200 Aldington Road Industrial Estate, Kemps Creek, Lot 200 DP1285691

Stormwater Management Report

SSDA 10479 MOD 6

SSD-85510213 LOT E

CLIENT / STOCKLAND FIFE KEMPS CREEK PTY LTD

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Commercial in Confidence

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Abbreviations

AEP	Annual Exceedance Probability
BAPS	Bochasanwasi Akshar Purushottam Sanstha ('BAPS') temple (adjoining site)
CEMP	Construction Environmental Management Plan
CPESC	Certified Professional in Erosion and Sediment Control
DCP	Mamre Road Precinct Development Control Plan 2021
ESCP	Erosion and Sediment Control Plan
GPT	Gross Pollutant Trap
MOD 6	SSD-10479 Modification 6
MRP	Mamre Road Precinct
OSD	On Site Detention
PCC	Penrith City Council
SSD	State Significant Development
SSDA	State Significant Development Application
WSUD	Water Sensitive Urban Design

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1. Introduction

This report has been prepared on behalf of Stockland Fife Kemps Creek (SFKC) to support:

- Modification 6 of SSD-10479 for development of Lot E on the development known as 200 Aldington Road Industrial Estate located in, Kemps Creek; and
- The additional SSD application for Lot E development SSD-85510213 LOT E.

The Estate is located to the east of Aldington Road and is legally described as Lot 200 DP 1285691, a consolidation of the former 7 lots, with an area of approximately 72.11 hectares (ha) within the Penrith City Council Local Government Area (LGA).

This is a stand-alone report that is based on the Stormwater Management Report prepared in June 2023 to address conditions 27, 29 and 31 of the SSD-10479 and updates the management methods to account for the additional stage of development now proposed.

1.1. Description of Proposed Modification 6

A sixth modification (Modification 6) to SSD10479 Concept Approval has been prepared for lodgement with the Department of Planning, Housing and Infrastructure (DPHI) relating primarily to a revised layout for Lot E, the building approval is under SSD-85510213. As part of the staged development of the Kemps Creek Industrial Estate, SFKC is seeking to construct a warehouse and distribution centre on Lot E. The development is a bespoke warehouse and distribution which represents a contemporary and innovative response to the site operational needs and the logistical requirements for a major national business. The development is comprised of one main warehouse and distribution building with a main dock face on the east side with two recessed docks, ancillary offices, carparking, hardstand vehicle parking, surrounded by perimeter landscaping and visual treatments to achieve pleasant micro-climates and desirable streetscapes.

The proposed changes under Modification 6 as amended can be summarised as:

1. To amend the proposed Subdivision Plan for Lot 200 in DP 1285691 and Concept Master plan to:
    a. Adjust the boundary between Lot E and Lot B by moving the boundary 8m north increasing the area of Lot E and reducing the area of Lot B.
    b. Changes to the site ingress and egress for Lot E; and
    c. Changes to the building footprint and general arrangement for Lot E.

1.2. Description of SSD-85510213 - Lot E

The works proposed on Lot E of the 200 Aldington Road Estate development are part of a separate SSD application SSD-85510213 and include:

- Stormwater works on Lot E
- Construction of a warehouse and distribution centre on Lot E;

Stormwater Management Measures for Lot E

- The construction phase stormwater targets for Lot E will be achieved through implementation of the Erosion and Sediment Control (ESC) measures within the ESC Plan for Lot E and will be within the boundaries of Lot E. A separate ESCP report and drawings will be prepared for Lot E on lot development building phase prior to construction commencement. The ESCP for Lot E will be part of the CEMP for Lot E.

- The operational phase stormwater management targets, prior to the operation of the MRP Stormwater Scheme, will be meet for Lot E through the construction of the MRP stormwater scheme Ponds and basins 28 and 29 within the estate. Sydney Water is preparing a letter identifying the Scheme Service Area (SSA) the construction of these ponds will provide. These ponds will provide for development of Lot E.
- The existing proposed stage 1 (estate civil infrastructure and Lot F), Lot J & Lot K continue to achieve the operational stormwater provisions of the DCP through the identified interim stormwater measures, and are not reliant on the regional infrastructure.
- Design of these regional infrastructure basins 28 and 29 are subject to a separate approval process.

1.3. Stormwater Management Strategy

This report in conjunction with the SSA letter from Sydney Water (for Lot E development) demonstrates the stormwater management strategies proposed for this development are in accordance with the Mamre Road Precinct Development Control Plan and demonstrates the operational phase stormwater quality and flow targets are achieved for the development site. This report has been prepared in accordance with the Technical Guidance for Achieving Wianamatta-South Creek stormwater management targets.

There is no change to the proposed interim stormwater infrastructure, for the existing development, stage 1 including site infrastructure and Lot F, Lot J and Lot K as submitted with MOD 5. There is no need to modify the previously proposed measures (in MOD 5) for proposed infrastructure/pond layouts.

The proposed **interim** operational stormwater management infrastructure is located on undeveloped Lots L, M and D with irrigation on residual land and includes:

- sediment pond (within Basin A);
- storage pond on Lot M;
- usage of Basin B pond 1 (as sediment pond) & Basin B pond 2(as storage pond);
- irrigation of 9.72 ha undeveloped/residual land or reuse of treated water to meet recycled water demand from within the estate.

The changes to stormwater arising from Modification 6 can be summarised as follows:

It is proposed that Lot E will be operational after the Regional Infrastructure (basins 28 and 29) proposed for Lot D within the Estate are operational, and the DCP operational stormwater controls will be achieved through the operation of these basins by Sydney Water. An SSA letter from Sydney Water is provided to this effect in Appendix F.

2. Site Description

The development, known as 200 Aldington Road Industrial Estate includes a single consolidated lot, Lot 200 DP1285691 formerly 7 lots, with an area of approximately 72 hectares (ha) in Aldington Road, Kemps Creek. The site, highlighted red in Figure 1, falls within the extent of the *State Environmental Planning Policy (Industry and Employment) 2021* ("I&E SEPP") which includes the Mamre Road Precinct.

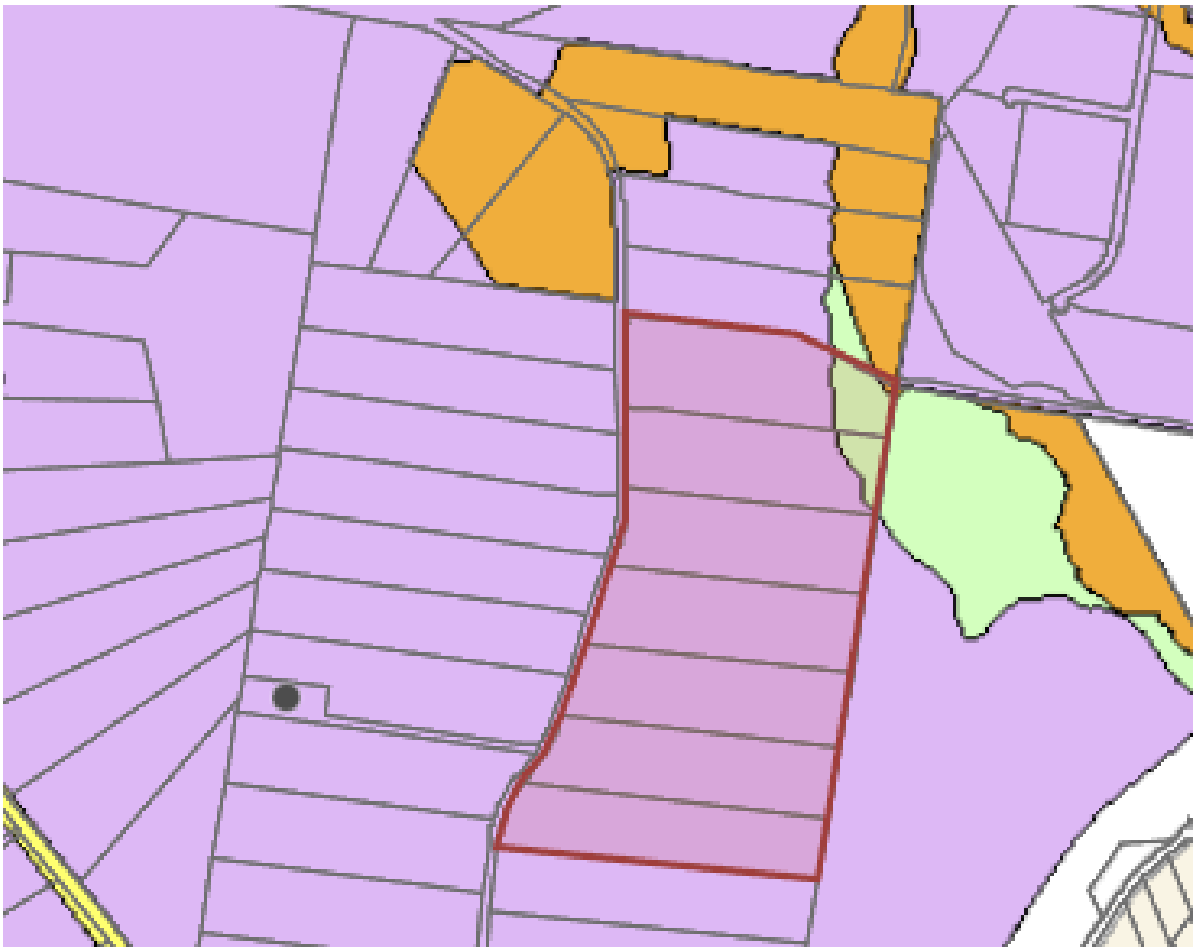


Figure 1 – Site Location

The site is bordered by Aldington Road to the west and existing rural lots to the north, east and south, some of which are subject to Development Applications. Refer to Figure 2 below for aerial image.

Figure 2 – Site Location (aerial image)

2.1. Existing Waterways and Vegetation

The site has been rezoned as IN1 land and comprises various land uses. Including RE2 and C2, with the north-eastern portion designated as non-developable. A 1st order watercourse, categorized as a tributary of Ropes Creek within the South Creek catchment, is located in the north-eastern corner. This watercourse flows in a roughly northerly direction.

2.1.1. Environmental Assessment (Narla) and Bio certification Letter (Ecological Aus)

conducted an environmental assessment that evaluates the potential environmental impacts of the proposed development and provides recommendations for mitigation and management strategies. The details of the assessment can be found in the EIS.

Ecological Aus provided details on bio certification that identified the site is certified urban capable under the Cumberland Plain Conservation Plan (CPCP). This certification concludes that development can proceed without further State or Commonwealth biodiversity approvals.

2.1.2. Farms Dams and Aquatic Habitat

Following the issue of SSDA in May 2023 the farm dams identified as 1-8 in the Riparian Assessment (Ecological, 2022) have been dewatered in accordance with the Dewatering Management Plan in the Construction Environmental Management Plan (CEMP).

2.1.3. DPI Mapping and Watercourses

The Department of Primary Industries (DPI) mapping identified two unnamed watercourses within the study area. The first watercourse, categorized as a 1st order tributary of Kemps Creek, is situated in the southern section of the site. However, no distinctive features of a waterway, such as defined bed and banks or geomorphic characteristics, were observed along the entire length of this mapped watercourse within the site. The second watercourse, also a

1st order tributary, is located in the north-eastern corner of the site. This watercourse originates upstream of the development area and flows in a roughly northerly direction.

Modification 2 as amended does not include construction of basins identified in the MRP scheme in Lot D, however the design allows for construction of these basins as part of future development, subject to a future modification application/approval.

Figure 3 Waterways – Stream order (Extract from Riparian Report, Eco Logical)

2.2. Geology and Soils

The geological composition of the area consists off Triassic age Bringelly Shale from the Wianamatta Group. The formation comprises shale, carbonaceous claystone, laminate, fine to medium grained lithic sandstone and some

minor coal bands. In the north-eastern corner of the project, there are Quaternary age fluvial sediments primarily consisting of fine-grained sands, silts and clays.

The majority of the site's soils are classified as non-saline to slightly saline, with only ten samples identified as moderately saline and one as very saline, as reported by ADE. Furthermore, the soils pose no significant aggression to concrete and steel. Management controls including preparation of a Salinity Management Plan have been adopted to mitigate potential impacts of the development.

2.3. Groundwater

Groundwater was observed during investigations by Douglas Partners (2019a) in Pit 4 and Pit 11 at depths of 2.5 m (RL59.1 AHD) and 3 m (RL61 AHD), respectively. Both pits are located in the north-eastern portion of the site, adjacent to the tributary to Ropes Creek (as shown in Figure 4). It is noted that the pits and boreholes were immediately backfilled following excavation, which precluded longer term monitoring of groundwater levels. Groundwater levels are affected by factors such as soil permeability and weather conditions and can therefore vary with time.

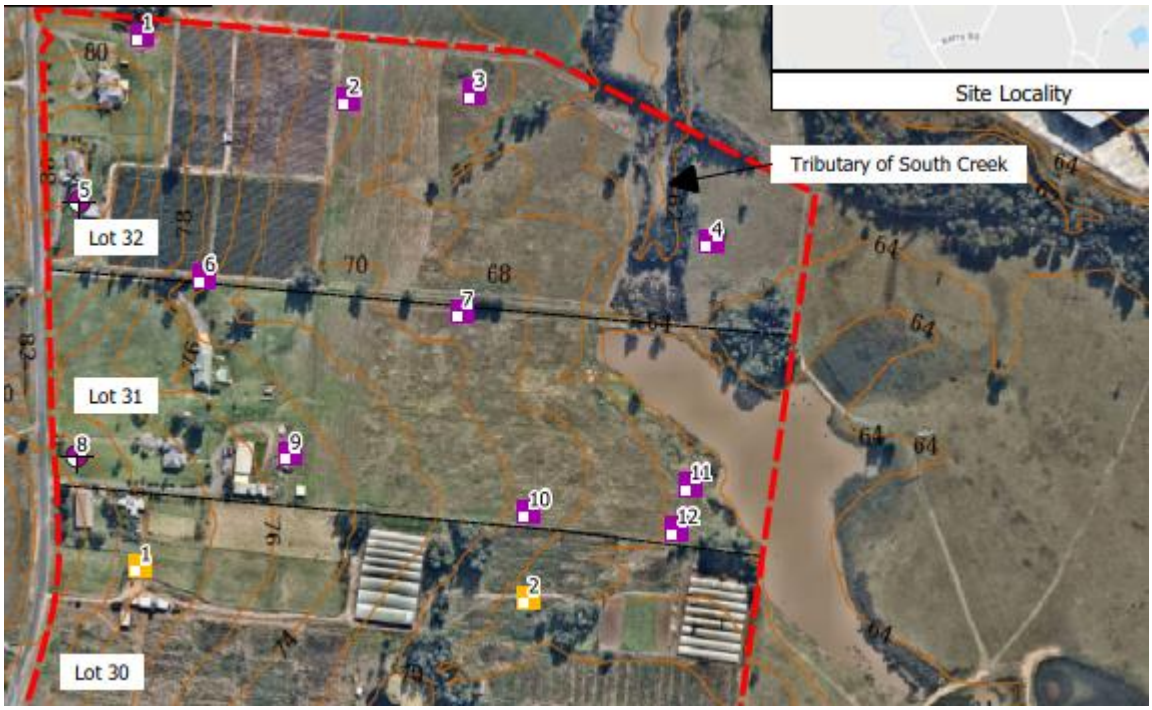


Figure 4 Test Pit locations (Extract from Geotechnical and Groundwater Summary Report, DP, 2019)

2.4. Predevelopment Catchment Delineation

Catchment delineation of the Site under pre-development conditions is presented in Figure 5**.**

Figure 5: Catchment delineation under pre-development conditions

Pre development the site consisted of four catchments and an external catchment west of Aldington Road that runs on to the site. Catchment 1 discharges to the south, Catchment 3 discharges to the west, Catchment 2, 4 and 5 discharge to the northeast. A summary of the internal catchments under pre-development conditions is presented in Table 1.

Table 1: Internal and external catchments under pre-development conditions

Catchment ID	Area (ha)	Description / Discharge Location
EXISTING CAT 1	19.675	Rural residential lots discharge to the neighbouring property in the south.
EXISTING CAT 2	43.162	Rural residential lots discharge to Ropes Creek by way of an unnamed tributary.
EXISTING CAT 3	5.614	Rural residential lots discharge to the west under Aldington Road.
EXISTING CAT 4	3.663	The riparian corridor in the north-eastern portion of the site no development is proposed in this area.
EXISTING CAT 5	3.669	An external catchment flows along the TransGrid easement to the south of the future northern road (within private property).
Total	72.113	Total Area excludes external catchment CAT 5

2.5. Indicative Trunk Drainage Paths

There is no change in MOD 5 to the proposed trunk drainage path within the estate, located in Lot G, as shown in Figure 6.

The MRP Integrated Stormwater Scheme Plan proposes trunk drainage paths to the north and east of Lot D. The construction of these channels in accordance with the Sydney Water scheme guidelines is dependent on adjacent landowners to the north and east of the site as these channels cross boundaries with adjacent landowners. It is anticipated these issues will be resolved with stakeholders to enable construction of the scheme plan infrastructure within the site however this would be subject to a separate planning application/approval process.

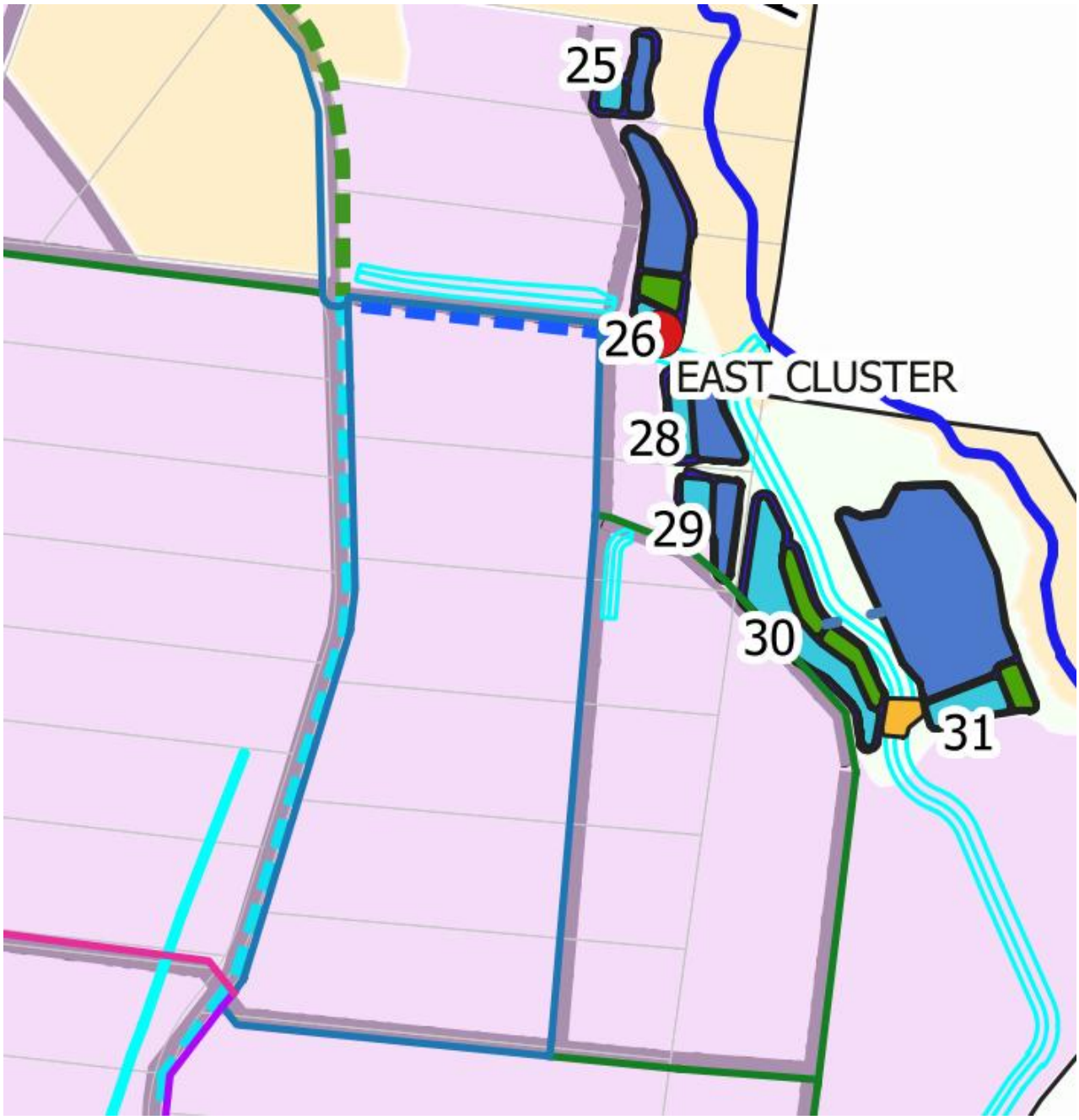


Figure 6: Mamre Road Precinct Integrated Stormwater Scheme Plan (Extract SWC May 2025)

3. Proposed Development

The proposed development comprises a warehouse and logistics estate at Lot 200 DP 1285691, Kemps Creek.

Consent has been granted under SSD-10479 for the Concept and Stage 1 (Lot F) development, and under SSD-61212208 for the Lot J development. Development on Lot K has been lodged as MOD 5, and SSD-80264236. This MOD6 application seeks to modify the existing consent, to be as shown in Figure 7 for Concept. This Concept development is subject to future development approvals for each of the buildings, not yet approved. This report includes the proposed addition of Lot E, which is subject to a separate SSDA application SSD-85510213 which is considered within this report to evaluate the cumulative impact of the development of Stage 1 civil infrastructure and development of Lot F, Lot J, Lot K and Lot E.

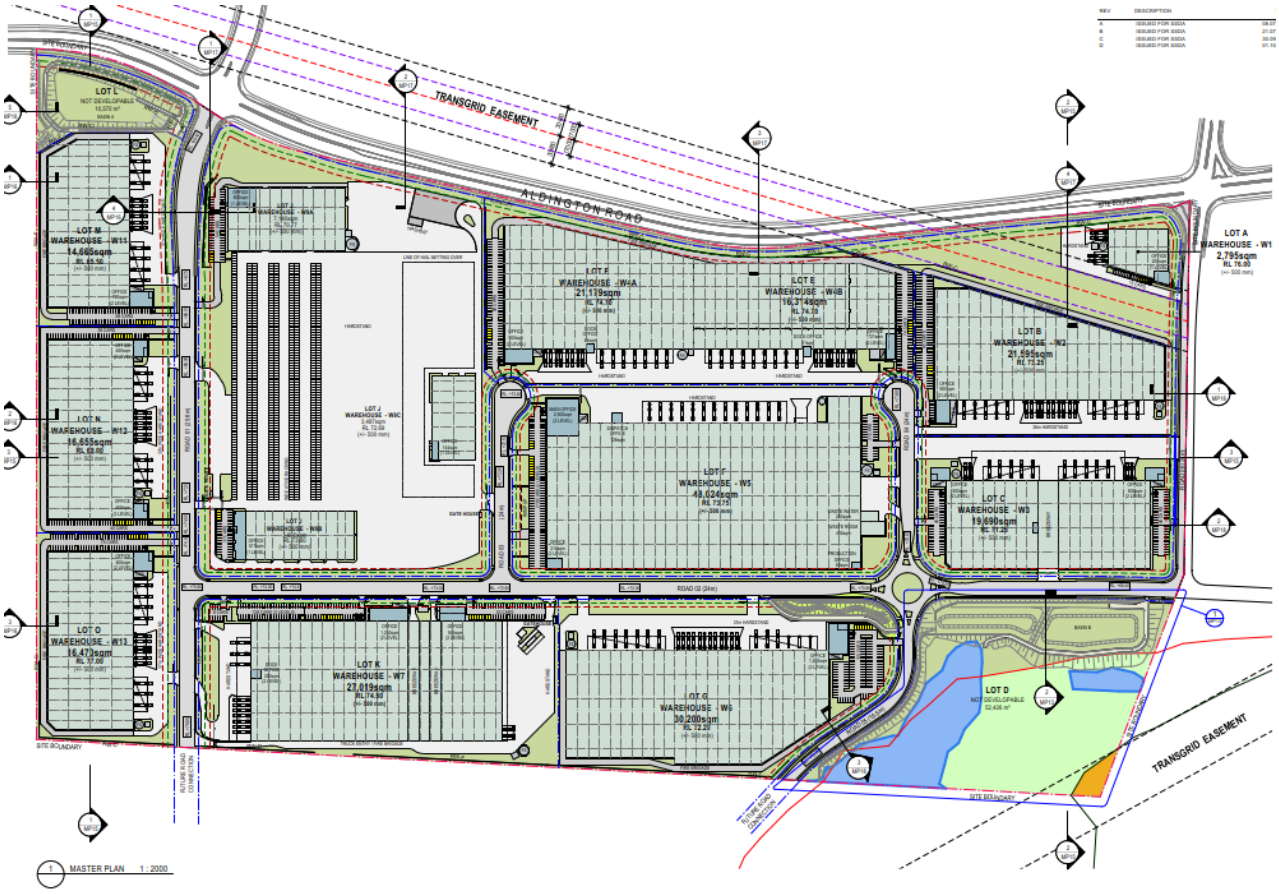


Figure 7: 200 Aldington Road Industrial Estate Concept Master Plan (MOD 6)

3.1. Proposed Development

The proposed existing development stages of Estate civil, Lot F, J and K are included in Table 2.

Table 2: Proposed development (as previously approved/lodged for approval)

Element	Description
Stage 1 Estate Works	**Site Preparation & Earthworks** ■ Construction of sediment basins. ■ Bulk earthworks, including cut and fill, road grading and boxing, benching and stabilisation (batters and/or retaining walls). **Road Infrastructure** ■ Staged construction of internal estate road network and connection to Aldington Road for primary site access. **Stormwater Infrastructure** ■ Staged construction of stormwater drainage, stormwater quality improvement and runoff volume reduction infrastructure. ■ Construction of two on-site stormwater detention (OSD) basins. One at the northern end of the estate and the other at the southern end of the estate. ■ Installation of runoff volume reducing measures including irrigation. ■ Sediment pond within Basin A (interim stormwater measure) ■ Storage/harvesting pond on Lot M (interim stormwater measure) ■ Storage pond within Basin B (interim stormwater measure) ■ Irrigation on undeveloped lots **Utilities and Services** ■ Construction of utility service infrastructure to provide water, sewer, electricity, and telecommunications services within the site.
Stage 1 – Development (Lot F)	**On Lot Works via MOD 4** ■ On-lot earthworks to establish site grading and final building pad for Warehouse. ■ On-lot stormwater, utility infrastructure and services connection. ■ Site-specific landscaping, signage, and public domain works such as footpaths, street trees and internal site landscaping. ■ Construction of Lot F (7.84 ha) comprising 5.62ha of roof area consisting of a warehouse and offices, 1.34ha of hardstand and 0.88ha of landscape.
Lot J	**On Lot Works via MOD 2 and SSD 61212208** ■ On-lot earthworks to establish site grading and final building pad for Warehouses. ■ On-lot stormwater, utility infrastructure and services connection. ■ Site-specific landscaping, signage, and internal footpaths and landscaping. ■ Construction of Lot J (12.93ha) comprising 1.84 ha of roof area (W9A,B, C), including offices, gate houses and washbay, hardstand and carparking of 9.15ha.
Lot K	**On Lot Works Via MOD 5 and SSD 80264236** ■ On-lot earthworks to establish site grading and final building pad for Warehouse. ■ On-lot stormwater, utility infrastructure and services connection. ■ Site-specific landscaping, signage, and internal footpaths and landscaping. Construction of Lot K (6.21ha) comprising 3.37 ha of roof area including offices, gate house, and hardstand / carparking of 2.07ha

3.2. Development of Lot E (SSDA 85510213)

The proposed Lot E Development incorporates key components described in Table 3.

Table 3: Proposed Lot E Works

Element	Description
Development (Lot E)	**On Lot Works** ■ On-lot earthworks to establish site grading and final building pad for a Warehouse. ■ On-lot stormwater, utility infrastructure and services connection. ■ Site-specific landscaping, signage, and internal footpaths and landscaping. ■ Construction of Lot E (6.83ha) comprising 4.55 ha of roof area including offices and hardstand / carparking of 1.71ha.

A plan showing the extent of works under now proposed is presented in Figure 8. This stormwater management plan demonstrates compliance with the DCP for these works.

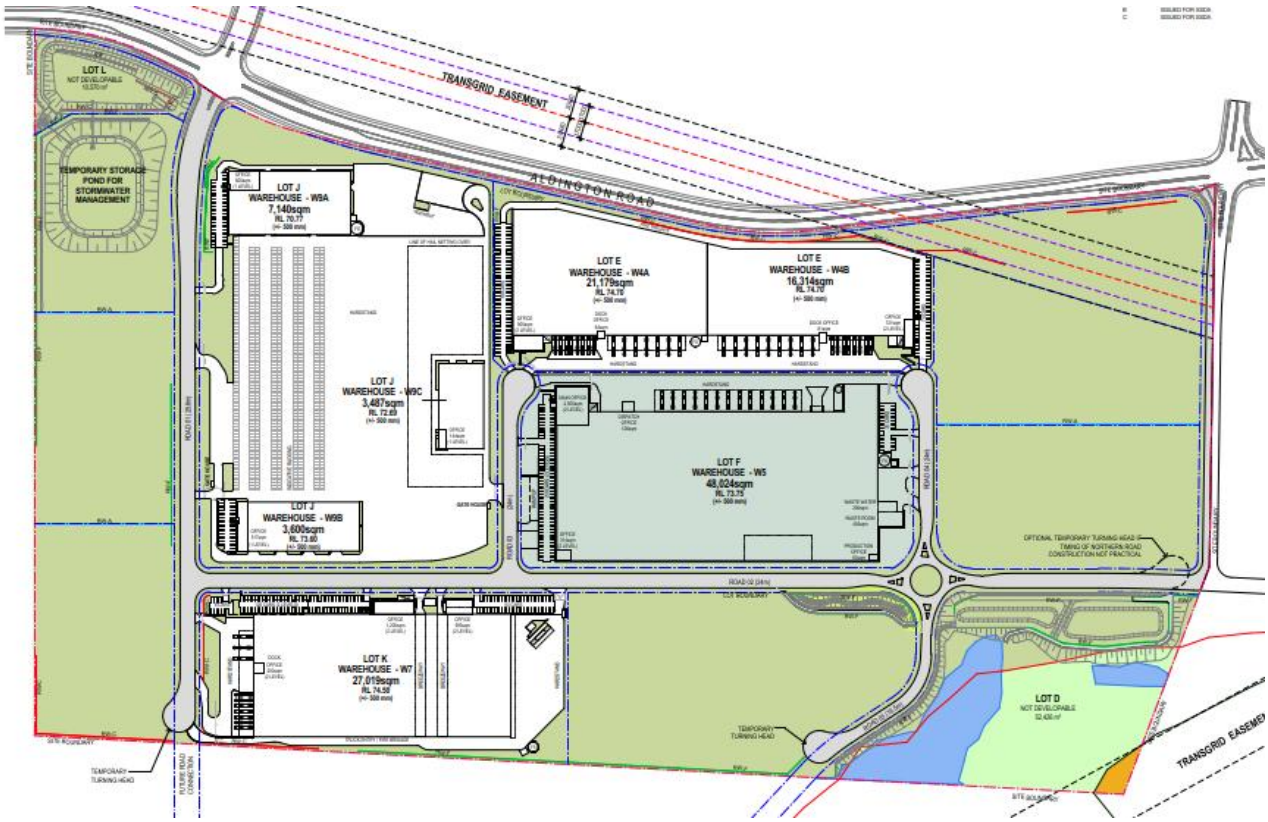


Figure 8: Proposed Lot F, J, K and E Development Plan

3.3. Post development Catchment Delineation

Catchment delineation of the site under post-development conditions is presented in Figure 9.

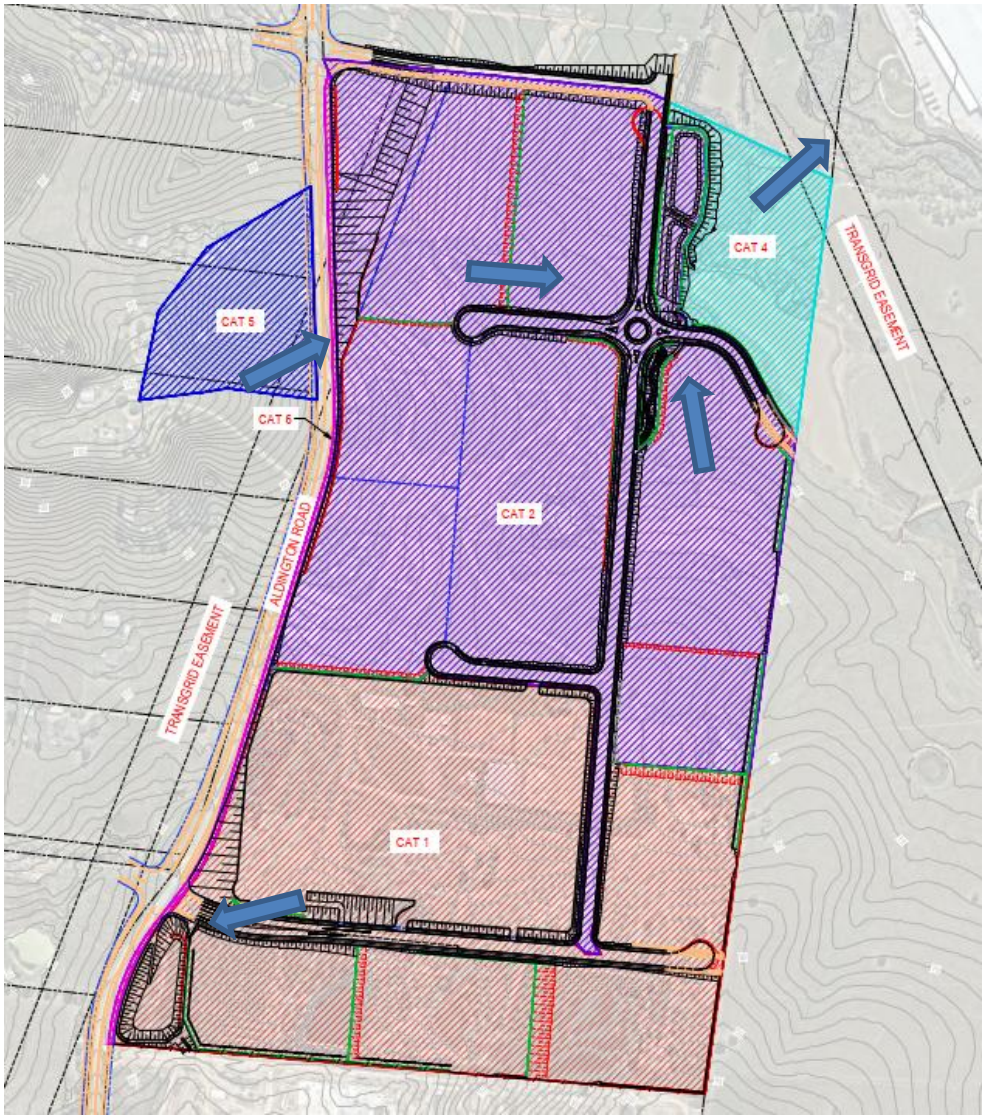


Figure 9: Catchment delineation under post-development conditions

The development site is split into three catchments and an external catchment that runs on to the site. Catchment 1 discharges to the south, Catchment 6 discharges to Aldington Road (land to be dedicated to PCC as road, as part of the Aldington Road Upgrade works), Catchment 2, 4 and 5 discharge to the northeast. A summary of the internal catchments under pre-development conditions is presented in Table 4.

Table 4: Internal and external catchments under post-development conditions

Catchment ID	Area (ha)	Description / Discharge Location	Catchment (northern/ southern)
CAT 1	28.26	Road 01 and Lots J - O conveyed to Basin A which outlets to a culvert and channel on the southern property.	Southern
CAT 2	39.02	Roads 02 – Road 05, 50% of Future Northern Road, trunk drainage and Lots A – Within this catchment there is a split between discharge via the trunk drainage channel (and in future wetland 30) and discharge to Basin B which outlets to wetland 28 and 29 and future trunk drainage channel.	Northern
CAT 3	-	Formerly catchment 3 in predevelopment. No longer considered an independent catchment.	Northern
CAT 4	4.19	The riparian corridor in the north-eastern portion of the site. This is the site of proposed wetlands and ponds to be designed and constructed in general accordance with the Sydney Water MRP SWS.	Northern
CAT 5	3.67	An external catchment flows north via the proposed drainage network on Aldington Road then east via the trunk drainage channel in Lot 90 (to the north), and then discharges into the proposed trunk drainage channel east of the Road 02. This future natural trunk drainage channel is proposed to be constructed in conjunction with wetland /pond 28 and 29 (subject to approval).	Northern
CAT 6	0.65	Land to be dedicated to PCC for the widening of Aldington Road (excl those included in CAT 2 and CAT 3 areas)	Northern
Total	72.13	Total Area excludes external catchment CAT 5	

Internal catchments within the Site will be directed via a network of proposed stormwater drainage infrastructure towards estate-based stormwater management measures, consisting of:

- The sediment basins and ponds will treat runoff prior to reuse (irrigation) and / or discharge from the Site.
- Two On site detention basins (OSD) (Basin A and Basin B) are designed to attenuate peak flows as required by the Mamre Road Precinct DCP. These basins are designed for the Concept Development, allowing for development of all developable lots. Further details of the proposed basins are outlined in Section 5.2.5.

The estate northern catchments contributing to each the Sydney Water proposed wetlands is depicted in Figure 10, an extract from SKC194 (Appendix B), this catchment layout is as per the scheme MUSIC model supplied by Sydney Water 1 May 2025. MOD 6 identifies the catchment areas resulting from the on lot design – to be consistent with the current Sydney Water Basin catchment layout.

This is consistent with the most current SSD10479 MOD 4 Condition of Consent D27 (c) which specifies the stormwater management system design must :

(c) be consistent with the latest Sydney Water Scheme Plan and Basin design, unless otherwise agreed with the Regional Stormwater Authority;

The distribution of flow to wetlands 28 and 29 is made by control structures located within Basin B.

The southern catchments contribute future to regional infrastructure basin 13 located west of Mamre Road as shown in Figure 11.

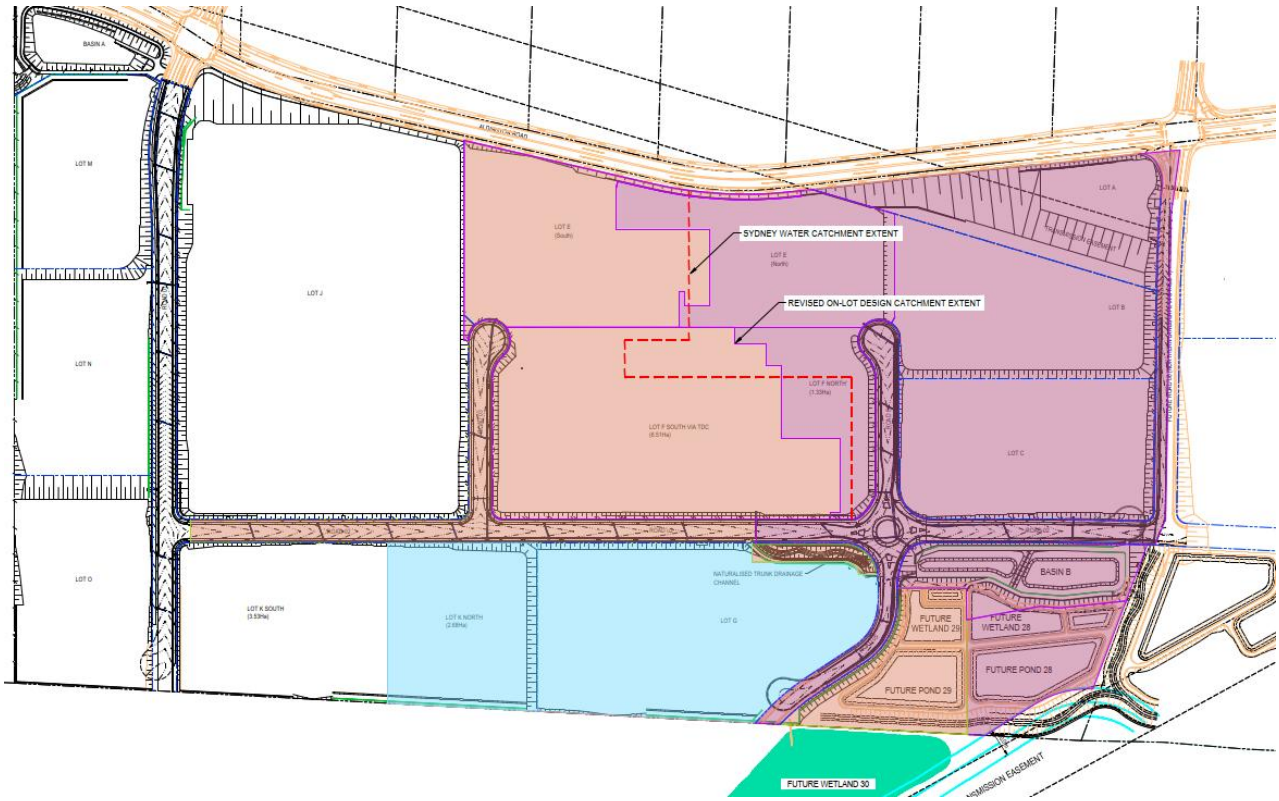


Figure 10: Post Development Northern Catchment to MRP Scheme Basins 28, 29 and 30 (extract of SKC194)

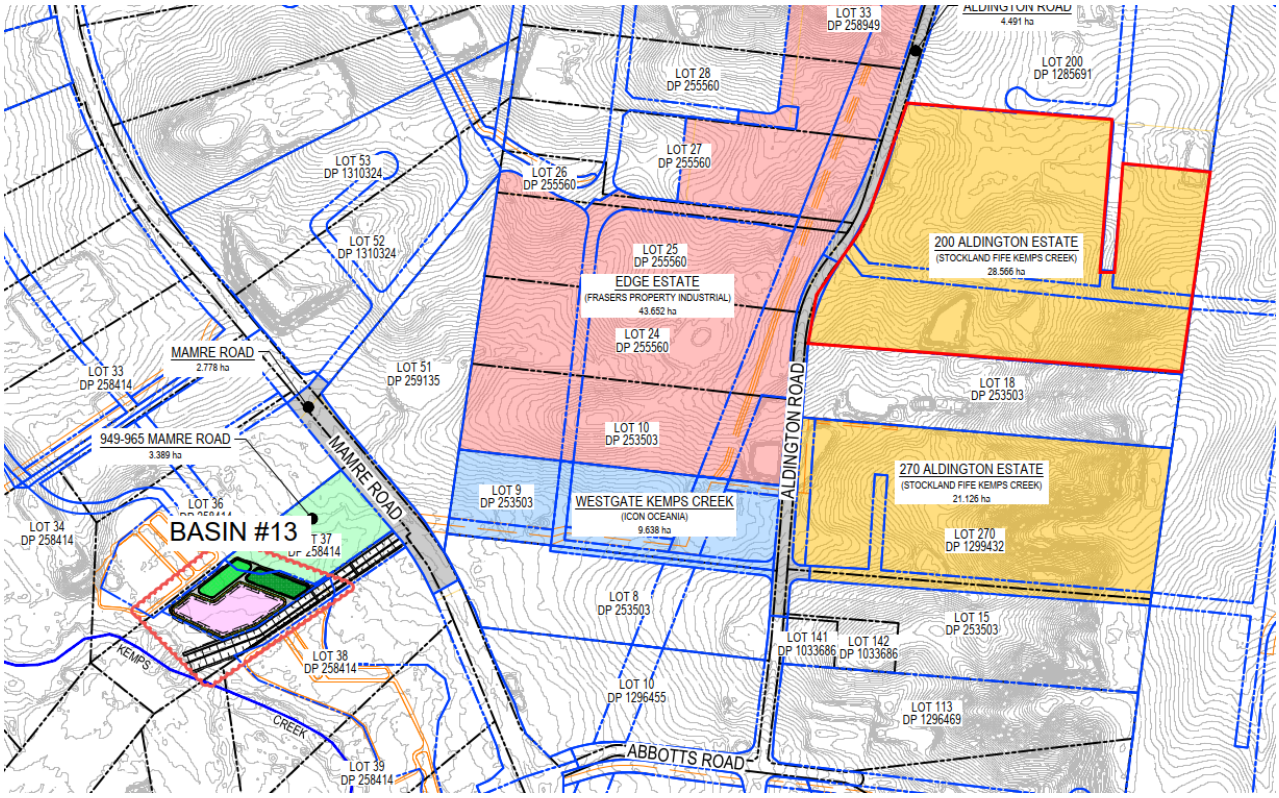


Figure 11: Post Development Southern Catchment to MRP Scheme Basin 13

Table 5: Summary of Lots, Regional Infrastructure catchments and cumulative development areas (ha)

Stage	Lot #	Lot Area (ha)	Cumulative Developed Lot area (ha)	Interim SW scheme	Catchment (North/ South)	Regional Infrastructure catchment/basin
1	F	7.84	7.84	Y	N	28 and 29
2	J	12.93	20.77	Y	S	13
3	K	6.21	26.98	Y	S/N	30
Current	**E**	**6.83**	**33.81**	**N[1]**	**N**	**28 and 29**

Grey text – identifies regional infrastructure has not been developed at time of operation of identified lot and interim stormwater measures apply.
[1] interim scheme continues to satisfy stages 1-3 previously submitted/approved, when Lot E becomes operational, however Lot E is not reliant on interim stormwater measures.

3.4. Water Sources and Demands

There are no changes to water sources proposed in MOD 6, the lot will be connected to the PW and RW network reticulation network within the estate.

3.5. Connection to Sydney Water Future Stormwater Infrastructure

3.5.1. Treatable flows to future wetlands

The ultimate stormwater management solution for the site is to connect to the Sydney Water MRP SSP.

MOD 6 proposes no changes to the alignment or pipe connections associated with the trunk drainage in Lot G and retains the invert level of the connections to Basins 28, 29 and 30. The location of the future discharge to Basin 28 and 29 aligned to tie into the concept design prepared for the future basins (not included in this modification).

Sydney Water requested the catchments contributing to each of the wetlands/basins in Ropes creek (Figure 12 and SKC194) be amended based on the revised MRP scheme plan and MUSIC model, Table 6 reflects the current information from the Scheme MUSIC model provided by Sydney Water on 1/05/2025.

Table 6: Catchment contribution to MRP Scheme Wetland/basins (Ropes Creek) – May 2025

Wetland /basin ref #	Total Catchment Area to Wetland	Local Catchment Area to Wetland	Local – Total Catchment Ratio	EDD level (mAHD)	Treatable flow rate [2] (m^3/s)	Proportional reduction in treatable flow rate (m^3/s)	Location of discharge
28	20.31	20.28[3]	1.0	63.48	2.843	2.843	Basin B
29	14.16	14.19[3]	1.0	64.21	3.864	3.864	Basin B
30	63.94	8.20	0.13	65.16	3.320	0.432	Low flow pipe from trunk drainage channel

1. MRP Scheme MUSIC model (1/5/25) identifies the catchment area for wetlands 28 + 29 both via controlled discharges from Basin B.
2. Treatable flow rate for the full contributing catchments (based on MRP Scheme MUSIC model provided by SWC on 1/5/25).
3. Local catchment includes wetland/pond direct catchment

Red text is change from MOD 5 to MOD 6 - minor change resulting from Lot E building layout proposed in MOD 6.

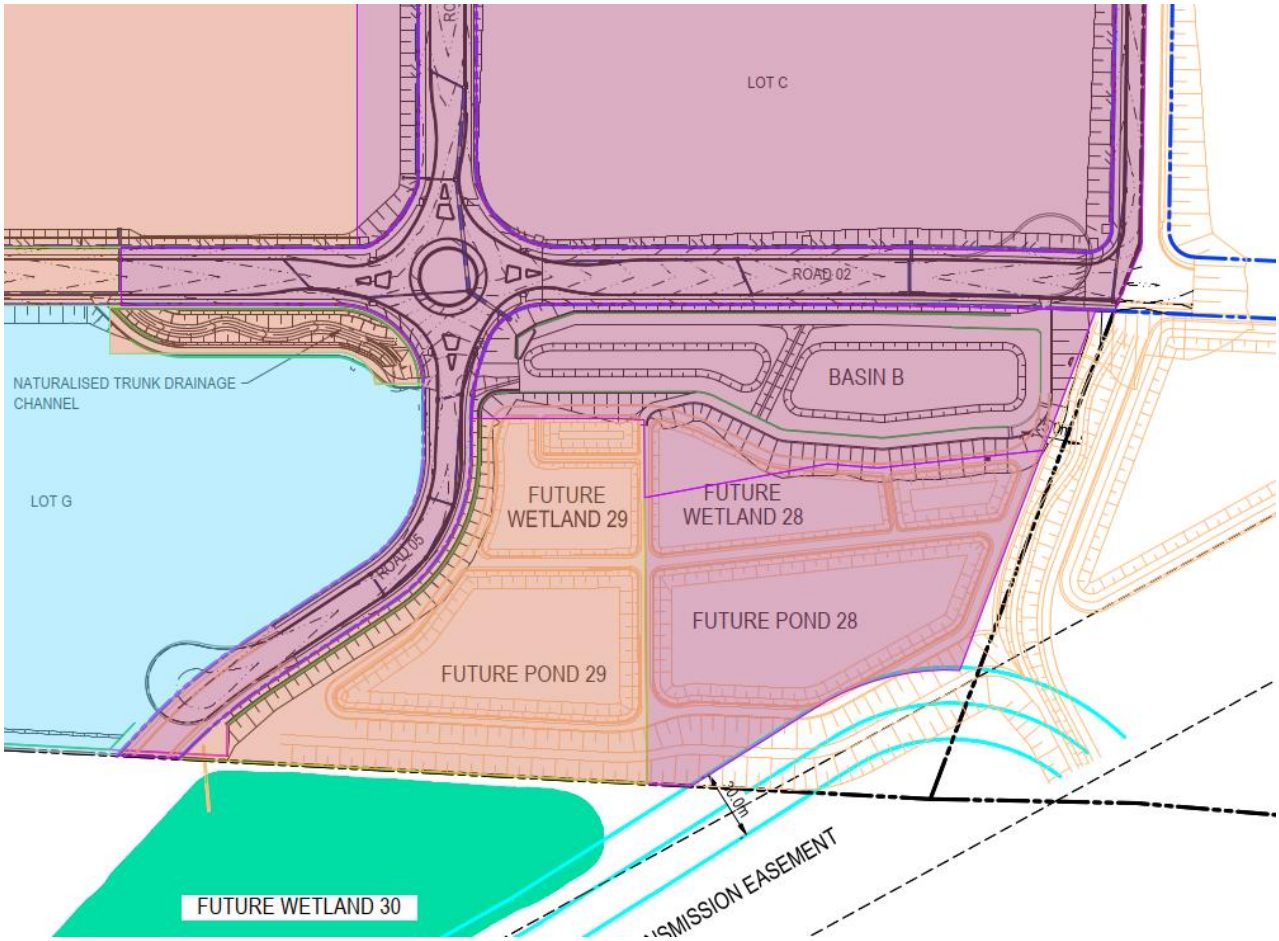


Figure 12 Concept layout of Sydney Water MRP Stormwater Scheme basins 28, 29 and 30

3.5.2. Basin 28 and Basin 29

The Basin B outlet design has been developed to provide connection to future stormwater infrastructure, to enable the diversion of necessary flows to Basins 28 and 29 (Figure 12 and drawing C1124) for treatment by Sydney Water and ensure that the wetlands receive adequate flows above the EDD for effective treatment and ecological health.

To accomplish this, Basin B (Figure 13 and C1087) has been divided into two separate but interconnected systems using an internal weir. This division allows for the creation of sufficient driving head or pressure difference between the two systems. The driving head is essential to meet the flow rates required by Sydney Water. By managing the flow through the interconnected systems, the outlets can generate the necessary head to direct the stormwater flows to Wetland 28 and Wetland 29.

Flows in excess of the treatable flow rates for Wetland 28 and Wetland 29 will discharge from Basin B directly to the future trunk drainage channel to the north of Basin B. Refer to Section 5.2.5 for addition information regarding the attenuation of flows in Basin B.

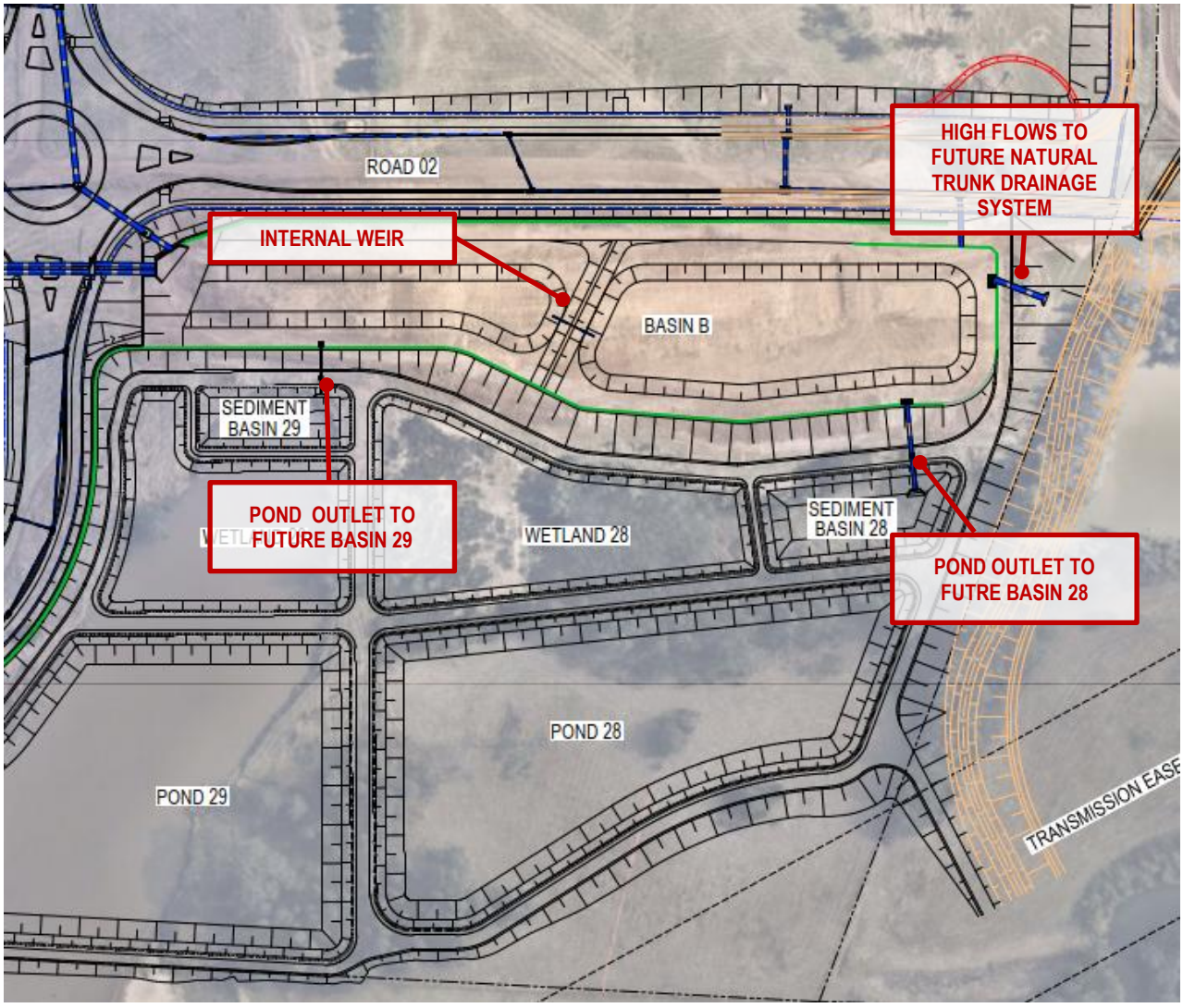


Figure 13: Wetland 28 and 29 Diversion system (based on concept basin design).

3.5.3. Wetland 30

A low flow diversion pipe has been designed to redirect low flows to Sydney Water Wetland 30 in the future. During the interim period (prior to construction of basin 30, by others), this low flow diversion pipe will be capped at the upstream end with a non-return flap valve to prevent water from entering the system. This temporary measure ensures that all flows are directed towards the OSD Basin (Basin B) located on Lot D.

Once the construction of Wetland 30 is completed, the cap on the low flow diversion pipe will be removed to direct the treatable flow to Wetland 30. Additionally, a cap will be retrofitted to the high flow structure connected to the OSD Basin B. This modification will allow water to be diverted to the low flow pipe, enabling the desired functioning of the proposed Wetland 30. Refer Figure 14 for further information.

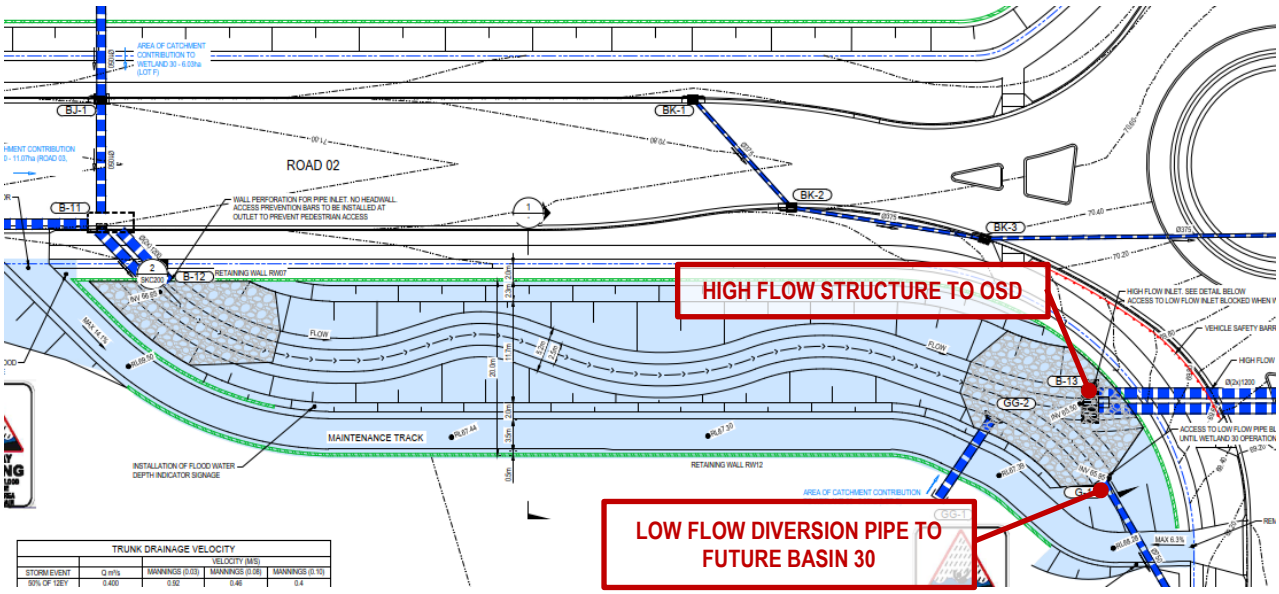


Figure 14: Diversion system to Basin 30 (refer 19-609 C1151 for details).

4. Stormwater Targets

The Mamre Road Precinct DCP establishes the construction and operational phase stormwater quality and quantity (flow) targets for the Site. This Stormwater Management Report addresses operational phase targets only. Construction phase targets are addressed in the separate Erosion and Sediment Control Plan prepared by the CPESC for the Site (from EMM consultants). There is a separate ESCP for each of the on-lot developments, prepared by a CPESC. These ESCPs address construction phase water management requirements for the on-lot runoff prior to completion of building works and full stabilisation of the lots.

For the operational phase targets there are two options available for stormwater quality and two options available for stormwater flow. Stormwater quality targets for Option 1 (annual load reduction) and Option 2 (allowable loads) are summarised in **Table 7**.

Table 7: Operational phase stormwater quality targets – Options 1 and 2

Parameter	Option 1 Target (reduction in mean annual load from unmitigated development)	Option 2 Target (allowable mean annual load from development)
Gross pollutants (anthropogenic litter >5mm and coarse sediment >1mm)	90%	< 16 kg/ha/yr
Total suspended solids (TSS)	90%	< 80 kg/ha/yr
Total phosphorus (TP)	80%	< 0.3 kg/ha/yr
Total nitrogen (TN)	65%	< 3.5 kg/ha/yr

Stormwater quantity (flow) targets for Option 1 (mean annual runoff volume) and Option 2 (flow percentiles) are summarised in **Table 8**.

Table 8: Operational phase stormwater quantity (flow) targets – Options 1 and 2

Parameter	Option 1 Target (MARV)	Option 2 Target (flow percentiles)
Mean annual runoff volume (MARV)	≤ 2 ML/ha/yr at the point of discharge to the local waterway	n/a
95%ile flow (L/ha/day at the point of discharge to the local waterway)	n/a	3000 – 15000
90%ile flow (L/ha/day at the point of discharge to the local waterway)	1000 – 5000	1000 – 5000
75%ile flow (L/ha/day at the point of discharge to the local waterway)	n/a	100 – 1000
50%ile flow (L/ha/day at the point of discharge to the local waterway)	5 – 100	5 – 100
10%ile flow (L/ha/day at the point of discharge to the local waterway)	0	n/a
Cease to flow	n/a	Between 10% to 30% of the time

The Mamre Road Precinct DCP requires On site detention (OSD) be provided to ensure no increase in 50% and 1% AEP peak storm flows at the Precinct boundary or at Mamre Road culverts. OSD design is to compensate for any local roads and/or areas within the development site that does not drain to OSD.

5. Water Sensitive Urban Design Strategy

The Water Sensitive Urban Design (WSUD) Strategy for the development incorporates a series of management measures to address stormwater quality, quantity (peak flow attenuation) and flow volume.

5.1. Strategy Overview

This WSUD Strategy has been developed for the development staging. The key elements of this Strategy are presented on 19-609-SKC228 and satisfy the stormwater quality, quantity (peak flow) and flow volume controls presented in Section 4.

5.1.1. Stormwater Quality and Flow Management Measures

The proposed measures to address the operational stormwater quality and flow targets for the proposed stages are summarised in Table 9Interim strategies proposed in MOD 5 will be retained during the period that the MRP Stormwater Scheme is not operational.

Regional infrastructure (ponds and basins 28 and 29) will provide quality and flow controls that satisfy development on Lot E and is not included in the MUSIC modelling which is solely for interim measures.

When Lot E becomes operational the interim measures proposed in MOD 5 (for Lot F, J and K (north)) will remain unchanged. Irrigation of treated stormwater from the interim storage basins is proposed until the MRP scheme becomes operational.

Table 9: Summary of measures to address stormwater quality and flow management targets for proposed stages of Development

200 Aldington Road Kemps Creek Development Stages/Lots	Northern Catchment - Developed area incl Roads NDA	Southern Catchment – Developed area incl roads	GPTs	OSD	Stormwater measures (MRP DCP operational stormwater mgmt. controls)			
					Sediment pond and storage basin with temporary irrigation	Temporary Irrigation area (total for Estate)	Regional Infrastructure - constructed	SSA utilisation (ref 5.2.6)
Estate Infra and Lot F + Lot F - SSD-10479 MOD 4	Lot F 7.84ha Roads 4.65 ha Total 12.49ha	Roads 1.95ha Total 1.95ha	+ Lot F	Estate OSD	Sediment pond and storage in Basin B (below OSD level) on Lot D (northern catchment)	2 ha	N/A	N/A
Lot J • Civil Infra and Lot F - SSD-10448 MOD4 + Lot J - SSD-10479 MOD2 / SSD 61212208	Lot F 7.84ha Roads 4.65 ha Total 12.49ha	Roads 1.95ha Lot J 12.93ha Total 14.88ha	• Lot F + Lot J	Estate OSD	Sediment pond and storage in Basin B (below OSD level) on Lot D (northern catchment) Sediment pond (in Basin A below OSD level) and storage on Lot M (southern catchment)	6.08ha	N/A	N/A
LOT K • Civil Infra and Lot F - SSD-10448 MOD4 • Lot J - SSD-10479 MOD2 / SSD 61212208 + LOT K - SSD-10479 MOD5 and SSD-80264236	Lot F 7.84ha Roads 4.65 ha Lot K 2.68ha Total 15.17ha	Roads 1.95ha Lot J 12.93ha Lot K 3.53ha Total 18.41ha	• Lot F • Lot J + Lot K	Estate OSD	As above	9.72 ha	N/A	N/A
LOT E • Civil Infra and Lot F - SSD-10448 MOD4 • Lot J - SSD-10479 MOD2 / SSD 61212208 • LOT K - SSD-10479 MOD5 and SSD-80264236 + Lot E -SSD10479 MOD 6 and SSD-85510213	Lot F 7.84ha Roads 4.65 ha Lot K 2.68ha Lot E 6.83ha Total 22.00ha	Roads 1.95ha Lot J 12.93ha Lot K 3.53ha Total 18.41ha	• Lot F • Lot J • Lot K + Lot E	Estate OSD	As above	9.72ha	Basins 28 and 29 on Lot D	6.83ha

5.1.2. Stormwater Quantity Management Measures

Two detention basins are proposed within the Estate to satisfy the stormwater quantity targets for the Site. The OSD is permanent and independent of the interim and ultimate Operational Stormwater Management Requirements of the MRP DCP.

A summary of onsite detention (OSD) information is provided in **Table 10**.

Table 10: Summary of onsite detention measures.

Basin Name	Base Area (m^2)	Top Area (m^2)	Basin Depth (m)	Volume (m^3)
Basin A (southern catchment)	892 (Sloped base)	6,500	2.05	11,433
Basin B (northern catchment)	8,500	10,500	1.0	8,220

Further details of these basins are provided in **Section 5.2.5.**

5.2. Proposed Water Management Measures

A general description of the proposed stormwater treatment train components is presented in the following sections. Some of these measures are interim and temporary and only required until the Sydney Water MRP Stormwater Scheme is operational. The exception is onsite detention (OSD) which is required in the interim and ultimate scenario, as OSD is not included in the MRP Stormwater Scheme. The MUSIC node catchments and proposed stormwater management measures are shown in Figure 15 and appended SKC0228.

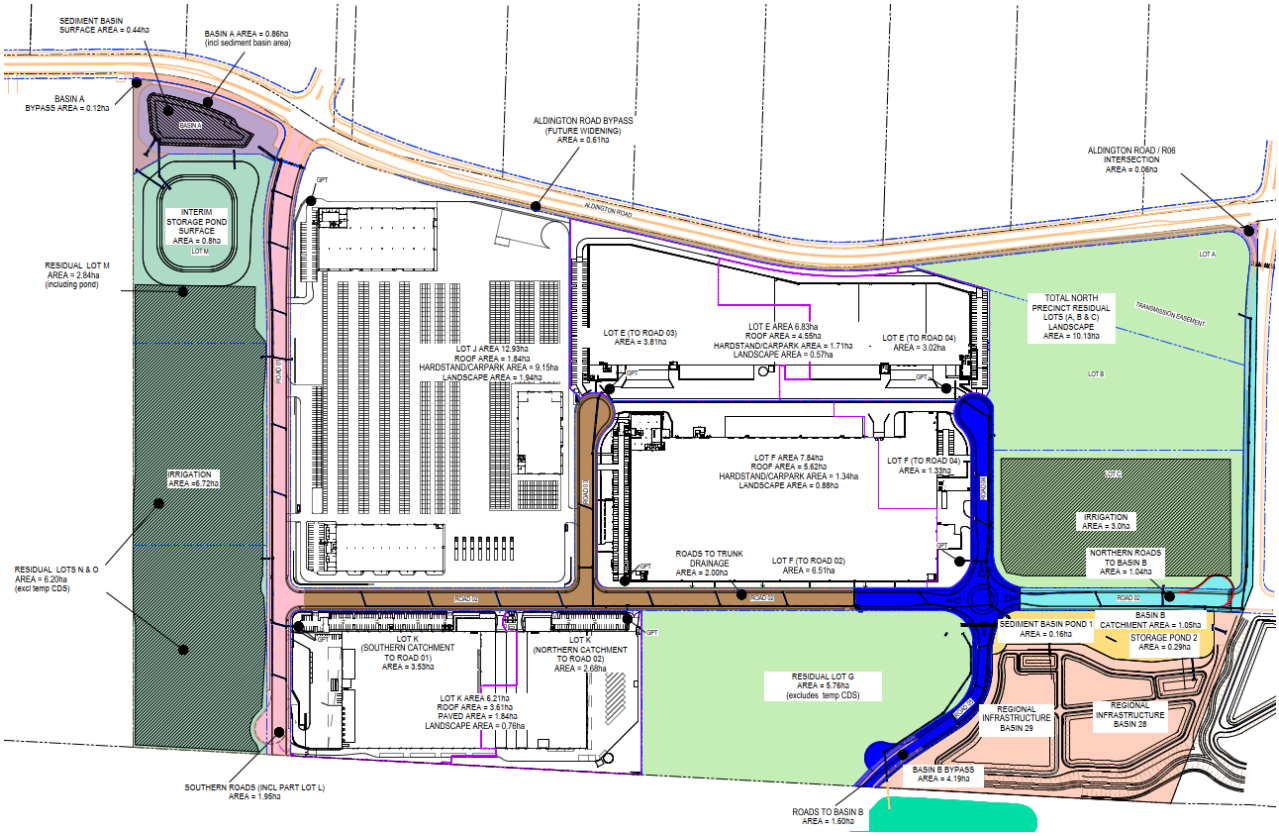


Figure 15 Interim Stormwater management Measures (extract SKC228)

5.2.1. GPTs

The proposed stormwater treatment train will consist of on-lot Gross Pollutant Traps (GPTs) as a means of primary stormwater treatment. GPT's will be delivered on each lot prior to stormwater discharge to the estate-wide stormwater drainage network to capture litter, debris, coarse sediment, as well as some oils and greases.

A high-flow bypass for the GPTs would nominally be equivalent to the 4 EY (3-month ARI) peak flow rate discharging to the GPT. Design flows for the GPTs and their final configuration will be confirmed at the detailed design phase.

5.2.2. Interim Sediment Basin

To manage the quality of runoff generated existing basins are utilised to trap sediment prior to discharge to the storage ponds.

In the **northern catchment** pond 1 within Basin B will be utilised as a sediment basin prior to discharge into pond 2 which is utilised as storage, prior to irrigation.

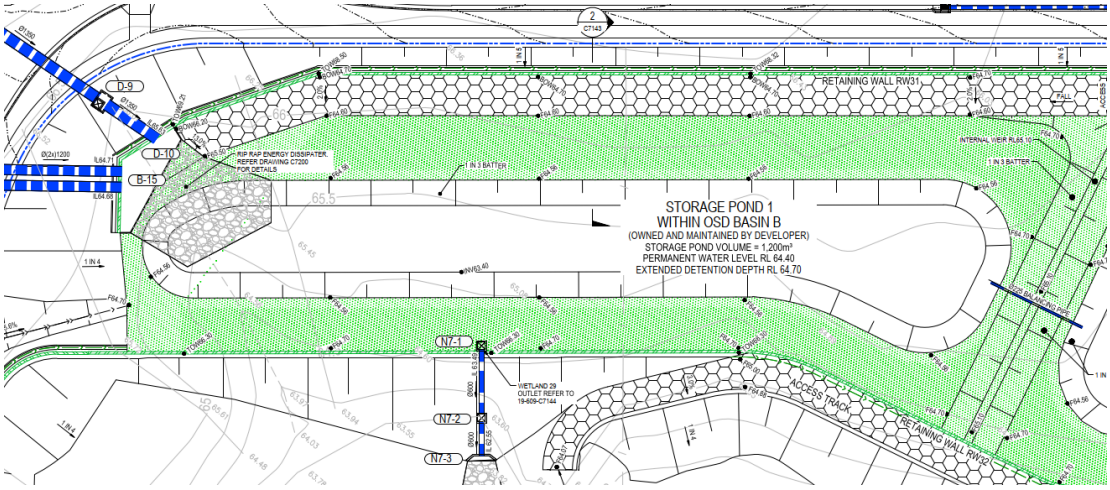


Figure 16 Sediment pond 1 (extract C7141) approved for construction

In the **southern catchment** as sediment basin is provided in Basin A which has been configured to trap sediment prior to discharge to the pond (on undeveloped land in Lot M). This is achieved through a high-level inlet to allow for the sediment basin build up below. Low flows are directed to the storage pond. The moderate and high flows outlets from Basin A continue to operate as in the ultimate design.

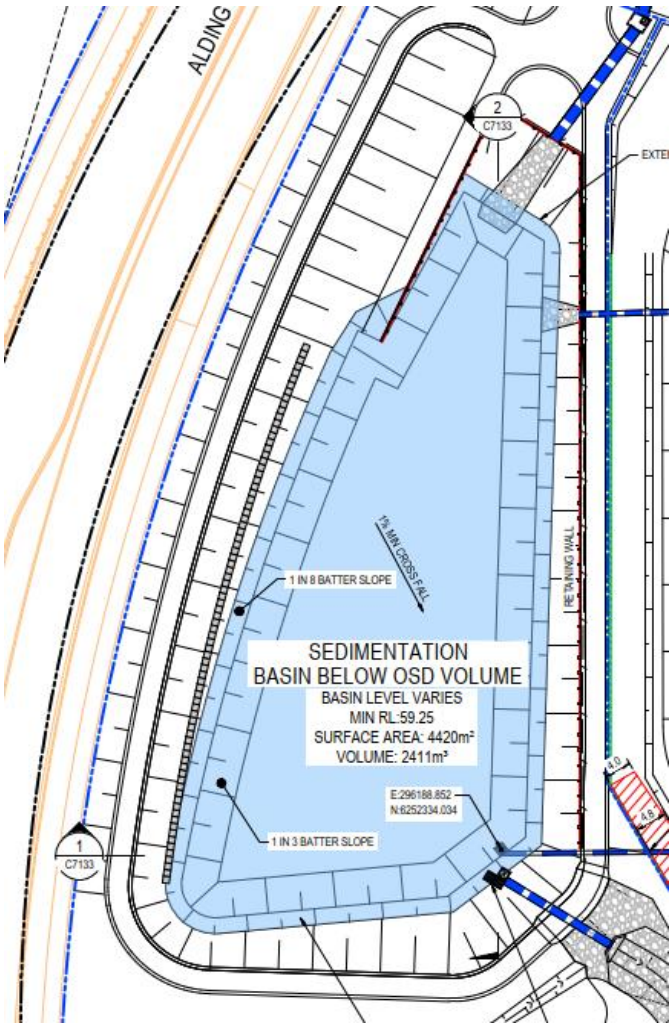


Figure 17 Sediment pond in Basin A (extract C7132) approved for construction

The cover blocking the low flow discharge will be removed in the ultimate design (when the MRP Stormwater Scheme is operational). A connection is provided between Basin A and the storage pond on undeveloped land to the east (Lot M), for storage prior to reuse/irrigation. The connection to the pond will be closed once the interim solution is no longer required. Noting this interim design provides for stage 1 (civil infrastructure and Lot F), Lot J, Lot E and Lot K development.

There is sufficient OSD storage above the level of the sediment pond within Basin A and Basin B.

The volume below the extended detention depth is excluded from OSD volumes.

Table 11: Sediment Pond parameters (interim measures)

Parameter	Northern Catchment Sediment Pond 1 within Basin B	Southern Catchment Sediment Pond within Basin A
Surface area (m^2)	1,635	4,342
Permanent pool volume (m^3)	654	2,411
Exfiltration rate (mm/hr)	0	0
Evaporation loss (% of PET)	100	100
Extended detention depth (m)	0.40	0.65
Low Flow Outlet (equivalent pipe diameter)	225	600

5.2.3. Interim Storage Ponds for Stormwater Harvesting and Reuse

Storage ponds can capture and store large quantities of stormwater runoff, while also being relatively easy to maintain. Key parameters adopted for the storage pond areas, is summarised below in **Table 12**. These ponds will only be required as an interim measure to satisfy the stormwater flow volume targets, until the Mamre Road Precinct Integrated Stormwater Management Scheme is operational.

These interim ponds will provide for Lot F, Lot J and Lot K and will be maintained until not require due to Regional Infrastructure. Development targets for Lot E will be achieved through connection to Regional infrastructure an approach supported by the SSA letter from Sydney Water (Appendix F).

Northern Catchment

In the northern catchment an area below the base level of the OSD provided in Basin B (pond 2), will be used to store stormwater for irrigation, thereby reducing runoff volume from the site.

Southern Catchment

In the southern catchment a pond will be constructed on undeveloped land within Lot M to store water for irrigation to manage the runoff volume from the site.

Table 12: Storage /Harvesting Pond parameters for Lot F, Lot J, Lot K (Lot E provided for via Regional Infrastructure)

Parameter	Northern Catchment Storage Pond 2 within Basin B	Southern Catchment Storage Pond within (Lot M)
Inflow from:	Lot A, B, C, E & G (undeveloped), Lot F & Lot K (north) (developed)	Lot M, N, O, (undeveloped) Lot J & Lot K (south) (developed)
Surface area (m^2)	2,937	8,060
Permanent pool volume (m^3)	2,630	8,500
Exfiltration rate (mm/hr)	0	0
Evaporation loss (% of PET)	100	100
Extended detention depth (m)	0.30	0.10
Low Flow Outlet (equivalent pipe diameter)	300	150
Reuse Rate (mm/ha/yr)	600 [2]	600 [2]
Adopted reuse (m^3/yr)	18,000 [1]	40,300[1]
Area required for irrigation (ha)	3.00	6.72

[1] Applied to undeveloped area

[2] Applied as Monthly Pattern as per MUSIC Modelling Toolkit, not at 50% as 100% of undeveloped area can be irrigated.

Red text identifies changes in MOD 6 since MOD 5

5.2.4. Reuse

The ponds and associated irrigation systems will incorporate a series of measures to demonstrate ongoing compliance with the stormwater flow controls and to mitigate potential risks associated with stormwater harvesting and reuse. The design and operation of these systems will comply with the principles and guidance outlined in the *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2); Stormwater harvesting and reuse* (Australian Government, 2009). As a minimum it is expected that the system will incorporate the following:

- A power supply and pump system to transfer water from the pond to the irrigation area.
- Stormwater treatment measures, which may include further filtration or other means. Any required treatment would be subject to detailed design, as well as consideration of the water reuse purpose and exposure, i.e. irrigation. The irrigated area will be fenced to prevent access by the public/contractors on adjacent sites and a buffer area, thus limiting exposure to irrigation water.
- Multi-channel irrigation controllers including inputs for flow meters, moisture sensors and weather stations may form part of the irrigation system to control, monitor and record irrigation system operation. It is expected that the controller would be a readily available "off-the-shelf" product and would be implemented and operated by the developer.

A concept irrigation design from Basin B has been prepared and is appended, a similar design will be utilised for irrigation from the temporary pond proposed in undeveloped Lot M.

5.2.5. On-site Stormwater Detention (OSD) Design Parameters

OSD is required within the development to mitigate post developed flows to pre-developed flow rates for design storm events between the 50% AEP event and the 1% AEP event. Two OSDs are proposed service the full concept master plan development.

The following constraints have been applied to ensure consistency with the technical guidance requirements:

- On-site stormwater detention is designed in accordance with the relevant approval or consent authority requirements.
- Extended detention volume for the treatment system is not included in on-site detention volume (i.e. is assumed to be full, prior to the storm event).
- On-site detention volume is not part of the extended detention of the WSUD measure (i.e. on-site detention volume is not considered in the MUSIC modelling for the WSUD measure).

Key parameters adopted for the OSD are summarised below in Table 13.

Table 13: OSD Basin parameters

Parameter	Southern catchment Basin A MOD 6 (no change since MOD 2)	Northern catchment Basin B MOD 6 (no change since MOD 2)
Inflow from:	Lot J, K (south), M, N, O	Lot A, B, C, E, F, G, K (north)
Base Surface area (m^2)	892 (Tapered base)	8,500
Top Surface area (m^2)	6,500	10,500
Depth (m)	2.05	1.0
Volume (m^3)	11,433	8,220
Outlet Interim	Trunk Drainage Channel (south) via BAPS	Existing retained farm dams
Outlet Ultimate	Trunk Drainage Channel (south) via BAPS	Natural Trunk Drainage Channel (north), Basin 28, 29

5.2.6. Regional Infrastructure Scheme Service Area

Sydney Water are the regional stormwater authority for the Mamre Road Precinct.

Sydney Water are to achieve the Wianamatta stormwater quality/flow targets of the relevant DCP's by implementing regional stormwater treatment and harvesting infrastructure.

Sydney Water has developed the Scheme Serviced Area (SSA) to ultimately fast track the delivery of regional infrastructure to minimise the need for on-lot temporary works and developable land.

The Stormwater SSA is an area of land that can be developed without the need for interim/temporary on-lot stormwater quality/quantity infrastructure, excluding those that are required specifically in the DCP, such as gross pollution traps, on-site detention, passively watered street trees, erosion and sediment control and sediment basins.

As the delivery of the Regional infrastructure is progressing it is deemed appropriate to move towards ultimate solutions rather than interim measures to achieve the DCP operational stormwater controls.

Key principles of SSA

Stormwater management targets (including both the adopted water quality and water quantity targets) will be met at all times.

The targets will be assessed by Sydney Water on a sub-catchment basis. Sub-catchments have been determined to be consistent with discharge into the receiving waterway and align with more recent published Stormwater Scheme MUSIC models. The northern catchment of this development is within the Ropes Catchment.

SSA will be generated at the practical completion of construction of stormwater basins (when 'practical completion' is awarded by Sydney Water).

SSA will be allocated by Sydney Water via a Feasibility Advice letter that can be included in the DA/SSDA documentation. The letter will outline:

a. the amount of SSA being awarded to the developer
b. the developments/land where the developer can use the SSA which will be based on the land that the developer currently owns within the sub-catchment
c. processes/requirements for the developer to implement ensuring SSA will be appropriately used

Sydney Water has advised the SSA generated by Basin 28 and 29 delivery is 17.94ha.

6. Performance Assessment

6.1. Hydrological and Hydraulic Modelling

DRAINS modelling software has been used to calculate the Hydraulic Grade Line (HGL) of the proposed estate-wide stormwater network, including pits, pipes, overland flow paths and detention basin. DRAINS is a software package used for designing and analysing urban stormwater drainage systems and catchments. It is widely accepted by Council's across NSW as the basis for stormwater design and has been confirmed by Penrith City Council as the preferred stormwater software analysis package. Refer to Table 14 for the following hydrological parameters adopted to establish predevelopment and post development flow rates.

Table 14: DRAINS hydrological parameters

Parameter	Units
Initial Loss (Pervious) (mm) [1]	37.1
Continuing Loss (Pervious) (mm) [1]	0.94
Initial Loss (Impervious) (mm) [1]	1
Continuing Loss (Impervious) (mm) [1]	0
Impervious area depression storage (mm) [2]	1
Supplementary area depression storage (mm) [2]	1
Pervious area depression storage (mm) [2]	5
Soil Type (1 to 4) [3]	3

[1] IL-CL methodology values used for establishing predevelopment flow rates. [2] ILSAX methodology values used for establishing post development flow rates. [3] Values are based on Hortons Losses from DRAINS and is typical for similar catchments.

Refer to Figure 18 for the DRAINS hydraulic setup configuration.

Figure 18: DRAINS Hydraulic Setup

6.2. Proposed Site Stormwater Drainage

The proposed drainage network within the Site has been designed to safely convey major and minor flows prior to the estate Onsite Stormwater Detention (OSD) basins and eventually discharging to the north-eastern creek and Sydney Water natural trunk drainage to the south. The following criteria have been adopted for the proposed drainage system:

- Major system (pit and pipe network, overland flow paths and channels): 1% AEP
- Minor system (pit and pipe network): minimum 5% AEP and 1% AEP for trapped catchments.

Lot F On-lot stormwater runoff has two discharge points to the Estate drainage network, this is based on the catchments specified in conditions of consent to ensure discharge to the allocated stormwater scheme basins (by Sydney Water), discussed in Chapter 3 of this report.

The following stormwater drainage pipes and culverts shall be used:

- Under estate roads – rubber ring jointed steel reinforced concrete (375mm diameter and larger) or reinforced concrete box culverts (RCBC).
- On-lot pipes within the buildings – rubber ring jointed uPVC with manufactured bends and fittings.
- On-lot pipes in-ground and external to the buildings – rubber ring jointed steel reinforced concrete (375mm diameter and larger) and uPVC pipes (<375mm diameter).

Stormwater drainage from the roof and through the building will be designed by the building hydraulic engineer. Detailed design drawings of the building hydraulics will be made available during submission of documents for Construction Certificate approval.

A summary of the key hydrological and hydraulic design parameters adopted in DRAINS to develop a major and minor system drainage design for the proposed development are as follows:

- Minor system (pit and pipe) drainage has been designed to accommodate the 5% AEP storm event.
- The combined pit and pipe drainage and overland flow paths have been designed to accommodate the 1% AEP storm event.
- Where trapped low points are unavoidable and potential for flooding private property is a concern, an overland flow path capable of carrying the total 1% AEP storm event has been provided. Alternatively, the pipe and inlet system has been upgraded to accommodate the 1% AEP storm event.
- Rainfall intensities have been adopted using the Bureau of Meteorology Design Rainfall Data System (2019).
- The width of flow in the gutter does not exceed 2.5 metres and pits are spaced no further than 75 metres apart.
- Velocity x depth product shall not exceed 0.4 m^2/s for all storms up to and including the 1% AEP event.
- Bypass from any pit on grade shall not exceed 15% of the total flow at the pit for the design minor storm event.
- Blockage factors of 20% and 50% shall be adopted for on-grade and sag pits respectively.
- A hydraulic grade line HGL design method shall be adopted for all road pipe drainage design.
- Pipelines in roadways shall have a minimum diameter of 375mm.
- A desirable minimum grade of 1% for all pipelines is preferred for self-cleansing under low flow velocities. An absolute minimum grade of 0.5% has been adopted.
- Where minimum cover cannot be achieved due to physical constraints the pipe class shall be suitably increased.
- All pipes in trafficable areas will be Reinforced Concrete Pipes (RCP) or Fibre Reinforced Cement (FRC) equivalent.
- Pipes discharging to an overland flow path shall adopt a minimum tailwater level equivalent to respective overland flow level.
- Pit Loss coefficients have been calculated in accordance with the Hare Charts as documented in the Queensland Urban Drainage Manual.

- A minimum 150mm freeboard has been maintained between pit HGL and pit surface levels for the minor design storm event (5% AEP).

6.3. Stormwater Quality Modelling

6.3.1. MUSIC Model Parameters

A MUSIC model of the proposed stormwater management strategy has been created to simulate post-development mean annual loads and treatment train effectiveness. MUSIC model parameters including rainfall and evaporation, rainfall-runoff and source node pollutant generation are consistent with the parameters adopted in the *MUSIC Modelling Toolkit – Wianamatta* (NSW DPIE, 2022).

The MUSIC model does not include the addition of LOT E development, as this will be satisfied via the Regional Infrastructure basins 28 and 29 located within Lot D of the estate, subject to separate approval.

An SSA letter from Sydney Water identifies the development footprint supported by the construction of Regional Infrastructure 28 and 29 is 17.94ha.

6.3.2. Modelling

The development proposed that is reliant on interim operational stormwater measures has been modelled to demonstrate the pollutant concentration and flow targets of the Mamre Road Precinct DCP are achieved. Refer to Appendix A for catchment summary tables and MUSIC model.

Note The MUSIC model is as for MOD 5 (including development of the estate, Lot F, Lot J and Lot K) and does not include development of Lot E that is satisfied by the SSA generated through regional infrastructure in Ropes Catchment - Basins 28 and 29.

6.4. Performance Against Stormwater Targets

6.4.1. Stormwater Quality

MUSIC model results presented as mean annual loads at the receiving node for southern catchment and northern Catchment are presented in Table 15.

Table 15: Summary of MUSIC modelling results against stormwater quality targets Option 2 – Mean Annual Load

		SSDA 10479 MOD 6 Stage 1 (Civil Infrastructure and Lot F) & Lot J & Lot K (note Lot E via Regional Infrastructure)	
Parameter	**Allowable (kg/ha/yr)**	**Southern Catchment (kg/ha/yr)**	**Northern Catchment (kg/ha/yr)**
Total Suspended Solids	**80**	39.75	74.10
Total Phosphorous	**0.3**	0.22	0.25
Total Nitrogen	**3.5**	2.64	2.69
Gross Pollutants	**16**	0.61	0.00

The MUSIC model results presenting allowable mean annual loads demonstrate the proposed stormwater management measures will satisfy the Mamre Road DCP Option 2 allowable loads stormwater quality controls.

Red text indicate new results, in MOD 6 since MOD 5.

6.4.2. Stormwater Quantity

The assessment of the performance of stormwater detention for the Estate has been undertaken at two locations, Basin A and Basin B, Post Development of:

- Concept master plan - the development of roads and all lots as per concept master plan.

A summary of the hydraulic results is provided in Table 16 for Basin A and Table 17 for Basin B.

Table 16: Pre-development and post-development flows at discharge point Basin A

Design Storm Event	Pre-Development Peak Flow [2] (m^3/s)	Post Concept MP Development Peak Flow [1] (m^3/s)	Complies (Y/N)
50% AEP	0.79	0.79	Y
20% AEP	1.30	1.16	Y
10% AEP	1.98	1.70	Y
5% AEP	2.52	1.96	Y
2% AEP	3.84	3.22	Y
1% AEP	4.99	4.55	Y

[1] Concept Master plan Development of all lots and roads. [2] Predevelopment flow rates updated as part of the precinct wide Sydney Water hydrology requirements utilising RAFTS methodology. [Note] The peak flow rate is selected in accordance with the ARR2019 ensemble storm method i.e. it is selected from a range of critical storm duration of each storm event from 5 minute to 6 hour duration.

Table 17: Pre-development and post-development flows at discharge point Basin B

Design Storm Event	Pre-Development Peak Flow (m^3/s) [2]	Post Concept MP Development Peak Flow [1] (m^3/s)	Complies (Y/N)
50% AEP	1.36	2.26	N [3]
20% AEP	2.52	2.45	Y
10% AEP	3.46	2.74	Y
5% AEP	4.55	3.10	Y
2% AEP	6.25	4.42	Y
1% AEP	7.92	6.63	Y

[1] Concept Master plan - Development of all lots and roads.

[2] Predevelopment flow rates updated as part of the precinct wide Sydney Water hydrology requirements utilising RAFTS methodology. [Note] The peak flow rate is selected in accordance with the ARR2019 ensemble storm method i.e. it is selected from a range of critical storm duration of each storm event from 5 minute to 6 hour duration.

[3] Non compliance is due to Sydney Water target flow requirement to Basins/Wetlands 28,29 and 30

The DRAINS model results demonstrate that the post-development peak flow rates to be less than or equal to pre-development peak flow rates for a range of storm events between (and including) the 50% AEP and 1% AEP design events. Therefore, the stormwater drainage system and detention basins as proposed will satisfy the development controls relating to stormwater detention.

6.4.3. Stormwater Quantity (Flow Duration Targets)

The MUSIC model results demonstrating performance of the proposed stormwater management measures against the stormwater flow targets for Lot F, J, K and E are presented in **Figure 19** and **Figure 20**. The results shown are an extract from the MUSIC modelling Toolkit provided by DPIE and confirm compliance with DCP Option 1 (Mean Annual Runoff Volume approach) for the proposed cumulative development scenario and include interim and ultimate measures.

It is proposed that the operational stormwater targets for Lot E is meet via ultimate measures via Sydney Water Regional Infrastructure located in the north eastern corner, via the operation of regional basins 28 and 29. This has been excluded from the MUSIC model.

ENTER DEVELOPMENT AREA (in cell F2)		
Development Area	28.43	ha (i.e. the total catchment areas used in MUSIC)

Stormwater Quantity (flow) Targets Option 2- flow percentiles			
Indices	Result	Comply	Target
95%ile	14,512	Yes	3000 to 15000 L/ha/day
90%ile	4,172	Yes	1000 to 5000 L/ha/day
75%ile	337	Yes	100 to 1000 L/ha/day
50%ile	25	Yes	5 to 100 L/ha/day
Cease to Flow	16%	Yes	10-30%

Stormwater Quantity (flow) Targets Option 1 - MARV			
Indices	Result	Comply	Target
MARV (ML/ha/yr)	2.05	No	≤ 2
90%ile	4,172	Yes	1000 to 5000 L/ha/day
50%ile	25	Yes	5 to 100 L/ha/day
10%ile	0	Yes	0 L/ha/day

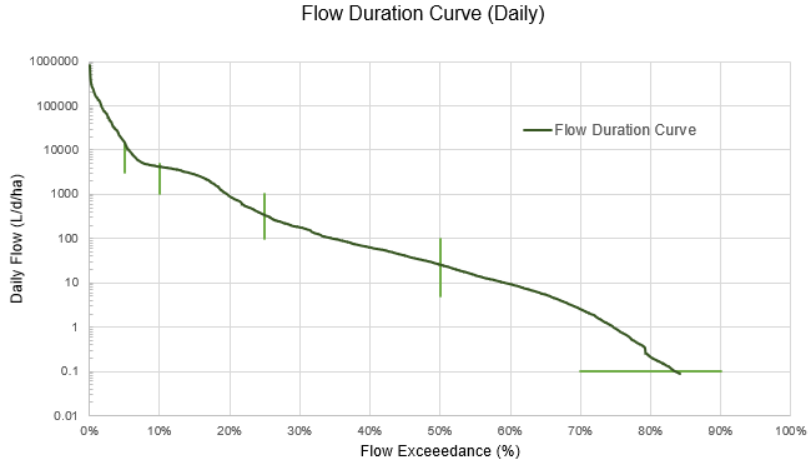


Figure 19: Flow duration curve and targets for proposed development (southern catchment)

ENTER DEVELOPMENT AREA (in cell F2)		
Development Area	43.70	ha (i.e. the total catchment areas used in MUSIC)

Stormwater Quantity (flow) Targets Option 2- flow percentiles			
Indices	Result	Comply	Target
95%ile	22,096	No	3000 to 15000 L/ha/day
90%ile	4,339	Yes	1000 to 5000 L/ha/day
75%ile	69	No	100 to 1000 L/ha/day
50%ile	11	Yes	5 to 100 L/ha/day
Cease to Flow	11%	Yes	10-30%

Stormwater Quantity (flow) Targets Option 1 - MARV			
Indices	Result	Comply	Target
MARV (ML/ha/yr)	1.65	Yes	≤ 2
90%ile	4,339	Yes	1000 to 5000 L/ha/day
50%ile	11	Yes	5 to 100 L/ha/day
10%ile	0	Yes	0 L/ha/day

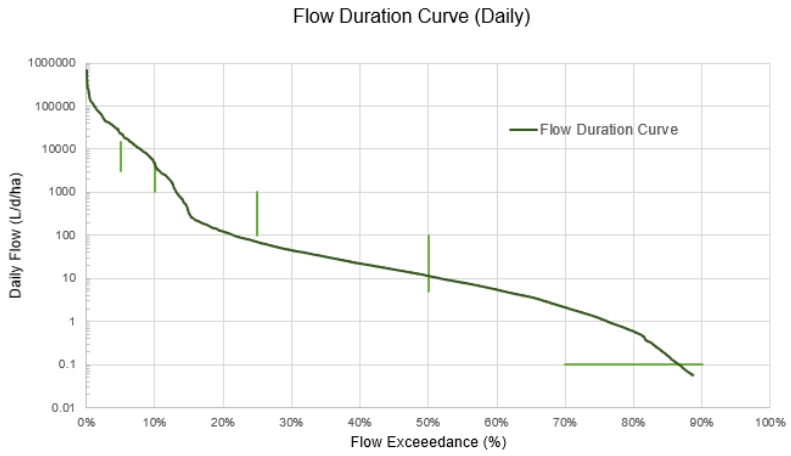


Figure 20: Flow duration targets for proposed development (northern catchment) achieved by interim measures

The results presented above demonstrate the proposed stormwater management measures to be implemented for the Lot F, J and K development satisfy the DCP stormwater flow targets for discharge from the southern catchment and northern catchments in the interim scenario.

The addition of Lot E is based on Lot E stormwater operational targets being meet by the operation of the Regional Infrastructure (via ponds/basins 28 and 29) by Sydney Water, in addition to the interim scenario until the regional scheme satisfies the MRP DCP operational stormwater controls. Lot E is not included in the MUSIC model.

7. Maintenance and Operations

The interim water management strategy elements will remain in private ownership and shared assets will be maintained under the community title through the community association. This includes Lot D (Basin B) and temporary irrigation on undeveloped lots. On lot components including GPTs will be maintained by the tenant of each lot. The cost of operating the WMS is estimated in Table 18. A draft WSUD Maintenance Plan is provided in Appendix C.

In the ultimate scenario when the MRP Stormwater Scheme is operational the on lot GPTs would continue to be maintained and operated by tenants.

OSD basins have not been included in the costs as they are a business as usual cost not a WSUD specific cost. The irrigation of the landscape areas on developed lots is also not considered a WSUD cost and is therefore not included.

Table 18:Whole of life cost (Lot F, J, K and E)

WSUD feature	Capital cost $	Asset Life	Operational & Maintenance cost / annum $	Renewal cost $/ 30 years
CONSTRUCTION				
Sediment ponds during construction Type B Basins	2,500,000	1-5 years	1,500,000	N/A
OPERATIONAL (Lot F, J, K and E)				
GPT (Lot J)	500,000	30 years	40,000	100,000
GPTs (Lot F)	300,000	30 years	40,000	100,000
GPTs (Lot K)	300,000	30 years	40,000	100,000
GPTs (Lot E)	300,000	30 years	40,000	100,000
Temporary Sediment basin (within Basin A and Pond 1 (Basin B)	10,000	10 years	5,000	N/A
Temporary Harvesting pond (Lot M) and pond 2 (Basin B)	100,000	5-10 years	0	N/A
Temporary Irrigation (undeveloped land)	120,000	10 years	60,000	N/A
OPERATIONAL Total	$1,630,000		$225,000	$400,000

The above excludes Regional Infrastructure capital and operational costs.

8. Compliance Protocol

Ongoing compliance of the stormwater management system, with the MRP DCP waterway health objectives and targets, will be achieved through a program of inspection, monitoring, and analysis. This will be detailed within a subsequent revision of the Stormwater Management Plan that will be submitted within the Operational Environmental Management Plan, required by condition E6 prior to operation of the development.

AT&L propose the following process for identifying and managing non-compliances with the Mamre Road Precinct DCP Integrated Water Cycle Management (IWCM) controls:

1) **Non-compliance identification:** Regular inspections and monitoring of the stormwater management system should be conducted to identify any potential non-compliances. This can involve visual assessments, data collection, and analysis of performance indicators.
2) **Review regulatory requirements**: The operator of the system is to familiarise themselves with the specific IWCM controls outlined in the regulatory framework. This may include local ordinances, stormwater management guidelines, or environmental protection regulations.
3) **Document non-compliances:** Once a non-compliance is identified, carefully document the details, including the specific control(s) not met, location, and associated concerns or issues. Capture photographs, measurements, and any other relevant data to provide comprehensive documentation.
4) **Investigate the root causes:** Conduct a thorough investigation to determine the underlying causes of the non-compliance. This may involve reviewing design plans, construction records, maintenance logs, and historical performance data. Consider factors such as inadequate infrastructure, improper maintenance, or unforeseen external factors.
5) **Assess impacts:** Evaluate the potential impacts of the non-compliance on water quality, ecosystem health, flood risk, or other relevant factors. Consider both immediate and long-term consequences, as well as potential risks to human health and the environment.
6) **Develop corrective action plan:** Based on the investigation findings, develop a comprehensive corrective action plan. This should outline specific measures to address the non-compliance and bring the stormwater management system into compliance with the IWCM controls. Consider the feasibility, cost-effectiveness, and potential long-term benefits of each proposed action.
7) **Implement corrective actions:** Execute the corrective actions as outlined in the plan. This may involve repairs, upgrades, maintenance activities, or changes in operational procedures. Ensure that the actions are implemented by qualified personnel adhering to best practices and relevant safety guidelines.
8) **Post-implementation assessment:** After implementing the corrective actions, conduct post-assessments to verify the effectiveness of the measures taken. This may include performance monitoring, water quality testing, or hydraulic modelling to evaluate the system's compliance with the IWCM controls.
9) **Reporting and communication:** Prepare a detailed report summarizing the non-compliances, investigation findings, corrective actions taken, and post-implementation results. Communicate the outcomes to relevant stakeholders.
10) **Ongoing monitoring and maintenance:** Establish a regular monitoring and maintenance program to ensure continued compliance with IWCM controls. This should include periodic inspections, data collection, and maintenance activities to prevent future non-compliances.

9. Conclusion

During construction phases the water quality targets will be achieved by following the Erosion and Sediment Control Plans (ESCPs) prepared by a CPESC for each stage of development.

The stormwater management strategies described within this report demonstrate that the requirements of the MRP DCP are achieved for the stages proposed and are consistent with the conditions of consent.

MUSIC modelling demonstrates the following:

- In the northern catchment the developed Lot F, and part of developed Lot K and remainder of the runoff is direct to Basin B, where in the interim pond 1 acts as a sedimentation pond and pond 2 provides storage. The water in pond 2 will be utilised for residual lot irrigation.
- In the southern catchment the developed Lot J and part of developed Lot K and remainder of the runoff is directed to the sediment pond within Basin A then the storage/harvesting pond within Lot M and utilised for residual lot irrigation which is shown to be sufficient to meet the flow duration curves and pollutant load reductions for the proposed development specified in Section 4.

The operational requirements for Lot E development will be achieved through the regional infrastructure ponds and basins 28 & 29 on Lot D, the Sydney Water SSA letter (Appendix F) supports the Lot E development footprint that is less than the SSA of 17.94ha generated through operation of basins 28 and 29.

The stormwater management scheme includes both ultimate and interim measures before the MRP Stormwater Scheme is operational.

DRAINS modelling demonstrates the following:

- Onsite detention Basins A and B ensure the 50% AEP to 1% AEP storm events flow rates are not greater than the predevelopment flow rates.
- The distribution of flows to Basin/Wetland 28, 29 and ultimately wetland 30 is as required by the consent conditions.
- The natural trunk drainage channel and low flow pipe within Lot G as required by the conditions of consent and the requirements of the Sydney Water Guidelines.

APPENDIX A – MUSIC MODEL

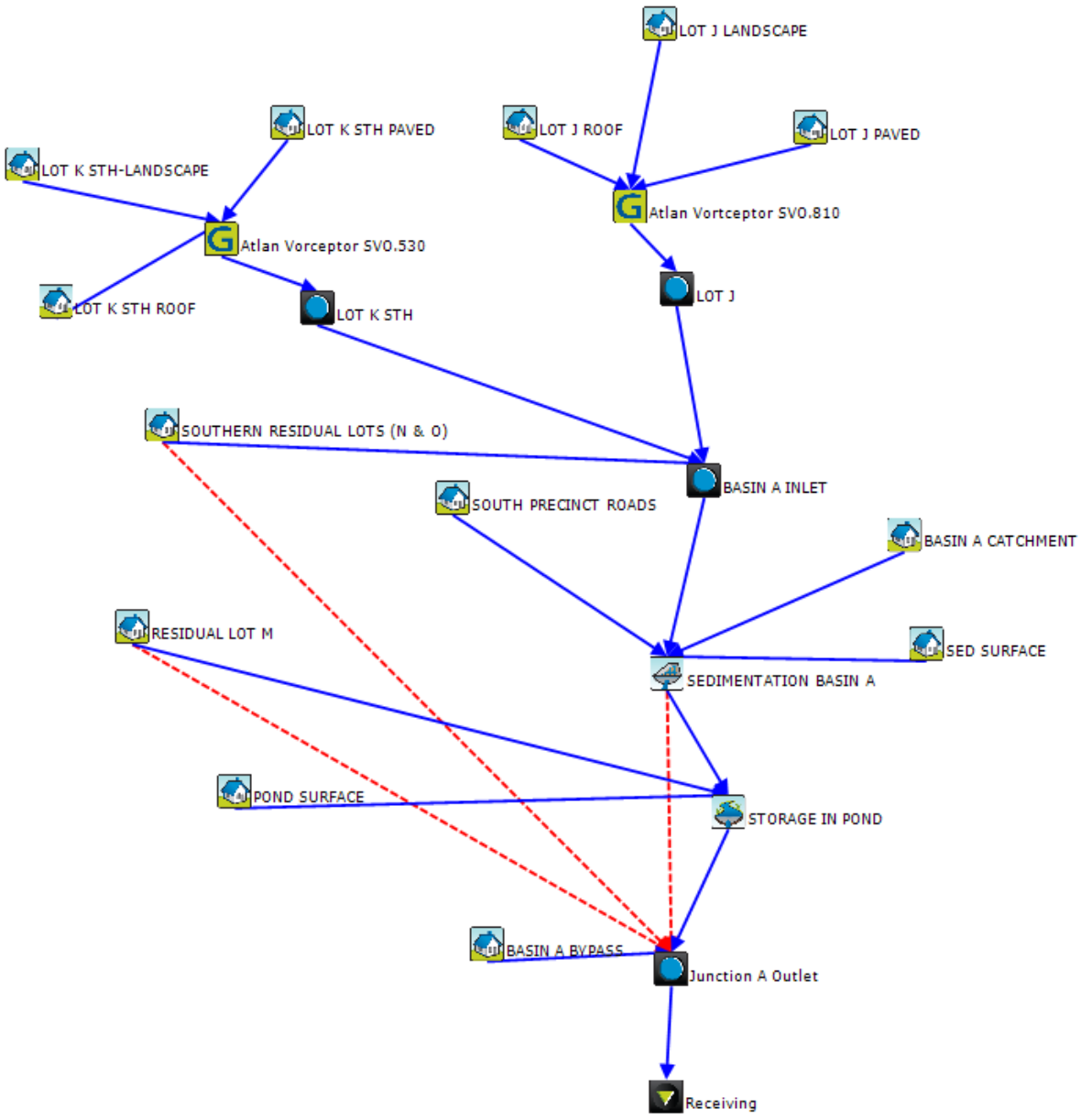


Figure 21 Music Model Southern Catchment – for proposed development stages

Table 19: Summary of MUSIC model and treatment paths – Southern Catchment

Node	Area (ha)	MUSIC node	Node Imperviousness (%)	Treatment Path
SOUTHERN RESIDUAL LOTS	**9.04**	**Urban Industrial (landscape)**	**0**	
LOT N & O	6.20			Sedimentation Basin →storage
LOT M			Varies	
Residual Lot M	2.04		100	storage
Lot M Pond surface	0.80		0	
BASIN A CATCHMENT	0.86	Urban Industrial	20	Sedimentation basin →storage
BASIN A BYPASS	0.12	Urban Industrial	70	No treatment
SOUTH ROADS (incl. part of Lot L)	**1.95**	**Sealed Road**	**80**	**Sedimentation basin →storage**
DEVELOPED LOT J	**12.93**	**Varies as below**		
LOT J ROOF	1.84	Roof	100	Sedimentation Basin →storage
LOT J PAVED	9.15	Sealed Road	100	Sedimentation Basin →storage
LOT J LANDSCAPE	1.94	Urban Industrial	0	Sedimentation Basin →storage
DEVELOPED LOT K (STH)	**3.53**	**Varies as below**		
LOT K ROOF	2.26	Roof	100	Sedimentation Basin →storage
LOT K PAVED	0.92	Sealed Road	100	Sedimentation Basin →storage
LOT K LANDSCAPE	0.35	Urban Industrial	0	Sedimentation Basin →storage
SOUTHERN CATCHMENT	**28.43**			

Note: Areas that changed between MOD 5 and MOD 6 are indicated in red text. Adjustment in area of southern catchment (0.17ha) is to meet Sydney Water requirement for consistency with MRP scheme MUSIC model catchment area to Basin 30.

Sydney Water uses the term 'Paved' in the MRP Stormwater Scheme MUSIC model therefore this has been adopted to avoid confusion between sealed road and hardstand. This node is identified in MUSIC X as Sealed Road and includes surfaces that are neither roof or landscape (Industrial).

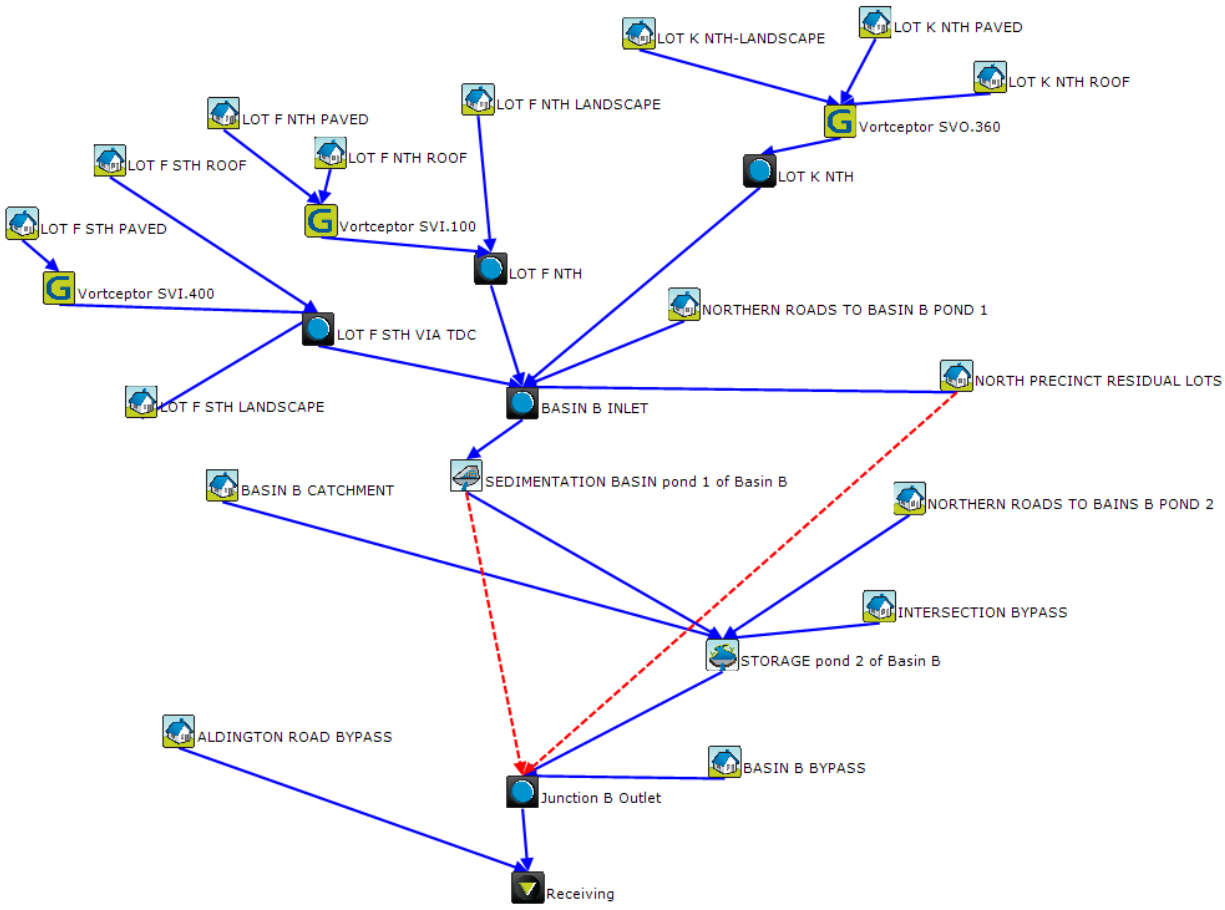


Figure 22 Music Model Northern Catchment – for proposed development

*Table 20: **Summary** of MUSIC model and treatment paths – Northern Catchment*

Node	Area (ha)	MUSIC node	Node Imperviousness (%)	Treatment Path
NORTH PRECINCT RESIDUAL LOTS	**15.89**	**Urban industrial**	**0**	
NORTH PRECINCT RESIDUAL LOTS (A, B, C) Excludes temp CDS on Lot C	10.13	Urban Industrial	0	Basin B pond 1 (sedimentation) pond 2 (storage)
RESIDUAL LOT G excludes temp CDS on Lot G	5.76	Urban Industrial	0	
TOTAL NORTHERN ROADS	**4.65**	**Sealed Road**	**80**	**Varies as below**
NORTHERN ROADS TO BASIN B (02 & half R06)	1.04	Sealed Road	80	Basin B Pond 2 (storage)
ROADS TO BASIN B (R05 /R04)	1.60	Sealed Road	80	Basin B pond 1 (sedimentation) pond 2 (storage)
ROADS TO TRUNK DRAINAGE	2.00	Sealed Road	80	Basin B pond 1 (sedimentation) pond 2 (storage)
DEVELOPED LOT F[1]	**7.84**	**Varies**		
LOT F LANDSCAPE	0.88	Urban Industrial	0	Basin B pond 1 (sedimentation) pond 2 (storage)
LOT F ROOF	5.62	Roof	100	
LOT F PAVED	1.34	Sealed Road	100	
DEVELOPED LOT K (Nth)	**2.68**	**Varies**		
LOT K LANDSCAPE	0.41	Urban Industrial	0	Basin B pond 1 (sedimentation) pond 2 (storage)
LOT K ROOF	1.35	Roof	100	
LOT K PAVED	0.92	Sealed Road	100	
DEVELOPED LOT E	**6.83**	**Varies**		
LOT E LANDSCAPE	0.57	Urban Industrial	0	Via Basin B to Regional Infrastructure Basin 28 & 29 Ropes Creek
LOT E ROOF	4.55	Roof	100	
LOT E PAVED	1.71	Sealed Road	100	
OTHER				
ALDINGTON ROAD/R06 INTERSECTION	0.06	Sealed Road	100	Basin B (storage)
ALDINGTON ROAD BYPASS (future widening - majority verge)	0.61	Urban industrial	5	No treatment (part of PCC Aldington Road upgrade)
LOT D	**5.24**	Urban industrial	**Varies**	**As below**
BASIN B CATCHMENT	1.05	Urban industrial	37	Basin B pond 1 (sedimentation) pond 2 (storage)
BASIN B BYPASS (Regional infrastructure basins 28 and 29)	4.19	Urban industrial	0	No treatment
NORTHERN CATCHMENT	**43.70**			

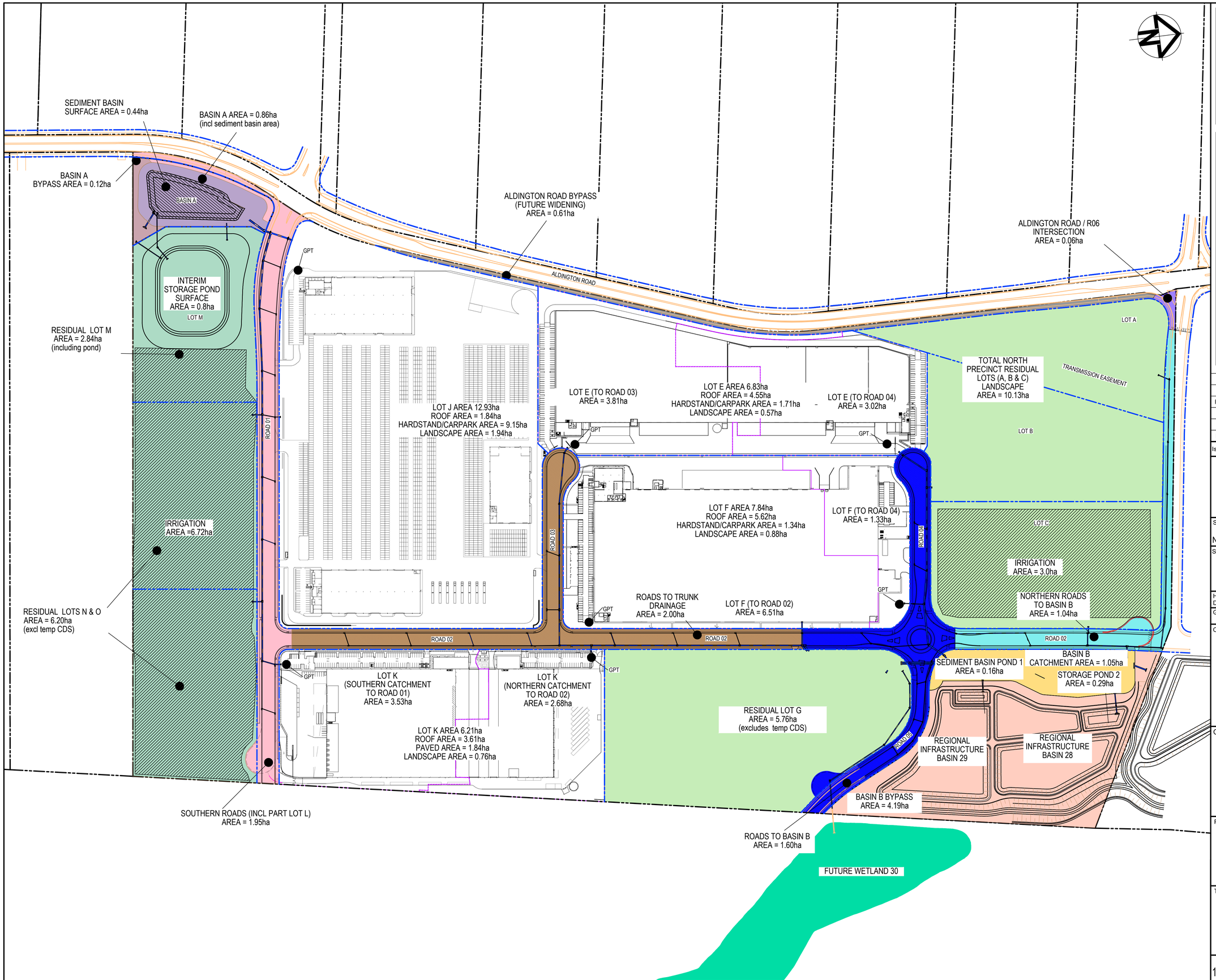
Note: Areas that changed between MOD 5 and MOD 6 are indicated in red text

[1] The split in the MUSIC model is to represent the two discharge points within the northern catchment and two GPTs, although the treatment path is the same for both Lot F to trunk drainage and Lot F to north.

APPENDIX B – SITE LAYOUT

Civil Plans – modified since MOD 5 submission

Sketches
19-609-SKC 228 200 Aldington Road SWMP MOD 6
19-609-SKC 194 - Post development catchment contributions to regional infrastructure



LEGEND

EXISTING
- EXISTING BOUNDARY
- EXISTING EASEMENT

PROPOSED
- PROPOSED BOUNDARY
- PROPOSED EASEMENT
- EXTERNAL FUTURE WORKS

TOTAL SITE AREA: 72.13 ha

SOUTHERN CATCHMENT TOTAL AREA: 28.43 ha
- SOUTHERN RESIDUAL LOTS AREA: 9.04 ha
- TOTAL LOT L (BASIN A EXCL. AREA DRAINING TO ROAD) AREA: 0.98 ha
- SOUTHERN ROADS AREA: 1.95 ha
- DEVELOPED LOT J & LOT K (STH) AREA: 16.46 ha

NORTHERN CATCHMENT TOTAL AREA: 43.70 ha
- NORTHERN RESIDUAL LOTS AREA: 15.79 ha
- TOTAL NORTHERN ROADS AREA: 4.65 ha
- TOTAL LOT D AREA: 5.24 ha
- DEVELOPED LOT F, LOT E & LOT K (NTH) AREA: 17.35 ha

OTHER AREAS
- ALDINGTON ROAD BYPASS AREA: 0.61 ha
- ALDINGTON ROAD / R06 INTERSECTION AREA: 0.06 ha

Issue	Description	Date
P10	AMENDED FOR MOD 6	26-09-25
P9	AMENDED AS PER MRP SCHEME CATCHMENTS	12-08-25
P8	FOR INFORMATION	11-05-25
P7	FOR INFORMATION	23-04-25

0 50 100 150m

1 : 2000 @ A1

Status: FOR INFORMATION
NOT TO BE USED FOR CONSTRUCTION

A1

Scales	1 : 2000	Drawn	JC
		Designed	DF
Height Datum	AHD	Checked	DF
Grid	GDA2020	Approved	

Client: Stockland / FIFECAPITAL

Civil Engineers and Project Managers
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info@atl.net.au

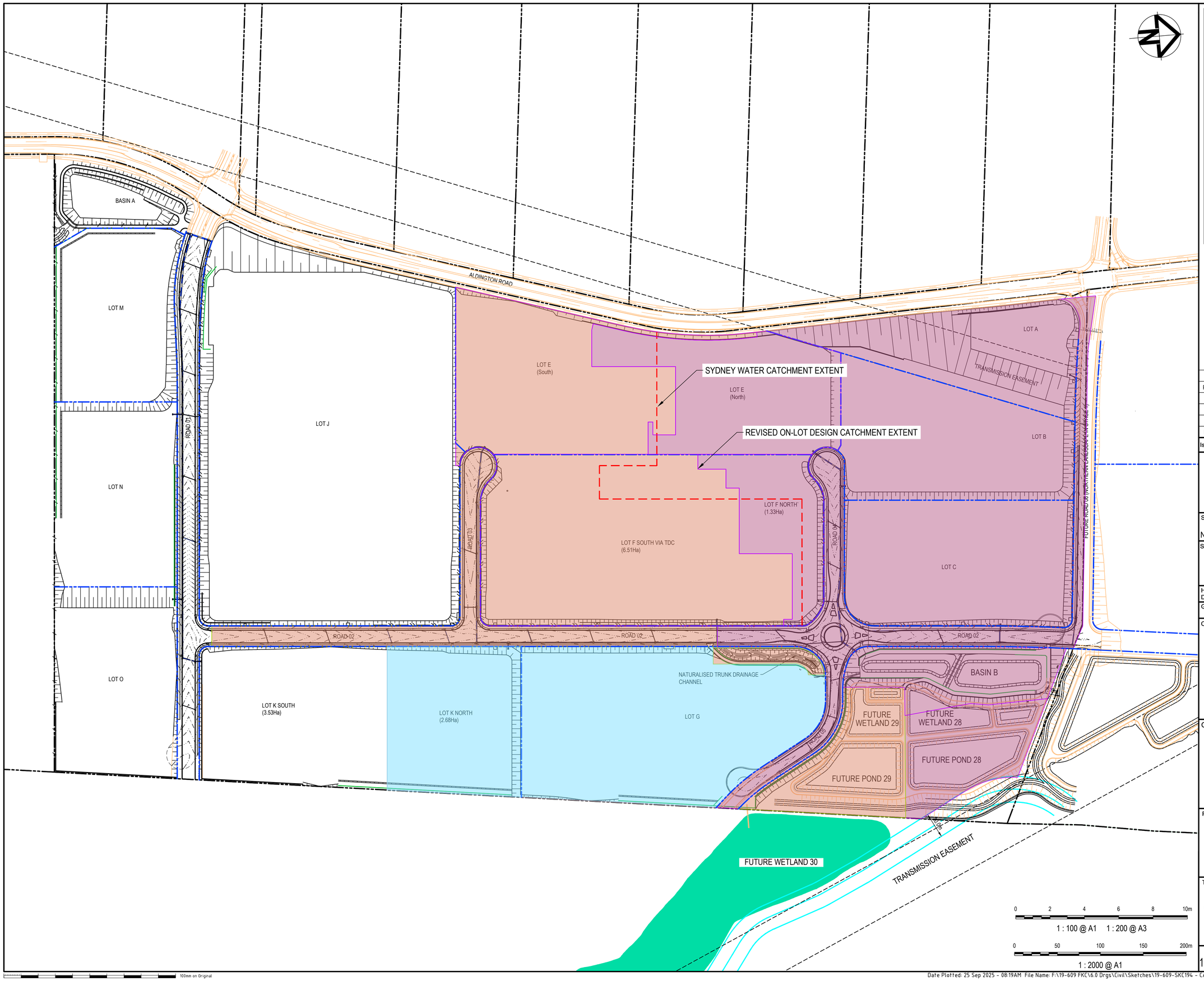
Project
200 ALDINGTON ROAD
INDUSTRIAL
DEVELOPMENT
SSDA10479 MOD 6

Title
STORMWATER MANAGEMENT
AND CATCHMENT PLAN
MOD6 STAGE 1,2,3 & 4

Drawing No.	Project No.	Issue
19-609-SKC228	19-609	P10

100mm on Original

Date Plotted: 24 Sep 2025 - 06:37PM File Name: F:\19-609 FKC\6.0 Drgs\Civil\Sketches\19-609-SKC228 - 200 SWMP & CATCHMENT MOD6.dwg



LEGEND

EXISTING

- EXISTING BOUNDARY
- EXISTING EASEMENT
- 60.0 EXISTING CONTOUR

PROPOSED

- PROPOSED BOUNDARY
- PROPOSED EASEMENT
- 70.25 PROPOSED CONTOUR
- FUTURE WORKS
- INDICATIVE FUTURE TRUNK DRAINAGE AS PER MRP SCHEME PLAN
- CATCHMENT AREA BASIN 30 (8.20Ha) PRIOR TO BASIN 30 CONSTRUCTION THIS CATCHMENT IS DIRECTED TO BASIN B (AND SUBSEQUENTLY POND 29)
- PROPOSED AREA TO BASIN 29 (14.16Ha) APPROVED CATCHMENT (14.19Ha)
- PROPOSED AREA TO BASIN 28 (20.31Ha) APPROVED CATCHMENT (20.28Ha)

Issue	Description	Date
P10	MOD 6 FOR APPROVAL	26-09-25
P9	MOD 5 FOR APPROVAL POST RFI	07-08-25
P8	MOD 5 FOR APPROVAL	11-05-25
P7	MOD 4 FOR APPROVAL	23-10-24
P6	FOR APPROVAL	26-07-24

Status: PRELIMINARY ONLY
NOT TO BE USED FOR CONSTRUCTION

A1

Scales	1 : 2000 1:500	Drawn	NT
		Designed	DF
Height Datum	AHD	Checked	TM
Grid	GDA2020	Approved	

Client: Stockland / FIFECAPITAL

Civil Engineers and Project Managers

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info@atl.net.au

Project

PROPOSED INDUSTRIAL DEVELOPMENT
200 ALDINGTON ROAD
KEMPS CREEK

Title

POST DEVELOPMENT CATCHMENT CONTRIBUTIONS TO FUTURE BASIN 28, 29 & 30 MOD 6

Drawing No.	Project No.	Issue
19-609-SKC194	19-609	P10

100mm on Original

Date Plotted: 25 Sep 2025 - 08:19AM File Name: F:\19-609 FKC\6.0 Drgs\Civil\Sketches\19-609-SKC194 - CATCHMENT CONTRIBUTIONS TO BASIN 29 & 30 MOD6.dwg

APPENDIX C - WSUD MAINTENANCE PLAN (DRAFT)

The shared Water management Strategy elements within the Estate will remain in private ownership. The shared assets will be maintained under the community title through the community association. This includes Lot D and Lot L.

These are draft plans that will need to be updated prior to operation based on final construction details and the maintenance plans should be regularly reviewed and updated as needed, especially if there are changes in regulations, controls or site conditions.

Table C1: Developed Lot GPT maintenance plan

GPT maintenance plan **Location: 200 Aldington Road** **Developed Lots** **SSDA 10479 and SSD varies.**			
Inspection Items	**Frequency**	**Action required**	**Action taken & date**

Visual inspection	3-6 months * or after heavy rain	▪ Inspect
		  ▸ Components
		  ▸ Inlet
		  ▸ Outlet
		  ▸ separation screen
		  ▸ diversion chamber
		▪ Empty filter/bag in accordance with manufacturer instructions
		▪ Record quantity of debris removed and sediment in sump
		▪ Dispose of debris appropriately
		▪ Repair if damaged	

Full dewater and clean	12 months	▪ Full sump pump out, jet screen and sump ▪ Clean behind screen ▪ Visual inspection of vortex separation screen ▪ If sediment has built up in diversion chamber Remove sediment	

Operation and Maintenance Manuals are available for most GPTs, the example used is the SPEL Vortceptor which contains full details and an example of inspection & Maintenance Log. 1370-SPEL-Vortceptor-HH.pdf

Table C2: Sediment Basin maintenance plan

Sediment Basin (interim) Maintenance Plan **Location: 200 Aldington Road** **Lot L (within Basin A)** **Lot D (within Basin B (pond 1)**			
Inspection	**Frequency**	**Action required**	**Action taken & date**
Visual Inspection	Monthly	Inspect condition of the basin, Inspect inlet and outlet structures, Inspect erosion control measures, Assess integrity of berms and liners Measure and record sediment levels	
Sediment Removal	At 25% -50% capacity	Remove sediment taking precautions to not damage structures or liner Dispose of sediment appropriately - in accordance with plan	

Table C3: Irrigation maintenance plan

Landscape Irrigation maintenance plan **Location: 200 Aldington Road** **Residual land utilised for irrigation.** **SSDA 10479**			
Inspection Items	**Frequency**	**Action required**	**Action taken & date**
Irrigation nozzles	12 months	Inspect nozzles Remove and replace damaged nozzles	
Irrigation network	6 months	Check for sign of leaks	
Irrigation Controller	3 months	Check for faults Follow manufacturers instructions	

APPENDIX D – DESIGNER DETAILS

Designer Information

Name: Tim Michel

Title: Technical Director Urban Water Management

Qualification: BE (Civil) BA DipEngPrac CPEng NER (Civil & Environmental)

CPESC N: 11555

AT&L Contact number. 02 9439 1777

APPENDIX E – PCC CHECKLIST

Water Sensitive Urban Design
Development Application Checklist

Site/ Project Name	200 ALDINGTON ROAD INDUSTRIAL ESTATE		
Lot and DP Number:	LOT 200 DP1285691	**DA Number:**	SSD10479

	Information Required with DA Submission:	**Y**	**N**
1	Has a Water Sensitive Urban Design Strategy been submitted as part of the development application?	Y	
2	Is a BASIX Certificate required? If so, Yes - Attach certificate with DA		N
3	Has the digital version of MUSIC and report on the MUSIC model using data prescribed outlined in Council's Technical Guideline been attached? Have stormwater quality retention criteria (TSS 85%, TP 60%, and TN 45%) and water quantity / drainage requirements been met and documented in the WSUD Strategy? If relevant, have the Water Conservation, Quantity and quantity targets been achieved?	Y	
4	Does WSUD Strategy contain the following information? • Review of the **WSUD principles** and ensure that these are considered throughout development of the WSUD strategy. • Confirmation of the **WSUD objectives** that are relevant to the development application. • Confirmation of the **WSUD targets** for potable water conservation, stormwater quality management and stormwater quality management that are relevant to the development application. • Complete a **site analysis** to evaluate the site characteristics that potentially will impact on the feasibility of WSUD for the site. • **WSUD measures** that would be appropriate for the development considering the development scale, site characteristics, stormwater quality management function and stormwater quantity management function. • A **preliminary WSUD strategy** that positions the selected WSUD measures in appropriate locations and arranges the measures in an appropriate series. • **Numerical modelling** utilising MUSIC software to evaluate appropriate sizes of the WSUD measures. • **Concept designs** of the WSUD measures. • **WSUD strategy report** that summarises the methodology and WSUD outcomes, and provide this with the development application for the site.	Y	
5	Have the conceptual plans of the proposed stormwater treatment measures been included on the plans? (Detailed engineering plans will be required for the construction certificate)	Y	

6	Has a Draft Operation and Maintenance Plan which includes details on the following been provided? • Site description (area, imperviousness, land use, annual rainfall, topography etc) • Site access description • Likely pollutant types, sources and estimated loads • Locations, types and descriptions of measures proposed • Operation and maintenance responsibility (council, developer or owner) • Inspection methods • Maintenance methods (frequency, equipment and personnel requirements including Work Health and Safety requirements) • Landscape and weed control requirements • Operation and maintenance costs • Waste management and disposal options, and • Reporting.	Y	

APPENDIX F – SSA Letter Ropes Catchment (Estate northern catchment)

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