



# **Aspect Industrial Estate**

## **SSD-10448 Modification 11**

### **Lot 301 and 305 DP1305254, and**

### **Lot 104 and 105 DP1305965**

### **788-882 Mamre Road, Kemps Creek**

## **Water and Stormwater**

## **Management Plan**

**CLIENT/ Mirvac**

**DATE/ 9/12/2025**

**CODE/ 18-596**

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## 1. Introduction

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This Water and Stormwater Management Plan (WSMP) has been prepared by AT&L on behalf of Mirvac Projects Pty Ltd (Mirvac) to inform a modification application, Modification No.11 (MOD11) of State Significant Development Application (SSDA) for the staged development of the Aspect Industrial Estate (AIE) at 788-882 Mamre Road, Kemps Creek (reference SSD-10448).

This modification application relates to changes to the proposed water management strategy for the AIE Site SSD-10448 to demonstrate interim compliance with stormwater quality, quantity and flow targets in accordance with the Mamre Road Precinct Development Control Plan (DCP) to support the development of warehouses 1, 2, 3, 6, 7 (incl. Café), 8 & 9 on AIE in advance of a regional stormwater scheme by Sydney Water.

As per MOD4 and MOD8 (both of which are approved), the undeveloped land at Mirvac's Elizabeth Enterprise Precinct at 1669-1732 Elizabeth Drive, Badgerys Creek (EEP) was included within cumulative MUSIC modelling to satisfy the stormwater quality, quantity and flow targets to enable progression of the abovementioned development on AIE in advance of a regional stormwater scheme for the Mamre Road Precinct.

AIE SSD-10448 MOD8 sought minor adjustments to the cumulative stormwater management strategy, which notably reduced the extent of undeveloped land considered at EEP. Minor modifications were made to the applicable SSD-10448 conditions of consent as part of the MOD8 approval.

**MOD11 seeks approval for an amended cumulative stormwater management strategy, which seeks to align with cumulative stormwater management which has been submitted for approval under a separate SSDA for works at the EEP site, notably the EEP Stage 1A SSDA (SSD-19618251). The EEP Stage 1 SSDA seeks approval to construct infrastructure works across the EEP Stage 1 lands, and also seeks approval for the development of Warehouse 2 and Warehouse 6 at EEP. The cumulative development scenario includes the development at AIE, including warehouses 1, 2, 3, 6, 7 (incl. Café), 8 & 9, and EEP Stage 1A, including warehouses 2 and 6.**

The MOD11 interim stormwater management strategy supports the following development on AIE in advance of delivery of a regional stormwater scheme within the Mamre Road Precinct:

- **Stages 1 to 3 (Warehouse 1, 3, 9, 2):** which are constructed and operational.
- **Stage 4 & 5 (Warehouse 8, 6, 7, adjacent Café):** which are currently under construction.

It also supports the delivery of Stage 1A works on the EEP site, as contemplated under SSD-19618251, which includes:

- Street trees throughout the EEP Stage 1 Estate – either passively or actively irrigated
- Evaporation Basin – with the potential for evaporative losses proposed within EEP Stage 2 land
- On-site stormwater detention (Basin A)

Refer to the EEP Stage 1 SSDA WSMP (REP005B-19-16-369) for more information.

As the warehouses contemplated under AIE Stage 4 and 5 are under construction, for the purposes of the MOD11 cumulative stormwater management strategy, we have only sought to demonstrate compliance with development at AIE for Stage 5, as this incorporates and builds upon all stormwater management approvals for prior AIE Stages 1-4.

Under the MOD8 approval, the Mirvac EEP site is proposed to be retained in its undeveloped state unless either of the following:

- 1) A regional stormwater scheme is delivered within the Mamre Road Precinct which satisfies the AIE stormwater quality and quantity targets.
- 2) An alternative interim stormwater strategy is approved by the Department of Planning and Environment (DPE) to enable development within the AIE site consistent with the abovementioned warehouses 1, 2, 3, 6, 7 (including adjacent Café), 8 & 9.

**3) Approval of a future development application by Mirvac which demonstrates ability to maintain compliance with waterway health targets on a cumulative basis between Mirvac AIE and EEP sites.**

4) Any other reason as approved by the DPE.

As such, and per 3) above, MOD11 seeks consent for a cumulative WWH strategy across AIE (to Stage 5) and EEP (including Stage 1A) to enable delivery of development under those staged built form approvals.

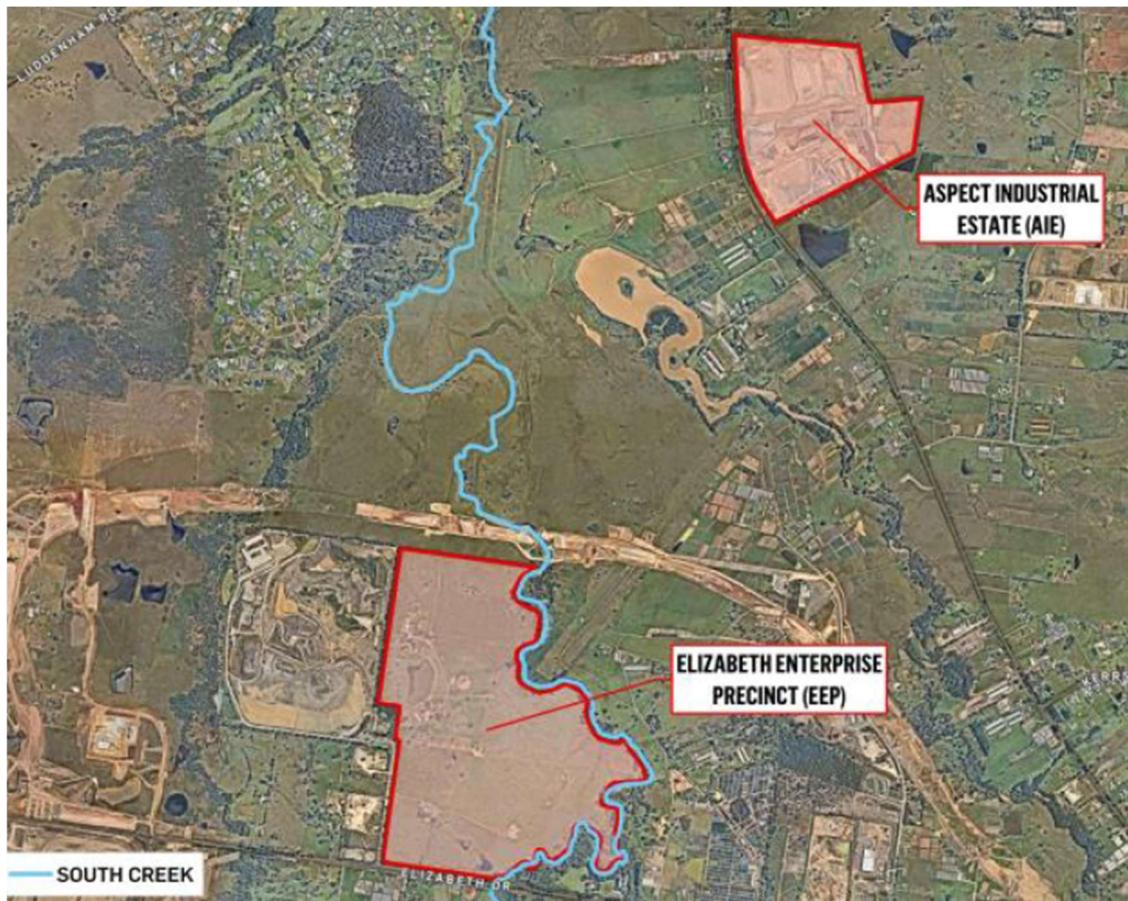
The proposed Stage 1 EEP development includes the construction and fit out of warehouses and distribution buildings on proposed Lots 2 and 6 among other works such as an internal road infrastructure works and on-site bulk earthworks.

Note that an update to the EEP Stage 1A SSDA WSMP has been submitted concurrently to DPHI for approval to support MOD11, which demonstrates compliance with the interim stormwater management requirements.

This report supports the MOD11 application to SSD-10448 for the Site and should be read in conjunction with the Environmental Impact Statement (EIS) as prepared by Urbis, development plans and supporting documentation submitted with the SSDA, and the most recently amended WSMP as included in the MOD8 application. It also should be read in conjunction with the EEP Stage 1 SSDA Water and Stormwater Management Plan (REP005B-19-16-369-SSDA WSMP) which was submitted as part of SSD-19618251 for approval.

The original SSD-10448 was approved on 24 May 2022 and the MOD8 application, incorporating the most recent amendments to the WSMP, was approved on 7 May 2025.

The location of the Mirvac AIE and EEP Sites are presented as **Figure 1**.



**Figure 1: AIE and EEP Site Locations (imagery from near map dated 30 March 2023)**

## 2. Site Description and Pre-Development Site Conditions

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### 2.1. Site Locations

#### 2.1.1. Aspect Industrial Estate (AIE)

The Mirvac AIE site is located at 788-882 Mamre Road, Kemps Creek is legally described as Lot 301 and 305 DP1305254, and Lot 104 and 105 DP 1305965 and is located east of Mamre Road, Kemps Creek within the Penrith Local Government Area (LGA). The site has approximately 950m of direct frontage to Mamre Road with a proposed signalised intersection providing permanent vehicular access via Mamre Road to the M4 Motorway and Great Western Highway to the north and Elizabeth Drive to the south.

The AIE site is located approximately 4km north-west of the future Western Sydney Nancy-Bird Walton Airport, 13km south-east of the Penrith CBD and 40km west of the Sydney CBD.

The AIE site has an area is approximately 55.83 Ha. Construction works, namely bulk earthworks, commenced across the Site in August 2022. Prior to the commencement of works, the Site was primarily used for rural activities and comprised of residential dwellings, sheds, man-made dams and grassed fields.

#### 2.1.2. Elizabeth Enterprise Precinct (EEP)

The Mirvac EEP site is located at 1669-1732 Elizabeth Drive, Badgerys Creek and is legally described as Lot 100 DP1283398, Lot 741 DP810111 and Lot 99 DP1283398. The EEP site is owned by Mirvac, is located directly adjacent to Wianamatta-South Creek and upstream of the Mirvac AIE site. The EEP site is zoned for employment generating purposes under the Aerotropolis SEPP though presently remains undeveloped in its rural residential state.

The EEP site has a total site area of approximately 132Ha.

### 2.2. Waterways and Vegetation

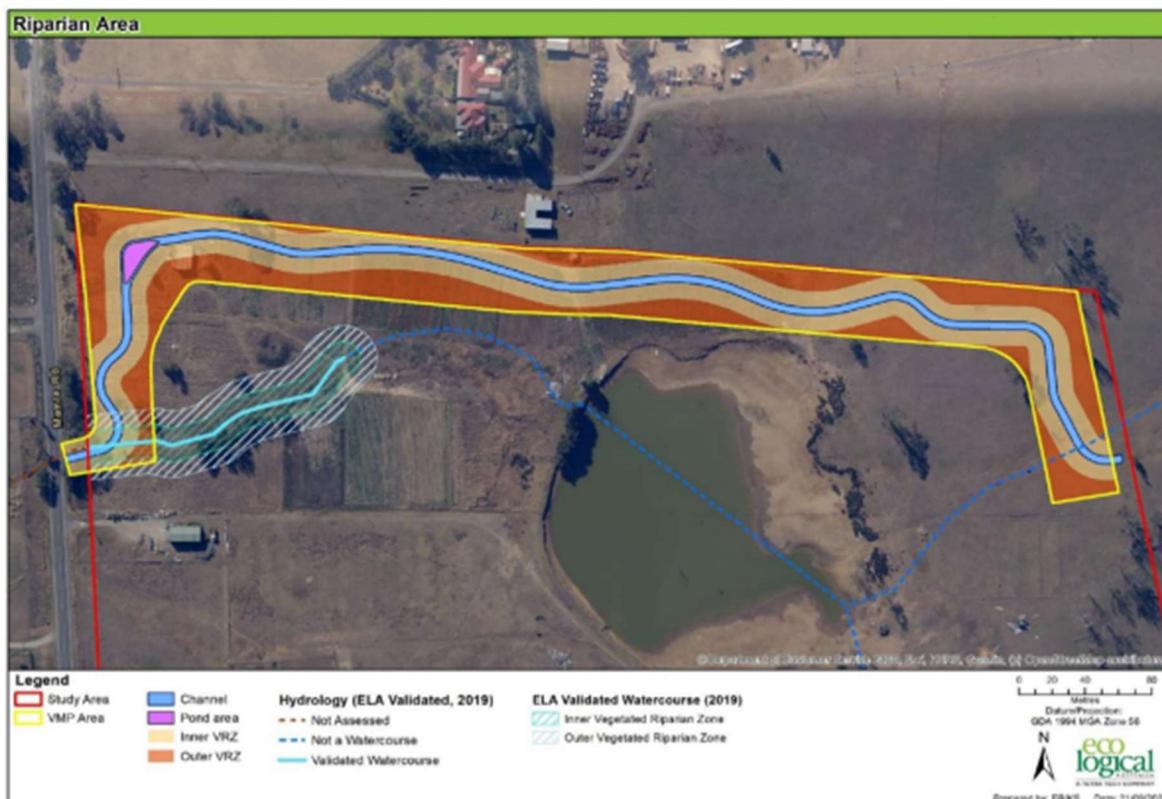
A [Riparian Assessment](#) report was undertaken by Eco Logical Australia to support SSD-10448 for the Aspect Industrial Estate (Eco Logical Australia, 2020). Within this report it was determined there were two mapped hydrolines located within the site. These hydrolines are indicated on **Figure 2**.



**Figure 2: Watercourses mapped within the AIE Site**

Realignment of the mapped hydrolines was approved under SSD-10448, and will generally include the following work (refer to **Figure 3**):

- Removal of the existing watercourse and establishment of a 40-metre-wide Realigned Trunk Drainage Corridor, consisting of an 800-metre-long channel.
- A low flow channel with a typical width of 3.75m – 5.7m.
- A high flow channel with a typical width of 20m.
- Establishment of Inner and Outer Vegetated Riparian Zones (VRZs).



**Figure 3: Proposed Realigned Trunk Drainage Corridor alignment approved under SSD-10448**

The diversion of the pre-development watercourse and proposed Realigned Trunk Drainage Corridor is unchanged as part of the MOD11 application.

## 2.3. Geology and Soils

Based on an [Geotechnical Report](#) undertaken by Pells Sullivan Meynink (PSM) for the AIE site (reference: PSM3739-004L Rev6, dated 13 October 2020) the following inferred sub surface soils were encountered across the site:

- Topsoil – Silty CLAY Depth 0.0 - 0.3m
- Natural Soil/ Fill – CLAY and Silty CLAY: Depth 0.1 to 4.5m
- Bedrock – SHALE: Depth 1.0 to 6.5m

### 2.3.1. Salinity

Based on site investigations undertaken by PSM for the AIE site, consisting of testing of 20 samples undertaken across the Site, the majority of soils were found to be “non-saline to moderately saline”. Only one sample out of the 20 tested was found to be “very saline”. The location of this sample is in an area on future lot 4 that will be filled by approximately 2 metres above pre-development ground level.

### 2.3.2. Sodicity

The Exchangeable Sodium Percentages (ESPs) calculated from tests undertaken by PSM ranged from 5.6% to 53.4%, which indicates that the soils on site range from sodic to highly sodic when compared to criteria listed in *Site Investigations for Urban Salinity* (DLWC, 2002).

### 2.3.3. Construction Salinity Management Plan

PSM prepared a [Construction Salinity Management Plan](#) (CSMP, July 2022) for the AIE Site to effectively manage site salinity, to minimise the effect of the proposed development on salinity processes and to protect

the development of the AIE Site from salinity damage. A range of strategies are outlined in the CSMP to manage potential impacts relating to salinity, including:

- Implementation of erosion and sediment control practices (e.g., diversion of surface water runoff around disturbed areas, sediment traps, silt fencing, sealing temporary batters and stockpiles).
- Avoid over-watering for dust suppression.
- Grade surfaces to prevent ponding of surface water
- Undertake salinity testing of soils to be imported to ensure high saline soils are not brought into the site.

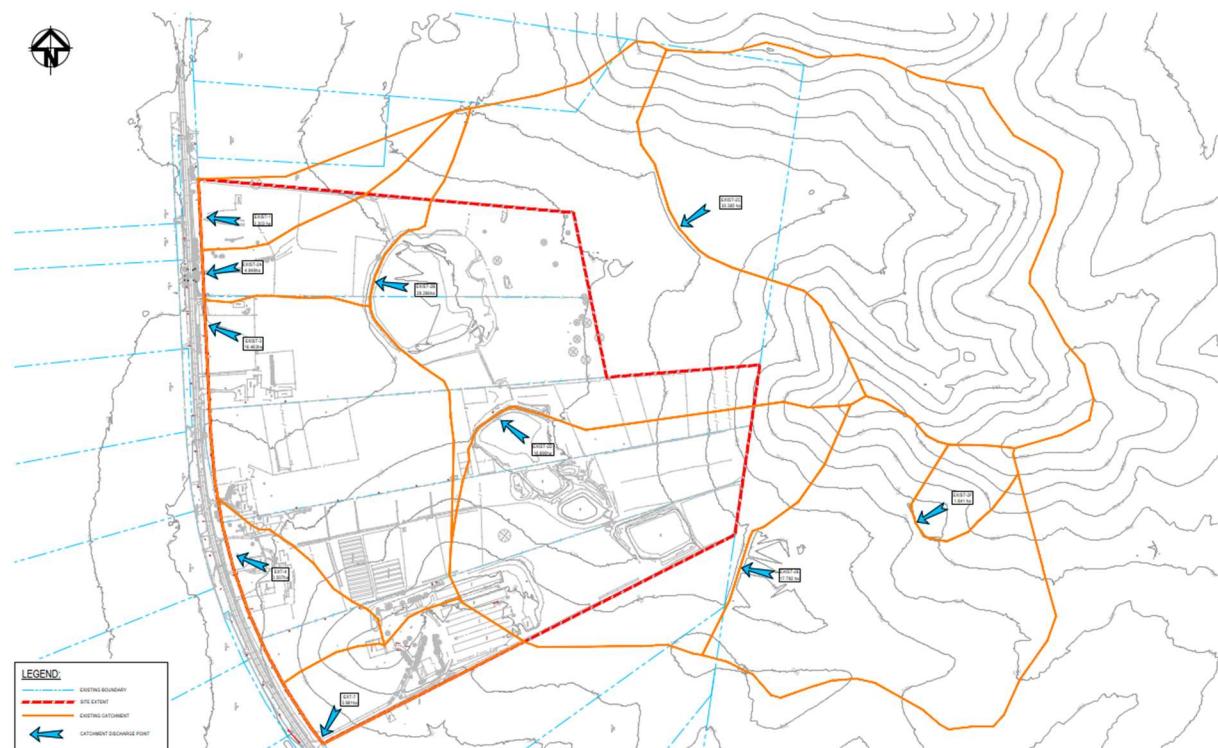
#### 2.3.4. Assessment of Potential Impacts on Soil Resources

PSM have also prepared an *Assessment of Potential Impact on Soil Resources and Infrastructure* (August 2022) in support of the MOD3 application. PSM noted that from a geotechnical point of view, the proposed development has close to no impact on soil resources at the site. The earthworks will comprise a cut to fill balance on site with minor import.

It shall be noted that the MOD11 application does not seek to amend the site bulk earthworks, and as such, the above assessment completed by PSM is still considered valid for MOD11.

### 2.4. Pre-Development Catchment Delineation

Catchment delineation of the AIE Site under pre-development conditions is presented in **Figure 4**.



**Figure 4: Catchment delineation under pre-development conditions**

A summary of the internal and external catchments under pre-development conditions is presented in **Table 1**.

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

| <b>Catchment ID</b> | <b>Area (ha)</b> | <b>Internal / External</b> | <b>Description</b>  |
|---------------------|------------------|----------------------------|---|
| <b>1</b>            | 3.303            | Internal & External        | North-western portion of AIE Site and a small portion of adjacent site to the north. Discharges towards Mamre Road.                                       |
| <b>2A</b>           | 4.848            | Internal & External        | North-western portion of AIE Site and a small portion of adjacent site to the north. Discharges towards a box culvert drainage crossing under Mamre Road. |
| <b>2B</b>           | 28.266           | Internal & External        | North-eastern portion of the AIE Site, including external catchment that drains towards a farm dam within the Site.                                       |
| <b>2C</b>           | 30.385           | External                   | External catchment that drains towards the eastern boundary of the Site.  |
| <b>2D</b>           | 18.890           | Internal & External        | South-eastern portion of the AIE Site, including external catchment that drains towards three farm dams within the Site.                                  |
| <b>2E</b>           | 17.792           | External                   | External catchment that drains towards the southern boundary of the Site.   |
| <b>2F</b>           | 1.841            | External                   | External catchment that drains towards the southern boundary of the Site.   |
| <b>3</b>            | 16.463           | Internal                   | Western portion of the Site that drains towards Mamre Road.   |
| <b>4</b>            | 3.507            | Internal                   | Western portion of the Site that drains towards Mamre Road.   |
| <b>7</b>            | 3.981            | Internal                   | South-western portion of the Site that drains in a southerly direction towards Mamre Road.  |

### 3. Proposed Development

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#### 3.1. Scope of MOD11 Application

Under the provisions of S4.55 (1A) of the EPA Act, the MOD11 application seeks consent for:

- Adjustment to the previously approved WSMP under SSD-10448 MOD8 for an amended cumulative stormwater management strategy, which seeks to align with cumulative stormwater management which has been submitted for approval under a separate SSDA for works at the EEP site, notably the EEP Stage 1A SSDA (SSD-19618251). The EEP Stage 1 SSDA seeks approval to construct infrastructure works across the EEP Stage 1 lands and also seeks approval for the development of Warehouse 2 and Warehouse 6 at EEP.

The amended cumulative stormwater management strategy sought as part of MOD11 includes the development at AIE, including warehouses 1, 2, 3, 6, 7 (incl. Café), 8 & 9, and EEP Stage 1A, as a progression from MOD8 to provide for the development of EEP Stage 1 Warehouse 2 and 6 along with Stage 1 estate infrastructure and the temporary evaporation basin within Stage 2 area of EEP whilst providing stormwater management measures for both EEP and AIE in advance of the regional stormwater scheme.

MOD4 incorporated 132Ha of undeveloped land at Mirvac's EEP site. MOD8 sought to reduce the area of undeveloped land at EEP down to 127Ha. This subject MOD 11 seeks to align with cumulative stormwater management which has been submitted for approval under a separate SSDA for works at the EEP site, notably the EEP Stage 1A SSDA (SSD-19618251).

- **All other water management measures remain unchanged from MOD8.**

After the approval of MOD11 by DPHI and until the development works commence for Stage 1 EEP, it is intended that the approved MOD8 stormwater management strategy will still be applicable to achieve compliance to the WWH/WSUD requirements. As outlined previously, the MOD8 stormwater strategy would include the EEP undeveloped land to achieve a cumulative stormwater strategy that is compliant to WWH requirements. Once Stage 1 EEP construction works commence, the construction phase targets outlined in DCP will apply to the EEP site. Next, once the Stage 1 EEP stormwater management measures are completed/commissioned, the MOD11 stormwater management strategy will come into effect. Where practicable, the construction and commissioning of the stormwater management measures as detailed in Stage 1 EEP (SSD-19618251) will be re-prioritised.

The overall objective of the proposed revisions to the WSMP is to document a series of water management measures that will be required on a staged basis to support the following development on the AIE site:

- **Stages 1 to 3 (Warehouse 1, 3, 9, 2):** which are constructed and operational.
- **Stage 4 & 5 (Warehouse 8, 6, 7, adjacent Café):** which are currently under construction.

As the warehouses contemplated under Stage 4 and 5 are under construction, for the purposes of the MOD11 cumulative stormwater management strategy, we have only sought to demonstrate compliance with development at AIE for Stage 5 as the Stage 5 scenario incorporates and builds upon the approved stormwater management measures for the prior AIE Stages 1-4.

Details of the proposed WSUD strategy are outlined in **Section 5** of this WSMP. In summary, the revised strategy incorporates the following key elements:

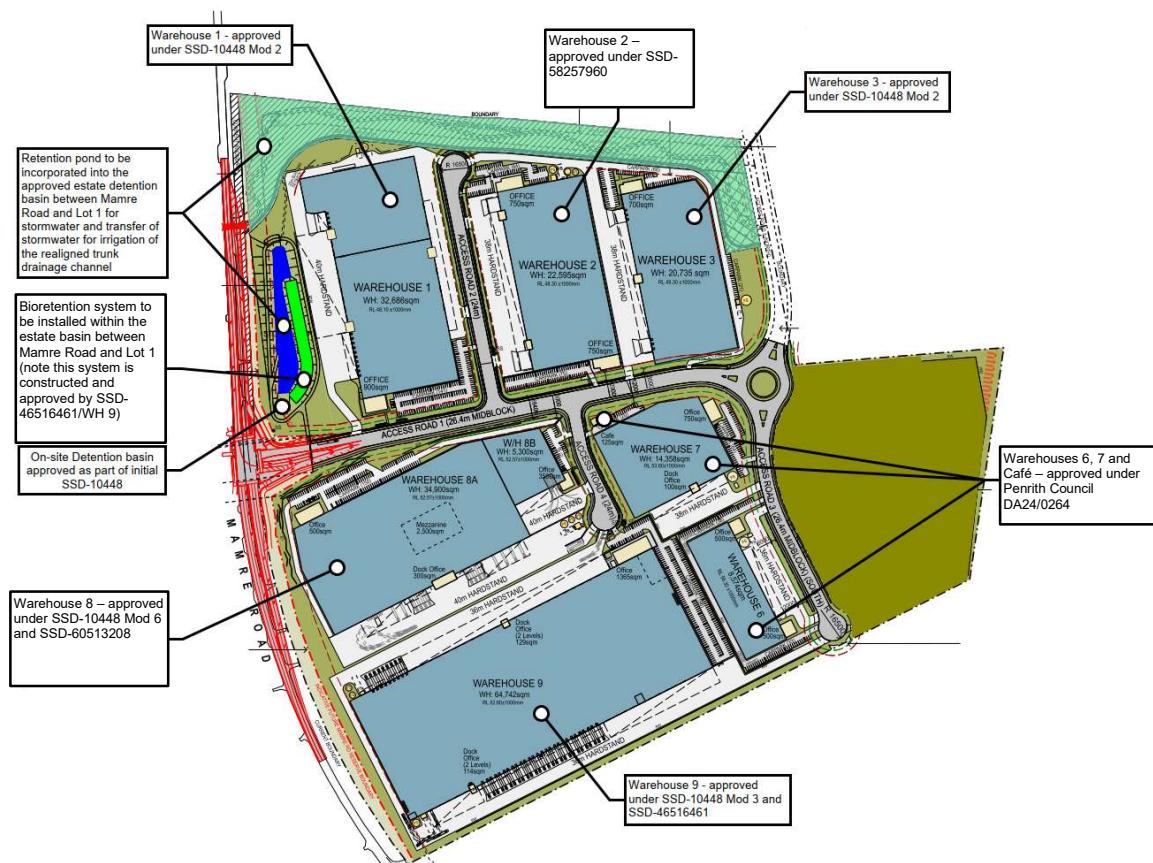
- Incorporation of the proposed development and stormwater management measures proposed as part of the EEP Stage 1A SSDA (SSD-19618251), into the overall cumulative stormwater management strategy that considers both AIE and the EEP sites together.
- The stormwater management measures to be implemented as part of the Stage 1A EEP SSDA include:
  - ▶ An evaporative basin with Mirvac's Stage 2 EEP lands. The evaporation basin will be formed via an earth bund to store all stormwater runoff generated from Stage 1 development and also the undeveloped areas of Stage 2. The evaporative losses through the large basin are modelled on MUSIC to demonstrate WWH compliance for both EEP and AIE sites.

- ▶ Existing farm dams are located within the EEP site and the Stage 1 existing farm dams are assumed to be removed for the infrastructure works associated with EEP Stage 1A. The existing farm dams are not modelled in MUSIC. Further discussion in Section 6.2.2.
- ▶ Street trees – either passively or actively irrigated
- ▶ On-site stormwater detention (Basin A)
- As noted above, the proposed stormwater management measures that are to be implemented at AIE remain unchanged from MOD8, and include:
  - ▶ Provision of stormwater management measures generally consistent with Mamre Road Precinct DCP requirements.
  - ▶ Provision of on lot stormwater management measures which include rainwater tanks for non-potable reuse, and gross pollutant traps.
  - ▶ Provision of an interim retention pond in the estate-wide detention basin for the purpose of stormwater storage and reuse for irrigation across the Realigned Trunk Drainage Corridor within the AIE Site.
  - ▶ Provision of bio-retention system within the estate basin between Mamre Road and Lot 1. Note the bio-retention system has been approved and installed.

Currently, AIE Stages 1 to 3 (Warehouses 1, 3, 9, 2) have completed construction and are currently operational. Stages 4 and 5 are currently under construction which includes Warehouse 8, 6, 7 and the adjacent Café. As the warehouses contemplated under Stage 4 and 5 are under construction, for the purposes of the MOD11 cumulative stormwater management strategy, we have only sought to demonstrate compliance with development at AIE for Stage 5.

The AIE development and final stormwater measures at AIE in Stage 5 are shown in

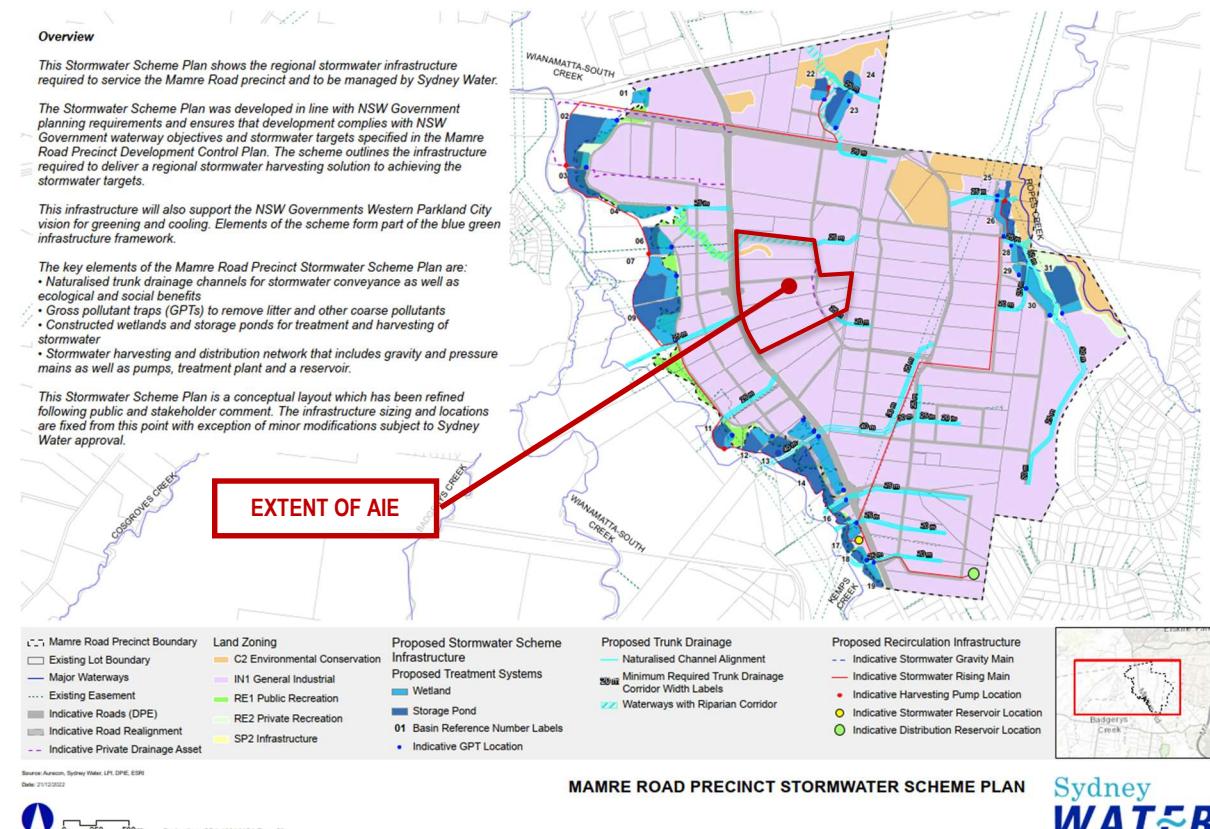
**Figure 5** below.



**Figure 5: Stage 5 – (Lots 1, 3, 9, 2, 8, 6, 7 and Café)**

### 3.2. Trunk Drainage Paths

In December 2022, Sydney Water released the Mamre Road Precinct Stormwater Scheme Plan (SSP), reproduced below as **Figure 6**. The SSP presents indicative regional trunk drainage infrastructure proposed by Sydney Water in the Mamre Road Precinct. The SSP was developed in line with NSW Government planning requirements and includes measures that would ensure development in the precinct complies with the waterway health targets outlined in the Mamre Road Precinct DCP.



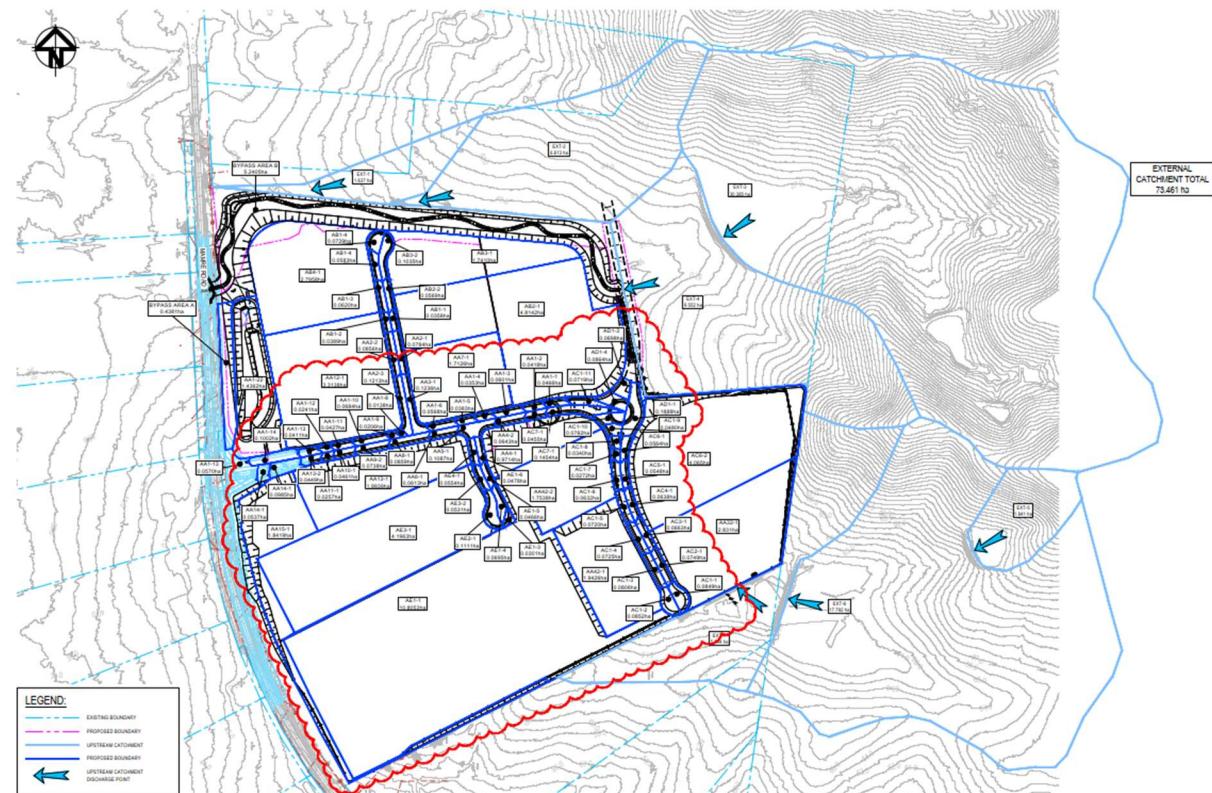
**Figure 6: Mamre Road Precinct Stormwater Scheme Plan (Sydney Water, December 2022)**

The approved SSDA for the AIE Site incorporates realignment of the trunk drainage channel such that it will follow the northern boundary of the Site. This is consistent with the proposed waterway shown in the SSP.

The SSP also shows a private drainage asset, which will drain the external catchment to the south and east of the AIE Site via a pit and pipe network that will be installed parallel to proposed Road 3. This drainage line will ultimately discharge into the proposed trunk drainage corridor. This proposed private drainage asset was approved under SSD-10448 and will remain unchanged as a result of the MOD11 application.

### 3.3. Post-Development Catchment Delineation

Catchment delineation of the AIE Site under post-development conditions is presented in **Figure 7**.



**Figure 7: Catchment delineation under post-development conditions**

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

- A bio-retention system, which will treat low flows prior to discharge from the Site. Further details of the proposed bio-retention system/basin are outlined in **Section 5.2.4**.
- A detention basin, which has been designed to attenuate peak flows such that the stormwater quantity management controls in the Mamre Road Precinct DCP are satisfied. Further details of the proposed basin are outlined in **Section 5.2.5**.

External catchments will be managed through the Site as follows:

- Catchments 1 and 2A will drain towards the northern boundary and will discharge into the new drainage channel (now constructed).
- Catchments 2B and 2C will drain towards the natural low point at the eastern boundary and into the upstream end of the new drainage channel (now constructed).
- Catchments 2D, 2E and 2F will discharge into an upstream diversion line (pit and pipe), which will follow the alignment of Road 3 and discharge into the upstream end of the new drainage channel (now constructed).

## 3.4. Water Sources and Demands

### 3.4.1. Water Requirements

Water requirements within the AIE Site will be typical of large format warehouses and distribution centres. Sources of demand for water within the allotments and public domain will include:

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

### 3.4.2. Water Sources

The primary source of water to the AIE Site will be Sydney Water's potable water reticulation network. Details of existing and proposed infrastructure that will be required to service the estate are presented in the Civil Infrastructure Report prepared by AT&L (refer to REP007-03-18-596-MOD3 Civil Infrastructure Report). Note the potable water network has been installed as part of the Estate Works.

A "third-pipe" reticulated recycled water network will supply non-potable water throughout the Mamre Road Precinct. Non-potable water will be supplied from two sources:

- Stormwater harvested within precinct-wide wetlands / ponds, to be delivered and operated by Sydney Water as part of a regional stormwater management scheme.
- Recycled water from the planned Upper South Creek Advanced Recycled Water Centre.

### 3.4.3. 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 apply to development within the AIE Site:

- **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.

## 4. Stormwater Targets

The Mamre Road Precinct DCP establishes the construction and operational phase stormwater quality and quantity (flow) targets for the Site. This Water and Stormwater Management Plan addresses operational phase targets only. Construction phase targets are addressed in an Erosion and Sediment Control Plan 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 2**.

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

| Parameter   | Option 1 Target<br>(reduction in mean annual load<br>from unmitigated development) | Option 2 Target<br>(allowable mean annual load<br>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 3**.

**Table 3: Operational phase stormwater quantity (flow) targets – Options 1 and 2**

| Parameter  | Option 1 Target<br>(MARV)                                    | Option 2 Target<br>(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        |

## 5. Water Sensitive Urban Design Strategy

The Water Sensitive Urban Design (WSUD) Strategy for the MOD11 application incorporates a series of management measures to address stormwater quality, quantity (peak flow attenuation) and flow volume. The stormwater management strategy outlined below supports the development under MOD11, which includes the development at AIE, including warehouses 1, 2, 3, 6, 7 (incl. Café), 8 & 9, and EEP Stage 1A, including warehouses 2 and 6.

### 5.1. Strategy Overview

This revised WSUD Strategy has been developed to support:

- a) The currently approved on-lot developments within AIE Lots 1, 3 (SSD-10448 MOD8), 9 (SSD-10448 MOD8 / SSD46516461 MOD3) and Lot 2 (SSD-58257960 MOD1, MOD 2 approval pending)
- b) Separate SSDA submission for the on-lot development located within Lot 8 (references SSD-10448 MOD10 and SSD-60513208 MOD2), and local Penrith City Council DA on Lot 6 and Lot 7 (DA DA24-624). The developments on Lot 8, 6 and 7 are all approved and are under construction.
- c) Development of the EEP Stage 1A SSDA application (SSD-19618251), which includes the development of Lots 2 and 6 in Stage 1 EEP (SSD-19618251) and the Stage 1 estate infrastructure, and other interim stormwater management measures, including a temporary evaporation basin in Stage 2 EEP land

Approval of the revised WSUD Strategy is being sought under the MOD11 application to SSD-10448. The key elements of this Strategy are presented on a series of drawings contained in **Appendix B** and **Appendix C** and form a solution that will satisfy the stormwater quality, quantity (peak flow) and flow volume controls presented in **Section 4**.

As an outcome of liaison between Mirvac and NSW DPHI, the currently approved interim strategy for WSUD (approved under SSD-10448 MOD8), which considers the on-lot development works on Lots 1, 2, 3, 6, 7 (Incl. Café), 8 and 9 and all AIE estate roads, has been developed that incorporates land that is under the control of Mirvac – the Elizabeth Enterprise Precinct (EEP Site) at 1669-1723 Elizabeth Drive, Badgerys Creek (Lot 100 DP1283398, Lot 741 DP810111 and Lot 99 DP1283398). The WSUD Strategy to support the proposed additional development of Lots 2, 6, 7 (incl. Café) and 8 on the AIE Site, including previously approved development on Lots 1, 3 and 9, involves including the existing EEP undeveloped site within cumulative MUSIC modelling. MOD11 seeks to amend this interim WSUD strategy to align with the cumulative stormwater management which has been submitted for approval under a separate SSDA for works at the EEP site, notably the EEP Stage 1A SSDA (SSD-19618251).

Should any further amendments to the WSUD Strategy be required to support development within the AIE site, this would form part of subsequent applications, i.e., further Modifications to SSD-10448, or as part of supplementary SSDA/DA submissions.

#### 5.1.1. Stormwater Quality and Flow Management Measures

In advance of delivery of a regional stormwater scheme within the Mamre Road Precinct, the interim stormwater measures within this WSMP supports the development of Warehouses 1, 2, 3, 6, 7 (Incl. Café), 8 and 9 on AIE. These measures are provided in five (5) key stages as follows:

- **Stages 1 to 3 (Warehouse 1, 3, 9, 2):** which are constructed and operational.
- **Stage 4 & 5 (Warehouse 8, 6, 7, adjacent Café):** which are currently under construction.

As the warehouses contemplated under Stage 4 and 5 are under construction, for the purposes of the MOD11 cumulative stormwater management strategy, we have only sought to demonstrate compliance with development at AIE for Stage 5, as this incorporates and builds upon all stormwater management approvals for prior AIE Stages 1-4.

The proposed interim measures to address the operational stormwater quality and flow targets for Stage 1 – Phase 1, Stage 1 – Phase 2, Stage 2, Stage 3, Stage 4 and Stage 5 are outlined within **Table 4**.

Note there are no proposed changes to any proposed stormwater management measures approved at AIE, or any subsequent approvals for any separate SSDA/DA approvals with development works within AIE.

Table 4: Summary of progressive stormwater measures to address stormwater quality and flow volume targets for AIE Stages 1–5

| AIE Development Stages   |  |            |          | Stormwater measures  |  |  |
|--|--|------------|----------|--|--|--|
|  | Rainwater Tanks (for non-potable water reuse)  | GPTs       | OSD      | Stormwater retention within estate basin for temporary irrigation  | Bio-filtration within Estate Basin   | Mirvac EEP site  |
| <b>Stage 1 – Phase 1</b><br>+ Warehouse 1 - SSD-10448 MOD8   | + WH1  | Estate OSD | As above | Nil  | Nil  | Existing 127Ha undeveloped EEP site included within cumulative MUSIC modelling As approved per AIE SSD-10448 MOD8  |
| <b>Stage 1 – Phase 2</b><br>• Warehouse 1 - SSD-10448 MOD8<br>+ Warehouse 3 - SSD-10448 MOD8   | • WH1<br>+ WH3   |            |          | Nil  | Bioretention system to be installed within the estate basin between Mamre Road and Lot 1 | As above   |
| <b>Stage 2</b><br>• Warehouse 1 - SSD-10448 MOD8<br>• Warehouse 3 - SSD-10448 MOD8<br>+ Warehouse 9 - SSD-10448 MOD8 and SSD-46516461 MOD3   | • WH1<br>• WH3<br>+ WH9  | As above   | As above | Retention pond to be incorporated into the approved estate detention basin between Mamre Road and Lot 1 for stormwater and transfer of stormwater for irrigation of the realigned trunk drainage channel | As above   | As above   |
| <b>Stage 3</b><br>• Warehouse 1 - SSD-10448 MOD8<br>• Warehouse 3 - SSD-10448 MOD8<br>• Warehouse 9 - SSD-10448 MOD8 and SSD-46516461 MOD 3<br>+ Warehouse 2 - SSD-58257960 MOD1 (MOD2 approval pending)   | • WH1<br>• WH3<br>• WH9<br>+ WH2   |            |          | As above   | As above   | As above   |
| <b>Stage 4</b><br>• Warehouse 1 - SSD-10448 MOD8<br>• Warehouse 3 - SSD-10448 MOD8<br>• Warehouse 9 - SSD-10448 MOD8 and SSD-46516461 MOD 3<br>• Warehouse 2 - SSD-58257960 MOD1 (MOD2 approval pending)<br>+ Warehouse 8 - SSD-10448 MOD10 and SSD-60513208 MOD2  | • WH1<br>• WH3<br>• WH9<br>• WH2<br>+ WH8  | As above   | As above | As above   | As above   | Proposed EEP Stage 1A SSD (SSD-19618251), including temporary evaporation basin within Stage 2 EEP lands, street trees and OSD Basin A, included within cumulative MUSIC modelling |
| <b>Stage 5</b><br>• Warehouse 1 - SSD-10448 MOD8<br>• Warehouse 3 - SSD-10448 MOD8<br>• Warehouse 9 - SSD-10448 MOD8 and SSD-46516461 MOD 3<br>• Warehouse 2 - SSD-58257960 MOD1 (MOD2 approval pending)<br>• Warehouse 8 - SSD-10448 MOD10 and SSD-60513208 MOD2<br>+ Warehouses 6, 7 and adjacent Café (PCC DA 24/264) | • WH1<br>• WH3<br>• WH9<br>• WH2<br>• WH8<br>+ WH6<br>+ WH7<br>+ Café (NB: rainwater tanks accounting for the both the WH7 and café area are sought to be provided by WH7) |            |          | As above   | As above   | As above   |

NB: Stormwater measures that are already implemented as part of Stages 1 to 3 are shown in green.

### 5.1.2. Stormwater detention Management Measures

The estate detention basin, approved as part of the original SSD-10448 consent, located between Mamre Road and Lot 1, has been designed to satisfy the stormwater peak flow discharge rate targets for the AIE Site. The detention basin has been designed to satisfy the following controls adopted in Section 2.5 of the Mamre Road Precinct DCP:

- 12) *OSD is to be accommodated on-lot, within the development site, or at the subdivision or estate level, unless otherwise provided at the catchment level to the satisfaction of the relevant consent authority.*
- 13) *Stormwater basins are to be located above the 1% AEP.*
- 14) *Post-development flow rates from development sites are to be the same or less than pre-development flow rates for the 50% to 1% AEP events.*
- 15) *OSD must be sized to ensure no increase in 50% and 1% AEP peak storm flows at the Precinct boundary or at Mamre Road culverts. OSD design shall compensate for any local roads and/or areas within the development site that does not drain to OSD.*

The approved detention basin dimensions, and location remain unchanged as part of MOD11 to that approved under original SSD-10448.

## 5.2. Proposed Stormwater Management Measures at AIE Only

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

Refer to AT&Ls EEP Stage 1 SSDA Water and Stormwater Management Plan (REP005B-19-16-369-SSDA WSMP) for details of the proposed stormwater management measures proposed to be implemented as part of the Stage 1A EEP SSDA development. A summary of the proposed water management measures is outlined below:

- Street trees – either passively or actively irrigated
- Evaporation Basin – with the potential for evaporative losses proposed within EEP Stage 2 land
- On-site stormwater detention (Basin A)

### 5.2.1. Rainwater Tanks

Rainwater tanks have been adopted to satisfy the following control in the MRP DCP:

- 8) *Where development is not serviced by a recycled water scheme, at least 80% of its non-potable demand is to be supplied through allotment rainwater tanks.*

The MUSIC modelling for the AIE site was developed to estimate the rainwater tank volume required to satisfy this control. To determine the tank volume required to meet at least 80% of non-potable demand on individual lots, the following assumptions have been made (consistent with the requirements of the *Technical guidance for achieving Wianamatta-South Creek stormwater management targets*):

- Non-potable demand for toilet flushing has been based on 15 litres 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 on-lot landscape area being irrigated at a rate of 600 millimetres per year (equivalent to 6 ML/ha/yr).
  - ▶ At least 50% 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 summary of the rainwater tank volumes adopted in MUSIC is presented in **Table 5**. The rainwater tank parameters for lots 1, 2, 3 and 9 remain unchanged from the approved Stage 1 (Lots 1 and 3) SSD-10448 (MOD8), Stage 2 (Lot 9) SSD-10448 MOD8 and SSD-46516461 MOD3, and Stage 3 (Lot 2) SSD-5827960 approvals.

**Table 5: Rainwater tank volumes adopted in MUSIC**

| Lot                  | Total Area (ha) | Roof area to rainwater tank (ha) | Non-potable demand in toilets (kL/day) | Non-potable irrigation demand (ML/year) | Adopted rainwater tank volume (kL) | % of reuse demand met |
|----------------------|-----------------|----------------------------------|--|---|------------------------------------|-----------------------|
| 1                    | 6.12            | 1.25                             | 2.29                                   | 2.06                                    | 305                                | 88.7                  |
| 2                    | 4.02            | 1.06                             | 1.51                                   | 1.22                                    | 120                                | 84.2                  |
| 3                    | 4.28            | 0.89                             | 1.60                                   | 1.93                                    | 250                                | 85.0                  |
| 6                    | 1.96            | 0.47                             | 0.74                                   | 0.62                                    | 60                                 | 83.1                  |
| 7<br>(Incl.<br>Café) | 2.69            | 0.73                             | 1.01                                   | 1.65                                    | 160                                | 81.0                  |
| 8                    | 7.57            | 2.40                             | 2.84                                   | 2.89                                    | 220                                | 80.4                  |
| 9                    | 11.31           | 3.10                             | 4.24                                   | 2.70                                    | 200                                | 80.5                  |

NB: cells shaded grey indicate rainwater tank parameters that remain unchanged from the approved Stage 1 Lot 1 & 3 SSD-10448 MOD2 and Stage 2 Lot 9 SSD-10448 MOD3 and SSD-46516461 (MOD3) applications. Cells shaded green indicate rainwater tank parameters that remain generally consistent with separate development applications for lot 2 (SSD-58257960 MOD1, MOD 2 approval pending), Lot 8 (SSD-10448 MOD10 and SSD-60513208 MOD2) and Lot 6&7 (Penrith DA24/0264). As noted above, final rainwater tank sizing will be confirmed during detailed design to ensure that the minimum 80% non-potable water supply requirement has been met. As such, the above parameters may vary to suit final designs.

### 5.2.2. Retention Pond for Stormwater Harvesting and Reuse

As an interim measure to satisfy the stormwater flow volume targets for the AIE Site under Stage 2, Stage 3, Stage 4 and Stage 5 conditions, a temporary retention pond is proposed within the approved estate basin, to provide an effective means of reducing runoff volume from the Site. The interim retention pond is not required as part of Stage 1 – Phase 1 or Stage 1 – Phase 2. The Retention Pond can capture and store large quantities of stormwater runoff, while also being relatively easy to maintain.

Under Stage 2, Stage 3, Stage 4 and Stage 5, a retention pond will be incorporated into the approved estate detention basin between Mamre Road and proposed lot 1, for storage and transfer of stormwater for irrigation of the realigned Trunk Drainage Corridor adjacent to the northern boundary of the AIE Site. Inclusion of the proposed retention component within the estate basin does not require amendment to the size or configuration of the approved estate basin. Rather, only a temporary amendment to the estate detention basin discharge control device will be required. As outlined within this report, this interim measure still maintains the required on-site detention requirements for all Stages 1-5. Note, as of the writing of the subject MOD11, the interim retention pond approved as part of MOD8 has been constructed and is currently in operation.

Key parameters adopted for the interim retention pond are summarised below in **Table 6**. This interim retention pond will only be required as an interim measure until delivery of the regional stormwater scheme within Mamre Road Precinct.

**Table 6: Interim retention pond parameters for Stage 2, Stage 3, Stage 4 and Stage 5**

| Parameter                               | Interim Retention Pond (within detention basin)  |
|---|--|
| Inflow from:                            | Lot / Warehouses 1, 2, 3, 6, 7 (Incl. Café), 8 and 9<br>Estate Roads 1, 2, 3 and 4         |
| Overflow to:                            | Realigned Trunk Drainage Corridor, approx. 100m upstream of culvert crossing of Mamre Road |
| Surface area (m <sup>2</sup> )          | 3,500  |
| Permanent pool volume (m <sup>3</sup> ) | 3,500  |

| Parameter  | Interim Retention Pond (within detention basin) |
|--|---|
| Exfiltration rate (mm/hr)  | 0.01  |
| Evaporation loss (% of PET)  | 100   |
| Extended detention depth (m)   | 0.5   |
| Outlet (equivalent pipe diameter)  | 50  |
| Adopted reuse (kL/yr)<br>(applied as Monthly Pattern as per <i>MUSIC Modelling Toolkit</i> ) | 20,190 <sup>[1]</sup>                           |

[1] Reuse from Interim Retention Pond would require pumping to the irrigation areas at a rate equivalent to the peak monthly demand as defined in MUSIC.

Stored water from the Interim Retention Pond was used to irrigate the Realigned Trunk Drainage Corridor, which has a total area of approximately 3.365 hectares and assumes an average annual irrigation rate of 600mm/year. An interim stormwater pumping system has been installed within the vicinity of the Interim Retention Pond, to pump stormwater captured within the Interim Retention Pond to the irrigation area. The sizing of the pumps and discharge mains was determined during detailed design. The irrigation system has been installed and is operational. A schematic plan of the interim retention pond and irrigation strategy is provided within **Appendix D**.

The 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 shown within plans included within Appendix D, the system incorporates the following:

- A pump system to transfer water from the Interim Retention Pond to the Realigned Trunk Drainage Corridor 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 type, i.e., 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 Proponent.

#### 5.2.3. Gross Pollutant Traps

The proposed stormwater treatment train will consist of on-lot Gross Pollutant Traps (GPTs) as a means of primary stormwater treatment. GPTs will be delivered on a staged basis as part of warehouses 1, 2, 3, 6, 7, 8 and 9. GPTs are designed to capture litter, debris, coarse sediment, as well as some oils and greases. GPTs will be installed on each lot prior to stormwater discharge to the estate-wide stormwater drainage network.

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 would be confirmed at the detailed design phase.

#### 5.2.4. Bio-retention System

The objective of biofiltration systems is to provide a filtering effect when stormwater runoff flows through a vegetation layer and sand and/or gravel filter media to remove pollutants from the runoff. Biofiltration systems generally consist of an open space containing landscaping of native grasses, shrubs and trees with an underlying filter media. The bio-retention system within the estate basin has been approved and installed.

Design plans for the completed bio-retention system as approved as part of the post-approval conditions under the Stage 2 Lot 9 SSD-46516461 consent are included within **Appendix E**.

The bio-retention system has been incorporated into the estate-wide basin located north of Access Road 1, between Mamre Road and proposed Lot 1, as approved under SSD-10448 (MOD8). MUSIC model parameters adopted for the proposed conventional bio-retention system are summarised in **Table 7**.

**Table 7: Bio-retention system parameters**

| Parameter                              | Unit           | Value  |
|--|----------------|--|
| Basin filter area                      | m <sup>2</sup> | 1611   |
| Basin surface area                     | m <sup>2</sup> | 1611   |
| Extended detention depth               | m              | 0.3  |
| Unlined filter media perimeter         | m              | 0.01   |
| Saturated hydraulic conductivity       | mm/hr          | 100  |
| Filter depth                           | m              | 0.6  |
| TN content of filter media             | mg/kg          | 800  |
| Orthophosphate content of filter media | mg/kg          | 40   |
| Exfiltration rate                      | mm/hr          | 0  |
| Base Lined?                            | -              | Yes  |
| Vegetation properties                  | -              | Vegetated with effective nutrient removal plants |
| Overflow weir width                    | m              | 10 (overflow into detention basin)               |
| Underdrain present                     | -              | Yes  |
| Submerged zone                         | -              | No   |

The proposed bio-retention system will be lined with an impermeable clay liner, such that subsurface flow from the system will not permeate the underlying soils.

#### **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 (approximately equivalent to the 1.5-year ARI) and the 1% AEP event (equivalent to the 100-year ARI).

The majority of the site currently falls towards the north-west corner and runoff drains into existing culverts underneath Mamre Road. For the post-development case, it is proposed to maintain this outlet and ensure peak flow rates are not increased via the OSD basin and controlled outlets through the use of low flow orifices and high flow weirs. Refer to [drawings 18-596-C1060 and 18-596-C1061 from the MOD-3 approved civil drawing package](#) for the OSD basin details.

Consistent with the original SSD-10448 consent, the base of the approved OSD basin has been ameliorated with gypsum and compacted to minimise the potential for infiltration to the underlying sodic soils.

## 6. Performance Assessment

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### 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.

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 (2016).
- Times of concentration for each sub catchment have been determined using the kinematic wave equation.
- 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<sup>2</sup>/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.
- 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.
- The minimum cover over pipes shall be 450mm in grassed areas and 600mm within carriageways.
- 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).
- Overland flow paths maintain a minimum of 300mm freeboard to all habitable floor levels.

## 6.2. Stormwater Quality Modelling

### 6.2.1. 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, 2021).

### 6.2.2. Scenario Modelling

A cumulative MUSIC model for both AIE and EEP have been created and simulated for Stage 5 AIE of the proposed development, which will ultimately incorporate the development of AIE Lots 1, 2, 3, 6, 7 (incl. café), 8, 9 and, the proposed Stage 1A EEP SSDA (SSD-19618251), which includes EEP Lots 2 and 6. The MUSIC model layout is shown in **Figure 8**.

It should be noted that the existing farm dams within Stage 1 EEP are assumed to be removed to enable Stage 1 infrastructure works and the EEP Stage 2 existing farm dams are excluded in the MUSIC model. The Stage 2 EEP existing farm dams are assumed to be full and subsequently any stormwater inflows are directly discharged as outflow to the temporary evaporation basin. The MUSIC model and results in Section 6.3 are consistent with the Stage 1A EEP SSDA (SSD-19618251).

A detailed breakdown of the sub-catchment areas and key parameters of the stormwater management measures for the AIE Stage 5 scenario is included in **Appendix A**.

Catchment plans showing the sub-catchment breakdown are included in **Appendix B**.

Stormwater Management Plans showing the proposed locations of the stormwater management measures under the AIE Stage 5 scenario is included in **Appendix C**.

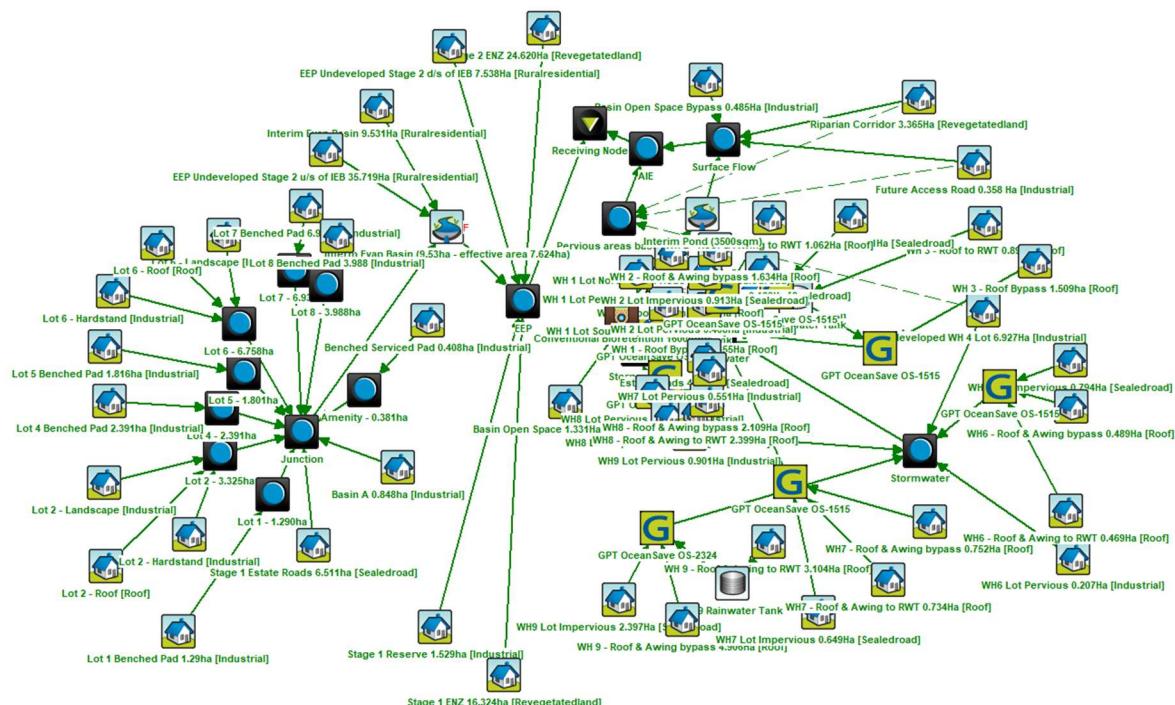


Figure 8: Post-development MUSIC model – MOD11 – AIE Stage 5 (AIE Lots 1, 3, 9, 2, 8, 6, 7 and café) + EEP Stage 1A SSDA (Lots 2 & 6)

## 6.3. Performance Against Stormwater Targets

### 6.3.1. Stormwater Quality

MUSIC model results presented as mean annual loads at the receiving node, including AIE Stage 5 (Development of Lots 1, 3, 9, 2, 8, 6, 7 and café) + EEP Stage 1A SSDA (Lots 2 & 6) is displayed below in **Table 8**.

**Table 8: Summary of MUSIC modelling results against stormwater quality targets – Stage 5 (Lots 1, 3, 9, 2, 8, 6, 7 and café) + EEP Stage 1A SSDA (Lots 2 & 6)**

| Parameter          | Sources Post-Development | Residual Load Post-Development | Reduction (%) | Complies with DCP Option 1 Target? | Mean annual load (kg/ha/yr) | Complies with DCP Option 2 Target? |
|--------------------|--------------------------|--------------------------------|---------------|------------------------------------|-----------------------------|------------------------------------|
| <b>TSS (kg/yr)</b> | 56600                    | 11400                          | <b>79.8</b>   | No                                 | <b>61.8</b>                 | Yes                                |
| <b>TP (kg/yr)</b>  | 118                      | 38.6                           | <b>67.4</b>   | No                                 | <b>0.21</b>                 | Yes                                |
| <b>TN (kg/yr)</b>  | 859                      | 400                            | <b>53.4</b>   | No                                 | <b>2.17</b>                 | Yes                                |
| <b>GP (kg/yr)</b>  | 10300                    | 114                            | <b>98.9</b>   | Yes                                | <b>0.62</b>                 | Yes                                |

The MUSIC model results presenting allowable mean annual loads demonstrate the proposed stormwater management measures under MOD11 will satisfy the Mamre Road Precinct DCP stormwater quality controls for the DCP Option 2 targets.

### 6.3.2. Stormwater Quantity

The assessment of the performance of stormwater quantity (peak flow rates) management for the AIE Site to ensure post development peak flow rates do not exceed pre-development peak flow rates (for the AIE site) has been undertaken for two post-development scenarios:

- AIE Site under Stage 5 development conditions, with a modified detention basin outlet arrangement to accommodate the interim retention pond that is required to satisfy stormwater quality and flow volume targets (MARV and flow duration). Note this is currently consistent with the MOD8 approval.
- AIE Site under Ultimate development conditions (entire AIE concept masterplan), with the detention basin outlet in its ultimate arrangement.

**Table 9** indicates the pre-development and post-development peak flow rates on AIE for a range of design storm events between and including the 1-year ARI and 100-year ARI at the Mamre Road culverts. Note the modelling of the basin tailwater levels within the Mamre Road culverts have been incorporated based on flood modelling undertaken by Cardno and included as part of the SSD-10448 MOD3 consent.

**Table 9: Pre-development and post-development flows at discharge point to Mamre Road culvert**

| Design Storm Event             | Pre-Development Peak Flow Rate (m <sup>3</sup> /s) | Post-Development Peak Flow Rate – Stage 5 (m <sup>3</sup> /s) | Post Development Peak Flow Rate – Ultimate AIE Concept Masterplan (m <sup>3</sup> /s) |
|--------------------------------|--|---|---|
| <b>1-Year ARI (63.2% AEP)</b>  | 1.40   | 1.03  | 1.40  |
| <b>2-Year ARI (39.4% AEP)</b>  | 4.34   | 2.20  | 2.97  |
| <b>5-Year ARI (18.1% AEP)</b>  | 8.54   | 4.07  | 4.69  |
| <b>10-Year ARI (≈ 10% AEP)</b> | 10.1   | 5.17  | 5.98  |
| <b>20-Year ARI (≈ 5% AEP)</b>  | 12.1   | 6.77  | 7.59  |
| <b>100-Year ARI (1% AEP)</b>   | 15.7   | 9.37  | 10.1  |

The above DRAINS model results for AIE demonstrates that the post-development peak flow rates for both the ultimate AIE concept Masterplan and all interim stages up to and including Stage 5 would be less than or equal to pre-development peak flow rates for a range of storm events between (and including) the 1-year ARI and

100-year ARI design events. Therefore, the stormwater drainage system and detention basins as proposed would satisfy the development controls relating to stormwater quantity management.

Refer to the AT&L EEP Stage 1A SSDA Water and Stormwater Management Plan (REP005B-19-16-369-SSDA WSMP) for details on how the EEP Stage 1A works are compliant with the pre vs post development peak flow rates.

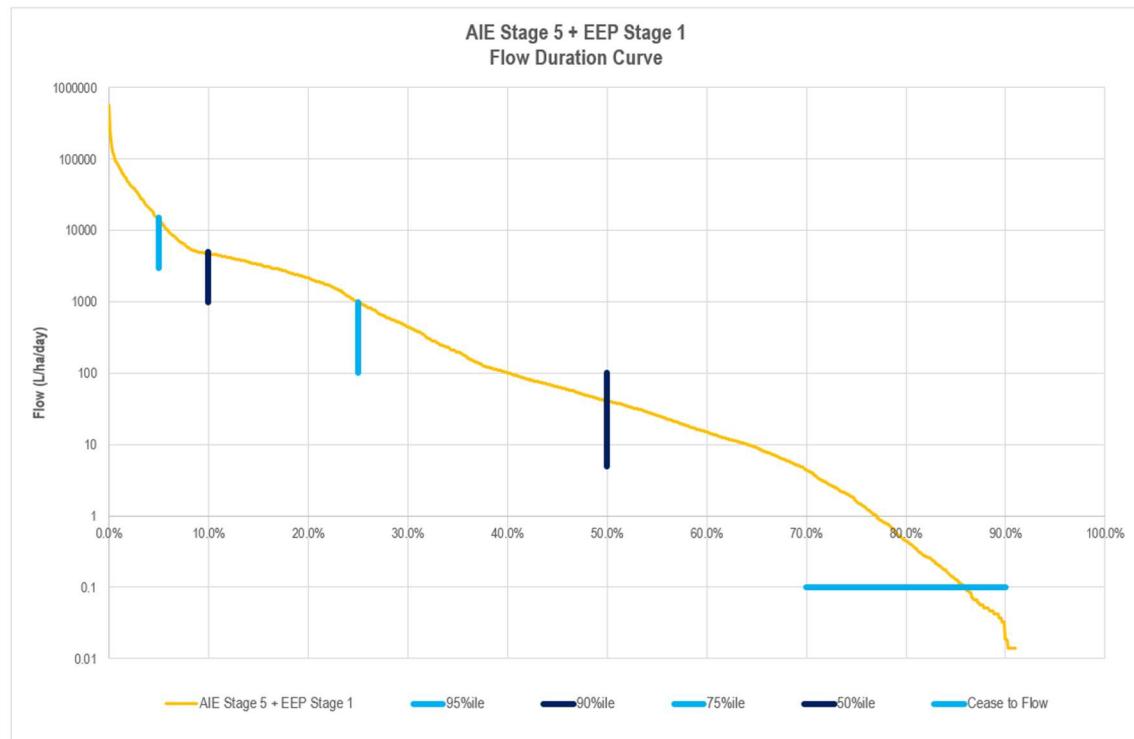
### 6.3.3. Stormwater Flow Volume (Marv and Flow Duration Curve)

MUSIC model results demonstrating performance of the proposed stormwater management measures against the stormwater flow targets are presented for MOD11 below in **Table 10**.

**Table 10: Summary of MUSIC model results against stormwater flow targets – MOD11, AIE Stage 5 (Lots 1, 3, 9, 2, 8, 6, 7 and Café) + EEP Stage 1A SSDA (Lots 2 & 6)**

| Parameter                               | Result | DCP Target    | Complies with DCP target        |   |
|---|--------|---------------|---------------------------------|---|
|   |        |               | DCP Option 1<br>(MARV approach) | DCP Option 2<br>(Flow Duration<br>Curve approach) |
| Mean annual runoff<br>volume (ML/ha/yr) | 1.37   | 2.0           | Yes                             | n/a for this<br>option                            |
| 95%ile flow (L/ha/day)                  | 14482  | 3000 to 15000 | n/a for this option             | Yes   |
| 90%ile flow (L/ha/day)                  | 4727   | 1000 to 5000  | Yes                             | Yes   |
| 75%ile flow (L/ha/day)                  | 995.6  | 100 to 1000   | n/a for this option             | Yes   |
| 50%ile flow (L/ha/day)                  | 40.7   | 5 to 100      | Yes                             | Yes   |
| 10%ile flow (L/ha/day)                  | 0.02   | 0             | No**                            | n/a for this<br>option                            |
| Cease to flow                           | 14.1%* | 10% to 30%    | n/a for this option             | Yes*  |

The resultant flow duration curve for the Stage 5 development scenario is presented in **Figure 9**.



**Figure 9: Flow duration curves for the proposed AIE Stage 5 + EEP Stage 1 water management measures**

\* Note that the MUSIC model for EEP Stage 1A with AIE Stage 5 rounds off at below 0.014L/ha/day, whereas the benchmark examples from the *Technical Guidance for Achieving Wianamatta-South Creek Stormwater Management Targets* (DPE, Sep 2022) show cease to flow occurring at 0.1L/ha/day. Using this benchmark, EEP Stage 1A with AIE Stage 5 achieves 14.1% cease to flow. The large amount of ENZ land downstream of the development and downstream of the stormwater management controls, naturally provide soil baseflows which extends the tail of the graph, and are not directly related to the development works themselves.

\*\* Further discussion on the 10-percentile flow results is presented below:

- The 10-percentile values of up to 0.02 L/ha/day equates to a total runoff from the combined AIE and EEP Site of approximately 3.46 litres per day over the 184.4ha catchment area (equivalent to around 0.144 litres per hour). Whilst it is acknowledged the values that generate the flow duration curve represent a statistical probability of the exceedance of a particular flow value, in reality the calculated 10-percentile flow from the site represents a value too small to practically measure. To put this into perspective, a flow of 0.144 L/h is roughly equivalent to a slow tap drip—about one small droplet every two seconds. If you placed a bottle underneath it, it would take over two hours just to half-fill up a 600mm bottle of water. In practical terms, this represents a flow so minimal that it would be difficult to reliably observe or measure in the field. Another way to look at this, the 0.144 L/h flow rate at the discharge point is less than pouring a quarter full 600mL water bottle every hour for catchment area of approximately 260 soccer fields.
- Although the 10-percentile flow from the model exceeds the DCP target marginally by 0.02 L/ha/day, it is important to note that the stormwater management strategy is temporary only and will ultimately be replaced by the Sydney Water Regional Infrastructure, meaning that marginal exceedance, will only be applicable during this interim phase. The temporary condition, in addition to the significantly low flow discussed above will mean that the adverse impacts of this strict non-compliance, will be reliable.
- Existing approvals of the AIE SSDA (SSD-10448), specifically both the stormwater management strategies for AIE MOD4 and AIE MOD8 which are both approved, both included technical non-compliance with the Cease-to-Flow and/or 10-percentile flow targets. Both AIE MOD4 and AIE MOD8 incorporated the cumulative land use of AIE and EEP for the purposes of the approved stormwater management strategy. The existing approvals should be considered when assessing the cumulative stormwater strategy and results in this report. With reference to the AIE MOD 4 WSMP (REP008-08-18-596-MOD4 WSMP), the 10-percentile flow for the Stage 5 development (Lots 1, 2, 3, 9, 6, 7, 8, 9 and Café) was 0.08 L/ha/day. Similarly, reference to the AIE MOD 8 WSMP (REP016-03-18-596-MOD8 WSMP), the 10-percentile flow for the Stage 5 development (Lots 1, 2, 3, 9, 6, 7, 8, 9 and Café) was 0.09 L/ha/day. Comparatively, the cumulative stormwater strategy contemplated in EEP Stage 1A, provides a more favourable result with lower 10-percentile flows of 0.02 L/ha/day.
- The 10-percentile flow results indicate how often zero flows occur at the receiving node or outlet. Due to a limitation in MUSIC, smaller catchments tend to produce more zero-flow results because the model rounds very low flows down to zero when equivalent treatment controls are applied. In contrast, the Stage 1A EEP cumulative model, representing the combined AIE and EEP catchment area of approximately 184.4 ha, reports fewer zero-flow events simply because the larger catchment generates higher baseline flows than an equivalent model with a smaller catchment area and treatment train. As such, it is likely that a comparable smaller site, would achieve compliance, however, given the larger combined site area, rounding errors have possibly contributed to the non-compliance.
- Given the above discussion, AT&L consider the resultant 10%ile flow of 0.02L/ha/day to be effectively a zero flow result (the flows are effectively negligible), considering the significant catchment area, limitations of the MUSIC model and temporary timeline that this interim stormwater strategy will be in place for. As such, compliance with the DCP stormwater flow target Option 1 is also reached.

The flow duration curve presented in **Figure 9** represent the site under proposed developed conditions on the AIE Site without regional stormwater management measures in place. Based on the proposed Stormwater Scheme Plan proposed by Sydney Water, future wetlands and harvesting ponds west of Mamre Road will provide additional capacity for stormwater quality and flow volume management for the AIE Site. Ultimately, the combination of on-lot, estate-wide and regional measures will satisfy the waterway health objectives and controls adopted in the Mamre Road Precinct DCP.

## 7. Maintenance and Operations

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All proposed water management measures that will be located within the AIE Site would be managed and maintained by the proponent. Inspection and Maintenance Plans have been separately prepared and lodged for each subsequent completed warehouse at AIE. Amendments to the Inspection and Maintenance Plan may be required as subsequent development stages are completed.

It is anticipated that the Inspection and Maintenance Plan would be prepared using current best practice guidance such as *Water sensitive urban design inspection and maintenance guidelines* (Blacktown City Council, 2019) and would describe:

- Each of the functional components of each water management measure
- Expertise required to inspect, maintain and (where necessary) repair or replace components
- Minimum required frequency of inspection, repair or replacement activities
- Inspection and maintenance forms that list all necessary activities and contain a record of activities completed.

## 8. Conclusion

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The Aspect Industrial Estate is proposed to connect to the Mamre Road Precinct regional stormwater scheme once delivered. In advance of delivery of a regional stormwater scheme, this WSMP presents an interim WSUD Strategy that will satisfy the stormwater quality, quantity (peak flow attenuation) and flow volumes targets outlined in the Mamre Road Precinct DCP.

This WSMP MOD11 interim stormwater management strategy supports the following development on AIE in advance of delivery of a regional stormwater scheme within the Mamre Road Precinct:

- **Stages 1 to 3 (Warehouse 1, 3, 9, 2):** which are constructed and operational.
- **Stage 4 & 5 (Warehouse 8, 6, 7, adjacent Café):** which are currently under construction.

As the warehouses contemplated under Stage 4 and 5 are under construction, for the purposes of the MOD11 cumulative stormwater management strategy, we have only sought to demonstrate compliance with development at AIE for Stage 5, as Stage 5 builds upon and incorporates all prior stage stormwater management approaches.

Previously, under AIE SSDA 10448 MOD4 and MOD8, the Mirvac owned EEP site was previously included as undeveloped land only. MOD11 seeks to change the usage of the Mirvac EEP site through an alternative stormwater strategy which is described within the EEP Stage 1 SSDA Water and Stormwater Management Plan (REP005B-19-16-369-SSDA WSMP) which was submitted as part of SSD-19618251 for approval. Stage 2 lands at EEP will remain largely as undeveloped land, with the inclusion of the temporary evaporation basin. The MUSIC model and results for MOD11 are consistent with the Stage 1 EEP SSDA (SSD-19618251).

The MOD 11 WSMP incorporates the proposed development of EEP Stage 1A and the proposed interim stormwater management measures proposed as part of the EEP Stage 1A SSDA application (SSD-19618251). Refer to AT&L's Water and Stormwater Management Plan (REP005B-19-16-369-SSDA WSMP) for more details of the proposed interim stormwater management measures proposed to be implemented at the EEP site. A summary of the proposed water management measures is outlined below:

- Street trees – either passively or actively irrigated
- Evaporation Basin – with the potential for evaporative losses proposed within EEP Stage 2 land
- On-site stormwater detention (Basin A)

The existing farm dams within Stage 1 EEP are assumed to be removed as part of Stage 1A EEP infrastructure works and the Stage 2 EEP existing farm dams are excluded in the MUSIC model.

As discussed above, the cumulative interim stormwater management strategy was modelled using MUSIC. The results shown in Section 6.3 show that the stormwater quality, quantity and flow are generally in compliance with the WWH stormwater targets with the exception of the 10-percentile stormwater flow volume (0.02 L/ha/day). Whilst it is acknowledged the values that generate the flow duration curve represent a statistical probability of the exceedance of a particular flow value, in reality the calculated 10-percentile flow from the site represents a value too small to practically measure.

## 9. References

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AT&L, *Aspect Industrial Estate SSD-10448 Modification 3, Water and Stormwater Management Plan*, Issue 03, February 2023

AT&L, *Aspect Industrial Estate SSD-10448 Modification 4, Water and Stormwater Management Plan*, Issue 07, December 2023

AT&L, *Aspect Industrial Estate SSD-10448 Modification 8, Water and Stormwater Management Plan*, Issue 02, October 2024

Blacktown City Council, *Water sensitive urban design inspection and maintenance guidelines*, Version 1.0, 2019, <https://www.blacktown.nsw.gov.au/Plan-build/Stage-2-plans-and-guidelines/Developers-toolkit-for-water-sensitive-urban-design-WSUD/WSUD-inspection-and-maintenance-guidelines>

Eco Logical Australia, *Aspect Industrial Estate State Significant Development Application - Riparian Assessment*, prepared for Mirvac Projects, 2020  
<https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-10448%2120201110T053852.271%20GMT>

NSW DPE, *Mamre Road Precinct Development Control Plan 2021*

NSW DPE, *Technical guidance for achieving Wianamatta-South Creek stormwater management targets*, September 2022

PSM, *788-904 Mamre Road, Kemps Creek, Result of Geotechnical Investigations*, reference PSM3739-004L Rev 6, <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-10448%2120201110T053418.906%20GMT>

## Appendix A – Catchment and WSUD Parameters

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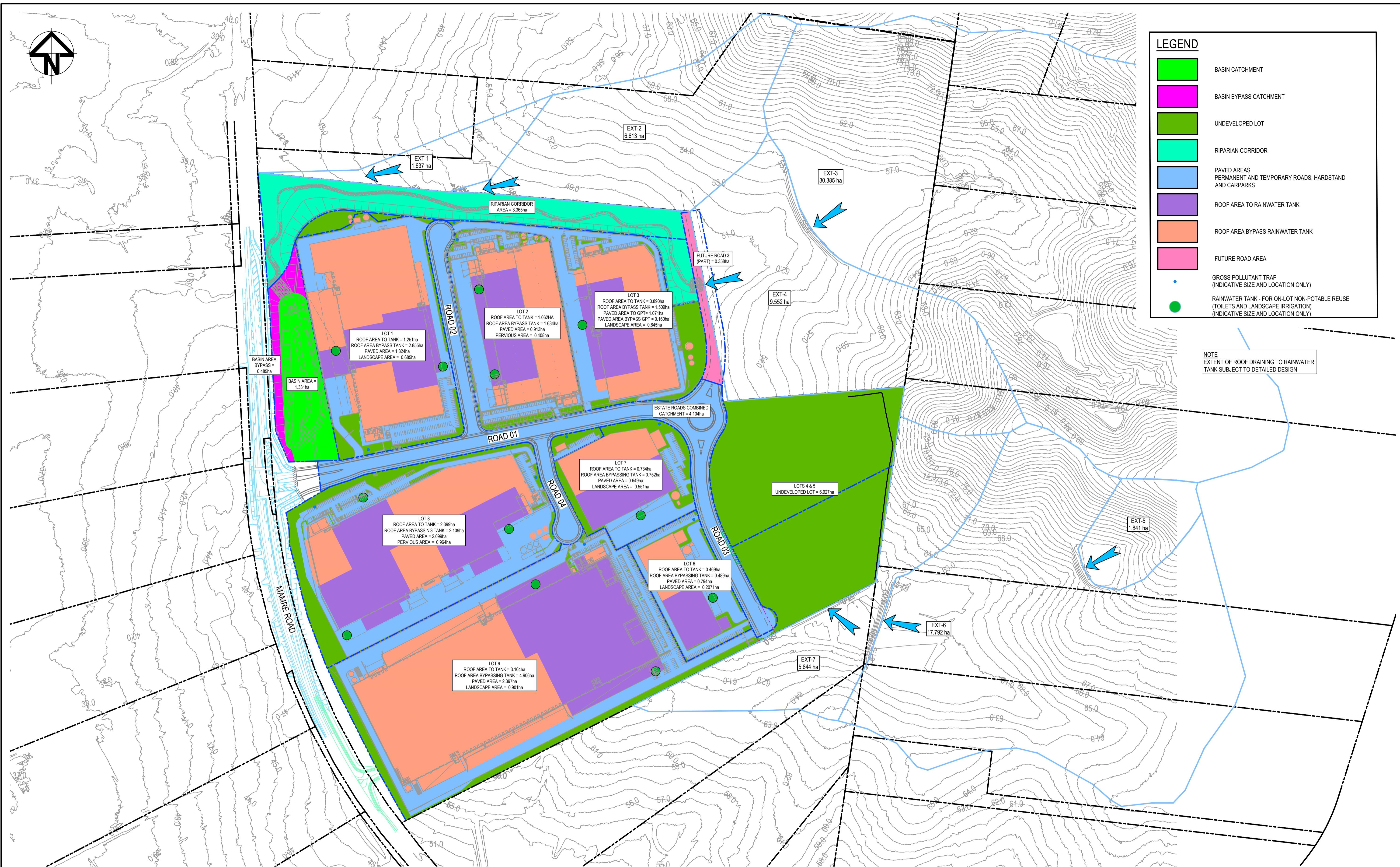
## AIE Stage 5 and EEP Stage 1

## Catchments & WSUD Elements

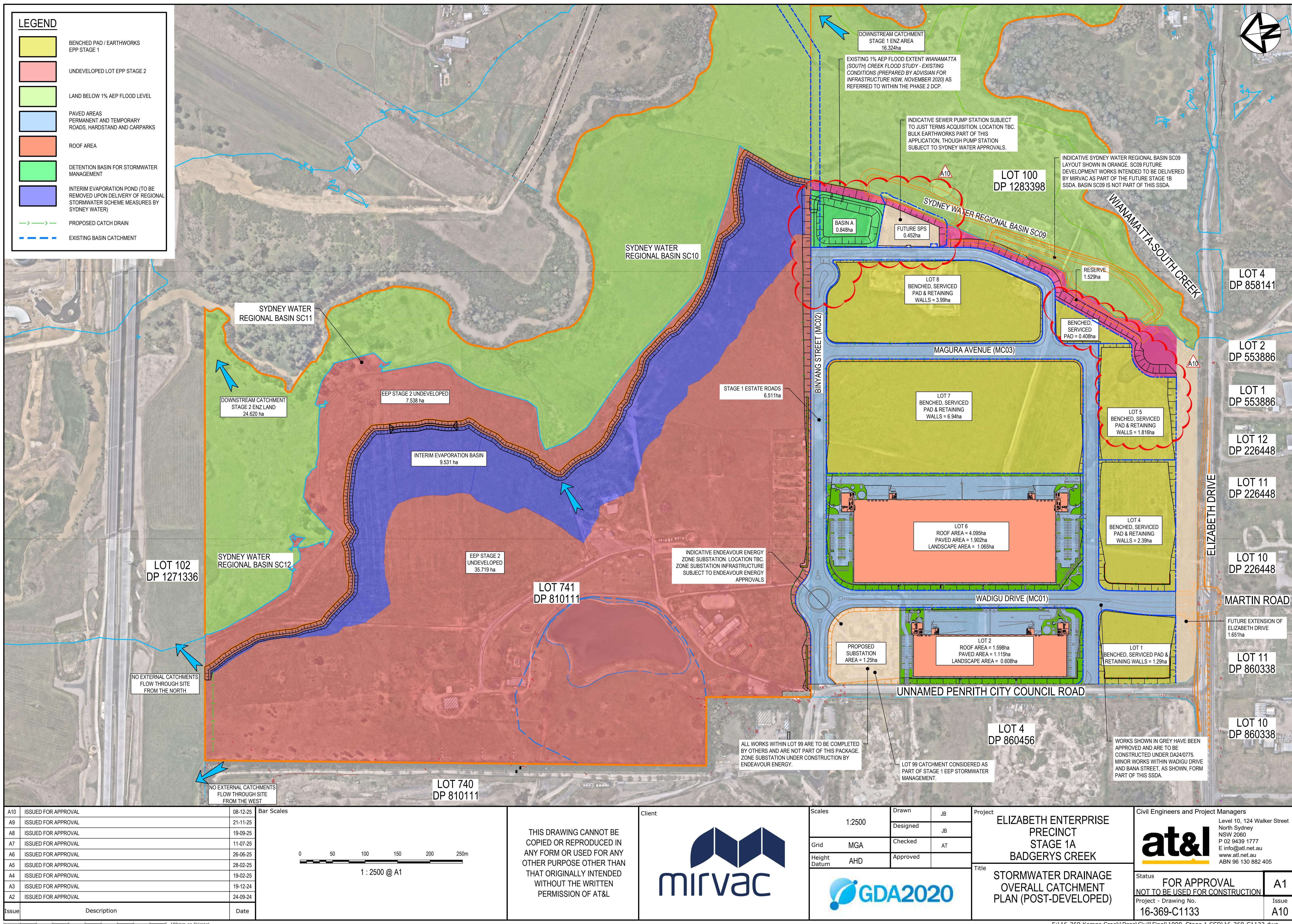
| Catchment ID   | Total Area (ha) | Roof to Tank (ha)<br>(100% impervious)                         | Roof to drain (ha)<br>(100% impervious) | Paved (ha)<br>(100% impervious) | Landscape (ha)<br>(0% impervious) | Undeveloped (ha) | Estate Road (ha)<br>(85% impervious) |
|--|-----------------|--|---|---------------------------------|-----------------------------------|------------------|--------------------------------------|
| <b>Aspect Industrial Estate (SSD-10448)</b>  |                 |  |   |                                 |                                   |                  |                                      |
| AIE Lot 1  | <b>6.115</b>    | 1.251  | 2.855                                   | 1.324                           | 0.685                             |                  |                                      |
| AIE Lot 2  | <b>4.017</b>    | 1.062  | 1.634                                   | 0.913                           | 0.408                             |                  |                                      |
| AIE Lot 3  | <b>4.275</b>    | 0.890  | 1.509                                   | 1.231                           | 0.645                             |                  |                                      |
| AIE Lots 4 & 5   | <b>6.927</b>    |  |   |                                 |                                   | <b>6.927</b>     |                                      |
| AIE Lot 6  | <b>1.959</b>    | 0.469  | 0.489                                   | 0.794                           | 0.207                             |                  |                                      |
| AIE Lot 7  | <b>2.686</b>    | 0.734  | 0.752                                   | 0.649                           | 0.551                             |                  |                                      |
| AIE Lot 8  | <b>7.571</b>    | 2.399  | 2.109                                   | 2.099                           | 0.964                             |                  |                                      |
| AIE Lot 9  | <b>11.308</b>   | 3.104  | 4.906                                   | 2.397                           | 0.901                             |                  |                                      |
| Estate Roads 1, 2, 3 & 4   | <b>4.104</b>    |  |   |                                 |                                   |                  | <b>4.104</b>                         |
| Basin  | <b>1.331</b>    |  |   |                                 | <b>1.331</b>                      |                  |                                      |
| Future Estate Road 3   | <b>0.358</b>    |  |   |                                 |                                   |                  | <b>0.358</b>                         |
| Basin Bypass   | <b>0.485</b>    |  |   |                                 | <b>0.485</b>                      |                  |                                      |
| Riparian Corridor  | <b>3.365</b>    |  |   |                                 | <b>3.365</b>                      |                  |                                      |
| <b>Sub-total - AIE</b>   | <b>54.501</b>   |  |   |                                 |                                   |                  |                                      |
| <b>Elizabeth Enterprise Precinct Stage 1 (SSD-19618251)</b>  |                 |  |   |                                 |                                   |                  |                                      |
| EEP Lot 1  | <b>1.290</b>    |  |   |                                 |                                   | <b>1.290</b>     |                                      |
| EEP Lot 2  | <b>3.321</b>    |  | 1.598                                   | 1.115                           | 0.608                             |                  |                                      |
| EEP Lot 4  | <b>2.391</b>    |  |   |                                 |                                   | <b>2.391</b>     |                                      |
| EEP Lot 5  | <b>1.816</b>    |  |   |                                 |                                   | <b>1.816</b>     |                                      |
| EEP Lot 6  | <b>7.062</b>    |  | 4.095                                   | 1.902                           | 1.065                             |                  |                                      |
| EEP Lot 7  | <b>6.937</b>    |  |   |                                 |                                   | <b>6.937</b>     |                                      |
| EEP Lot 8  | <b>3.988</b>    |  |   |                                 |                                   | <b>3.988</b>     |                                      |
| Future Café (Benchend Serviced)  | <b>0.408</b>    |  |   |                                 |                                   | <b>0.408</b>     |                                      |
| Stage 1 Estate Roads   | <b>6.511</b>    |  |   |                                 |                                   |                  | <b>6.511</b>                         |
| Basin A  | <b>0.848</b>    |  |   |                                 | <b>0.848</b>                      |                  |                                      |
| Future SPS   | <b>0.000</b>    | Area = 0.452ha, excluded from calculation (separate allotment) |   |                                 |                                   |                  |                                      |
| Reserve  | <b>1.529</b>    |  |   |                                 |                                   | <b>1.529</b>     |                                      |
| Future extension of Elizabeth Dr   | <b>0.000</b>    | Area = 1.671ha, excluded from calculation (separate allotment) |   |                                 |                                   |                  |                                      |
| ENZ Zone in Stage 1  | <b>16.324</b>   |  |   |                                 |                                   | <b>16.324</b>    |                                      |
| <b>Sub-total - EEP Stage 1</b>   | <b>52.425</b>   |  |   |                                 |                                   |                  |                                      |
| <b>Elizabeth Enterprise Precinct Stage 2 (subject to assessment and approval under future DA / SSDA)</b> |                 |  |   |                                 |                                   |                  |                                      |
| EEP Stage 2 Undeveloped to Evaporation Pond  | <b>35.719</b>   |  |   |                                 |                                   | <b>35.719</b>    |                                      |
| Evaporation basin  | <b>9.531</b>    |  |   |                                 | <b>9.531</b>                      |                  |                                      |
| Undev land below evap basin  | <b>7.538</b>    |  |   |                                 |                                   | <b>7.538</b>     |                                      |
| ENZ Zone in Stage 2  | <b>24.620</b>   |  |   |                                 |                                   | <b>24.620</b>    |                                      |
| <b>Sub-total - EEP Stage 2</b>   | <b>77.408</b>   |  |   |                                 |                                   |                  |                                      |
| <b>TOTAL AREA - AIE + EEP</b>  | <b>184.334</b>  |  |   |                                 |                                   |                  |                                      |

## Appendix B – MUSIC Model Catchment Plans

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|              |                     |   |          |  |   |        |                   |  |  |          |
|--------------|---------------------|---|----------|--|---|--------|-------------------|--|--|----------|
|              |                     | Bar Scales  |          | THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L | Client<br><br><b>GDA2020</b> | Scales |                   | Project<br><b>ASPECT INDUSTRIAL ESTATE<br/>MAMRE ROAD,<br/>KEMPS CREEK</b> | Civil Engineers and Project Managers                                   |          |
|              |                     | 0 50 100 150 200 250m   |          |  |   | 1:2500 | Drawn<br>Designed | MH<br>TM   |  |          |
| Grid         | GDA2020             |   | Checked  |  | DS/TM   |        |                   |  | Status<br><b>FOR APPROVAL ONLY<br/>NOT TO BE USED FOR CONSTRUCTION</b> | A1       |
| Height Datum | AHD                 |   | Approved |  | DS/TM   |        |                   |  |  |          |
|              |                     | Title<br><b>MOD 8<br/>STAGE 5<br/>POST-DEVELOPMENT<br/>CATCHMENT PLAN</b> |          |  |   |        |                   |  |  |          |
| P1           | ISSUED FOR APPROVAL | 23-09-24  |          |  |   |        |                   | Project - Drawing No.  | 18-596-SKC224F   | Issue P1 |
| Issue        | Description         | Date  |          |  |   |        |                   |  |  |          |

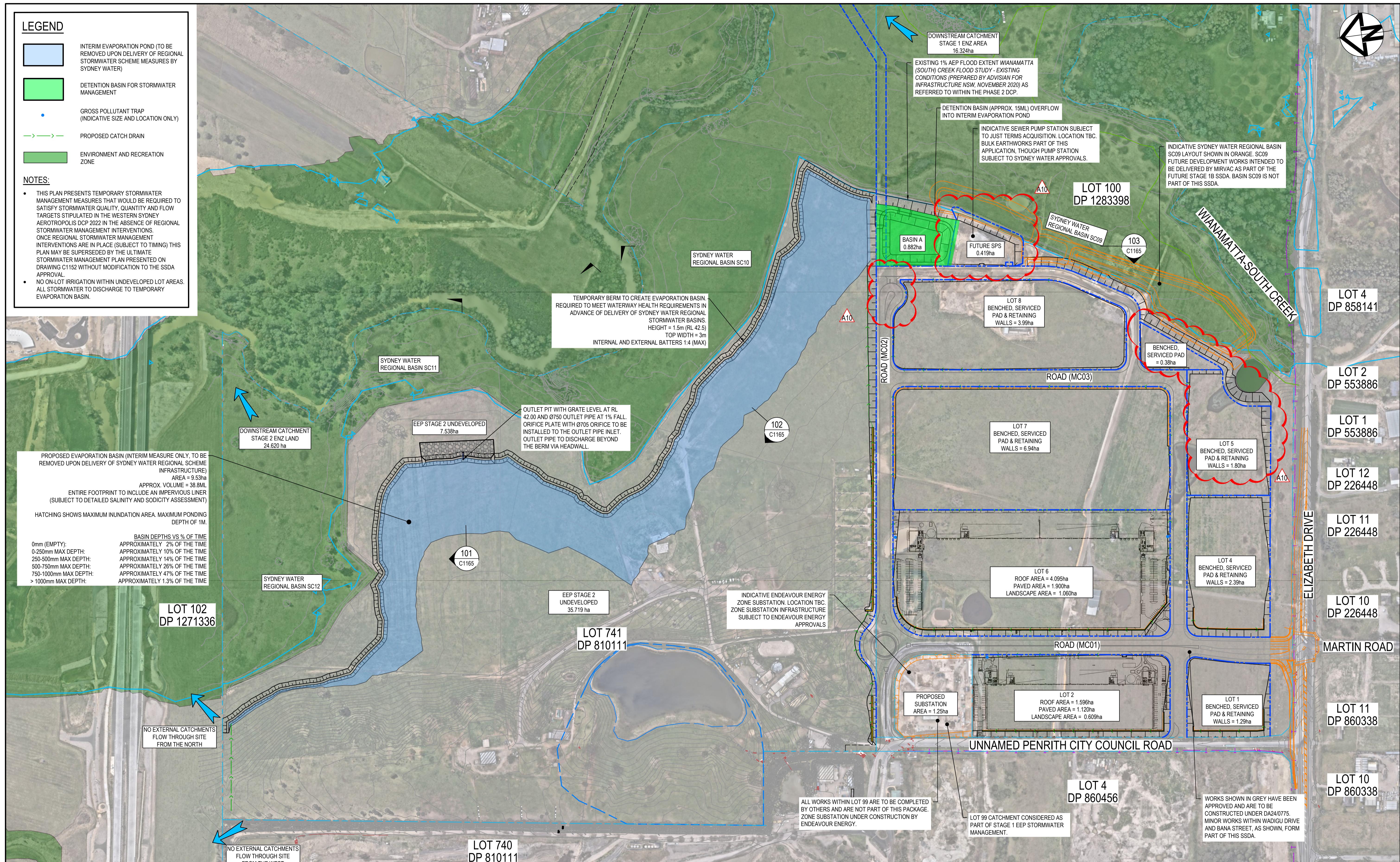


## Appendix C – Stormwater Management Plans

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|       |                     | Bar Scales            | THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L | Client<br><br> | Scales        | Drawn   | MH   | Project<br>ASPECT INDUSTRIAL ESTATE<br>MAMRE ROAD,<br>KEMPS CREEK | Civil Engineers and Project Managers<br><b>at&amp;l</b><br>Level 7, 153 Walker Street<br>North Sydney NSW 2060<br>ABN 96 130 882 405<br>Tel: 02 9439 1777<br>Fax: 02 9923 1055<br>www.atl.net.au<br>info@atl.net.au |
|-------|---------------------|-----------------------|--|--|---------------|---|--|---|---|
| P1    | ISSUED FOR APPROVAL | 0 50 100 150 200 250m |  |  | 1 : 2500 @ A1 | Designed  | TM   |   |   |
| Issue | Description         | Date                  | Grid<br>GDA2020  | Checked  | DS/TM         | Title<br>MOD 8 STAGE 5<br>STORMWATER MANAGEMENT<br>PLAN | Status<br>FOR APPROVAL ONLY<br>NOT TO BE USED FOR CONSTRUCTION | A1  |   |
| P1    | ISSUED FOR APPROVAL | 23-09-24              | Height<br>Datum<br>AHD   | Approved   | DS/TM         | Project - Drawing No.<br>18-596-SKC223F                 | Issue<br>P1  |   |   |



| FROM THE WEST |                     |          |
|---------------|---------------------|----------|
| Issue         | Description         | Date     |
| A10           | ISSUED FOR APPROVAL | 08-12-25 |
| A9            | ISSUED FOR APPROVAL | 21-11-25 |
| A8            | ISSUED FOR APPROVAL | 19-09-25 |
| A7            | ISSUED FOR APPROVAL | 11-07-25 |
| A6            | ISSUED FOR APPROVAL | 26-06-25 |
| A5            | ISSUED FOR APPROVAL | 28-02-25 |
| A4            | ISSUED FOR APPROVAL | 19-02-25 |
| A3            | ISSUED FOR APPROVAL | 19-12-24 |
| A2            | ISSUED FOR APPROVAL | 24-09-24 |

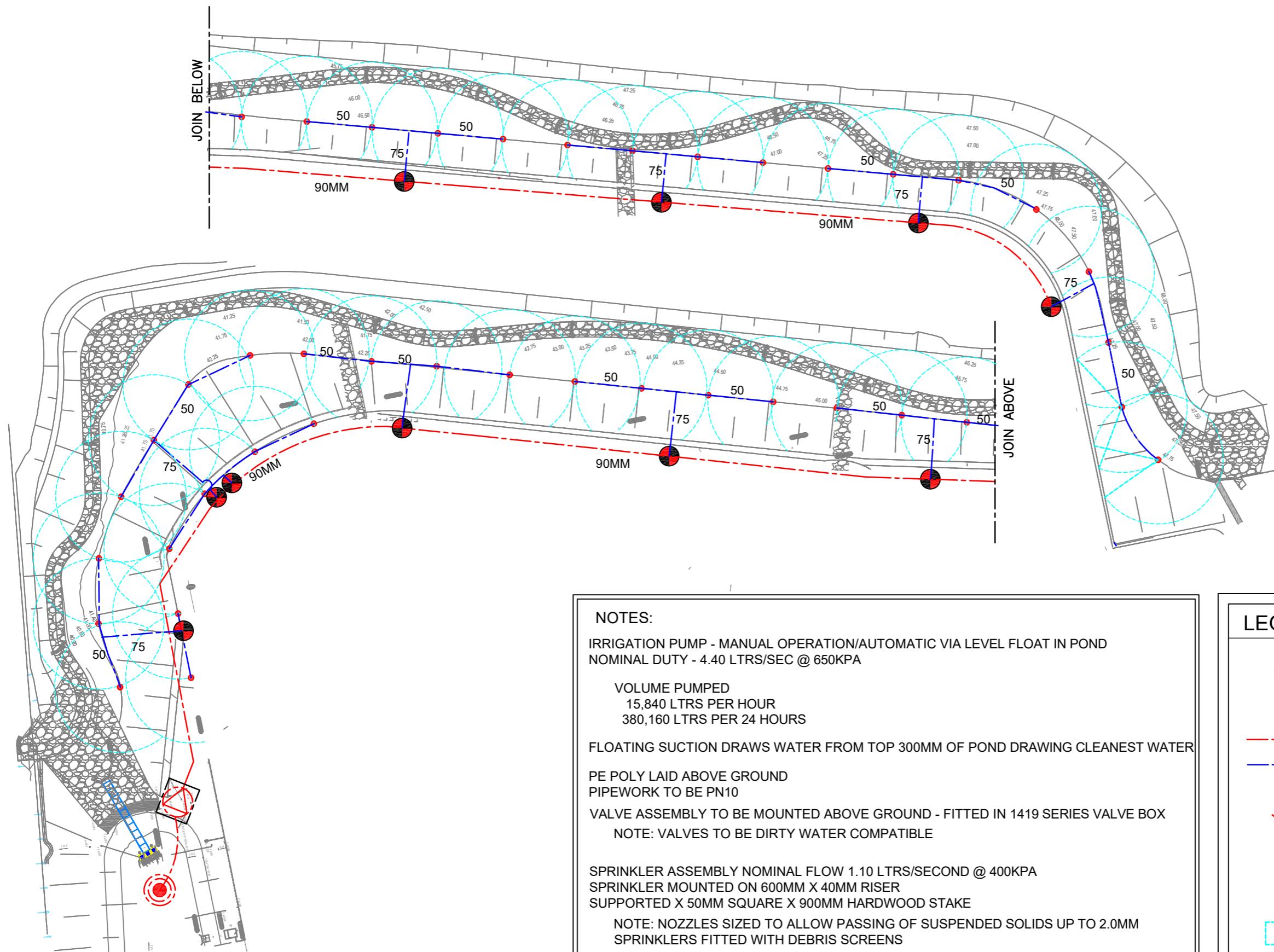
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ANY FORM OR USED FOR AN  
OTHER PURPOSE OTHER THAN  
THAT ORIGINALLY INTENDED  
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|                                      |   |  |  |  |  |  |
|--------------------------------------|---|--|--|--|--|--|
| Client                               | <p>THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&amp;L</p>  |  |  |  |  |  |
|                                      | <p>Scales<br/>1:2500<br/>Grid MGA<br/>Height Datum AHD</p> <p>Drawn<br/>Designed<br/>Checked<br/>Approved</p> <p>JB<br/>JB<br/>AT</p>   |  |  |  |  |  |
| Project                              | <p>ELIZABETH ENTERPRISE PRECINCT STAGE 1A BADGERYS CREEK</p>  |  |  |  |  |  |
|                                      | <p>Title<br/>STORMWATER MANAGEMENT PLAN<br/>INTERIM ARRANGEMENT</p>   |  |  |  |  |  |
| Civil Engineers and Project Managers | <p>at&amp;l</p> <p>Level 10, 124 Walker Street<br/>North Sydney<br/>NSW 2060<br/>P 02 9439 1777<br/>E info@atl.net.au<br/>www.atl.net.au<br/>ABN 96 1308 82405</p>  |  |  |  |  |  |
|                                      | <p>Status<br/>FOR APPROVAL<br/>NOT TO BE USED FOR CONSTRUCTION</p>  |  |  |  |  |  |
| Project - Drawing No.                | 16-369-C1151  |  |  |  |  |  |
| Issue                                | A10   |  |  |  |  |  |

## Appendix D – Interim Retention Pond and Realigned Trunk Drainage Corridor Irrigation Schematic Plans

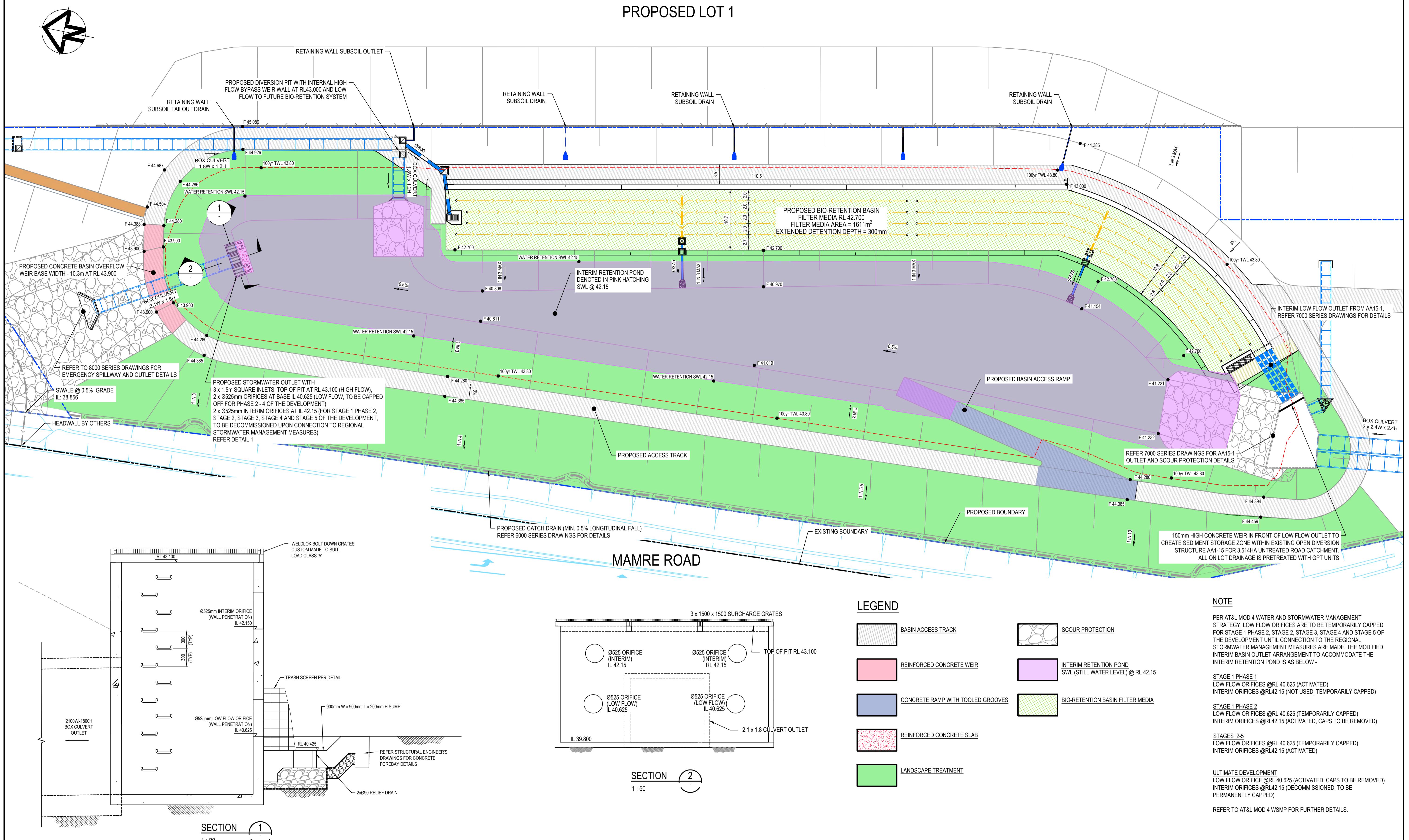
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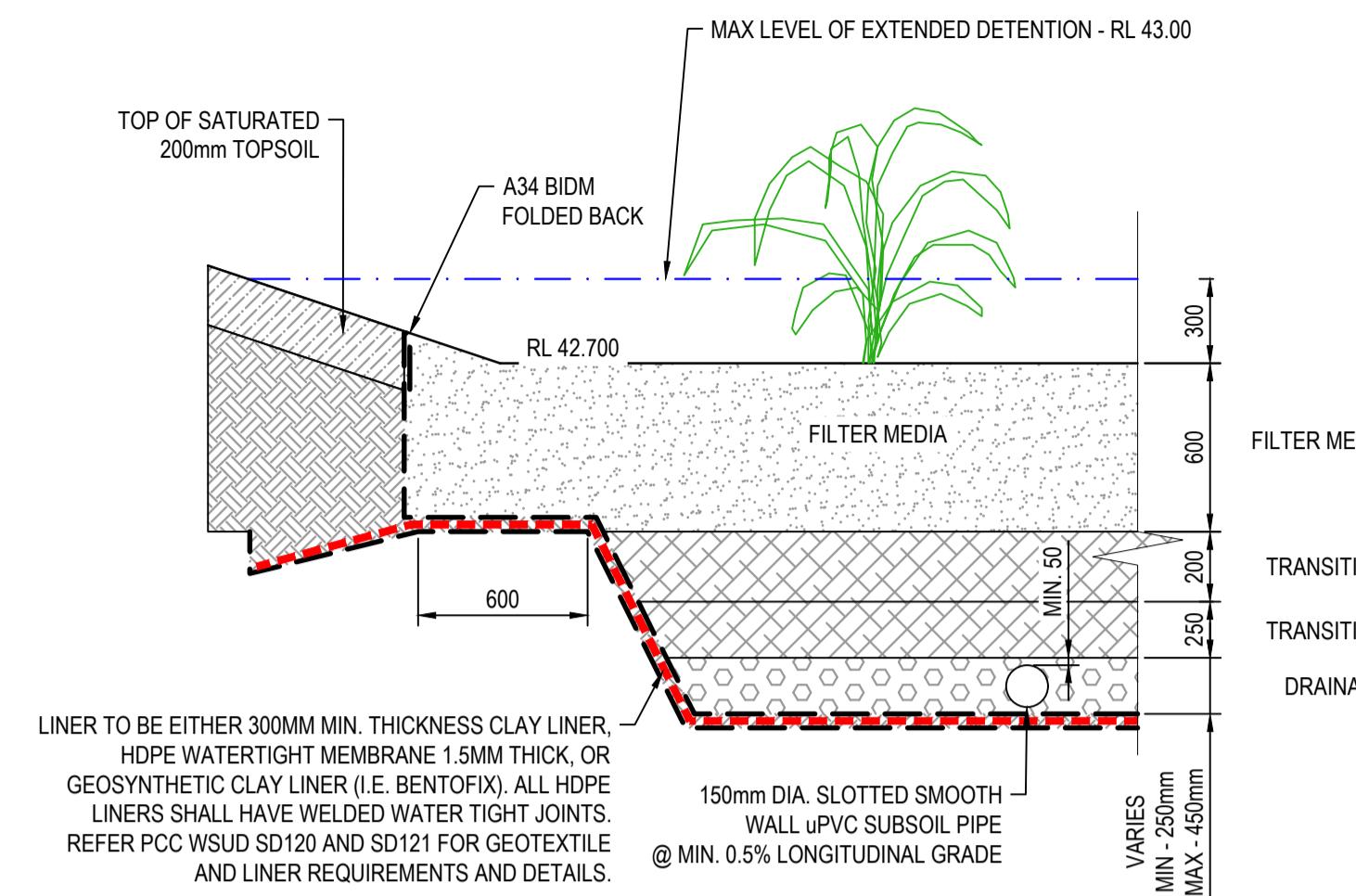
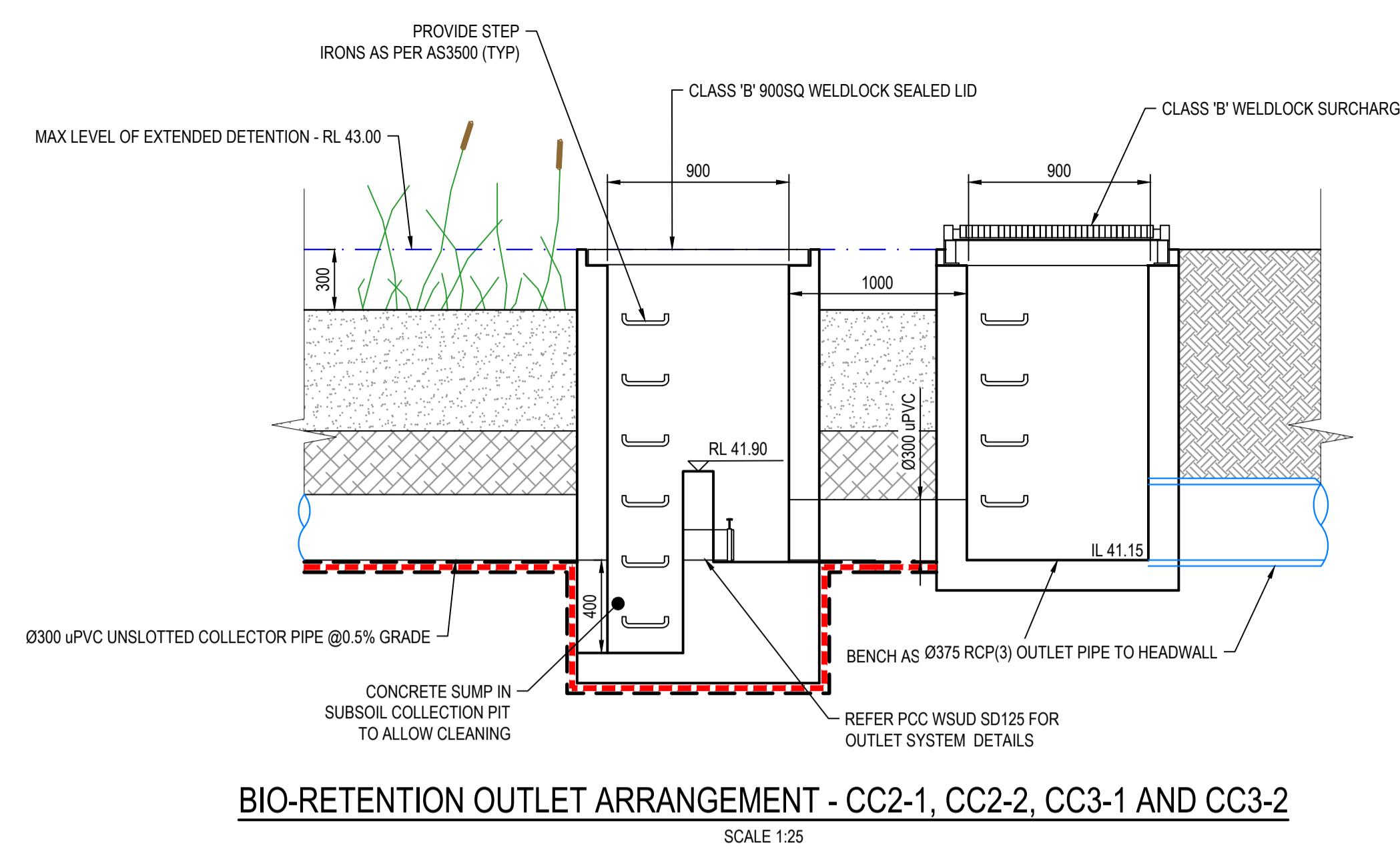
## Appendix E – Bio-Retention Basin Schematic Plans

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## PROPOSED LOT 1



|   |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
|---|-------------|------|-------|--------|--------|-------|--------|-------------------------|-------------------------|--|--|--|------------------|--|---|--|--|----------|--|--|---------------------------|--|----|--|--|--|---|--|--|--|--|--|
| 1 : 20  |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| Bar Scales  |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">0</td> <td style="width: 10%;">500</td> <td style="width: 10%;">1000</td> <td style="width: 10%;">1500</td> <td style="width: 10%;">2000mm</td> </tr> <tr> <td colspan="5" style="text-align: center;">1 : 20 @ A1</td> </tr> <tr> <td colspan="5" style="text-align: center;">Designed</td> </tr> <tr> <td colspan="5" style="text-align: center;">JB/MH</td> </tr> </table>   |             |      | 0     | 500    | 1000   | 1500  | 2000mm | 1 : 20 @ A1             |                         |  |  |  | Designed         |  |   |  |  | JB/MH    |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| 0   | 500         | 1000 | 1500  | 2000mm |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| 1 : 20 @ A1   |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| Designed  |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| JB/MH   |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">0</td> <td style="width: 10%;">1000</td> <td style="width: 10%;">2000</td> <td style="width: 10%;">3000</td> <td style="width: 10%;">4000mm</td> </tr> <tr> <td colspan="5" style="text-align: center;">1 : 20 @ A1 1 : 40 @ A3</td> </tr> <tr> <td colspan="5" style="text-align: center;">Grid GDA2020</td> </tr> <tr> <td colspan="5" style="text-align: center;">Checked</td> </tr> <tr> <td colspan="5" style="text-align: center;">DS</td> </tr> </table>   |             |      | 0     | 1000   | 2000   | 3000  | 4000mm | 1 : 20 @ A1 1 : 40 @ A3 |                         |  |  |  | Grid GDA2020     |  |   |  |  | Checked  |  |  |                           |  | DS |  |  |  |   |  |  |  |  |  |
| 0   | 1000        | 2000 | 3000  | 4000mm |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| 1 : 20 @ A1 1 : 40 @ A3   |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| Grid GDA2020  |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| Checked   |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| DS  |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">0</td> <td style="width: 10%;">1000</td> <td style="width: 10%;">2000</td> <td style="width: 10%;">3000</td> <td style="width: 10%;">4000mm</td> </tr> <tr> <td colspan="5" style="text-align: center;">1 : 40 @ A1 1 : 80 @ A3</td> </tr> <tr> <td colspan="5" style="text-align: center;">Height Datum AHD</td> </tr> <tr> <td colspan="5" style="text-align: center;">Approved</td> </tr> <tr> <td colspan="5" style="text-align: center;">DS</td> </tr> </table>  |             |      | 0     | 1000   | 2000   | 3000  | 4000mm | 1 : 40 @ A1 1 : 80 @ A3 |                         |  |  |  | Height Datum AHD |  |   |  |  | Approved |  |  |                           |  | DS |  |  |  |   |  |  |  |  |  |
| 0   | 1000        | 2000 | 3000  | 4000mm |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| 1 : 40 @ A1 1 : 80 @ A3   |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| Height Datum AHD  |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| Approved  |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| DS  |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">0</td> <td style="width: 10%;">6.25</td> <td style="width: 10%;">12.5</td> <td style="width: 10%;">18.75</td> <td style="width: 10%;">25</td> <td style="width: 10%;">31.25m</td> </tr> <tr> <td colspan="6" style="text-align: center;">1 : 40 @ A1 1 : 80 @ A3</td> </tr> <tr> <td colspan="6" style="text-align: center;">Title INTERIM RETENTION POND,<br/>DETENTION BASIN AND<br/>BORETENTION SYSTEM<br/>LAYOUT PLAN</td> </tr> <tr> <td colspan="6" style="text-align: center;">Status FOR INFORMATION A1</td> </tr> <tr> <td colspan="6" style="text-align: center;">Project - Drawing No. 18-596-SKC 199 Issue P1</td> </tr> </table> |             |      | 0     | 6.25   | 12.5   | 18.75 | 25     | 31.25m                  | 1 : 40 @ A1 1 : 80 @ A3 |  |  |  |                  |  | Title INTERIM RETENTION POND,<br>DETENTION BASIN AND<br>BORETENTION SYSTEM<br>LAYOUT PLAN |  |  |          |  |  | Status FOR INFORMATION A1 |  |    |  |  |  | Project - Drawing No. 18-596-SKC 199 Issue P1 |  |  |  |  |  |
| 0   | 6.25        | 12.5 | 18.75 | 25     | 31.25m |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| 1 : 40 @ A1 1 : 80 @ A3   |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| Title INTERIM RETENTION POND,<br>DETENTION BASIN AND<br>BORETENTION SYSTEM<br>LAYOUT PLAN   |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| Status FOR INFORMATION A1   |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| Project - Drawing No. 18-596-SKC 199 Issue P1   |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| P1 ISSUED FOR INFORMATION 23-11-23  |             |      |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |
| Issue   | Description | Date |       |        |        |       |        |                         |                         |  |  |  |                  |  |   |  |  |          |  |  |                           |  |    |  |  |  |   |  |  |  |  |  |



#### STAGING OF BIO-RETENTION BASIN (PER PCC WSUD SD 105)

STAGE 1 TEMPORARY SEDIMENT BASIN PER CURRNET ON SITE ESCP PREPARED BY CPESC.

STAGE 2 FUNCTIONAL INSTALLATION OF SACRIFICIAL BIOPETENTION - ONCE UPSTREAM CATCHMENTS BULK EARTHWORKS ARE COMPLETE AND ROADS AND TRUNK DRAINAGE COMPLETED A SACRIFICIAL FILTER SYSTEM SHALL BE CONSTRUCTED. THIS INCLUDES:

- REMOVAL OF TEMPORARY ROCK DISSIPATOR AT SYSTEM INLET HEADWALL.
- REMOVAL OF ALL SEDIMENT
- INSTALLATION OF GEOTEXTILE AND LINERS UNDER
- INSTALLATION OF SUBSOIL DRAINS AND DRAINAGE LAYERS. TEMPORARY SUPPORT FLUSHING POINTS
- INSTALLATION OF 250MM OF TRANSITION LAYER
- INSTALLATION OF TEMPORARY GEOTEXTILE AND 150MM MEDIA OR COARSE SAND LAYER INSTALLATION OF WASHED TURF OVER THE SACRIFICIAL MEDIA LAYER

STAGE 3 COMPLETION OF BIOPETENTION ONCE 90% DEVELOPMENT HAS OCCURRED- REMOVAL OF TURF, SACRIFICIAL MEDIA LAYER AND TEMPORARY GEOTEXTILE INSTALLATION OF:

- SEDIMENT FOREBAY
- UPPER 200MM OF TRANSITION LAYER
- FILTER MEDIA LAYER
- PLANTING
- REMOVAL OF ALL SEDIMENT FROM PIPES, INLETS AND OUTLETS.

STAGE 4 ESTABLISHMENT OF BIOPETENTION SYSTEM FOR MONTHS 0 - 12 AFTER COMPLETION:

- OPERATION OF AUTOMATIC IRRIGATION SYSTEM
- TEMPORARY BLOCKAGE OF DIVERSION
- ESTABLISHMENT OF BIOPETENTION SYSTEM FOR MONTHS 13-36 AFTER COMPLETION: WEEDING
- PLANT REPLACEMENT AS REQUIRED.

EXISTING STRUCTURE AA-15

SCALE 1:25

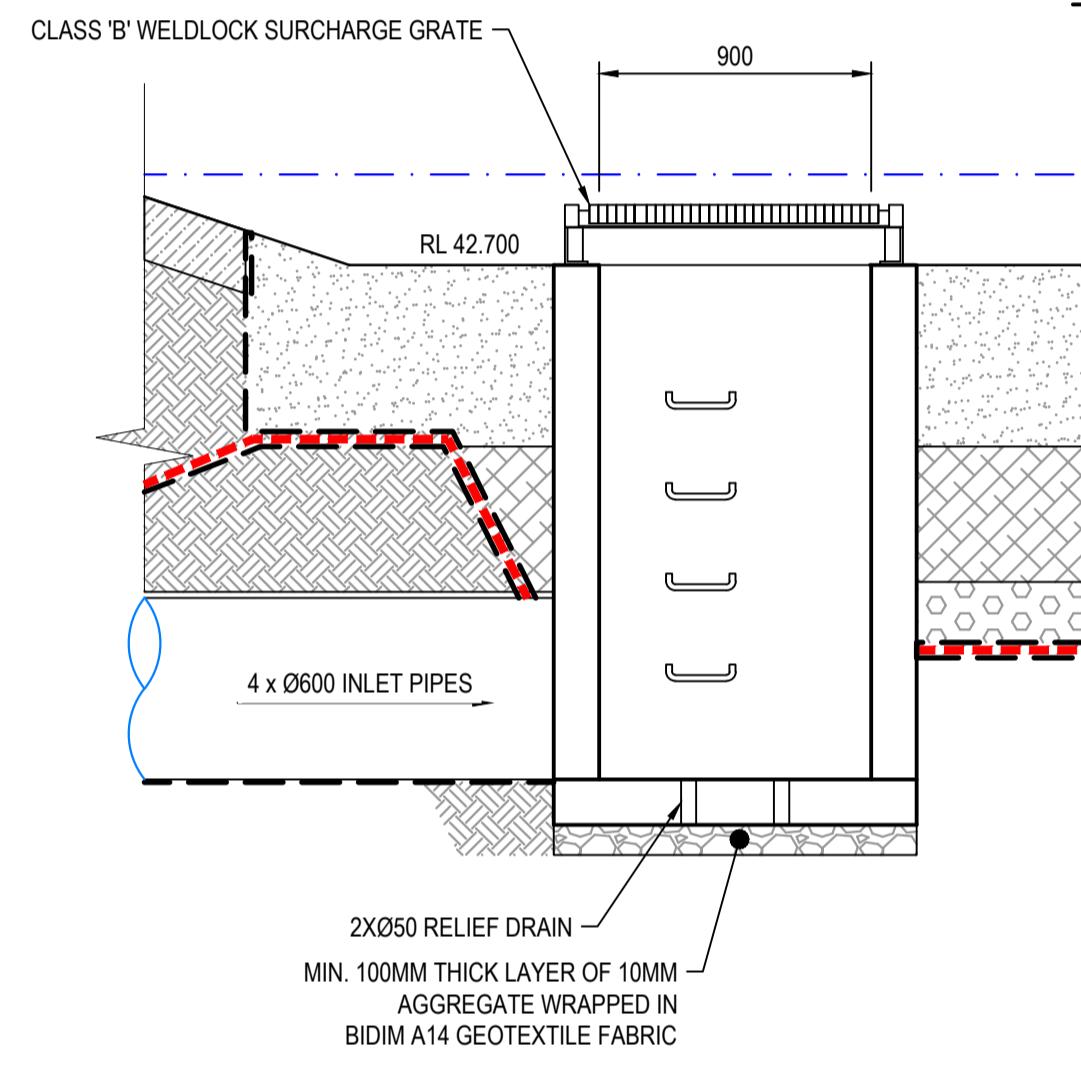
INSTALL 150mm HIGH CONCRETE WEIR IN FRONT OF LOW FLOW OUTLET TO CREATE SEDIMENT STORAGE ZONE WITHIN EXISTING OPEN DIVERSION STRUCTURE AA-15 FOR 3.514HA UNTREATED ROAD CATCHMENT

$$V_s = A_c \times R \times L_0 \times F_c$$

$$V_{s(\min)} = 3.514 \times 0.8 \times 1 \times 0.5$$

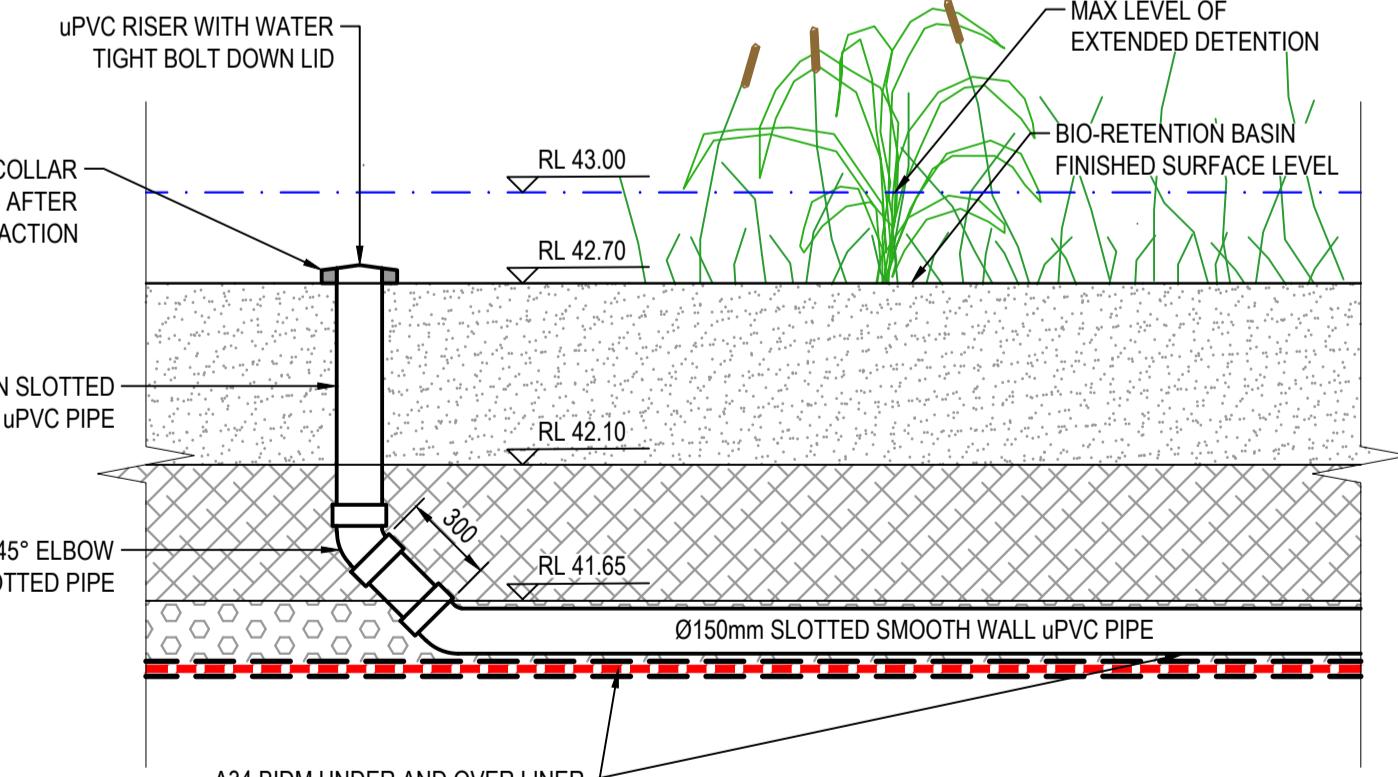
$$V_{s(\max)} = 1.406m^3$$

MINIMUM VOLUME REQUIRED = 1.406m<sup>3</sup>  
EFFECTIVE SEDIMENT STORAGE AREA = 80.5m<sup>2</sup>  
EFFECTIVE SEDIMENT STORAGE VOLUME = 10.867m<sup>3</sup>



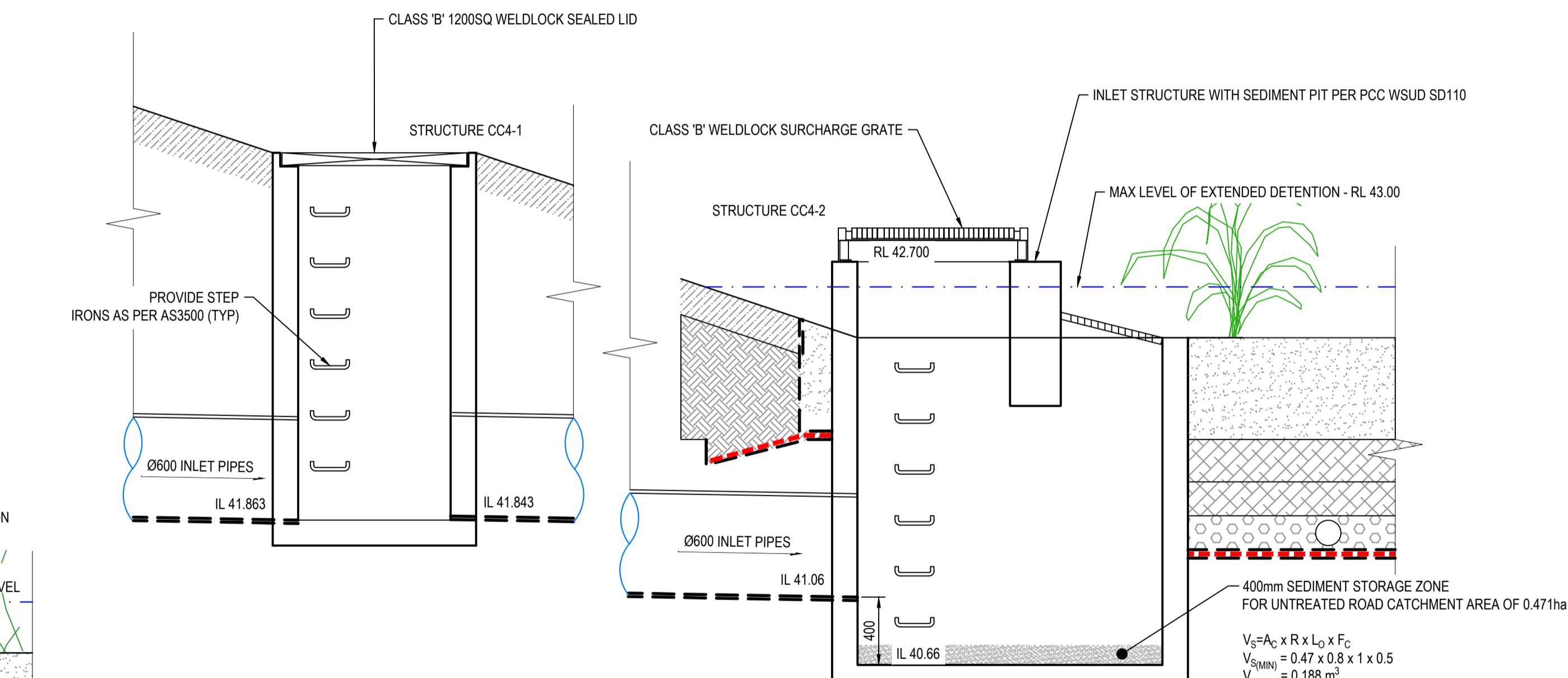
**INLET STRUCTURE CC1-1**

SCALE 1:25



**FLUSHING POINT DETAIL**

SCALE 1:25

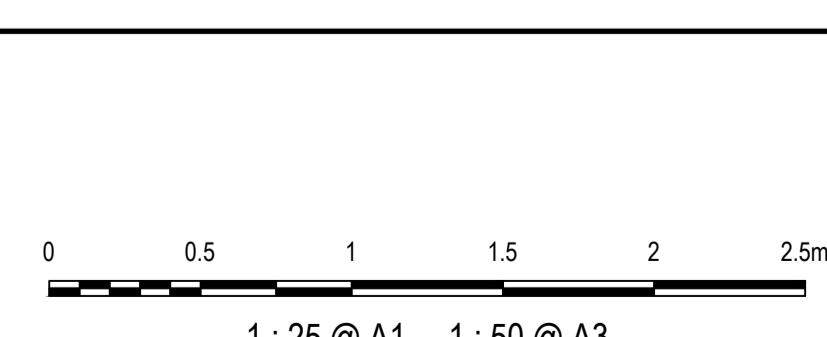


**INLET STRUCTURES CC4-1 AND CC4-2**

SCALE 1:25

| Bar Scales             |             |      |
|------------------------|-------------|------|
| 0                      | 0.5         | 1    |
| 1.5                    | 2           | 2.5m |
| 1:25 @ A1 1:50 @ A3    |             |      |
| P2 ISSUED FOR APPROVAL | 24-11-23    |      |
| P1 ISSUED FOR APPROVAL | 26-07-23    |      |
| Issue                  | Description | Date |

100mm on Original



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Scales  
Grid  
Height  
Datum

1:25  
GDA2020  
AHD

Drawn  
Designed  
Checked  
Approved

MH  
MH  
DS/TM  
DS/TM

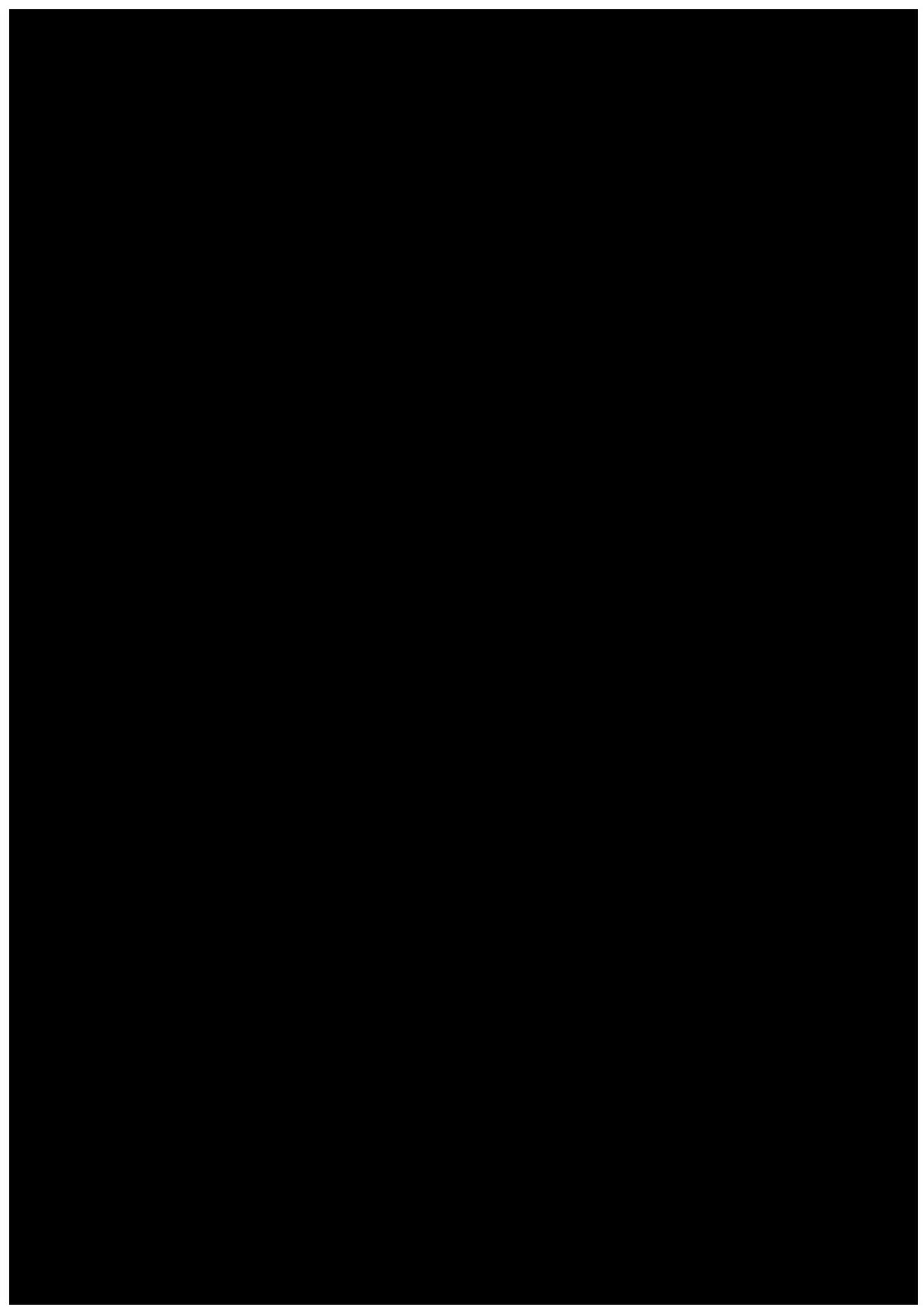
Project  
Title  
Status

ASPECT INDUSTRIAL ESTATE  
MAMRE ROAD,  
KEMPS CREEK  
PROPOSED BIO-RETENTION  
BASIN DETAILS  
FOR APPROVAL ONLY

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Project - Drawing No.  
18-596-SKC171

Issue  
P2





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