-7	9.644	88.89	88.28	6.33	Concrete,	375	375	0.3	Existing	1	A02-7	0					
P A06-1	A06-1	A01-8	10.657	90.9	90.48	3.94	Concrete,	375	375	0.3	Existing	1	A01-8	0					

DETAILS of SERVICES CROSSING PIPES

Pipe	Chg (m)	Bottom Elev (m)	Height of S (m)	Chg (m)	Bottom Elev (m)	Height of S (m)	Chg (m)	Bottom Elev (m)	Height of S (m)	etc	etc

CHANNEL DETAILS

Name	From	To	Type	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Base Width (m)	L.B. Slope (1:?)	R.B. Slope (1:?)	Manning n	Depth (m)	Roofed

OVERFLOW ROUTE DETAILS

Name	From	To	Travel Time (min)	Spill Level (m)	Crest Length (m)	Weir Coeff. C	Cross Section	Safe Depth Major (m)	Safe Depth Minor (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %	id	
F A01-1x	A01-1	A011-1		1			7.5 m road	0.3	0.15	0.4	3.21	100	46344147	22.957
F A01-2x	A01-2	A01-3		1			7.5 m road	0.3	0.15	0.4	3.03	100	46344148	23.387
F A01-3x	A01-3	Pit243512		1			7.5 m road	0.3	0.15	0.4	3.26	100	46344149	16.947
OF236497	Pit243512	A01-4		1			7.5 m road	0.3	0.15	0.4	3.26	100	93687364	16.947
F A01-4x	A01-4	A01-5		1			7.5 m road	0.3	0.15	0.4	3.15	100	46344150	12.549
F A01-5x	A01-5	A01-6		1			7.5 m road	0.3	0.15	0.4	3.96	100	46344151	15.212
F A01-6	A01-6	A01-7		1			7.5 m road	0.3	0.15	0.4	4.26	100	46344152	20.768
F A01-7	A01-7	A01-8		1			7.5 m road	0.3	0.15	0.4	5.77	100	46344153	32.298
F A01-8	A01-8	A01-9		1			7.5 m road	0.3	0.15	0.4	6.67	100	46344154	21.169
F A01-9	A01-9	A01-10		1			7.5 m road	0.3	0.15	0.4	5.18	100	46344155	17.901
F A01-10	A01-10	A01-11		1			7.5 m road	0.3	0.15	0.4	2.84	100	46344156	6.79
F A01-11	A01-11	A01-12		1			7.5 m road	0.3	0.15	0.4	1.31	100	46344157	21.494
F A01-12	A01-12	A01-14		1			4 m wide p	0.3	0.15	0.4	1.49	100	46344158	21.739
F A01-13	A01-13	A01-14		1			7.5 m road	0.3	0.15	0.4	0.49	100	46344159	18.076
F A01-14	A01-14	A01-15		1			7.5 m road	0.3	0.15	0.4	0.8	100	46344160	11.834
F A01-15	A01-15	A01-16		1			7.5 m road	0.3	0.15	0.4	0.69	100	46344161	11.938
F A01-16	A01-16	A01-17		1			7.5 m road	0.3	0.15	0.4	0.63	100	46344162	5.115
F A01-17	A01-17	A01-18		1			7.5 m road	0.3	0.15	0.4	0.76	100	46344163	4.46
F A01-18	A01-18	A01-20		1			7.5 m road	0.3	0.15	0.4	1	100	46344164	22.775
F A01-19	A01-19	A01-20		1			7.5 m road	0.3	0.15	0.4	1.48	100	46344165	13.21
F A01-20	A01-20	O A01-20		1			7.5 m road	0.3	0.15	0.4	4	100	46344166	13.6
F A01-21	A01-21	A01-22		1			7.5 m road	0.3	0.15	0.4	4	100	46344167	10
F A02-1x	A02-1	A02-3		1			Overflow a	0.05	0	0.6	3.78	100	46344168	16.75
F A02-2x	A02-2	A02-3		1			7.5 m road	0.3	0.15	0.4	2.64	100	46344169	11.128
F A02-3x	A02-3	A02-4		1			7.5 m road	0.3	0.15	0.4	4.97	100	46344170	39.322
F A02-4x	A02-4	A02-5		1			7.5 m road	0.3	0.15	0.4	7.01	100	46344171	14.996
F A02-5x	A02-5	A02-6		1			7.5 m road	0.3	0.15	0.4	7.17	100	46344172	33.903
F A01-19x	A02-6	A02-7		1			7.5 m road	0.3	0.15	0.4	7.02	100	46344173	25.327
F A01-20x	A02-7	A02-8		1			7.5 m road	0.3	0.15	0.4	5.84	100	46344174	9.821
F A01-21x	A02-8	O A02-8		1			7.5 m road	0.3	0.15	0.4	1	100	46344175	10
F A03-1	A03-1	A03-2		1			7.5 m road	0.3	0.15	0.4	0.13	100	46344176	6.811
OF169744	A03-2	A03-5		0.1			4 m wide p	0.3	0.15	0.4	3.72	100	60940239	24.1
F A03-3	A03-3	A03-2		1			7.5 m road	0.3	0.15	0.4	0.17	100	46344177	10.299
F A03-4x	A03-4	A03-5		1			7.5 m road	0.3	0.15	0.4	3.62	100	46344178	21.236
F A03-5	A03-5	A08-1		1			7.5 m road	0.3	0.15	0.4	4.19	100	46344179	20.435
F A04-1x	A04-1	A04-2		1			7.5 m road	0.3	0.15	0.4	4.29	100	46344180	10.429
F A04-2	A04-2	A04-3		1			7.5 m road	0.3	0.15	0.4	2.32	100	46344181	7.333
F A04-3	A04-3	A04-4		1			7.5 m road	0.3	0.15	0.4	0.85	100	46344182	8.132
F A04-4	A04-4	A04-5		1			4 m wide p	0.3	0.15	0.4	1.88	100	46344183	18.598
F A04-5	A04-5	A01-13		1			7.5 m road	0.3	0.15	0.4	0.49	100	46344184	12.954
F A07-1x	A07-1	A04-1		1			7.5 m road	0.3	0.15	0.4	6.87	100	46344187	29.244
F A08-1	A08-1	A07-1		1			7.5 m road	0.3	0.15	0.4	5.62	100	46344188	32.204
F A10-1	A10-1	A09-2		1			7.5 m road	0.3	0.15	0.4	7.18	0	46344192	43.041
F A010-2	A10-2	A09-2		1			7.5 m road	0.3	0.15	0.4	7.15	100	46344193	45.22
F A11-1	A011-1	A012-1		1			7.5 m road	0.3	0.15	0.4	3.18	100	46344202	17.5
F A012-1	A012-1	A03-1		1			7.5 m road	0.3	0.15	0.4	1.1	100	46344195	17.9
OF130487	N159188	A02-1		0.2			7.5 m road	0.3	0.15	0.4	1	100	46671226	25.8
F Bypass	Bypass	A01-18		0.2			Overflow a	0.05	0	0.6	2	0	76451743	10
OF681625	Pit649042	A09-2		1			Swale with	0.45	0.3	1	5.96	0	2.4E+08	38.669
OF437332	OSD B	A05-1		0.1	89.7	2	1.67	4 m wide p	0.3	0.15	0.4	1	0	1.64E+08	15
OF154692	A05-1	A01-12		0.1				4 m wide p	0.3	0.15	0.4	1.39	0	53371041	12.7
OF681609	Pit649043	A01-9		1				Swale with	0.45	0.3	1	5.96	0	2.4E+08	38.669
OF667343	Pit649050	A01-18		0.1				4 m wide p	0.3	0.15	0.4	1	0	2.27E+08	11
OF667319	Pit649049	Pit649050		0.5				Informal pa	0.04	0.04	0.6	1	0	2.27E+08	11
OF667323	Pit649048	OSD B		0.5				Informal pa	0.04	0.04	0.6	1	0	2.27E+08	11

F A09-1	A09-1	A09-3	1		7.5 m road	0.3	0.15	0.4	5.15	0	46344189	49.235
F A09-2	A09-2	A09-3	1		7.5 m road	0.3	0.15	0.4	7.09	100	46344190	14.298
F A09-3	A09-3	A01-19	1		7.5 m road	0.3	0.15	0.4	3.69	100	46344199	36.7
F A03-4	A06-1	A01-8	1		Swale with	0.45	0.3	1	5.96	0	46344186	38.669

PIPE COVER DETAILS

Name	Type	Dia (mm)	Safe Cover	Cover (m)	
P A01-1	Concrete, r	375	0.6	0.85	
P A01-2	Concrete, r	375	0.6	0.96	
P A01-3	Concrete, r	375	0.6	0.95	
P249763	Concrete, r	375	0.6	0.93	
P A01-4	Concrete, r	375	0.6	0.93	
P A01-5	Concrete, r	375	0.6	0.98	
P A01-6	Concrete, r	375	0.6	1.11	
P A01-7	Concrete, r	375	0.6	1.2	
P A01-8	Concrete, r	375	0.6	1.12	
P A01-9	Concrete, r	375	0.6	1.05	
P A01-10	Concrete, r	600	0.6	0.78	
P A01-11	Concrete, r	600	0.6	0.78	
P A01-12	Concrete, r	600	0.6	0.87	
P A01-13	Concrete, r	600	0.6	0.92	
P A01-14	Concrete, r	750	0.6	0.84	
P A01-15	Concrete, r	750	0.6	0.92	
P A01-16	Concrete, r	750	0.6	0.95	
P A01-17	Concrete, r	750	0.6	1	
P A01-18	Concrete, r	750	0.6	1.03	
P A01-19	Concrete, r	750	0.6	1.47	
P A01-20	Concrete, r	750	0.6	1.47	
P A01-21	Concrete, r	750	0.6	1.5	
P A02-1	Concrete, r	375	0.6	1.06	
P A02-2	Concrete, r	375	0.6	1.17	
P A02-3	Concrete, r	375	0.6	1.17	
P A02-4	Concrete, r	375	0.6	1.32	
P A02-5	Concrete, r	375	0.6	1.18	
P A02-6	Concrete, r	375	0.6	1.18	
P A02-7	Concrete, r	600	0.6	1.14	
P A02-8	Concrete, r	600	0.6	1.14	
P A03-1	Concrete, r	375	0.6	1.03	
P A03-2	Concrete, r	375	0.6	1.05	
P A03-3	Concrete, r	375	0.6	1.29	
P A03-4	Concrete, r	375	0.6	0.97	
P A03-5	Concrete, r	375	0.6	0.97	
P A04-1	Concrete, r	375	0.6	0.88	
P A04-2	Concrete, r	375	0.6	0.88	
P A04-3	Concrete, r	375	0.6	1.02	
P A04-4	Concrete, r	375	0.6	1.06	
P A04-5	Concrete, r	375	0.6	1.08	
P A07-1	Concrete, r	375	0.6	1.11	
P A08-1	Concrete, r	375	0.6	0.98	
P A10-1	Concrete, r	375	0.6	0.85	
P A10-2	Concrete, r	375	0.6	1.07	
P A11-1	Concrete, r	375	0.6	0.92	
P A12-1	Concrete, r	375	0.6	0.83	
Pipe67166	uPVC, not	105	0.3	0.24	Unsafe
Pipe50638	uPVC, und	386	0.5	0.41	Unsafe
Pipe16451	Concrete, r	375	0.6	0.39	Unsafe
P A05-1	Concrete, r	375	0.6	0.55	Unsafe
Pipe67166	uPVC, not	105	0.3	0.49	
Pipe39145	uPVC, und	386	0.5	0.21	Unsafe
Pipe67168	uPVC, not	242	0.3	0.16	Unsafe
Pipe67168	uPVC, not	242	0.3	0.26	Unsafe
Pipe67168	uPVC, not	242	0.3	0.36	
P A09-1	Concrete, r	375	0.6	0.81	
P A09-2	Concrete, r	375	0.6	0.92	
P A09-3	Concrete, r	375	0.6	1.02	
P A06-1	Concrete, r	375	0.6	0.89	

These pipes have non-return valves: Pipe506382, Pipe164513, Pipe391453, Pipe671689

Appendix C

DRAINS Modelling Results

DRAINS results prepared from Version 2022.012

PIT / NODE DETAILS Version 8

Name	Max HGL	Max Pond HGL	Max Surfac Flow Arrivi (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
A01-1	96		0.032		1.11	0	None
A01-2	95.85		0.016		1.25	0	None
A01-3	95.26		0.022		1.13	0	None
Pit243512	95.09		0.018		0.93	0	None
A01-4	94.94		0		0.9	0	None
A01-5	94.76		0.013		0.68	0	Inlet Capacity
A01-6	94.59		0.018		0.25	0	None
A01-7	93.25		0.017		0.71	0	None
A01-8	92.1		0.039		0	0.046	Outlet System
A01-9	90.6		0.15		0.08	0	None
A01-10	89.35		0.129		0.4	0	None
A01-11	89.32		0.032		0.24	0	None
A01-12	88.96		0.035		0.33	0	Inlet Capacity
A01-13	88.78		0.11		0.27	0.009	Inlet Capacity
A01-14	87.87		0.051		1.09	0	None
A01-15	87.84		0.023		1.02	0	None
A01-16	87.76		0.025		1.02	0	None
A01-17	87.7		0.011		1.05	0	None
A01-18	87.65	88.75	0.018	0.1	1.07	0	Inlet Capacity
A01-19	87.54		0.08		1.43	0.002	Inlet Capacity
A01-20	87.32		0.02		1.45	0	Inlet Capacity
A01-21	87.19		0.016		1.54	0	None
A01-22	86.42		0				
A02-1	97.94		0.694		0	0.575	Outlet System
A02-2	97.57		0		0.03	0	None
A02-3	97.29		0.842		0.01	0.402	Inlet Capacity
A02-4	95.35		0.722		0	0.433	Outlet System
A02-5	94.3		0.722		0	0.414	Outlet System
A02-6	91.85		0.677		0.01	0.302	Inlet Capacity
A02-7	88.59		0.55		1.5	0.138	Inlet Capacity
A02-8	88.41		0.303		1.11	0.042	Inlet Capacity
A03-1	95.6		0.079		0.03	0.013	Inlet Capacity
A03-2	95.53	95.61	0.098	0.3	0	0.013	Outlet System
A03-3	95.29		0.082		0.35	0.014	Inlet Capacity
A03-4	95.06		0.022		0.53	0	None
A03-5	94.82		0.062		0	0.027	Outlet System
A04-1	89.17		0.031		0.97	0	None
A04-2	89.17		0.067		0.53	0	None
A04-3	89.07		0.01		0.46	0	None
A04-4	89.04		0.052		0.42	0.005	Inlet Capacity
A04-5	88.92		0.027		0.19	0	None
A07-1	92.14		0.085		0.01	0.015	Inlet Capacity
A08-1	93.27		0.137		0.7	0	None
A10-1	94.31		0		0.29	0	None
A10-2	94.3		0.026		0.27	0	None
A011-1	95.36		0.069		1.02	0	Inlet Capacity
A012-1	94.97		0.046		0.85	0	None
Pit649050	89.6	89.6	0.017	3.4	0	0.007	Outlet System
Pit649049	89.6	89.61	0.012	1.6	0	0	Outlet System
Pit649048	89.6	89.62	0.01	0.5	0	0	Outlet System
A05-1	89.36		0		0.24	0	None
N779497	92.22		0.111				
Pit649043	92.2		0		0	0	Outlet System
N779498	90.97		0.115				

Pit649042	90.91	0	0.59	0	None
A09-1	90.55	0	0.95	0	None
A09-2	90.28	0.027	1.06	0	None
A09-3	89.08	0.006	1.24	0	None
A06-1	92.16	0	0.04	0	None

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
C A01-1	0.026	0.026	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-2	0.013	0.013	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-3	0.018	0.018	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-4	0.015	0.015	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-5	0.011	0.011	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-6	0.014	0.014	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-7	0.013	0.013	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-8	0.026	0.026	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-9	0.014	0.014	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-10	0.017	0.017	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-11	0.011	0.011	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-12	0.014	0.014	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-13	0.052	0.052	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-14	0.027	0.027	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-15	0.018	0.018	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-16	0.02	0.02	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-17	0.009	0.009	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-18	0.01	0.01	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-19	0.064	0.064	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-20	0.01	0.01	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A01-21	0.013	0.013	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A02-1	0.067	0.067	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A02-3	0.011	0.011	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A02-4	0.039	0.039	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A02-5	0.01	0.01	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A02-6	0.027	0.027	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A02-7	0.023	0.023	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A02-8	0.011	0.011	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A03-1	0.063	0.063	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A03-2	0.041	0.041	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A03-3	0.066	0.066	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A03-4	0.018	0.018	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A03-5	0.016	0.016	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A04-2	0.054	0.054	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A04-3	0.006	0.006	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A04-4	0.042	0.042	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A04-5	0.015	0.015	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A07-1	0.06	0.06	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A08-1	0.01	0.01	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A10-2	0.021	0.021	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A11-1	0.056	0.056	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A12-1	0.034	0.034	0	5	10	0	1% AEP, 5 min burst, Storm 1
Cat101892	0.593	0.593	0	8.5	10	0	1% AEP, 10 min burst, Storm 1
C Bypass	0.004	0.004	0	5	5	2	1% AEP, 5 min burst, Storm 1
Cat583675	0.013	0.012	0.001	5	7.5	2	1% AEP, 5 min burst, Storm 1
Cat583674	0.009	0.008	0.001	5	7.5	2	1% AEP, 5 min burst, Storm 1
Cat583670	0.008	0.007	0.001	5	7.5	2	1% AEP, 5 min burst, Storm 1
C A05-1	0.253	0.253	0	7.5	10	0	1% AEP, 10 min burst, Storm 8
C A06-1	0.089	0.089	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A09-1	0.093	0.093	0	5	10	0	1% AEP, 5 min burst, Storm 1

C A09-2	0.022	0.022	0	5	10	0	1% AEP, 5 min burst, Storm 1
C A09-3	0.005	0.005	0	5	10	0	1% AEP, 5 min burst, Storm 1

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
P A01-1	0.026	0.87	96.002	95.848	1% AEP, 5 min burst, Storm 1
P A01-2	0.038	1.29	95.848	95.263	1% AEP, 5 min burst, Storm 1
P A01-3	0.11	1.46	95.212	95.09	1% AEP, 5 min burst, Storm 1
P249763	0.121	1.27	94.963	94.944	1% AEP, 5 min burst, Storm 1
P A01-4	0.152	1.5	94.824	94.763	1% AEP, 10 min burst, Storm 5
P A01-5	0.162	1.47	94.666	94.591	1% AEP, 10 min burst, Storm 5
P A01-6	0.35	3.17	93.712	93.246	1% AEP, 5 min burst, Storm 1
P A01-7	0.375	3.4	93.105	92.095	1% AEP, 10 min burst, Storm 8
P A01-8	0.468	4.23	91.447	90.601	1% AEP, 5 min burst, Storm 1
P A01-9	0.495	4.48	90.253	89.354	1% AEP, 5 min burst, Storm 1
P A01-10	0.521	1.84	89.354	89.323	1% AEP, 10 min burst, Storm 1
P A01-11	0.53	1.87	89.05	88.955	1% AEP, 10 min burst, Storm 1
P A01-12	0.54	1.91	88.828	88.776	1% AEP, 10 min burst, Storm 1
P A01-13	0.679	2.52	88.023	87.872	1% AEP, 10 min burst, Storm 5
P A01-14	0.709	2	87.872	87.838	1% AEP, 10 min burst, Storm 5
P A01-15	0.727	1.75	87.8	87.764	1% AEP, 10 min burst, Storm 5
P A01-16	0.745	1.74	87.717	87.701	1% AEP, 10 min burst, Storm 5
P A01-17	0.753	1.72	87.664	87.649	1% AEP, 10 min burst, Storm 5
P A01-18	0.764	1.73	87.61	87.539	1% AEP, 10 min burst, Storm 5
P A01-19	0.818	1.94	87.371	87.324	1% AEP, 10 min burst, Storm 5
P A01-20	0.827	1.9	87.217	87.187	1% AEP, 10 min burst, Storm 5
P A01-21	1.471	5.75	87.08	86.421	1% AEP, 20 min burst, Storm 4
P A02-1	0.288	2.61	97.655	97.574	1% AEP, 45 min burst, Storm 5
P A02-2	0.288	2.61	97.367	97.291	1% AEP, 45 min burst, Storm 5
P A02-3	0.371	3.36	96.48	95.35	1% AEP, 10 min burst, Storm 10
P A02-4	0.42	3.8	94.719	94.299	1% AEP, 5 min burst, Storm 1
P A02-5	0.464	4.2	93.107	91.855	1% AEP, 5 min burst, Storm 1
P A02-6	0.58	5.9	90.655	88.592	1% AEP, 20 min burst, Storm 3
P A02-7	0.752	5.06	88.592	88.407	1% AEP, 10 min burst, Storm 3
P A02-8	0.772	2.89	88.268	87.187	1% AEP, 10 min burst, Storm 2
P A03-1	0.05	0.46	95.539	95.535	1% AEP, 5 min burst, Storm 1
P A03-2	0.104	0.94	95.307	95.287	1% AEP, 5 min burst, Storm 1
P A03-3	0.155	1.4	95.098	95.057	1% AEP, 5 min burst, Storm 1
P A03-4	0.17	1.54	94.932	94.82	1% AEP, 5 min burst, Storm 1
P A03-5	0.183	1.66	94.636	94.591	1% AEP, 5 min burst, Storm 1
P A04-1	0.016	0.15	89.172	89.172	1% AEP, 5 min burst, Storm 1
P A04-2	0.064	0.58	89.072	89.065	1% AEP, 10 min burst, Storm 5
P A04-3	0.069	0.62	89.048	89.037	1% AEP, 10 min burst, Storm 5
P A04-4	0.103	0.93	88.966	88.924	1% AEP, 10 min burst, Storm 5
P A04-5	0.121	1.1	88.817	88.776	1% AEP, 10 min burst, Storm 5
P A07-1	0.061	0.55	92.098	92.095	1% AEP, 5 min burst, Storm 1
P A08-1	0.034	0.31	93.248	93.246	1% AEP, 10 min burst, Storm 5
P A10-1	0.022	0.2	94.3	94.3	1% AEP, 10 min burst, Storm 5
P A10-2	0.044	0.4	94.299	94.299	1% AEP, 20 min burst, Storm 1
P A11-1	0.055	0.81	95.274	95.263	1% AEP, 5 min burst, Storm 1
P A12-1	0.033	0.3	94.946	94.944	1% AEP, 5 min burst, Storm 1
Pipe67168	0.015	0.17	89.6	89.6	1% AEP, 45 min burst, Storm 6
Pipe67168	0.02	0.22	89.6	89.601	1% AEP, 10 min burst, Storm 4
Pipe67168	0.027	0.3	89.601	89.624	1% AEP, 10 min burst, Storm 4
Pipe16451	0.101	0.91	89.425	89.36	1% AEP, 45 min burst, Storm 6
P A05-1	0.101	0.91	89.357	89.354	1% AEP, 45 min burst, Storm 6
P700876	0.094	0.8	92.22	92.202	1% AEP, 5 min burst, Storm 1
Pipe67166	0.024	2.75	91.702	89.624	1% AEP, 5 min burst, Storm 1

Pipe39145	0.074	0.6	92.172	92.164	1% AEP, 5 min burst, Storm 1
P700990	0.094	1.9	90.97	90.91	1% AEP, 5 min burst, Storm 1
Pipe67166	0.014	1.62	90.728	89.624	1% AEP, 5 min burst, Storm 1
Pipe50638	0.08	1.3	90.904	90.554	1% AEP, 5 min burst, Storm 1
P A09-1	0.079	1.28	90.485	90.281	1% AEP, 5 min burst, Storm 1
P A09-2	0.112	1.96	90.254	89.082	1% AEP, 5 min burst, Storm 1
P A09-3	0.104	1.83	89.082	88.592	1% AEP, 5 min burst, Storm 1
P A06-1	0.088	0.8	92.105	92.095	1% AEP, 5 min burst, Storm 1

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
F A01-1x	0	0.056	0.851	0.07	0.1	1.48	1.44	1% AEP, 5 min burst, Storm 1
F A01-2x	0	0.018	0.865	0.049	0.06	0.77	1.2	1% AEP, 5 min burst, Storm 1
F A01-3x	0	0.015	0.839	0.045	0.05	0.63	1.21	1% AEP, 5 min burst, Storm 1
OF236497	0	0	0.839	0	0	0	0	
F A01-4x	0	0.011	0.863	0.041	0.05	0.5	1.1	1% AEP, 5 min burst, Storm 1
F A01-5x	0	0.014	0.786	0.044	0.06	0.58	1.27	1% AEP, 5 min burst, Storm 1
F A01-6	0	0.013	0.778	0.042	0.05	0.54	1.29	1% AEP, 5 min burst, Storm 1
F A01-7	0	0.026	0.655	0.05	0.08	0.78	1.69	1% AEP, 5 min burst, Storm 1
F A01-8	0.046	0.057	0.604	0.063	0.12	1.24	1.96	1% AEP, 10 min burst, Storm 8
F A01-9	0	0.017	0.705	0.045	0.07	0.62	1.49	1% AEP, 5 min burst, Storm 1
F A01-10	0	0.011	0.895	0.042	0.04	0.52	1.05	1% AEP, 5 min burst, Storm 1
F A01-11	0	0.014	1.11	0.052	0.04	0.86	0.81	1% AEP, 5 min burst, Storm 1
F A01-12	0	0.027	1.463	0.029	0.01	4	0.49	1% AEP, 5 min burst, Storm 1
F A01-13	0.009	0.034	1.464	0.081	0.05	1.84	0.6	1% AEP, 10 min burst, Storm 8
F A01-14	0	0.018	1.287	0.061	0.04	1.18	0.69	1% AEP, 5 min burst, Storm 1
F A01-15	0	0.02	1.338	0.065	0.04	1.31	0.64	1% AEP, 5 min burst, Storm 1
F A01-16	0	0.009	1.369	0.051	0.03	0.82	0.56	1% AEP, 5 min burst, Storm 1
F A01-17	0	0.01	1.291	0.051	0.03	0.82	0.61	1% AEP, 5 min burst, Storm 1
F A01-18	0	0.01	1.201	0.049	0.03	0.77	0.71	1% AEP, 5 min burst, Storm 1
F A01-19	0.002	0.011	1.081	0.047	0.04	0.71	0.83	1% AEP, 5 min burst, Storm 1
F A01-20	0	0	0.79	0	0	0	0	
F A01-21	0	0	0.79	0	0	0	0	
F A02-1x	0.575	0.586	0.56	0.051	0.07	11.8	1.45	1% AEP, 10 min burst, Storm 10
F A02-2x	0	0.011	0.901	0.044	0.04	0.58	1.03	1% AEP, 5 min burst, Storm 1
F A02-3x	0.402	0.432	0.731	0.127	0.31	3.38	2.45	1% AEP, 10 min burst, Storm 7
F A02-4x	0.433	0.439	0.603	0.121	0.34	3.17	2.81	1% AEP, 10 min burst, Storm 8
F A02-5x	0.414	0.426	0.594	0.119	0.34	3.11	2.82	1% AEP, 10 min burst, Storm 8
F A01-19x	0.302	0.307	0.588	0.108	0.28	2.72	2.63	1% AEP, 10 min burst, Storm 7
F A01-20x	0.138	0.139	0.642	0.086	0.18	1.99	2.13	1% AEP, 10 min burst, Storm 7
F A01-21x	0.042	0.042	1.201	0.077	0.07	1.71	0.85	1% AEP, 10 min burst, Storm 7
F A03-1	0.013	0.051	0.948	0.114	0.04	2.94	0.37	1% AEP, 5 min burst, Storm 1
OF169744	0.013	0.028	1.43	0.026	0.02	4	0.64	1% AEP, 10 min burst, Storm 5
F A03-3	0.014	0.051	1.084	0.11	0.05	2.81	0.41	1% AEP, 5 min burst, Storm 1
F A03-4x	0	0.016	0.825	0.046	0.06	0.67	1.26	1% AEP, 5 min burst, Storm 1
F A03-5	0.027	0.034	0.772	0.058	0.09	1.05	1.51	1% AEP, 10 min burst, Storm 5
F A04-1x	0	0.054	0.763	0.067	0.11	1.35	1.63	1% AEP, 5 min burst, Storm 1
F A04-2	0	0.006	0.939	0.036	0.03	0.41	0.81	1% AEP, 5 min burst, Storm 1
F A04-3	0	0.042	1.251	0.08	0.06	1.8	0.78	1% AEP, 5 min burst, Storm 1
F A04-4	0.005	0.019	1.453	0.026	0.01	4	0.43	1% AEP, 10 min burst, Storm 8
F A04-5	0	0.052	1.464	0.093	0.06	2.25	0.64	1% AEP, 5 min burst, Storm 1
F A07-1x	0.015	0.015	0.597	0.041	0.06	0.48	1.58	1% AEP, 5 min burst, Storm 1
F A08-1	0	0.06	0.662	0.066	0.12	1.33	1.86	1% AEP, 5 min burst, Storm 1
F A10-1	0	0	0.594	0	0	0	0	
F A010-2	0	0.022	0.593	0.046	0.08	0.65	1.77	1% AEP, 5 min burst, Storm 1
F A11-1	0	0.034	0.847	0.06	0.08	1.14	1.34	1% AEP, 5 min burst, Storm 1

F A012-1	0	0.063	1.163	0.087	0.08	2.04	0.93	1% AEP, 5 min burst, Storm 1
OF130487	0.593	0.642	1.201	0.189	0.27	5.34	1.42	1% AEP, 10 min burst, Storm 1
F Bypass	0.004	0.004	0.407	0.008	0	4.76	0.24	1% AEP, 5 min burst, Storm 1
OF667343	0.007	0.007	1.479	0.022	0.01	4	0.25	1% AEP, 45 min burst, Storm 2
OF667319	0	0	0.015	0	0	0	0	
OF667323	0	0	0.015	0	0	0	0	
OF437332	0	0	1.479	0	0	0	0	
OF154692	0	0	1.463	0	0	0	0	
OF695921	0	0	1.51	0	0	0	0	
OF695922	0	0	1.51	0	0	0	0	
F A09-1	0	0	0.703	0	0	0	0	
F A09-2	0	0.005	0.591	0.026	0.03	0.3	1.16	1% AEP, 5 min burst, Storm 1
F A09-3	0	0.064	0.814	0.072	0.11	1.54	1.56	1% AEP, 5 min burst, Storm 1
F A03-4	0	0	1.51	0	0	0	0	

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD B	89.62	185.4	0.101	0.101	0

Run Log for Doran Drive Showground DRAINs Model run at 12:18:52 on 2/6/2022 using version 2022.012
Upwelling occurred at: Pit649050, A03-5, A02-6, A02-5, A02-4, A02-3, A02-1, A01-8
Freeboard was less than 0.15m at Pit649049, Pit649048, A07-1, A06-1, A03-2, A03-1, A02-2, A01-9
The maximum flow in these overflow routes is unsafe: F A02-1x

Appendix D

Drawings