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

Stormwater Management Report

STOCKLAND FIFE KEMPS CREEK LIMITED

7/09/2023

19 – 609A

Commercial in Confidence

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05	RFI music areas	07-09-23	Darren Galia	☒	☒

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1. Executive Summary

This report has been prepared to support the State Significant Development Application for Stage 1 of the development known as 200 Aldington Road Industrial Estate located in, Kemps Creek.

The site 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).

1.1. Summary Stage 1 SSD 10479 approved on 5 May 2023

- A concept masterplan and
- Detailed consent for progressive delivery of site preparation, earthworks and infrastructure works (i.e., Stage 1 works) on the site, including:
  - Demolition and clearing of all existing built form structures.
  - Drainage and infill of existing farm dams and any ground dewatering.
  - Clearing of existing vegetation.
  - Subdivision of the site into 15 individual lots.
  - Construction of a warehouse building (on Lot F) with a total of 50,300 sqm of GFA, including:
  - 47,800 sqm of warehouse GFA.
  - 2,500 sqm of ancillary office GFA.
  - 221 car parking spaces.
  - Bulk earthworks including 'cut and fill' to create level development platforms for the warehouse buildings, and site stabilisation works (if required).
  - Roadworks and access infrastructure, including an interim access road and a temporary junction with Aldington Road.
  - Stormwater works including stormwater basins, diversion of stormwater.
  - Utilities services including sewer and potable water reticulation.
  - Road and boundary retaining walls.

This is a stand-alone report and supersedes the previous civil reports and supplementary information prepared for the original development application and subsequent response to submissions.

1.2. Stormwater Management Results

This report demonstrates that the stormwater management strategies implemented for this development will be 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. It has been prepared in accordance with the Technical Guidance for Achieving Wianamatta-South Creek stormwater management targets.

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 72.11 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.

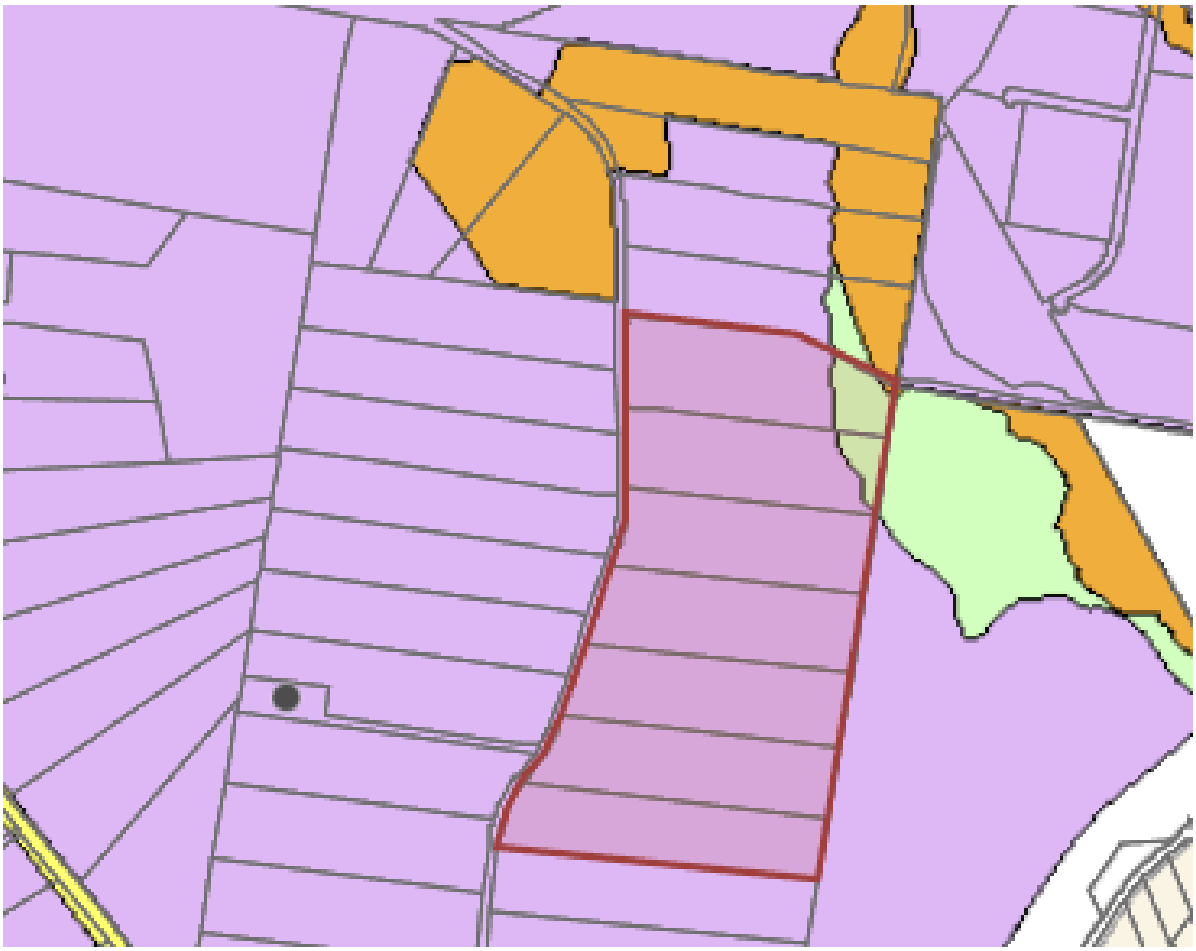


Figure 1 – Site Location

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. Farms Dams and Aquatic Habitat

Within the study area, there are a total of eleven farm dams. The majority of these dams have limited riparian and/or fringing vegetation, resulting in poor aquatic habitat quality. Additionally, the environment in this area has been significantly modified, leading to altered flow paths of waterbodies and watercourses. It should be noted that the watercourses in the north-eastern part of the site do not accurately represent their original flow patterns.

2.1.2. 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.

2.1.3. Conservation Measures:

In the north-eastern corner of the site, the existing farm dams and the watercourse identified in the Mamre Road Development Control Plan (DCP) are being preserved. These features will be accompanied by vegetated riparian zones, as outlined in the proposed Vegetation Management Plan. For further details, please refer to the waterways plan presented in Figure 3, extracted from the Riparian Report Plan prepared for the site.

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

2.1.4. Environmental Assessment Report after CPCP by Narla

Narla conducted an environmental assessment in November 2022. This assessment evaluates the potential environmental impacts of the proposed development and provides recommendations for mitigation and management strategies. The full details of the assessment can be found in the accompanying SSDA.

The land subject to development is land that is certified urban capable under the CPCP.

2.1.5. Retained Farm Dams Geotechnical Report by ADE

The Geotechnical Report on Retained Farm Dams, prepared by ADE (2022), focuses on the safety of the retained dam and the adjacent dam wall located on the property to the south. Based on initial geotechnical investigations, it has been determined that these structures are considered safe. However, ongoing monitoring is recommended to ensure their continued safety. The downstream land use is classified as Environmental Protection Land (C2), which helps mitigate the associated risks of these dams.

2.1.6. Infrastructure Design and Impact on Watercourse

The infrastructure associated with the development has been designed to minimise alterations to the first-order stream. It ensures that discharges from the development largely follow the pre-development discharge locations. However, there are two exceptions to this. An area of 5.334 ha of which used to discharge eastward, now flows northward to Basin B and eventually reaches the same waterway. Additionally, an area of 5.614 ha to the southwest of the site, which previously discharged under Aldington Road to the west, is now directed to Basin A before being discharged southward.

2.1.7. Cumberland Plain Conservation Plan Status of the Land Subject to Development

The land subject to development has been certified as urban capable under the Cumberland Plain Conservation Plan (CPCP). This certification indicates that development can proceed without further State biodiversity approvals.

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. We note that Basins B is located in a moderately saline area and will subject to further testing to confirm suitability for harvesting and irrigation. Furthermore, the soils pose no significant aggression to concrete and steel. Management controls including preparation of a Salinity Management Plan have been recommended 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.

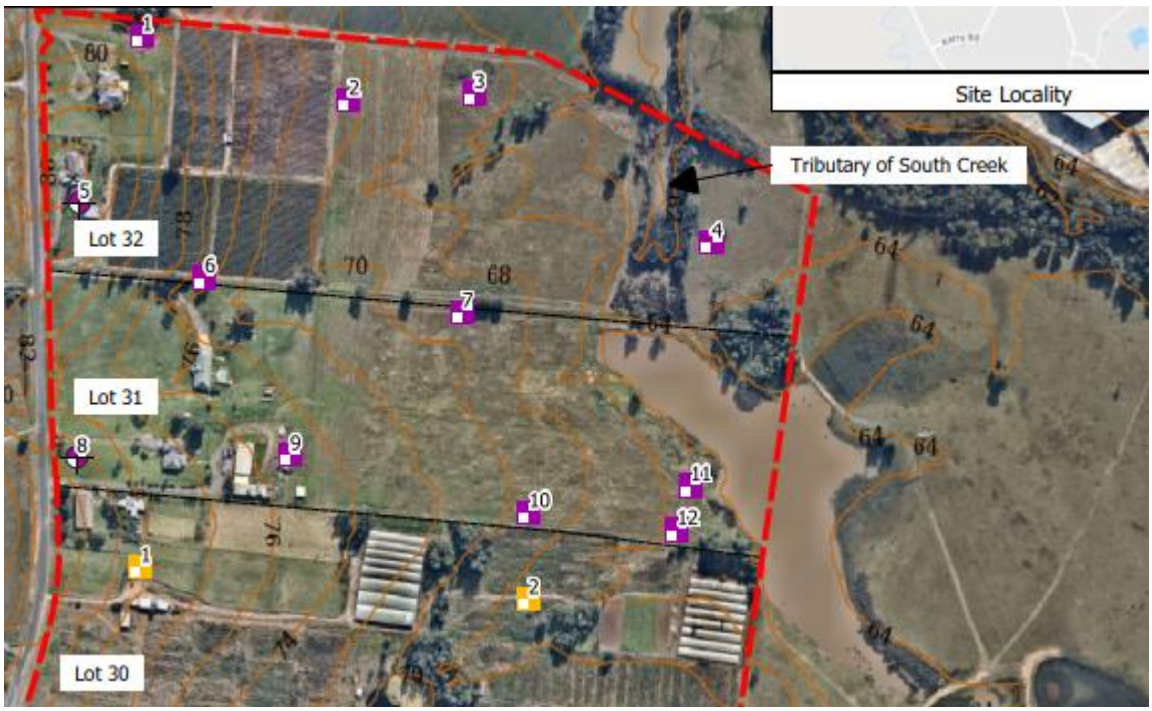


Figure 4 Test Pit locations (Extract from Geotechnical and Groundwater Summary Report, DP, 2019)

2.4. Topography

The existing site is approximately 72.11Ha and comprises of internal catchments that drain to the north, east, south, and west. Additionally, there is a minor external catchment entering the site in the northwest corner with an area of 3.93Ha. The pre-development stormwater catchment plan is shown in Figure 7.

The highest elevation within the site is located in the southern region, ranging from approximately RL 75.5m to RL80.5m. Another high point is situated in the north-western corner. The northern portion of the site drains towards the northern and eastern boundary, ultimately reaching the existing dam via the first order watercourse. The southern portion of the site drains towards the western side of the southern boundary and an existing swale/dam located on the adjacent property to the south. Additionally, a small portion of the site drains westwards towards Aldington Road.

2.5. 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

The development site is split into four catchments and an external catchment 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

2.6. Indicative Trunk Drainage Paths

The indicative trunk drainage paths, as outlined in the Development Control Plan (DCP), are depicted in Figure 6. Please refer to the highlighted yellow section for the site representation extracted from the DCP.

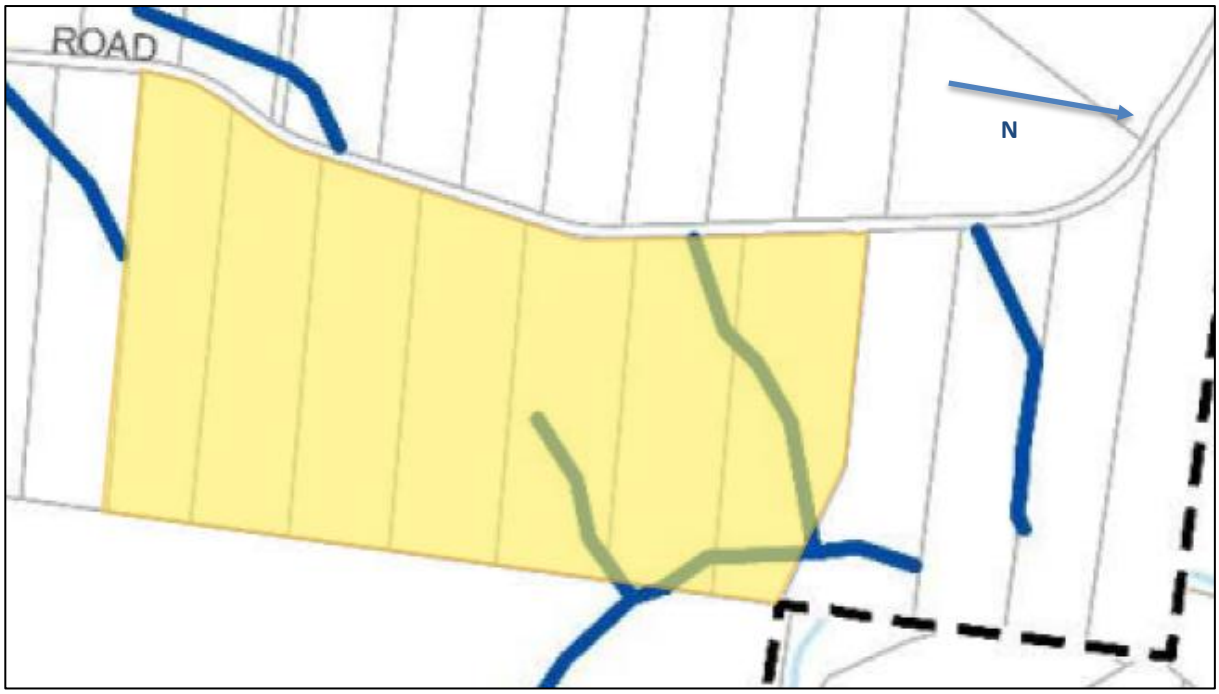


Figure 6 Indicative trunk drainage paths (N.T.S)

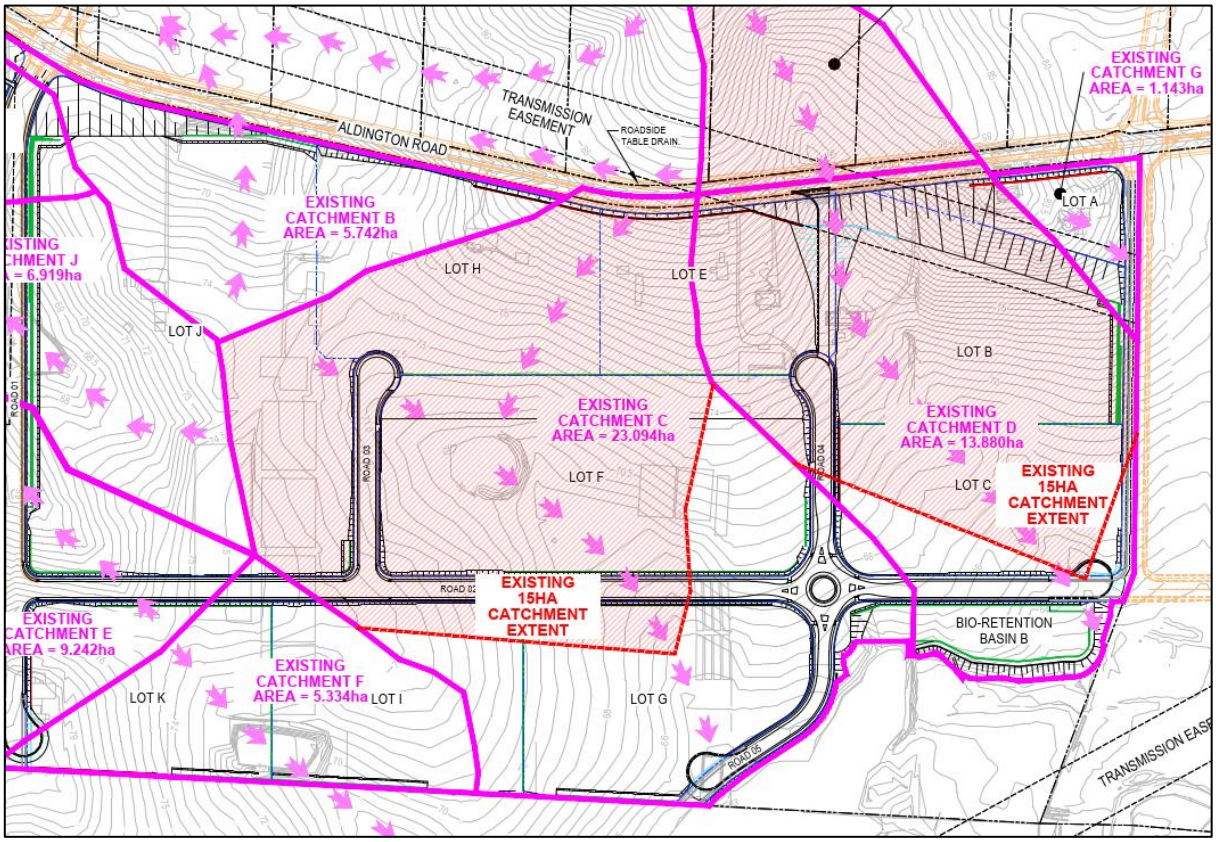


Figure 7 Catchment areas (15ha catchment thresholds – based on 19-609 C1081)

As shown in Figure 7, Catchment D in the north of the site meets the 15 hectare trunk drainage threshold specified in the DCP to the immediate west of Road 02 (alignment north south). Sydney Water has agreed that only once this is on the east side of Road 02, this trunk drainage channel must be naturalised. The detailed design and construction of this channel will need to be coordinated with the proposed Mamre Road Precinct Stormwater Scheme (MRPSS) infrastructure identified within Lot D.

Catchment C, situated in the central/east of the of the site, also meets the 15 hectare trunk drainage threshold to the east of Road 2. Originally it was proposed to be piped within private land (Lot G) in accordance with the Control 16 of MRP CCP Trunk Drainage Infrastructure. However, in December 2022, Sydney Water advised that this trunk drainage component must be a naturalised trunk drainage channel. This is now included in the design and the channel runs parallel to Road 02 until it reaches Road 05, where it is piped into the on-site detention system (OSD).

3. Proposed Development

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

Consent has been granted for the concept masterplan and stage 1:

The 200 Aldington Road Estate concept masterplan showing the ultimate developed Estate is presented in Figure 8 and is subject to future development approvals for each of the buildings that is not within stage 1.

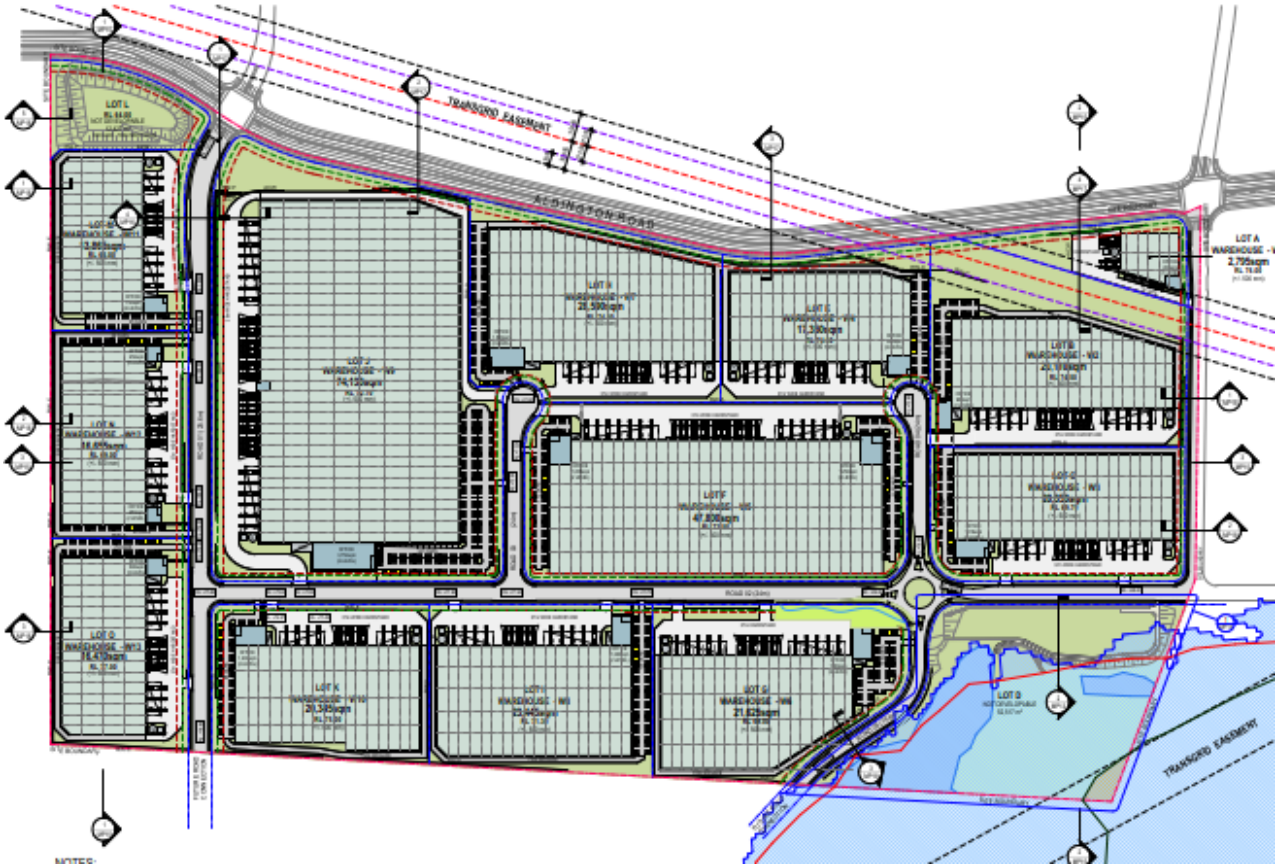


Figure 8: 200 Aldington Road Industrial Estate Concept Masterplan

3.1. Stage 1 Development

The proposed Stage 1 Development incorporates two key components:

1. Estate works across the site.

2. Development of Warehouse on Lot F, including on-lot works, infrastructure and landscaping.

The proposed Stage 1 works are detailed below in Table 2.

Table 2: Proposed Stage 1 Works

Element	Description
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 and the other at the southern limit of the site. ■ Installation of runoff volume reducing measures including irrigation. **Utilities and Services** ■ Construction of utility service infrastructure to provide water, sewer, electricity, and telecommunications services within the site.
Stage 1 – Development (Lot F Warehouse 5)	**On Lot Works** ■ 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 (7.37 ha) comprising 47,800 m^2 of warehouse 5, 2,500 m^2 of offices, 221 parking spaces and associated hardstand loading areas.

A plan showing the extent of works under Stage 1 is presented in Figure 9.

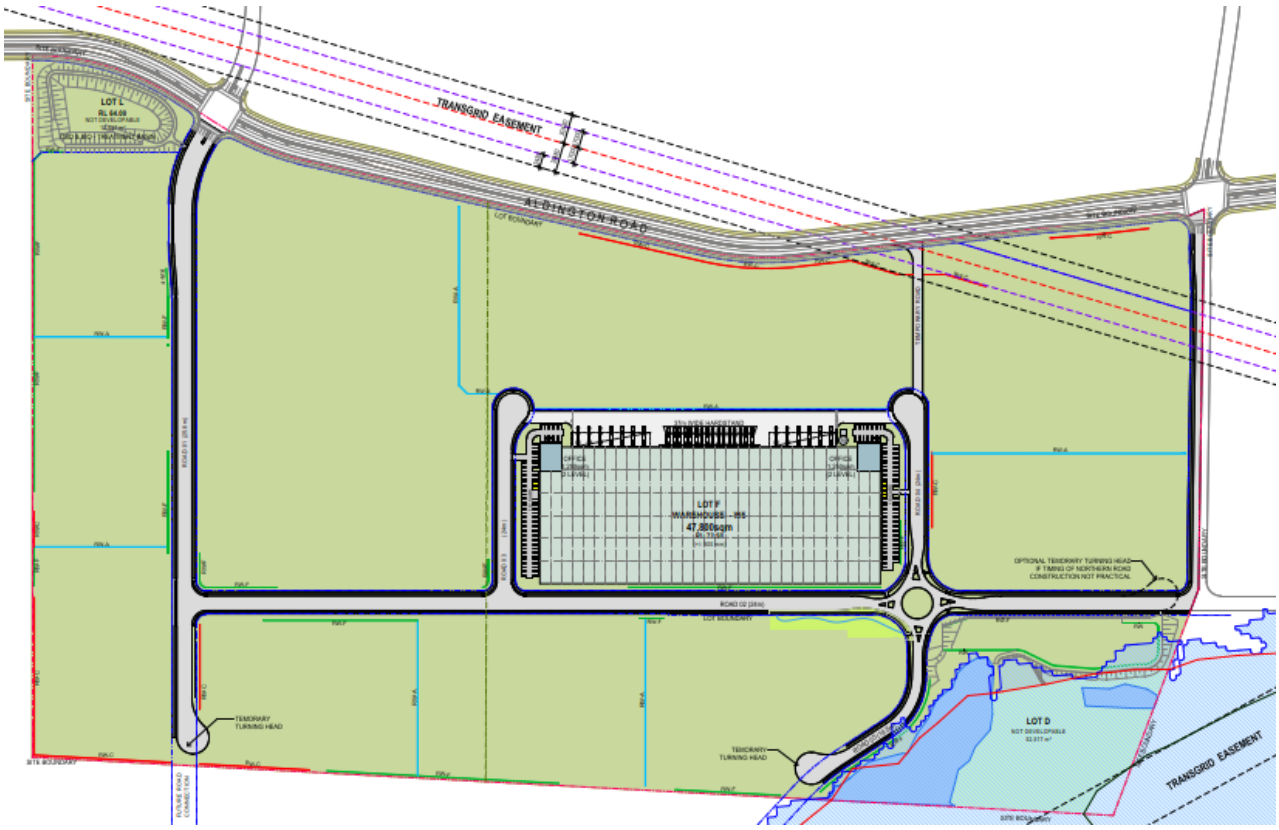


Figure 9: Stage 1 Estate Works Plan

3.2. Post development Catchment Delineation

Catchment delineation of the site under post-development conditions is presented in Figure 10.

Figure 10: 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 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 3.

Table 3: Internal and external catchments under post-development conditions

Catchment ID	Area (ha)	Description / Discharge Location
CAT 1	27.890	Road 01 and Lots J - O conveyed to Basin A which outlets to a culvert and channel on the southern property.
CAT 2	39.385	Roads 02 – Road 05, 50% of Future Northern Road, trunk drainage and Lots A – I discharge to Basin B which outlets to the riparian corridor in the north eastern portion of the site.
CAT 3	-	Formerly catchment 3 in predevelopment. No longer considered an independent catchment.
CAT 4	4.178	The riparian corridor in the north-eastern portion of the site no development is proposed in this area.
CAT 5	3.669	An external catchment flows along TransGrid easement to south of northern road (within private property). Discharges north of basin B to an outlet where it can flow overland to enter the waterway in the north-east. Eventually this will be a natural trunk drainage channel, anticipated to be constructed in conjunction with wetland /pond 28 and 29.
CAT 6	0.652	Land to be dedicated to PCC for the widening of Aldington Road.
Total	72.113	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 basins will treat low flows prior to discharge from the Site. Further details of the proposed basins are outlined in **Section 5.2.2.**
- Two detention basins, designed to attenuate peak flows as required by the Mamre Road Precinct DCP and PCC are satisfied. Further details of the proposed basin are outlined in 5.2.4

Alternative bypass routes have been provided for external catchments.

The catchments contributing to each the Sydney Water proposed wetlands is depicted in Figure 11 an extract from SKC194, where grey catchment contributes to wetland 29, and blue catchment to wetland 30.

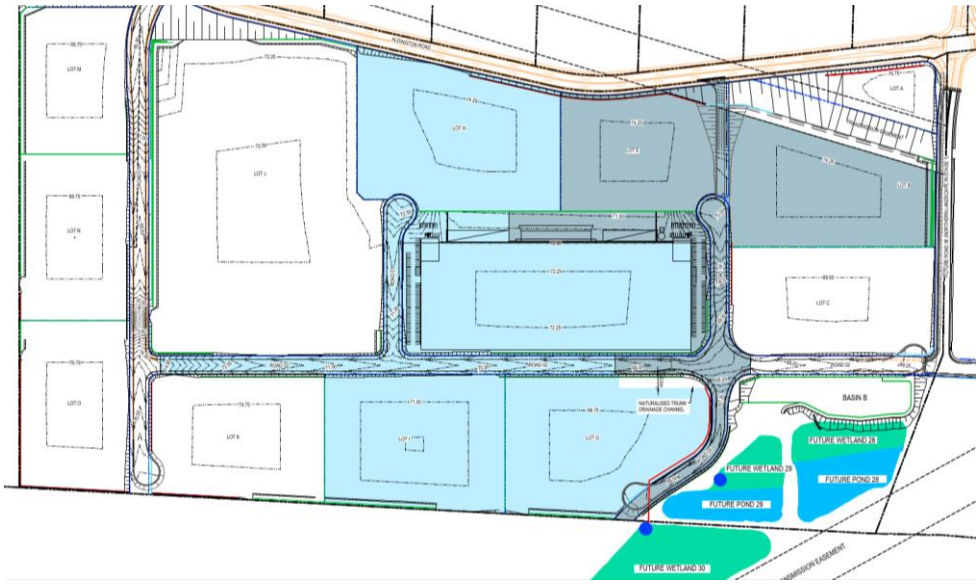


Figure 11: Post Development Catchment Contributions to Pond 29 and 30

3.3. Water Sources and Demands

3.3.1. Water Requirements

Water requirements within the 200 Aldington Road Industrial Estate will be typical of large format warehouses. Sources of demand for water within the proposed allotments and public domain will include:

- Office amenities (kitchen, bathrooms)
- Landscape irrigation
- Dust suppression (depending on end user requirements)

3.3.2. Water Sources

The primary source of water to the 200 Aldington Road Industrial Estate is via connection to Sydney Water's potable water and recycled water reticulation network. Details of proposed infrastructure to service the estate are presented in the Civil Infrastructure Report by AT&L.

3.3.3. Water Use Minimisation

Sydney Water provides a wide range of advice and guidance relating to water use minimisation and water efficiency. Whilst warehouses and distribution centres are relatively low water users in comparison to other industrial users, the following water use minimisation principles will apply to development within the Estate:

- **Avoid using water** where possible, such as sweeping hard surfaces instead of washing them.
- **Reduce water use** by installing water-efficient appliances and equipment (e.g., toilets, urinals, shower heads).
- **Reuse water** from manufacturing or cooling processes to toilet flushing, landscape irrigation and dust suppression.

3.4. Connection to Sydney Water Future Stormwater Infrastructure

3.4.1. Treatable flows to future wetlands

The ultimate stormwater management solution for the site is to connect to the Sydney Water designed and operated MRPSS. The developer is in discussion with Sydney Water on the design of this solution. The layout and configuration of the stormwater discharges from Basin B have been amended post SSD approval to achieve the conditions of consent. Specifically, the Trunk Drainage condition B14, which specifies treatable flows to wetlands within the future MRPSS (Figure 12 and SKC194). Refer to Table 4 for an extract of the requirements.

Table 4: EDD levels for identified wetlands

Total Catchment Area to Wetland	Local Catchment Area to Wetland	Local – Total Catchment Ratio	Wetland ref #	EDD level (mAHD)	Treatable flow rate (m^3/s)	Proportional reduction in flow rate (m^3/s)	Location of discharge
33.55	21.14	0.67	28	63.48	1.501	1.0[1]	Basin B
9.56	9.56	1.00	29	64.21	0.581	0.58	Basin B
75.96	20.98	0.28	30	64.61	4.722[2]	1.30	Low flow pipe from trunk drainage channel

1. SW Basin Details and Scheme 25/01/23 identifies the catchment area for wetlands 28 + 29 as 43.11ha, note some of this is from other sites. 9.56ha is sent to Wetland 29, via Basin B and the remainder 10ha goes to Wetland 28.

2. Treatable flow rate for the full 75.96 Ha catchment area contributing to Wetland 30 (based on SW Basin Details and Scheme 25/01/23).

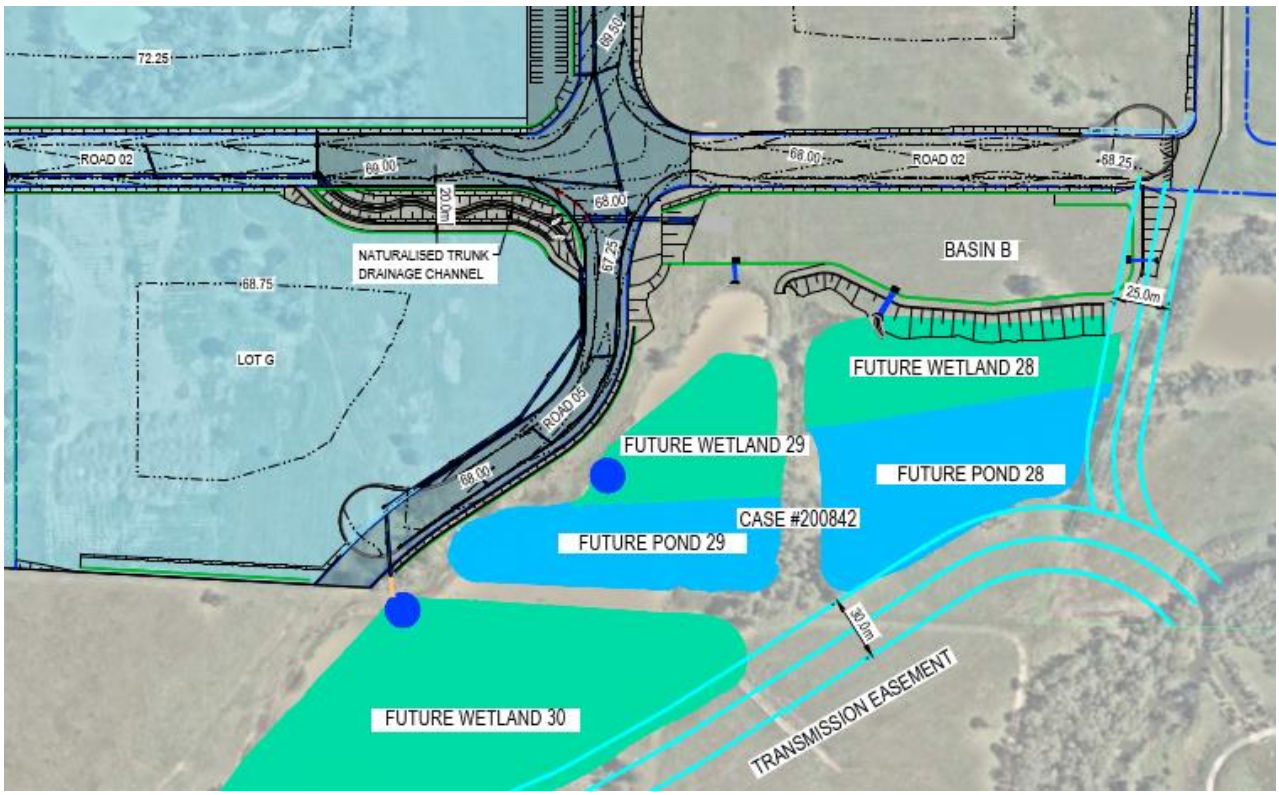


Figure 12 Proposed Sydney Water MRP Stormwater Scheme wetlands in proximity (extract from SKC194)

3.4.2. Wetland 28 and Wetland 29

The Basin B outlet strategy has been developed to provide connection to future stormwater infrastructure, enable the diversion of necessary flows to Wetland 28 and Wetland 29 (Figure 12 and SKC194) 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 SKC205-206) 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.

The maximum flow rate to Wetland 28 and Wetland 29 is 1.060 m^3/s and 0.356 m^3/s respectively. These flow rates are lower than the treatable flow rate nominated in Condition B14 of the conditions of consent due to the Penrith City Council flow attenuation requirements. The remainder of the flows are attenuated within Basin B and are conveyed to the future natural trunk drainage channel to the north. Refer to Section 5.2.4 for further information regarding the attenuation of flows in Basin B.

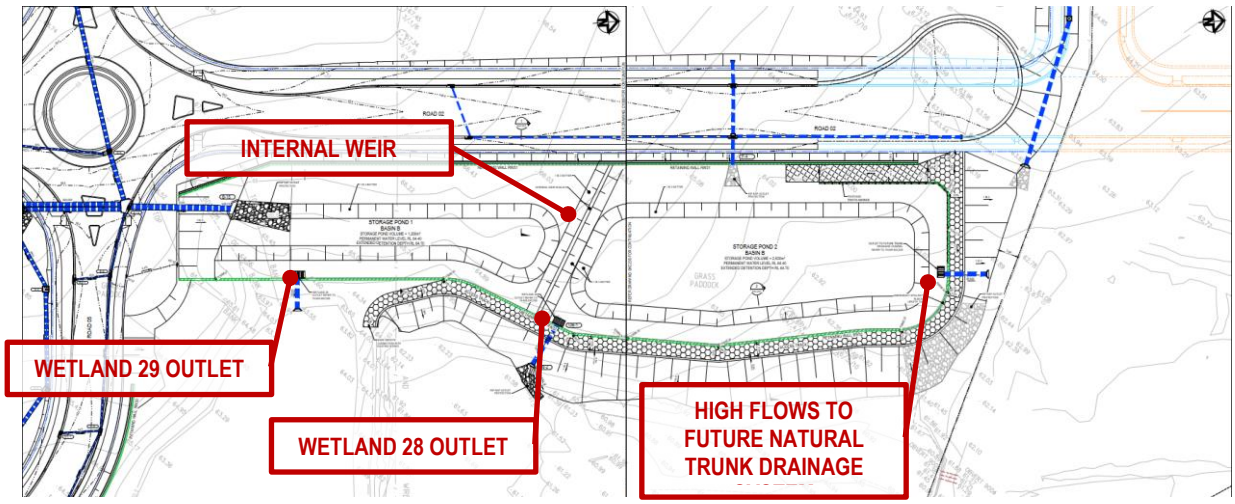


Figure 13: Wetland 28 and 29 Diversion system (extract from SKC 205-206)

3.4.3. Wetland 30

A low flow diversion pipe has been designed to redirect low flows to Sydney Waters Wetland 30 in the future. However, during the interim period, 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 allow 1.50 m^3/s to enter the Wetland in the 1EY. 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.

The detail of this design is included in Appendix B.

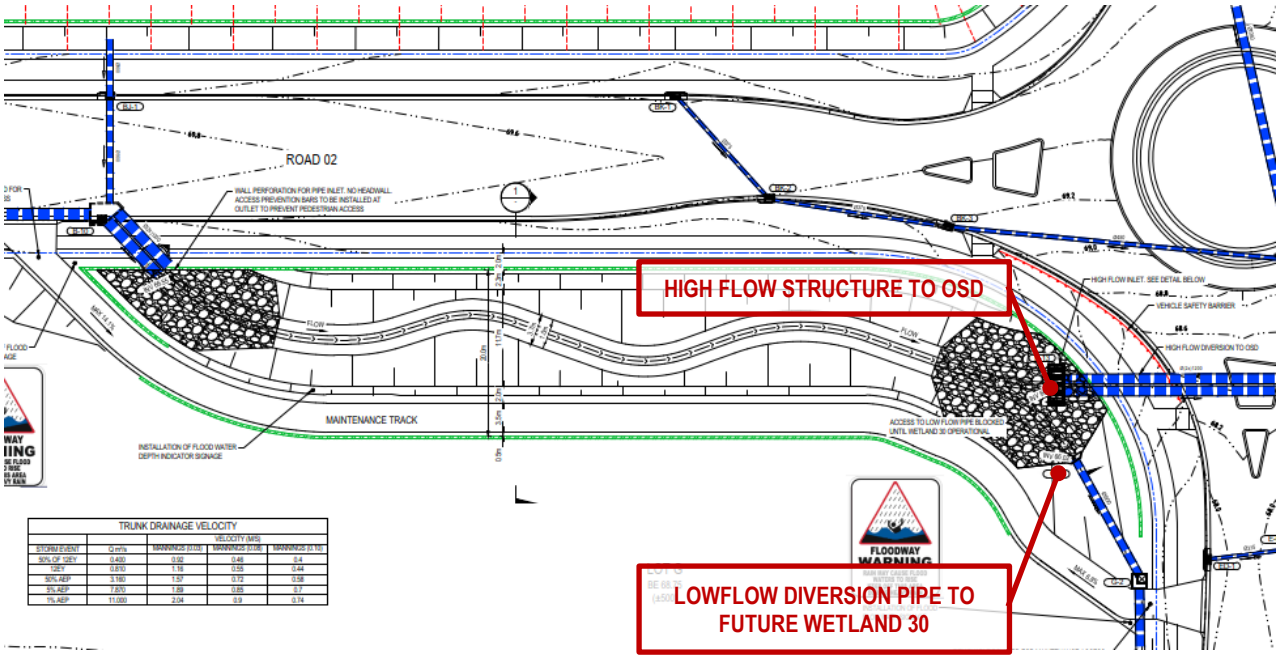


Figure 14: Wetland 30 Diversion system. (refer SKC 202 for details)

4. Stormwater Targets

The Mamre Road 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 a CPESC at EMM for the Site.

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 5**.

Table 5: 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 6**.

Table 6: 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 onsite detention 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 Stage 1 development. The key elements of this Strategy are presented on 19-609-SKC180 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 Stage 1 are summarised in **Table 7**. The strategies implemented are dependent on the Sydney Water Stormwater Scheme:

The interim strategies are applicable during the period that the MRP Stormwater Scheme is not constructed whilst the ultimate strategies are to the implemented once the MRP Stormwater Scheme is constructed.

Table 7: Summary of options to address stormwater quality and flow management targets for Stage 1

Measure	**Stage 1** (refer to drawing 19-609-SKC180)
	INTERIM – BEFORE MRP STORMWATER SCHEME IS OPERATIONAL
Rainwater tanks (for non-potable reuse)	▪ Rainwater tanks on proposed Lot F to meet at least 80% demand for non-potable water (toilet flushing and landscape irrigation). This is an interim measure until the MRP SW scheme is operational and the recycled water network is connected.
Trunk Drainage Swale	▪ The low flow channel component of the trunk drainage swale will temporary provide treatment in the interim until the ultimate scheme is active.
Stormwater harvesting pond and irrigation of undeveloped lots	▪ Stormwater harvesting pond integrated into OSD Basin B with an irrigation area proposed on an undeveloped lot. The storage pond area is below the depth of the OSD.
GPT and Bioretention	▪ GPTs upstream of OSD Basin A, small area of bioretention within basin A
	ULTIMATE – WHEN MRP STORMWATER SCHEME IS OPERATIONAL
Wetlands with integrated sediment ponds for stormwater treatment	▪ Wetlands 28, 29 and 30 are to be design and constructed by or on behalf of Sydney Water. Low flows from the site are to be diverted to these wetlands as required by the consent conditions.

5.1.2. Stormwater Quantity Management Measures

Two detention basins are proposed within the Estate to satisfy the stormwater quantity targets for the Site. A summary of onsite detention information is provided in **Table 8**.

Table 8: Summary of onsite detention measures.

Basin Location	**Base Area (m^2)**	**Top Area (m^2)**	**Basin Depth (m)**
Basin A	3,700	7,200	2.0
Basin B	8,500	10,500	1.0

5.2. Proposed Water Management Measures

A general description of the proposed stormwater treatment train components is presented in the following sections.

5.2.1. Rainwater Tank

A temporary rainwater tank is provided on Lot F to help satisfy the Wianamatta-South Creek stormwater management targets within stage 1. This rainwater tank will be utilised until the MRP stormwater scheme is operational, at which point it will be disconnected.

The following assumptions have been made:

- Non-potable demand for toilet flushing has been based on 15L per person per day, at a rate of 25 persons per hectare of warehouse roof.
- Non-potable demand for landscape irrigation has been based on 50% of the total on-lot landscape area (7,310m^2) being irrigated at a rate of 600 millimetres per year (equivalent to 6 ML/ha/yr).
- 80% of the warehouse roof area would drain to the rainwater tank (or multiple tanks if required based on configuration of roof guttering and downpipes). If a proportion of the roof cannot drain to a rainwater tank, the tank volume would be increased to satisfy the 80% non-potable supply requirement. This would be confirmed during detailed design.
- A rainwater tank volume of **50 kL/ha** of roof was used to initially estimate volume requirements.

A summary of the rainwater tank volumes adopted in MUSIC is presented in **Table 9**.

Table 9: Rainwater tank volumes adopted in MUSIC.

Lot	Roof area to rainwater tank (ha)	Non-potable demand in toilets (kL/day)	Non-potable irrigation demand (ML/year)	Adopted rainwater tank volume (kL)	Irrigation area (m^2)
Lot F	3.924 (80% of 4.905)	1.84	2.19	250	3,655

5.2.2. Interim Storage Pond for Stormwater Harvesting and Reuse

As an interim measure to satisfy the stormwater flow volume targets an area below the level of the OSD provided in Basin B will be used to store water for irrigation hence reducing runoff volume from the Site. 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 area, below the OSD volume is summarised below in **Table 10**. This pond will only be required as an interim measure, until the ultimate Sydney Water management strategy is delivered.

We note that Basin B is located within a high salinity area. Water is to be measured in the basin as part of the harvesting scheme to ensure suitable levels for reuse for irrigation.

Table 10: Pond parameters for Stage 1

Parameter	Stage 1 Pond B (storage pond area)
Inflow from:	Lot A, B, C, E, G, H, I (undeveloped), Lot F (developed)
Surface area (m^2)	4,500
Permanent pool volume (m^3)	3,810
Exfiltration rate (mm/hr)	0
Evaporation loss (% of PET)	100

Parameter	Stage 1 Pond B (storage pond area)
Extended detention depth (m)	0.30
Outlet (equivalent pipe diameter)	300
Reuse Rate (mm/ha/yr)	600 [1]
Adopted reuse (m3/yr)	5,800 [2]
Area for irrigation (m^2)	9,700m2 plus buffer

. [1] Applied as Monthly Pattern as per MUSIC Modelling Toolkit, not at 50% as no lost area on the undeveloped lot. [2] Applied to undeveloped areas

The pond and associated irrigation systems would need to 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 pump system to transfer water from the pond to the irrigation area.
- Stormwater treatment measures, will 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, thus limiting exposure to irrigation.

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.

5.2.3. Interim Bioretention in Basin A for Flow Duration Control

An interim bioretention will be located within Basin A to ensure the Flow Duration targets are achieved for the catchment discharging to the south. Bioretention systems provide treatment through a combination of physical, chemical, and biological processes. These systems are designed to capture, treat and infiltrated stormwater runoff, effectively removing pollutants. This bioretention system will only be required as an interim measure until the Sydney Water treatment measures are constructed downstream. Key parameters adopted for the ponds are summarised below in Table 11.

Table 11: Bioretention Parameters

Parameter	Stage 1 Basin A
Inflow from:	Lot J, K, M, N, O (undeveloped)
Extended Detention Depth (m)	0.3
Surface area (m^2)	700
Saturated Hydraulic Conductivity (mm/hr)	100
Filter Depth (m)	0.5
Lined (Y/N)	Y
Submerged Zone Depth (m)	0.3
Discharge Location	Natural Trunk Drainage Channel (south)

5.2.4. 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 to be integrated with storage ponds to service the Stage 1 works.

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 12.

Table 12: OSD parameters for Stage 1

Parameter	Stage 1 Basin A	Stage 1 Basin B
Inflow from:	Lot J, K, M, N, O (undeveloped)	Lot A, B, C, E, G, H, I (undeveloped), Lot F (developed)
Base Surface area (m^2)	3,700	8,500
Top Surface area (m^2)	7,200	10,500
Depth (m)	2.0	1.0
Volume Required (m^3)	7,560	8,220
Outlet:	Natural Trunk Drainage Channel (south)	Natural Trunk Drainage Channel (north), Wetland 28, 29, 30

5.2.5. GPTs for Basin A

In accordance with the Sydney Water MRP SWS Design Guidelines a GPT should be placed at the point of discharge from the site (or prior to OSD if this is located downstream) and upstream of a wetland. As Basin A is the OSD prior to the southern discharge from the site GPTs have been located upstream of Basin A.

GPTs have not been provided on Basin B as there are wetlands downstream in the ultimate and the GPTs are not necessary to achieve the water quality targets in the DCP, in the interim case.

5.2.6. Trunk Drainage Swale

A component of the trunk drainage swale is considered to have treatment function for low flows up to the 2EY. Water Depths are wholly contained within the low flow channel for these flow rates with the following depths:

4EY Water Depth = 0.37m

2EY Water Depth = 0.46m

It is anticipated that flow rates exceeding the 2 EY will overtop the low flow banks into the high flow banks. Both area are proposed to be vegetated in accordance with the Sydney Water Infrastructure Design Guidelines. Refer to Figure 15 for a diagrammatic representation of the water levels.

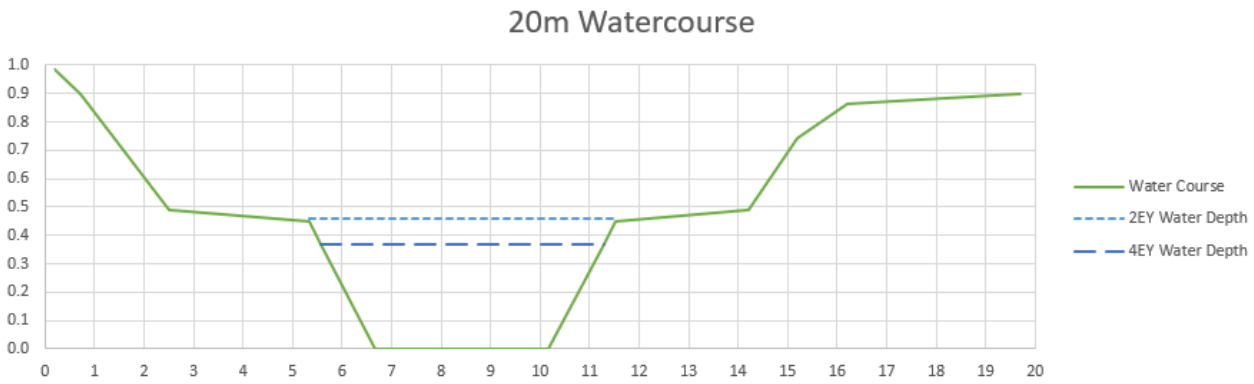


Figure 15: Frequent Flow Water Depths

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 13 for the following hydrological parameters adopted to establish predevelopment and post development flow rates.

Table 13: 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] Value are based on Hortons Losses from DRAINS and is typical for similar catchments.

Refer to Figure 16 for the DRAINS hydraulic setup configuration.

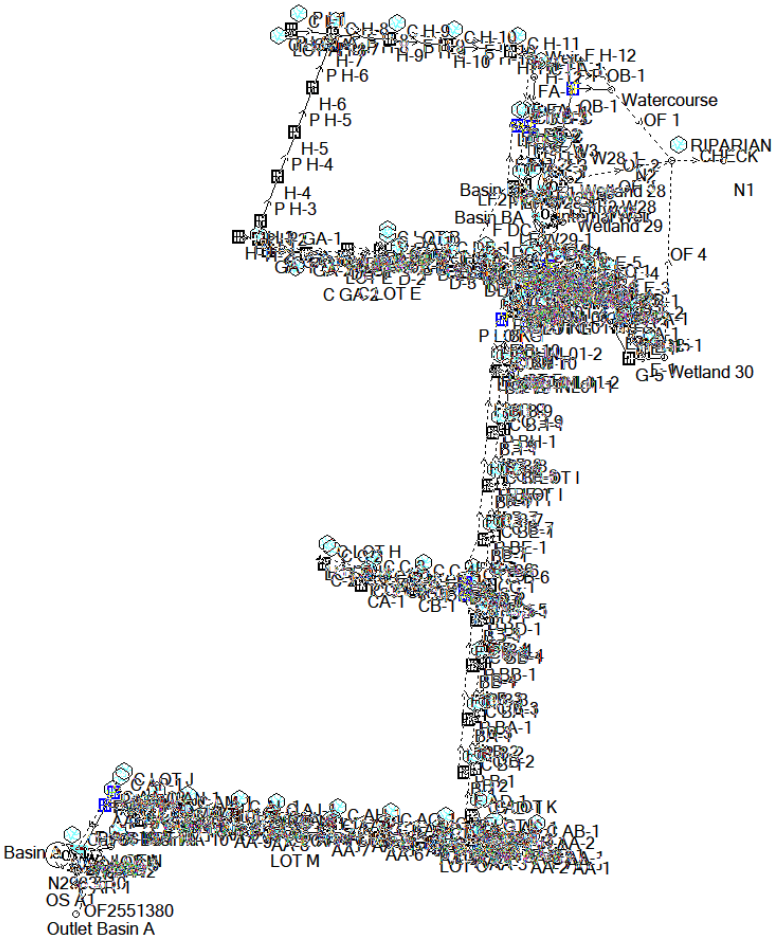


Figure 16: DRAINS Hydraulic Setup

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 from the roof shall be drained into the rainwater reuse tank (where connected) and then overflow into the Estate drainage network. Runoff from car parks, hardstands and courtyards will be drained directly into the Estate drainage network.

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 including all connections into the rainwater tank 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 flowpath 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).

6.3.2. Modelling

The stage 1 proposal 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, catchment plan and MUSIC model.

6.4. Performance Against Stormwater Targets

6.4.1. Stormwater Quality

MUSIC model results presented as mean annual loads at the receiving node for Basin A and Basin B are presented in **Table 14**.

Table 14: Summary of MUSIC modelling results against stormwater quality targets 2 – Mean Annual Load

Parameter	Allowable (kg/ha/yr)	Stage 1 Basin A (kg/ha/yr)	Stage 1 Basin B (kg/ha/yr)
Total Suspended Solids (kg/yr)	**80**	25.86	78.92
Total Phosphorous (kg/yr)	**0.3**	0.11	0.23
Total Nitrogen (kg/yr)	**3.5**	0.69	2.36
Gross Pollutants (kg/yr)	**16**	0.00	0.00

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

6.4.2. Stormwater Quantity

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

- Stage 1 - the development of roads and Lot F.
- Concept masterplan - the development of roads and all lots as per concept masterplan.

A summary of the hydraulic results is provided in Table 15 for Basin A and Table 16 for Basin B.

Table 15: Pre-development and post-development flows at discharge point Basin A

Design Storm Event	Pre-Development Peak Flow (m^3/s)	Post Stage 1 Development Peak Flow [1] (m^3/s)	Post Concept MP Development Peak Flow [2] (m^3/s)	Complies (Y/N)
50% AEP	0.96	0.40	0.87	Y
20% AEP	1.44	0.70	1.38	Y
10% AEP	2.14	0.86	1.64	Y
5% AEP	2.81	1.27	2.04	Y
2% AEP	4.36	1.67	3.76	Y
1% AEP	5.44	2.28	5.20	Y

[1] Stage 1 Development of Lot F and roads only. [2] Concept Masterplan Development of all lots and roads. [3] 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 16: Pre-development and post-development flows at discharge point Basin B

Design Storm Event	Pre-Development Peak Flow (m^3/s)	Post Stage 1 Development Peak Flow [1] (m^3/s)	Post Concept MP Development Peak Flow [2] (m^3/s)	Complies (Y/N)
50% AEP	2.26	1.39	2.92	N [3]
20% AEP	3.37	1.58	3.36	Y
10% AEP	5.18	2.89	3.75	Y
5% AEP	6.66	4.97	5.31	Y
2% AEP	10.40	7.24	7.61	Y
1% AEP	12.90	8.67	9.03	Y

[1] Stage 1 Development of Lot F and roads only. [2] Concept Masterplan - Development of all lots and roads. [3] Non compliance is due to Syd Water target flow requirement to wetlands 28,29 and 30. [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.

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)

MUSIC model results demonstrating performance of the proposed stormwater management measures against the stormwater flow targets for Stage 1 are presented in Figure 17 and Figure 18.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 Stage 1 development scenario.

ENTER DEVELOPMENT AREA (in cell F2)		
Development Area	27.922	ha (i.e. the total catchment areas used in MUSIC)

Stormwater Quantity (flow) Targets Option 2- flow percentiles			
Indices	Result	Comply	Target
95%ile	5,276	Yes	3000 to 15000 L/ha/day
90%ile	2,481	Yes	1000 to 5000 L/ha/day
75%ile	491	Yes	100 to 1000 L/ha/day
50%ile	65	Yes	5 to 100 L/ha/day
Cease to Flow	20%	Yes	10-30%

Stormwater Quantity (flow) Targets Option 1 - MARV			
Indices	Result	Comply	Target
MARV (ML/ha/yr)	0.62	Yes	≤ 2
90%ile	2,481	Yes	1000 to 5000 L/ha/day
50%ile	65	Yes	5 to 100 L/ha/day
10%ile	0	Yes	0 L/ha/day

Figure 17: Flow duration targets for Stage 1 at Basin A

ENTER DEVELOPMENT AREA (in cell F2)		
Development Area	43.52	ha (i.e. the total catchment areas used in MUSIC)

Stormwater Quantity (flow) Targets Option 2- flow percentiles			
Indices	Result	Comply	Target
95%ile	20,211	No	3000 to 15000 L/ha/day
90%ile	4,801	Yes	1000 to 5000 L/ha/day
75%ile	89	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)	1.41	Yes	≤ 2
90%ile	4,801	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 18: Flow duration targets for Stage 1 at Basin B

The results presented above demonstrate the proposed stormwater management measures to be implemented for the Stage 1 development satisfy the DCP stormwater flow targets for discharges to Basin A and Basin B.

7. Maintenance and Operations

The 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 GPT's upstream of Lot L (Basin A) and interim irrigation schemes on undeveloped lots. On lot components will be maintained by the developer and / or tenant of each lot including the rainwater tank and on lot irrigation system. The cost of operating the WMS is estimated in Table 17. A draft WSUD Maintenance Plan is provided in Appendix C.

In the ultimate scenario when the MRP Stormwater Scheme is operational the GPTs prior to the southern discharge from site and OSD basins would continue to be maintained and operated by the community association.

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 area on Lot F is also not considered a WSUD cost and is therefore not included.

Table 17 –Whole of life cost (Stage 1 Development)

WSUD feature	Capital cost $	Asset Life	Operational & Maintenance cost / annum $	Renewal cost $/ 30 years
CONSTRUCTION				
Sediment ponds during construction Type B Basins	1,000,000	1-5 years	1,000,000	N/A
OPERATIONAL (Stage 1)				
GPTs (Basin A)	400,000	30 years	30,000	$150,000
Rainwater Tank (Lot F)	120,000	50 years	5,000	N/A
Irrigation undeveloped land (via Basin B)	50,000	10 years	20,000	N/A
OPERATIONAL Total	$570,000		$55,000	$150,000

7.1.1. Water Management Strategy (Compliance)

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.

8. Non-Compliance Protocol

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 phase the water quality targets will be achieved by following the Erosion and Sediment Control Plan prepared by a CPESC (Michael Frankcombe (draft ESCP) & Wayne Walsh (final ESCP), EMM Consultants).

Additional development of buildings and hardstands within the Estate will require a DA/SSDA and the expectation is operational flow and quality targets specified in the DCP will be achieved through connection to the Sydney Water MRP Stormwater Scheme. The Developer will continue to work with Sydney Water to provide the part of the Scheme. The applicant will continue to work with Sydney Water on the design to meet the DCP and guidelines through the S73 process, taking into account the additional information provided by Sydney Water in December 2022.

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

MUSIC modelling demonstrates the following:

- The rainwater tank on Lot F utilised for non-potable purposes and the storage pond within Basin B utilised for residual lot irrigation and the trunk drainage channel in Lot G (functioning as a swale) will be sufficient to meet the flow duration curves and pollutant load reductions specified in Section 4.
- The GPT and bioretention within Basin A will be sufficient to meet the flow duration curves and pollutant load reductions specified in Section 4.

These features are 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 Wetland 28, 29 and 30 as required by the consent conditions.
- A natural trunk drainage channel and low flow pipe within Lot G is able to be constructed to the requirements of the Sydney Water Guidelines as required by the consent conditions.

APPENDIX A – MUSIC MODEL

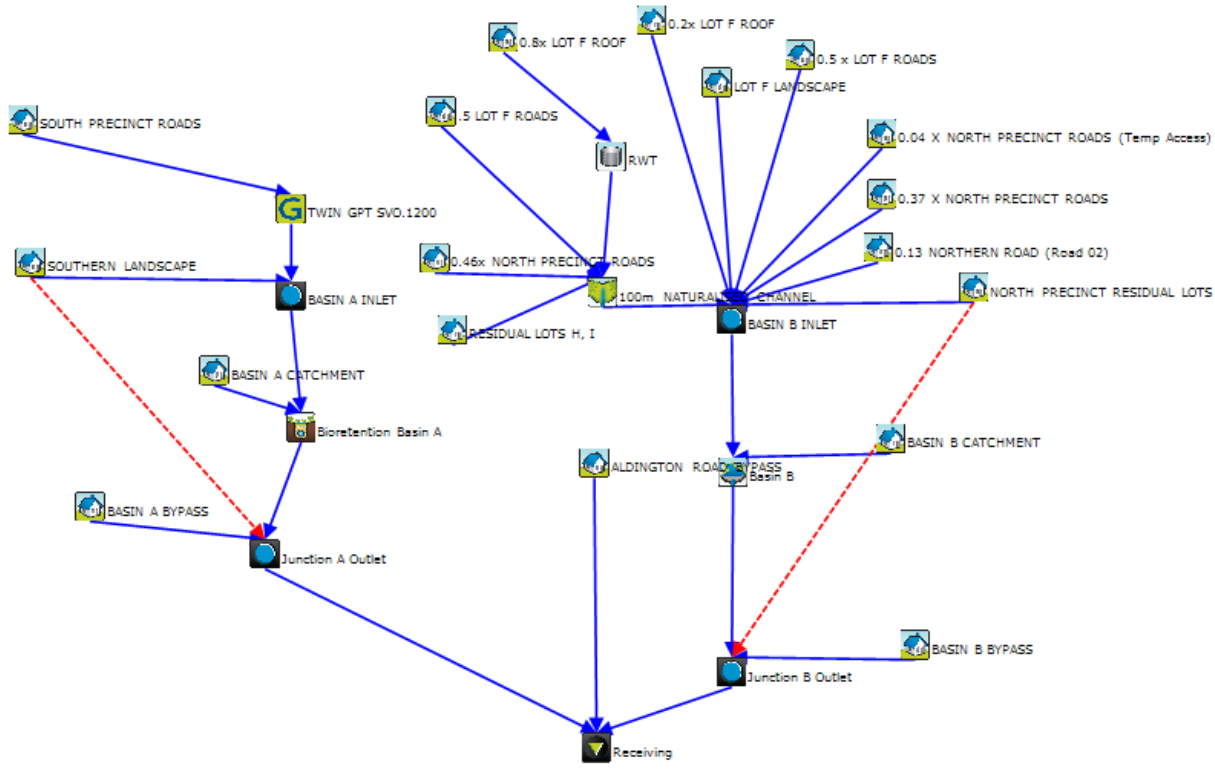


Table 18: Summary of MUSIC model and treatment paths

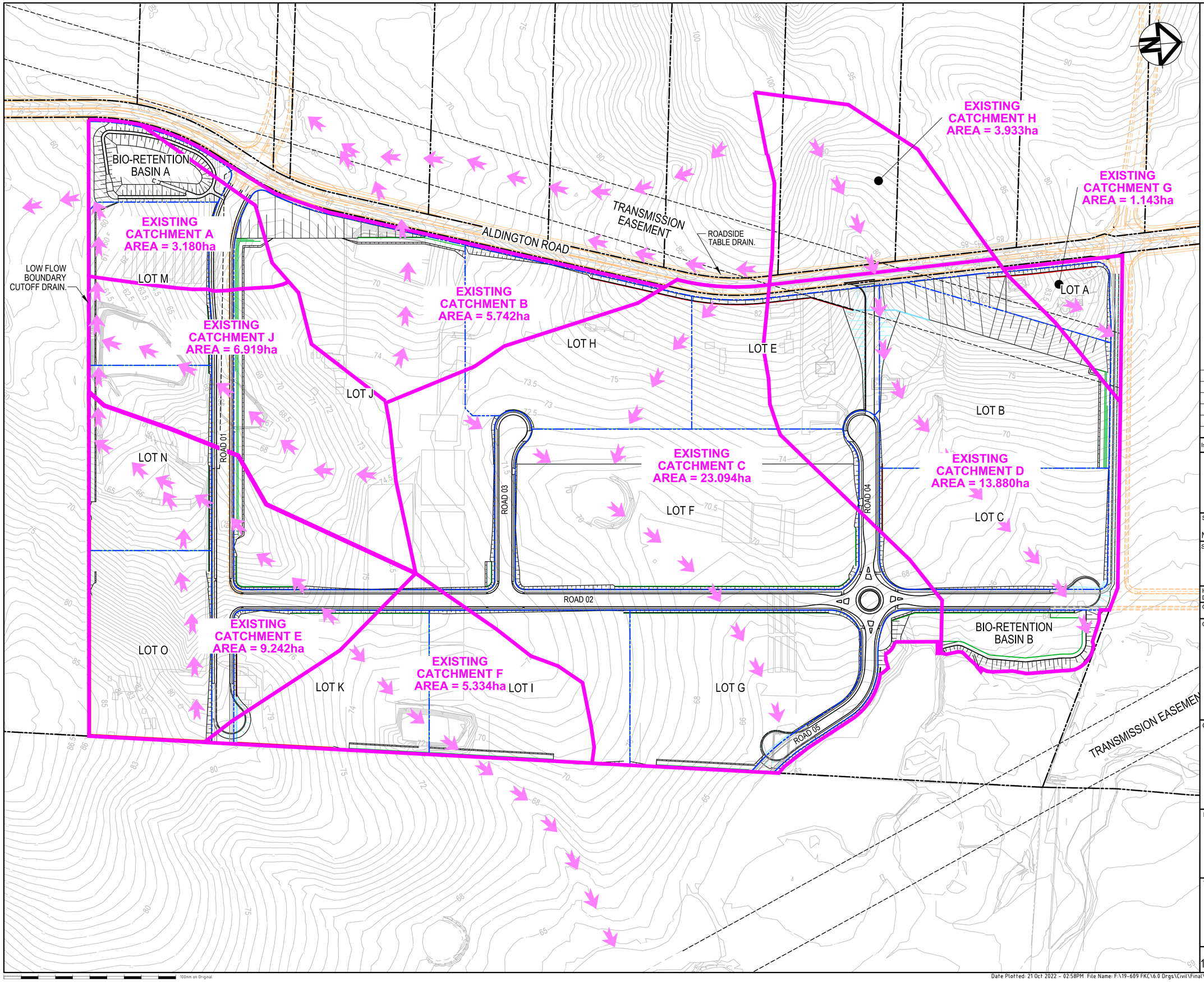
Node	Area (ha)	Catchment Type	Node Imperviousness (%)	Treatment Path
SOUTH PRECINCT ROADS	1.84	Road	80	GPT→ Basin A (no storage)
SOUTHERN LANDSCAPE	24.85	Landscape	0	Basin A (no storage)
BASIN A CATCHMENT	1.00	Landscape	0	Basin A (no storage)
BASIN A BYPASS	0.24	Landscape	0	No treatment
ALDINGTON ROAD BYPASS	0.65	Road	0	No treatment (part of PCC Aldington Road upgrade)
0.8 LOT F ROOF	3.924	Roof	100	RWT→ Swale → Basin B (storage)
0.2 LOT F ROOF	0.981	Roof	100	Basin B (storage)
0.5 LOT F ROADS	0.867	Road	100	Swale → Basin B (storage)
0.5 LOT F ROADS	0.867	Road	100	Basin B (storage)
0.46 NORTH PRECINCT ROADS	2.007	Road	80	Swale → Basin B (storage)
LOT F LANDSCAPE	0.731	Landscape	0	Basin B (storage)
0.04 NORTH PRECINCT ROADS	0.17	Road	100	Basin B (storage)
0.37 NORTH PRECINCT ROADS	1.595	Road	80	Basin B (storage)
0.13 NORTHERN ROAD	0.597	Road	80	Basin B (storage)
NORTH PRECINCT RESIDUAL LOTS	17.769	Landscape	0	Basin B (storage)

RESIDUAL LOTS H & I	8.796	Landscape	0	Swale → Basin B (storage)
BASIN B CATCHMENT	1.05	Landscape	0	Basin B (storage)
BASIN B BYPASS	4.19	Landscape	0	No treatment

APPENDIX B – SITE LAYOUT

Civil Plans
19-609 – C1081 Stormwater Drainage Catchment Plan (Pre developed) – with 15ha catchment
19-609 – C1082 Stormwater Drainage Catchment Plan (Post developed)

Sketches
19-609-SKC 180 200 Aldington Road SWMP
19-609-SKC 194 - Post development catchment contributions to wetland 29 & 30
19-609-SKC202 – Naturalised Trunk Drainage Channel Plan and Section
19-609-SKC203 – Low Flow Diversion Plan to Future Wetland 30
19-609-SKC204 – Naturalised Trunk Drainage Channel & Stormwater Pipe Profile
19-609-SKC205 - Basin B Detail Plan - Sheet 1
19-609-SKC206 - Basin B Detail Plan - Sheet 2
19-609-SKC207 - Basin B Typical Sections
19-609-SKC208 - Basin B Outlet Details



Issue	Description	Date
F	ISSUED FOR SSD APPROVAL	21-10-22
E	ISSUED FOR SSD APPROVAL	03-08-22
D	ISSUED FOR SSD APPROVAL	13-04-22
C	ISSUED FOR SSD APPROVAL	09-03-22
B	ISSUED FOR SSD APPROVAL	08-09-21
A	ISSUED FOR SSD APPROVAL	30-09-20

0 50 100 150m

1 : 2000 @ A1

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

A1

Scales	1 : 2000	Drawn GB	
		Designed GB	
Height Datum	AHD	Checked AM	
Grid	GDA2020	Approved	

Client

19-609-C1081.dwg

Stockland

FIFECAPITAL

Civil Engineers and Project Managers

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Project

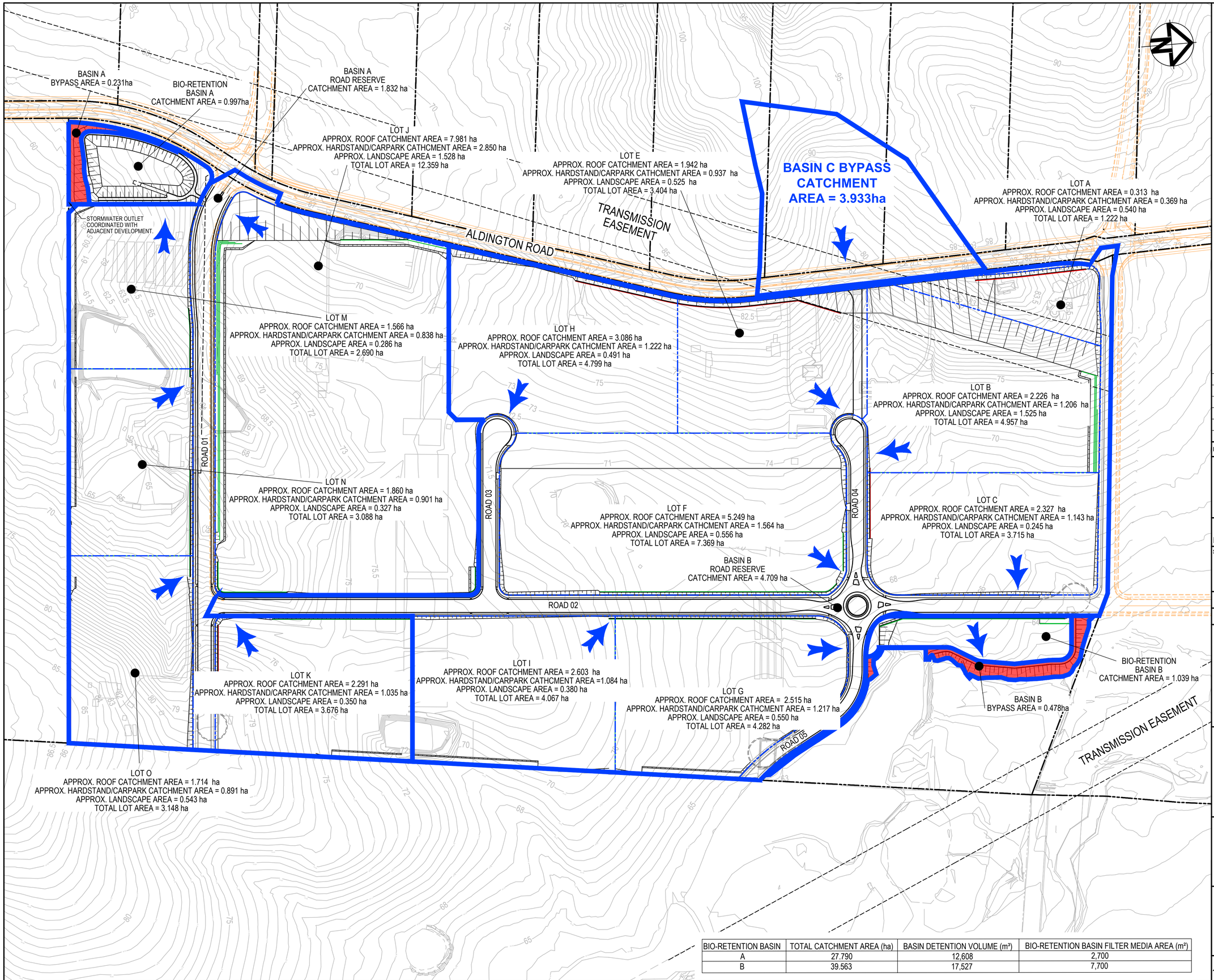
PROPOSED INDUSTRIAL DEVELOPMENT
200 ALDINGTON

Title

STORMWATER DRAINAGE CATCHMENT PLAN (PRE-DEVELOPED)

Drawing No.	Project No.	Issue
19-609-C1081	19-609	F

100mm on Original



BIO-RETENTION BASIN	TOTAL CATCHMENT AREA (ha)	BASIN DETENTION VOLUME (m^3)	BIO-RETENTION BASIN FILTER MEDIA AREA (m^2)
A	27.790	12,608	2,700
B	39.563	17,527	7,700

Issue	Description	Date
E	ISSUED FOR SSD APPROVAL	21-10-22
D	ISSUED FOR SSD APPROVAL	03-08-22
C	ISSUED FOR SSD APPROVAL	13-04-22
B	ISSUED FOR SSD APPROVAL	09-03-22
A	ISSUED FOR SSD APPROVAL	08-09-21

0 50 100 150m

1 : 2000 @ A1

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

A1

Scales: 1 : 2000

Drawn: GB
Designed: GB
Checked: AM
Approved:

Height Datum: AHD
Grid: GDA2020

Client

19-609-C1082.dwg

Stockland

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Project

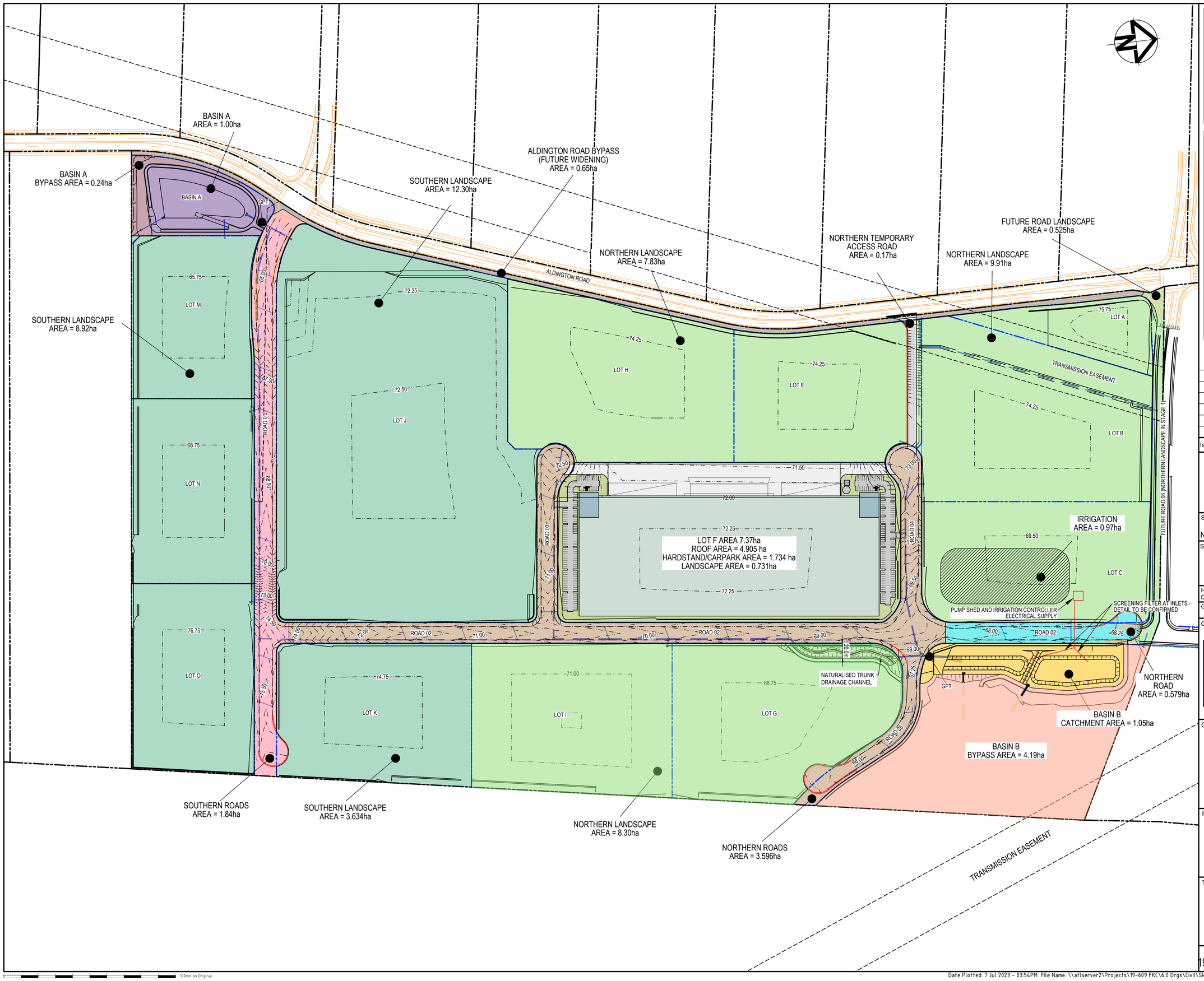
PROPOSED INDUSTRIAL
DEVELOPMENT
200 ALDINGTON

Title

STORMWATER DRAINAGE
CATCHMENT PLAN
(POST-DEVELOPED)

Drawing No.	Project No.	Issue
19-609-C1082	19-609	E

100mm on Original



LEGEND

EXISTING
- EXISTING BOUNDARY
- EXISTING EASEMENT
- 60.0 EXISTING CONTOUR

PROPOSED
- PROPOSED BOUNDARY
- PROPOSED EASEMENT
- BEL 70.25 AVERAGE BULK EARTHWORKS LEVEL
- PROPOSED CONTOUR
- 60.0 EXTERNAL FUTURE WORKS

TOTAL SITE AREA: 72.1 ha

SOUTHERN CATCHMENT TOTAL AREA: 27.93 ha
- SOUTHERN LANDSCAPE AREA: 24.85 ha
- TOTAL LOT L (BASIN A) AREA: 1.24 ha
- SOUTHERN ROADS AREA: 1.84 ha

NORTHERN CATCHMENT TOTAL AREA: 43.52 ha
- NORTHERN LANDSCAPE AREA: 26.57 ha
- TOTAL NORTHERN ROAD AREA: 4.35 ha
- TOTAL LOT D AREA: 5.24 ha
- LOT F AREA: 7.37 ha

OTHER
- ALDINGTON ROAD FUTURE WIDENING AREA: 0.65 ha

Issue	Description	Date
P4	FOR INFORMATION	07-07-23
P3	FOR INFORMATION	01-06-23
P2	FOR INFORMATION	25-01-23
P1	FOR INFORMATION	24-11-22

0 50 100 150m

1 : 2000 @ A1

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

A1

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

Client

19-609-SKC180 - 200 SWMP & CATCHMENT.dwg

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Project

PROPOSED INDUSTRIAL DEVELOPMENT
200 ALDINGTON ROAD
KEMPS CREEK

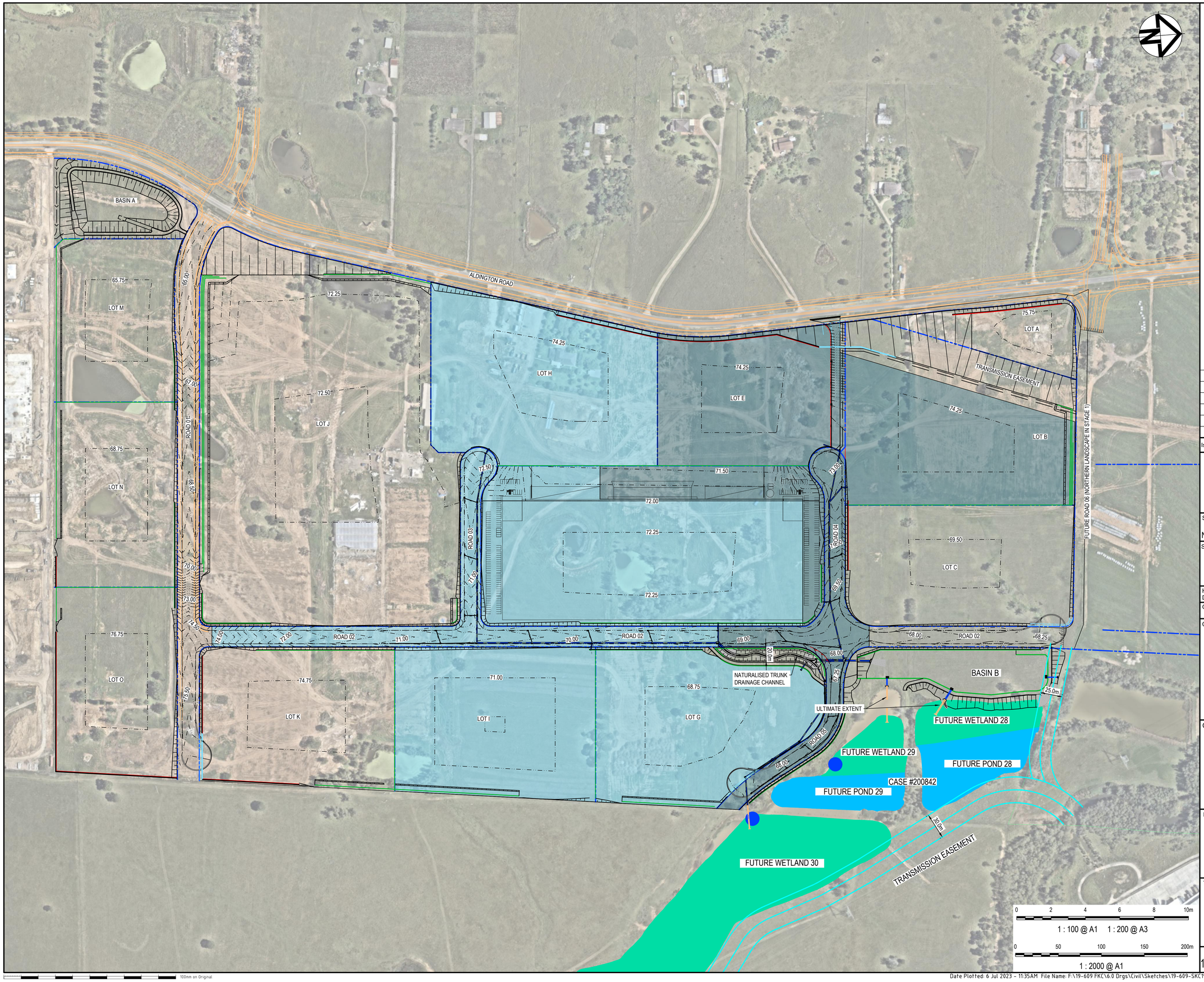
Title

STORMWATER MANAGEMENT AND CATCHMENT PLAN
STAGE 1

Drawing No.	Project No.	Issue
19-609-SKC180	19-609	P4

100mm on Original

Date Plotted: 7 Jul 2023 - 03:54PM File Name: \\atlserver2\Projects\19-609 FKC\6.0 Drgs\Civil\Sketches\19-609-SKC180 - 200 SWMP & CATCHMENT.dwg



LEGEND

EXISTING
- EXISTING BOUNDARY
- EXISTING EASEMENT
- 60.0 EXISTING CONTOUR

PROPOSED
- PROPOSED BOUNDARY
- PROPOSED EASEMENT
- 70.25 PROPOSED CONTOUR
- EXTERNAL FUTURE WORKS
- CATCHMENT AREA BASIN 29 (9.56 Ha)
- CATCHMENT AREA BASIN 30 (21.08 Ha)
- MRP STORMWATER SCHEME WETLAND BY SYDNEY WATER
- GPT AT INLETS TO WETLANDS - AS PER SYDNEY WATER SCHEME PLAN
- INDICATIVE FUTURE TRUNK DRAINAGE AS PER SYDNEY WATER SCHEME PLAN

Issue	Description	Date
P4	FOR APPROVAL	06-07-23
P3	FOR APPROVAL	05-06-23
P2	AMENDED AS PER SYDNEY WATER REQUEST	16-03-23
P1	FOR INFORMATION	10-03-22

Status: PRELIMINARY ONLY
NOT TO BE USED FOR CONSTRUCTION

A1

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

Client: Stockland / FIFECAPITAL

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Project

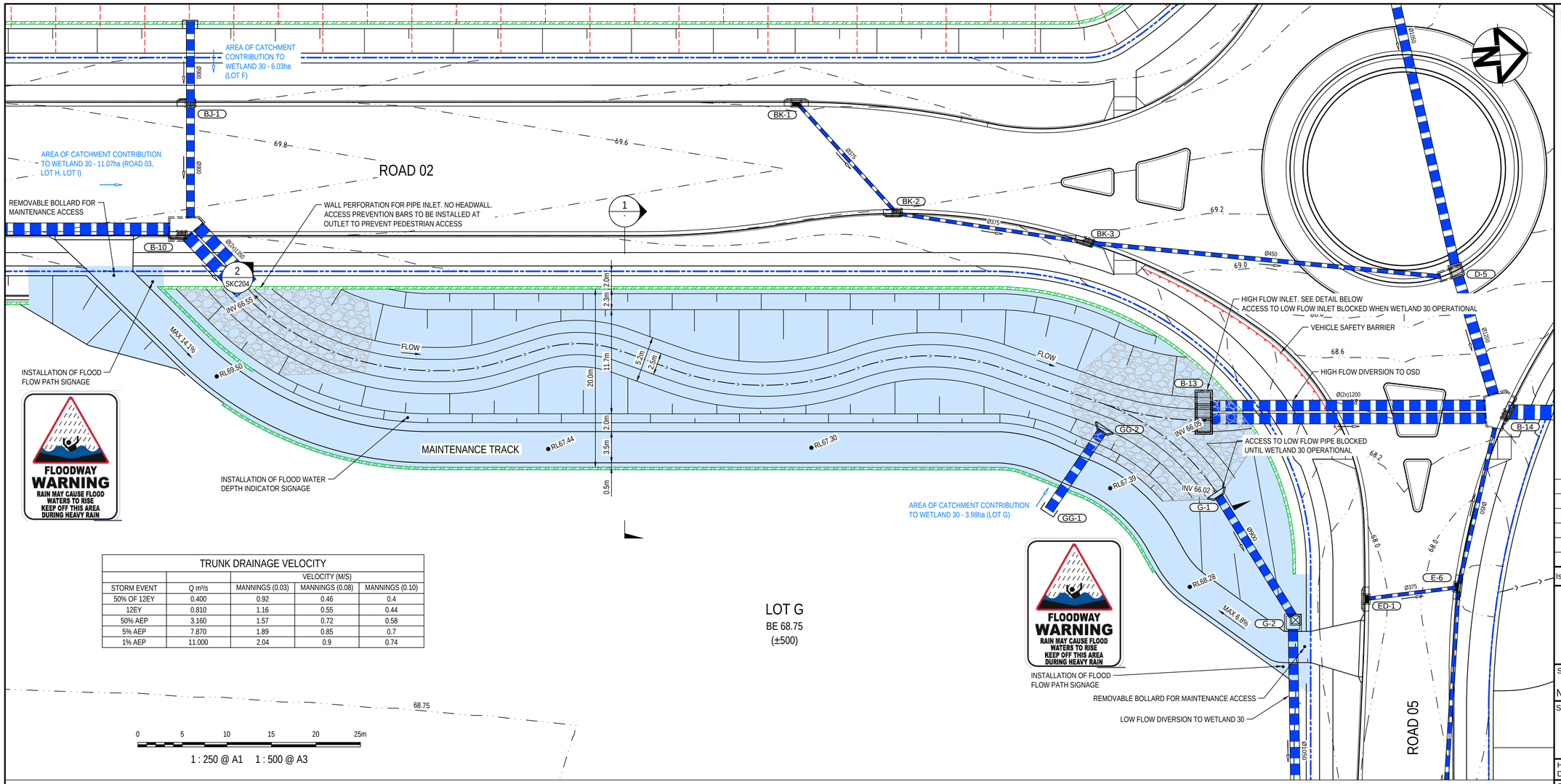
PROPOSED INDUSTRIAL DEVELOPMENT 200 ALDINGTON ROAD KEMPS CREEK

Title

POST DEVELOPMENT CATCHMENT CONTRIBUTIONS TO FUTURE BASIN 29 & 30

Drawing No.	Project No.	Issue
19-609-SKC194	19-609	P4

100mm on Original



1 : 250 @ A1 1 : 500 @ A3

TRUNK DRAINAGE VELOCITY				
		VELOCITY (M/S)		
STORM EVENT	Q m³/s	MANNINGS (0.03)	MANNINGS (0.08)	MANNINGS (0.10)
50% OF 12EY	0.400	0.92	0.46	0.4
12EY	0.810	1.16	0.55	0.44
50% AEP	3.160	1.57	0.72	0.58
5% AEP	7.870	1.89	0.85	0.7
1% AEP	11.000	2.04	0.9	0.74

LOT G
BE 68.75
(±500)

LEGEND

- PROPOSED BOUNDARY
- 65.0 PROPOSED CONTOUR
- PROPOSED KERB AND GUTTER
- 375Ø PROPOSED STORMWATER PIPE WITH SIZE
- PROPOSED KERB INLET PIT
- PROPOSED HEADWALL
- AA-1 PROPOSED STORMWATER PIT NUMBER
- PROPOSED RETAINING WALL
- AREA OF CHANNEL = 2664m²

NOTES

1. ALL NATURALISED TRUNK DRAINAGE IS LINED WITH AN IMPERMEABLE LINER AND COMPACTED TO A SUITABLE DEPTH AND TOPSOILED (AS44119) TO LIMIT INFILTRATION TO SOILS
2. MAINTENANCE TRACK MATERIAL - ROAD BASE FOR LIGHT VEHICLE ACCESS

Issue	Description	Date
P4	ISSUED FOR APPROVAL	07-07-23
P3	ISSUED FOR APPROVAL	06-07-23
P2	ISSUED FOR APPROVAL	29-06-23
P1	ISSUED FOR APPROVAL	31-05-23

Status: PRELIMINARY ONLY
NOT TO BE USED FOR CONSTRUCTION

A1

Scales	1 : 50 1 : 100 1 : 250	Drawn	JH
		Designed	JH
Height Datum	AHD	Checked	DB
Grid	GDA2020	Approved	

Client 19-609-SKC202 – Naturalised Trunk Drainage Channel.dwg

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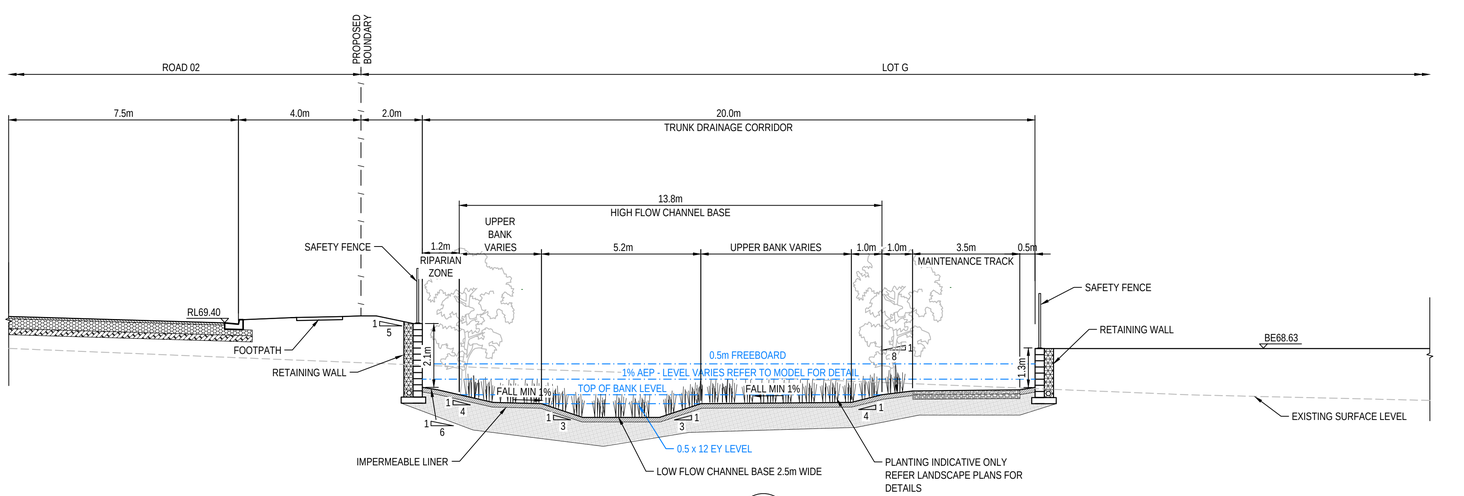
Project
PROPOSED INDUSTRIAL DEVELOPMENT
200 ALDINGTON

Title
NATURALISED TRUNK DRAINAGE CHANNEL PLAN AND SECTION

Drawing No.	Project No.	Issue
19-609-SKC202	19-609	P4

NATURALISED TRUNK DRAINAGE CHANNEL PLAN

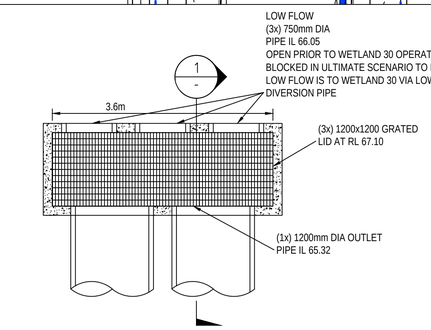
SCALE 1:250



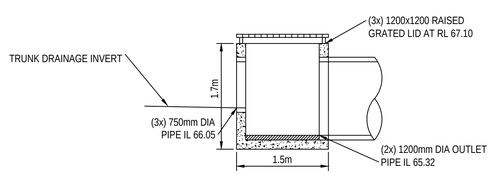
SECTION 1 : 100

0 2 4 6 8 10m

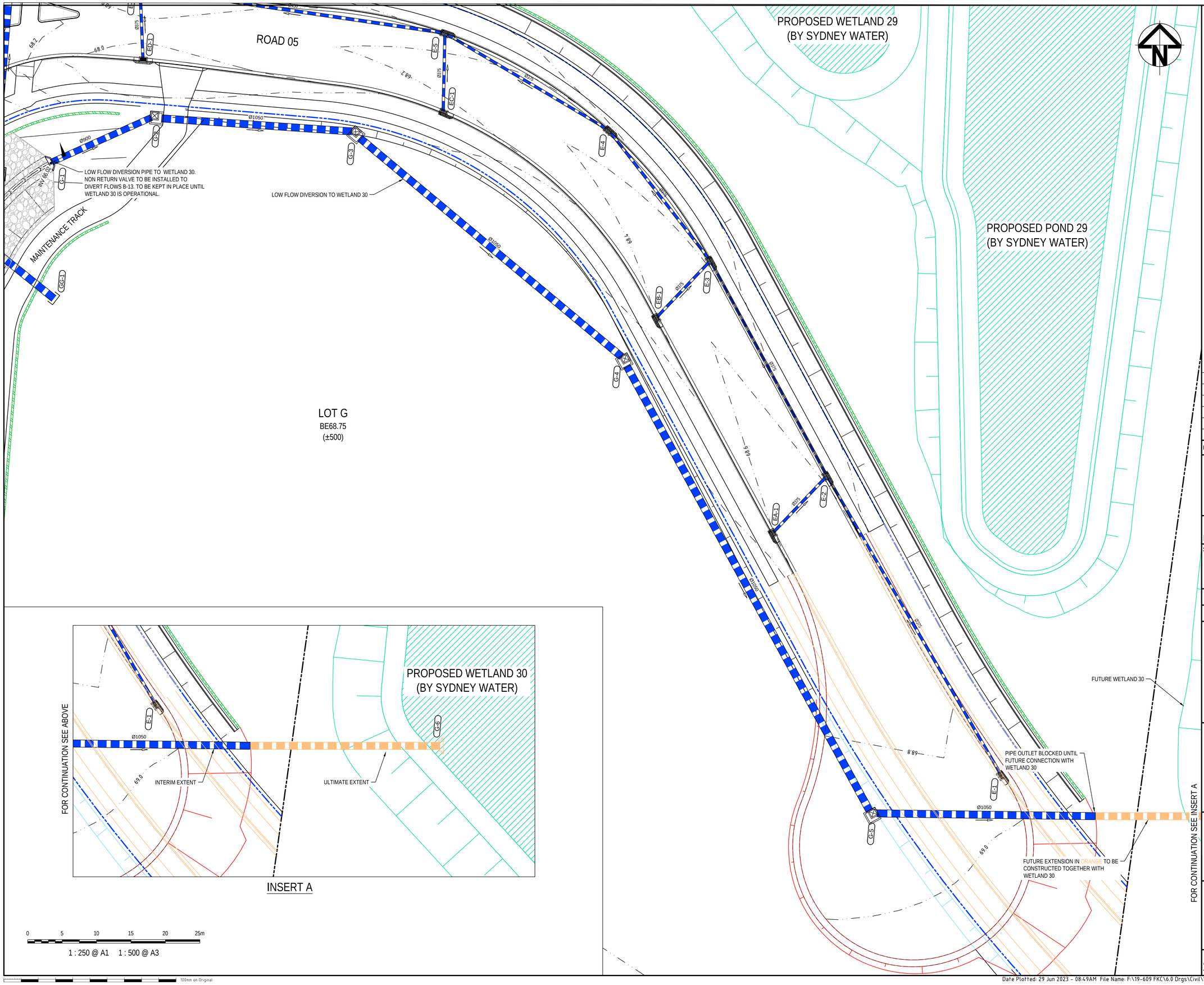
1 : 100 @ A1 1 : 200 @ A3



HIGHFLOW INLET FROM TRUNK DRAINAGE



SECTION 1 : 50



LEGEND

- PROPOSED BOUNDARY
- 65.0 PROPOSED CONTOUR
- PROPOSED KERB AND GUTTER
- 375Ø PROPOSED STORMWATER PIPE WITH SIZE
- PROPOSED KERB INLET PIT
- PROPOSED HEADWALL
- AA-1 PROPOSED STORMWATER PIT NUMBER
- PROPOSED RETAINING WALL
- PROPOSED MRPSWS LAYOUTS PROVIDED BY SYDNEY WATER (JUNE 2023-12D DESIGN)

Issue	Description	Date
P2	ISSUED FOR APPROVAL	29-06-23
P1	ISSUED FOR APPROVAL	31-05-23

Status: PRELIMINARY ONLY
NOT TO BE USED FOR CONSTRUCTION

A1

Scales	1 : 250	Drawn	JH
		Designed	JH
Height Datum	AHD	Checked	DB
Grid	GDA2020	Approved	

Client: 19-609-SKC203 – Low Flow Diversion Pipe.dwg

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Project

PROPOSED INDUSTRIAL DEVELOPMENT 200 ALDINGTON

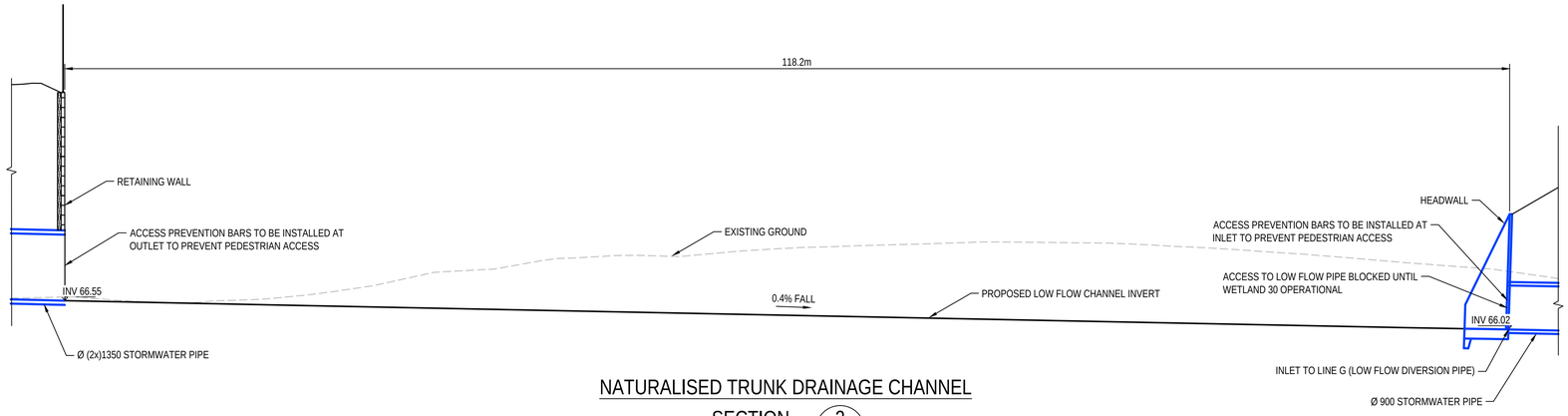
Title

LOW FLOW DIVERSION PIPE PLAN TO FUTURE WETLAND 30

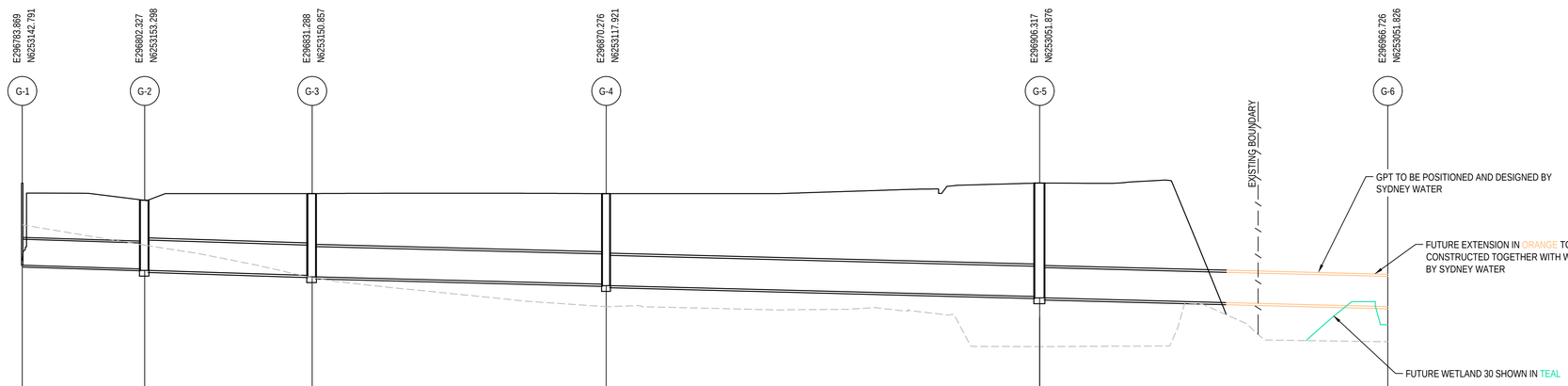
Drawing No.	Project No.	Issue
19-609-SKC203	19-609	P2

100mm on Original

Date Plotted: 29 Jun 2023 – 08:49AM File Name: F:\19-609 FKC\6.0 Drgs\Civil\Sketches\19-609-SKC203 – Low Flow Diversion Pipe.dwg V1



NATURALISED TRUNK DRAINAGE CHANNEL
SECTION 2
1:1000(H) 1:250(V) SKC202



	G-1	G-2	G-3	G-4	G-5	G-6
	E296783.869 N6253142.791	E296802.327 N6253153.298	E296831.288 N6253150.857	E296870.276 N6253117.921	E296906.317 N6253051.876	E296966.726 N6253051.826
	HEADWALL	900 x 900 GATIC LID	900 x 900 GATIC LID	900 x 900 GATIC LID	900 x 900 GATIC LID	FUTURE HEADWALL
PIPE SIZE & CLASS		Ø900 RRJ RCP 3	Ø1050 RRJ RCP 3	Ø1050 RRJ RCP 3	Ø1050 RRJ RCP 3	Ø1050 RRJ RCP 3
GRADE (%)		0.6%	0.6%	0.5%	0.5%	0.5%
Datum R.L		45.00				
DEPTH TO INVERT	2.844	2.844 / 2.428	2.428 / 2.886	2.886 / 3.189	3.189 / 3.983	3.983 / 1.050
INVERT LEVEL	66.021	65.894 / 65.844	65.844 / 65.619	65.619 / 65.314	65.314 / 64.888	64.888 / 64.586
TOP OF PIT LEVEL	68.865	68.272	68.506	68.504	68.871	65.636
EXISTING SURFACE LEVEL	67.420	66.717	65.587	64.583	63.200	63.368
CHAINAGE	0.000	21.239	50.303	101.340	176.579	236.988
		L=21.239	L=29.064	L=51.037	L=75.239	L=60.409

NOTE:
SYDNEY WATER SPECIFIED EDD 64.61 (WETLAND 30)

LOW FLOW DIVERSION TO FUTURE WETLAND 30
LINE G
1:500(H) 1:100(V)

0 2 4 6 8 10m
1 : 100 @ A1 1 : 200 @ A3

0 5 10 15 20 25m
1 : 250 @ A1 1 : 500 @ A3

0 10 20 30 40 50m
1 : 500 @ A1 1 : 1000 @ A3

0 20 40 60 80 100m
1 : 1000 @ A1 1 : 2000 @ A3

Issue	Description	Date
P2	ISSUED FOR APPROVAL	29-06-23
P1	ISSUED FOR APPROVAL	31-05-23

Status: PRELIMINARY ONLY NOT TO BE USED FOR CONSTRUCTION

A1

Scales: 1 : 100, 1 : 250, 1 : 500, 1 : 1000

Drawn JH | Designed JH | Checked DB | Approved

Height Datum: AHD

Grid: GDA2020

Client

19-609-SKC204 – Trunk Drainage Profile.dwg

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Project

PROPOSED INDUSTRIAL DEVELOPMENT
200 ALDINGTON

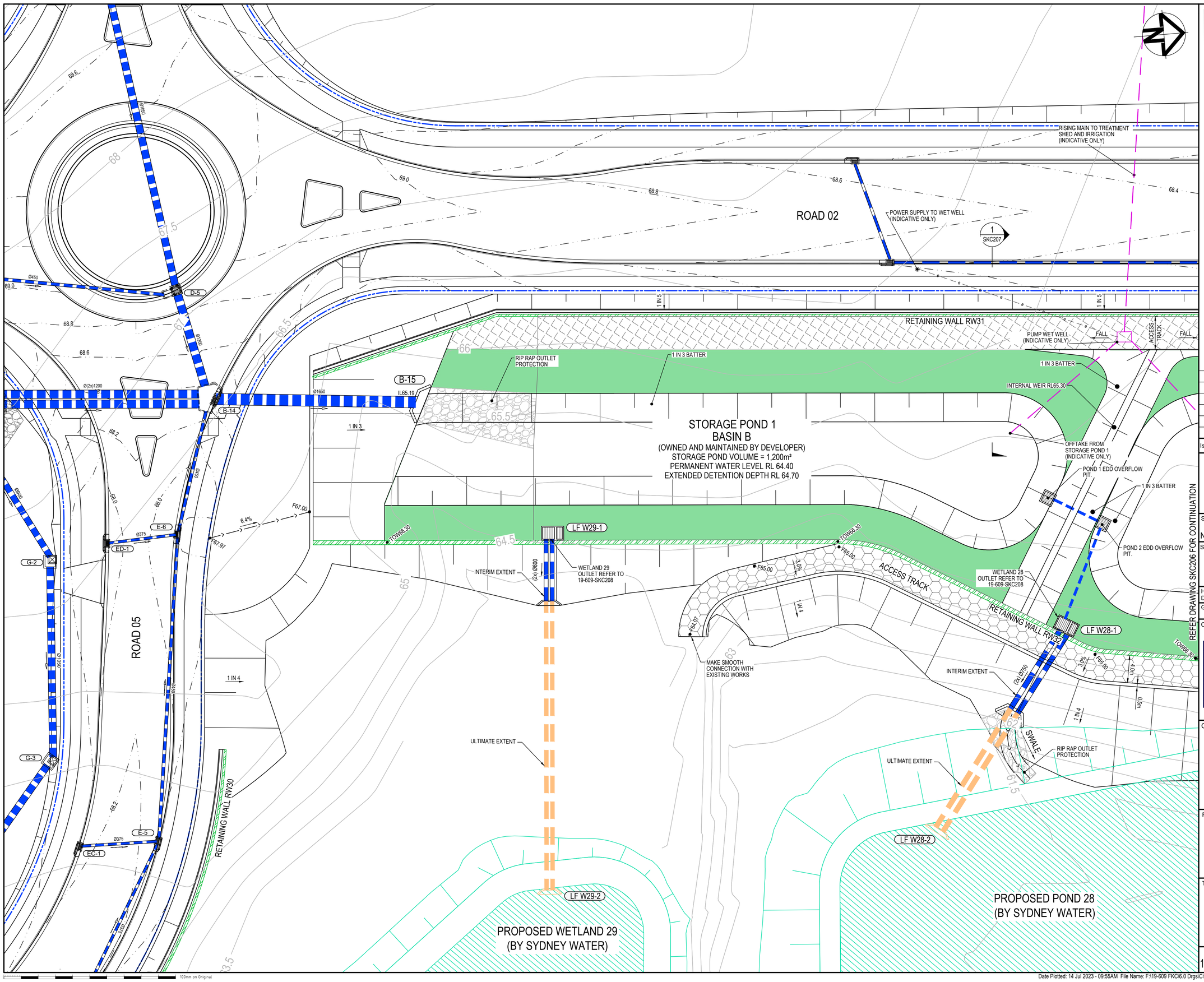
Title

NATURALISED TRUNK DRAINAGE CHANNEL & LOW FLOW STORMWATER PIPE PROFILE

Drawing No.	Project No.	Issue
19-609-SKC204	19-609	P2

100mm on Original

Date Plotted: 29 Jun 2023 - 08:48AM File Name: F:\19-609 FKC\6.0 Drgs\Civil\Sketches\19-609-SKC204 – Trunk Drainage Profile.dwg V1



LEGEND

- PROPOSED BOUNDARY
- PROPOSED CONTOUR
- PROPOSED KERB AND GUTTER
- PROPOSED STORMWATER PIPE WITH SIZE
- PROPOSED KERB INLET PIT
- PROPOSED HEADWALL
- PROPOSED STORMWATER PIT NUMBER
- PROPOSED RETAINING WALL
- PROPOSED MRPSWS LAYOUTS PROVIDED BY SYDNEY WATER (JUNE 2023-12D DESIGN)
- TURF
- SCOUR PROTECTION
- MAINTENANCE DRIVEWAY

OSD BASIN B
BASE AREA = 8,500m²
TOP AREA = 10,500m²
BASE = RL64.70m
DEPTH = 1m

NOTES:

1. STORAGE POND LINED - NO PLANTING
2. OSD PLANTED TURF

Issue	Description	Date
P5	AMENDMENTS PER PEER REVIEW 10/07/23	11-07-23
P4	ISSUED FOR APPROVAL	07-07-23
P3	ISSUED FOR APPROVAL	06-07-23
P2	ISSUED FOR APPROVAL	29-06-23
P1	ISSUED FOR APPROVAL	31-05-23

0 5 10 15 20m
1 : 250 @ A1 1 : 500 @ A3

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION
A1

Scales	1 : 250	Drawn JH	
		Designed DG	
Height Datum	AHD	Checked DB	
Grid	GDA2020	Approved	

Client: Stockland / FIFECAPITAL

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Project: PROPOSED INDUSTRIAL DEVELOPMENT 200 ALDINGTON

Title: BASIN B DETAIL PLAN SHEET 1

Drawing No.	Project No.	Issue
19-609-SKC205	19-609	P5

ROAD 02

RETAINING WALL RW31

RETAINING WALL RW32

ACCESS TRACK

F-4

1 IN 5

1 IN 3 BATTER

RIP RAP OUTLET PROTECTION

PROPOSED TRAFFIC BARRIER

OFFTAKE FROM STORAGE POND 2 (INDICATIVE ONLY)

STORAGE POND 2
BASIN B
(OWNED AND MAINTAINED BY DEVELOPER)
STORAGE POND VOLUME = 2,630m³
PERMANENT WATER LEVEL RL 64.40
EXTENDED DETENTION DEPTH RL 64.70

OUTLET TO FUTURE TRUNK DRAINAGE CHANNEL. OPERATES IN INTERIM AND ULTIMATE SCENARIO REFER TO 19-609-SKC208

Ø1500

EMERGENCY SPILLWAY RL66.00 LENGTH 12m

RIP RAP OUTLET PROTECTION

PROPOSED WETLAND 28
(BY SYDNEY WATER)

PROPOSED 25m NATURAL TRUNK DRAINAGE CHANNEL ALIGNMENT SUBJECT TO COORDINATION WITH ADJACENT INFRASTRUCTURE (WETLAND TO NORTH/BASIN TO SOUTH)

REFER DRAWING SKC205 FOR CONTINUATION

GRASS PADDOCK

CREEK

OBVERT 900ø

LEGEND

- PROPOSED BOUNDARY
- 65.0 PROPOSED CONTOUR
- PROPOSED KERB AND GUTTER
- 375ø PROPOSED STORMWATER PIPE WITH SIZE
- PROPOSED KERB INLET PIT
- PROPOSED HEADWALL
- AA-1 PROPOSED STORMWATER PIT NUMBER
- PROPOSED RETAINING WALL
- PROPOSED MRPSWS LAYOUTS PROVIDED BY SYDNEY WATER (JUNE 2023-12D DESIGN)
- TURF
- SCOUR PROTECTION
- MAINTENANCE DRIVEWAY

OSD BASIN B
BASE AREA = 8,500m²
TOP AREA = 10,500m²
BASE = RL64.70m
DEPTH = 1m

NOTES:

1. STORAGE POND LINED - NO PLANTING
2. OSD PLANTED TURF

Issue	Description	Date
P4	AMENDMENTS PER PEER REVIEW 10/07/23	10-07-23
P3	ISSUED FOR APPROVAL	07-07-23
P2	ISSUED FOR APPROVAL	29-06-23
P1	ISSUED FOR APPROVAL	31-05-23

0 5 10 15 20m
1 : 250 @ A1 1 : 500 @ A3

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

A1

Scales	1 : 250	Drawn	JH
		Designed	DG
Height Datum	AHD	Checked	DB
Grid	GDA2020	Approved	

Client: Stockland / FIFECAPITAL

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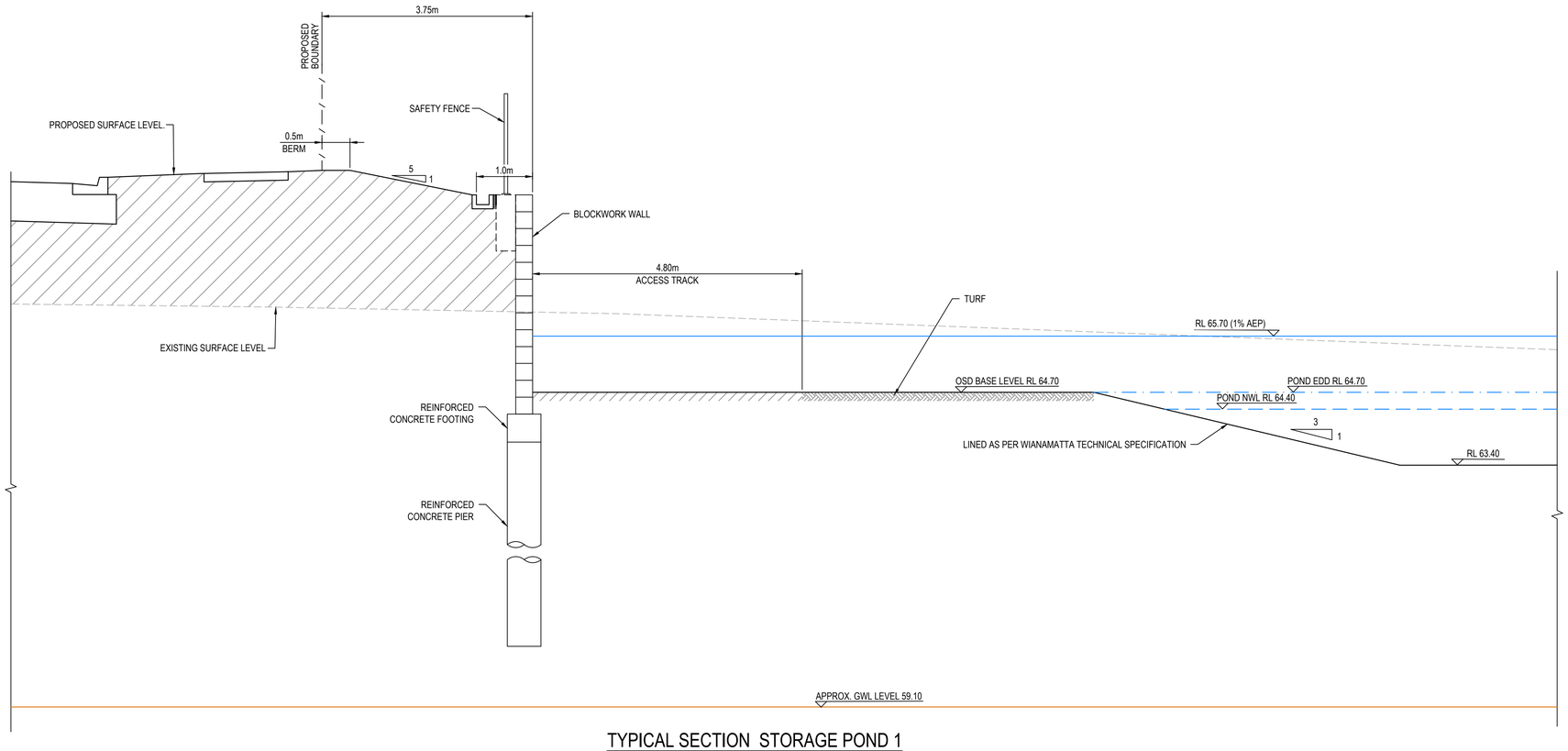
Project
PROPOSED INDUSTRIAL DEVELOPMENT
200 ALDINGTON

Title
BASIN B
DETAIL PLAN
SHEET 2

Drawing No.	Project No.	Issue
19-609-SKC206	19-609	P3

100mm on Original

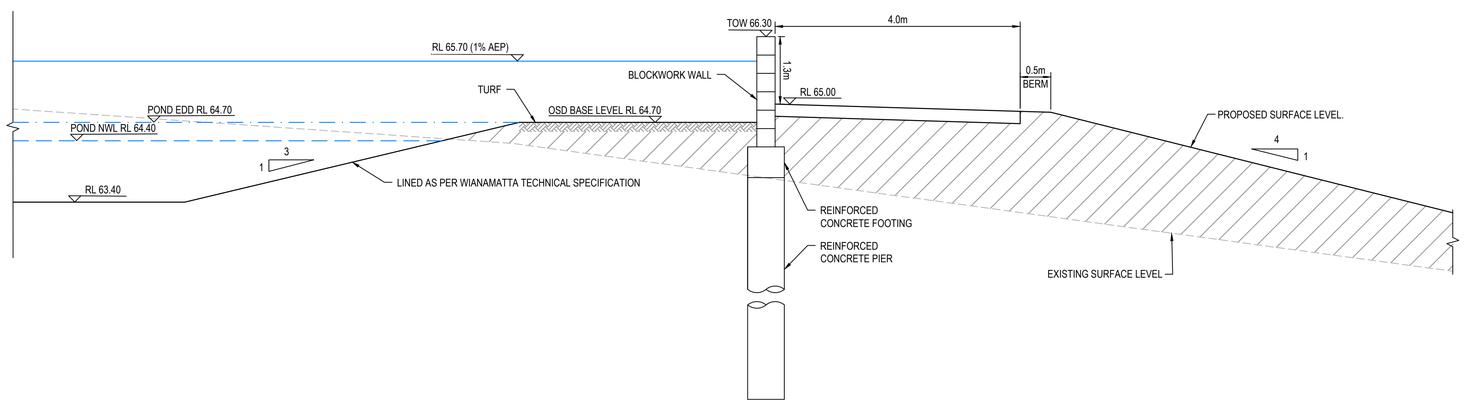
Date Plotted: 11 Jul 2023 - 03:58PM File Name: F:\19-609 FKC\6.0 Drgs\Civil\Sketches\19-609-SKC206 - Basin B Detail Plan - Sheet 2.dwg V1



TYPICAL SECTION STORAGE POND 1
BASIN B

SECTION 1 (SKC205, SKC211)

1 : 50



TYPICAL SECTION STORAGE POND 2
BASIN B

SECTION 2 (SKC206, SKC212)

1 : 50

Issue	Description	Date
P6	AMENDMENTS PER PEER REVIEW 10/07/23	11-07-23
P5	ISSUED FOR APPROVAL	10-07-23
P4	ISSUED FOR APPROVAL	07-07-23
P3	ISSUED FOR APPROVAL	06-07-23
P2	ISSUED FOR APPROVAL	30-06-23
P1	ISSUED FOR APPROVAL	31-05-23

0 1 2 3 4m

1 : 50 @ A1 1 : 100 @ A3

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

A1

Scales	1 : 50	Drawn JH	
		Designed DG	
Height Datum	AHD	Checked DB	
Grid	GDA2020	Approved	

Client

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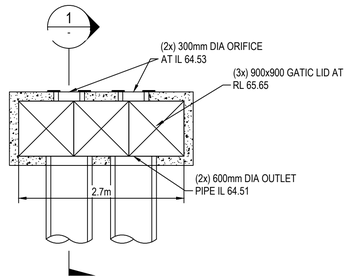
Project

PROPOSED INDUSTRIAL DEVELOPMENT
200 ALDINGTON

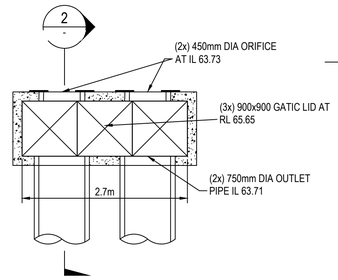
Title

BASIN B
TYPICAL SECTIONS

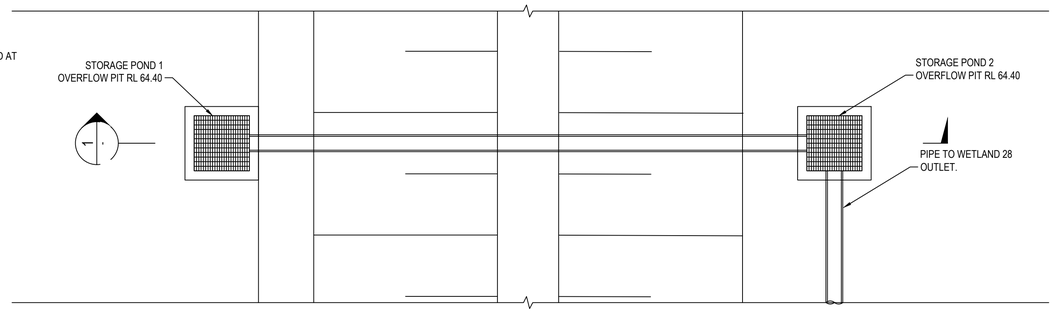
Drawing No.	Project No.	Issue
19-609-SKC207	19-609	P6



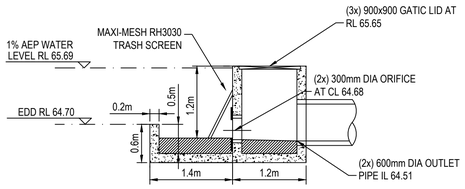
WETLAND 29 OUTLET PLAN



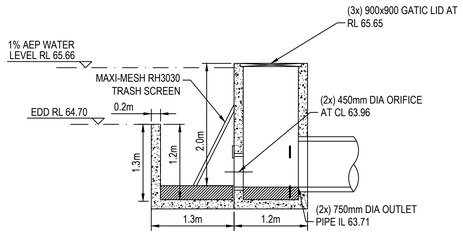
WETLAND 28 OUTLET



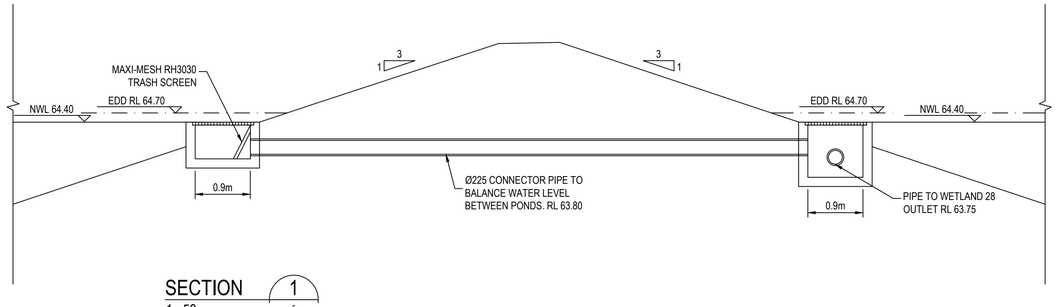
STORAGE POND OVERFLOW PIT PLAN



SECTION 1
1 : 50

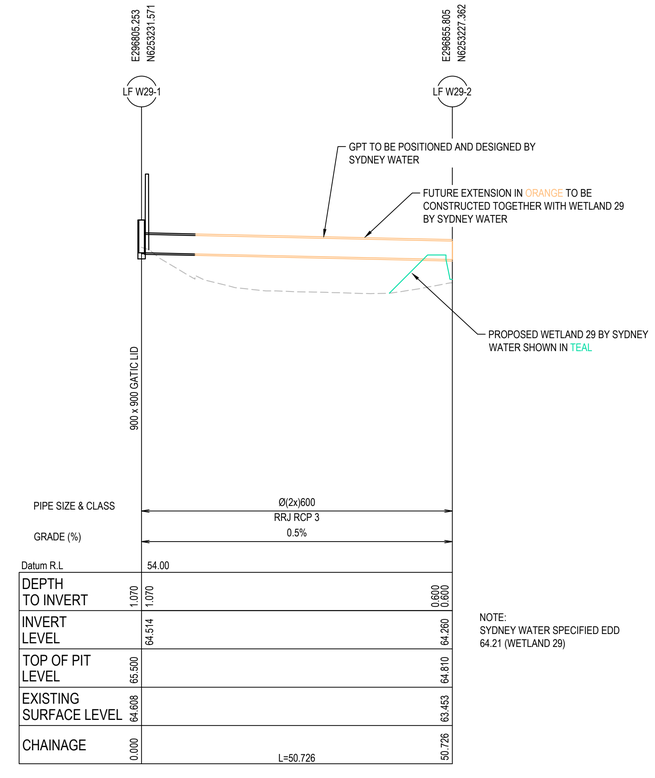


SECTION 2
1 : 50



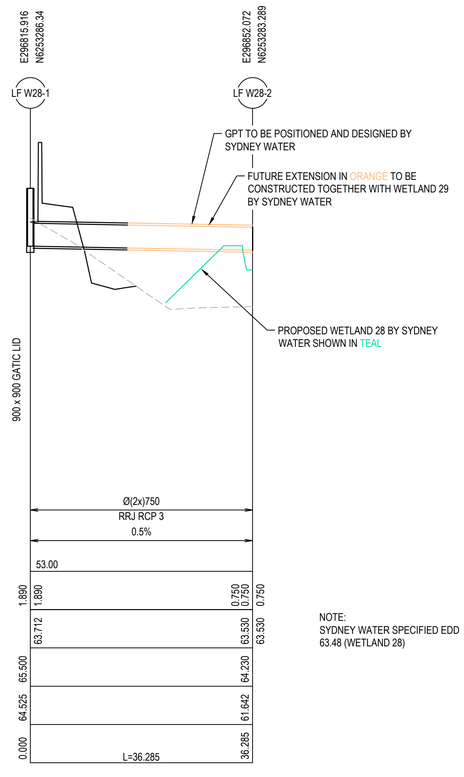
SECTION 1
1 : 50

NOTES:
GALVANISED STEP IRONS TO BE PROVIDEDAT 0.3M
INTERVALS FOR PIT DEPTHS GREATER THAN 1.0M



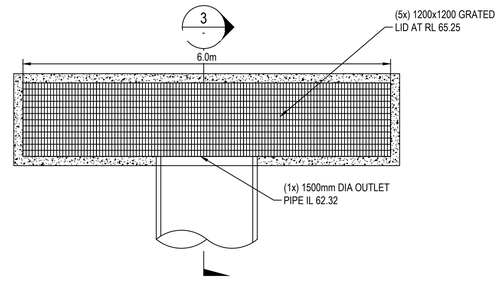
NOTE:
SYDNEY WATER SPECIFIED EDD
64.21 (WETLAND 29)

LOW FLOW DIVERSION TO FUTURE WETLAND 29
1:500(H) 1:100(V)

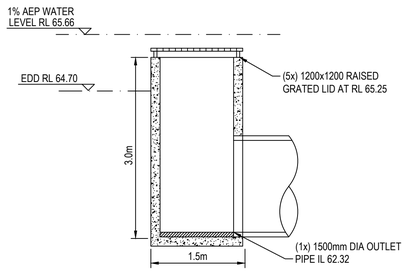


NOTE:
SYDNEY WATER SPECIFIED EDD
63.48 (WETLAND 28)

LOW FLOW DIVERSION TO FUTURE WETLAND 28
1:500(H) 1:100(V)



WATERCOURSE OUTLET



SECTION 3
1 : 50

Issue	Description	Date
P4	AMENDMENTS PER PEER REVIEW 10/07/23	11-07-23
P3	ISSUED FOR APPROVAL	30-06-23
P2	ISSUED FOR APPROVAL	06-06-23
P1	ISSUED FOR APPROVAL	31-05-23

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION
A1

Scales	1 : 50	Drawn	JH
		Designed	DG
Height Datum	AHD	Checked	DB
Grid	GDA2020	Approved	

Client: 19-609-SKC208 - Basin B Outlet Details.dwg

Stockland

FIFECAPITAL

Civil Engineers and Project Managers

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Project
PROPOSED INDUSTRIAL DEVELOPMENT
200 ALDINGTON

Title
BASIN B
OUTLET DETAILS

Drawing No.	Project No.	Issue
19-609-SKC208	19-609	P4

0 1 2 3 4 5m
1 : 50 @ A1 1 : 100 @ A3

0 2 4 6 8 10m
1 : 100 @ A1 1 : 200 @ A3

0 10 20 30 40 50m
1 : 500 @ A1 1 : 1000 @ A3

100mm on Original

APPENDIX C - WSUD MAINTENANCE PLAN (DRAFT)

The Water management Strategy elements within the site 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.

Table C1 Bioretention Basin maintenance plan

Bioretention Basin maintenance plan Location: 200 Aldington Road Basin A / Basin B SSDA 10479			
Inspection Items	**Frequency**	**Action required**	**Action taken & date**
Surface vegetation	6 months	▪ Inspect health of plants and trim where necessary ▪ Remove and replace diseased/dead plants *with same species ▪ Remove weeds	
Debris/sediment	3 monthly	Inspect and clean debris/sediment build-up from surface, inlet area and overflow Disposal to sorting facility to separate recyclables and organic material to suitable composting facility	
Outlet / Overflow	3 monthly	If ponding occurs for more than 3 days after storms, check whether underdrain or filter media is blocked	
Pits / outlets	12 monthly	Repair cracking	
Under drainage	5 years	Flush underdrainage	
Filter media	Approx. 30 years	Replace filter media	

Additional reference material available online through Maintaining Vegetated Stormwater Assets - Water by Design

*A detailed landscape plan will be prepared during detailed design of the basin.

Table C2: GPT maintenance plan

GPT maintenance plan **Location: 200 Aldington Road** **Lot L** **SSDA 10479**			
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	

*Review required frequency after 12 months of monitoring and recording

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 C3: Rainwater harvesting Tank maintenance plan

Rainwater Harvesting Tank maintenance plan –Including filter **Location: 200 Aldington Road** **Lot F** **SSDA 10479**			
Inspection Items	**Frequency**	**Action required**	**Action taken & date**
Filter	6 months	Inspect Clean in accordance with manufacturer instructions	
Pump	6 monthly	Inspect / test	
Tank access	12 monthly	Check lid condition of access	
Likely pollutants			
Roof – leaves			

Table C4: Irrigation maintenance plan

Landscape Irrigation maintenance plan **Location: 200 Aldington Road** **Lot F** **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: Darren Galia

Title: Senior – Civil Engineer

Design Components: DRAINS, MUSIC, Report, Stormwater design

Qualifications: B.Eng Civil, MIEAust CPEng, NER

Reviewer information

Name: Tim Michel

Title: Associate – Civil Engineer

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

CPESC N: 11555

AT&L Contact number. 02 9439 1777

APPENDIX E – PCC CHECKLIST

PENRITH

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	

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