

Westgate Kemps Creek

SSD-23480429

253-267 Aldington Road, Kemps Creek

Water and Stormwater Management Plan

Icon Oceania

4/03/2025

21-860

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1. Introduction

This Water and Stormwater Management Plan (WSMP) has been prepared by AT&L on behalf of Icon Oceania in support of a State Significant Development Application (SSDA) (reference [SSD-23480429](#)) for the proposed development of Westgate Kems Creek, located at 253-267 Aldington Road, Kems Creek (the Site).

1.1. Site Description

The extent of the site is presented in **Figure 1**. The site is located in the suburb of Kems Creek, within the Penrith Local Government Area (LGA), and approximately 13 km south-east of the Penrith CBD and 6 km north-east of the under-construction Western Sydney Airport. The site is zoned *IN1 – General Industrial* under the *State Environmental Planning Policy (Industry and Employment) 2021* and has a total area of 10.15 hectares.



Figure 1: Site Extent (source: Nearmap, image dated 29 August 2024)

The site is also located in the Mamre Road Precinct and is therefore subject to controls outlined in the Mamre Road Development Control Plan.

1.2. Supporting Documentation

The following documentation is referred to throughout and should be read in conjunction with this report:

- Civil Design Report (AT&L) – “REP001-05-21-860-SSDA Civil Design Report.pdf”
- Civil Drawings (AT&L) – “21-860-INFRASTRUCTURE AND ONLOT-SSDA_CIVIL WORKS PACKAGE.pdf”
- Flood Impact Risk Assessment (AT&L) - “REP005-01-860 WSMP.pdf”
- Erosion and Sediment Control Plan (AT&L) - “REP006-01-21-860-ESCP.pdf”

2. Response to Submission - Stormwater

RTS Comment	Response
Biodiversity, Conservation and Science (DCCEE)	
1) The MUSIC model was not submitted and has therefore not been reviewed. The report and plans contain a number of treatment devices (Humefilter, Jellyfish filter) that do not have any of the modelling assumptions stated.	MUSICX model has been provided in the package. Modelling assumptions shown in the report in further detail in Section 8.2 .
2) Management Strategy Rev 9 contains a number of elements which require further details including: 2 A Jellyfish filter is nominated in the civil plans (C250, C251) to treat roads but is not in the stormwater report. It is unclear how the roads could be treated separately from the lots through an end-of-line system. 2 Update Table 5 to include filter systems (jellyfish, humefilter) mentioned elsewhere in submission.	Jellyfish filter and Humefilter UPT have been removed from the design. The road catchment no longer has any treatment until discharge into the trunk drainage channel.
3) Some of the interim stormwater management measures identified in the Water Cycle Management Strategy are not detailed in the civil engineering or landscape plan set. Specifically, the evaporation pond is not detailed and the following is required: 2 Detailed engineering plans and sections for the pond, showing lining, levels and hydraulic structures, and interface with the trunk drainage channel and how this will remain stable during major event flows. 2 Updated landscape plans which show how vegetation will be established and remain viable in this system so it does not become eroded.	Interim measures are shown at DA level of design. Additional detail shown on sheet 21-860-C250 of the civil drawing set. Design for stability will be part of the construction certificate design. (Landscape plan is outside of the stormwater scope)
Penrith City Council	
7a) The development includes the provision of temporary stormwater management basins and associated infrastructure. It is indicated that ultimately the site will connect to Sydney Water's drainage network. Interim arrangements are proposed although it is noted that additional information is required to demonstrate compliance with the requirements outlined in the MRP DCP.	Noted. Additional detail provided in Section 8.3 shows compliance with the DCP.
7b) It is recommended that prior to determination, DPHI ensure that the controls are met in terms of compliance with the stormwater and waterway health targets (for both the construction and operational stages). Additional information and many points of clarification are needed to address these matters.	Construction phase targets are demonstrated in the Erosion and Sediment Control Plan report "REP006-01-21-860-ESCP". Compliance with the DCP waterway health and other stormwater targets are demonstrated in Section 8.3 .
7c) With respect to the GPTs, while the plans indicate locations, additional details (e.g., access arrangements and type) are required on the engineering plans. All GPTs need to be included on the plans. Further, the GPTs need to be prepared as per the specifications outlined in Sydney Water Technical Design Guidelines. It is noted that the GPT's will be the responsibility of the developer / property owners to maintain. Conditions will need to be included in the consent requiring this.	Additional detail has been provided for the privately owned and maintained OceanGuard pit baskets in Section 7.3.2 . Final locations and access arrangements are subject to the detailed design CC for the allotments.

RTS Comment	Response
7d) The engineering plans (Sheet C250) referred to providing Ocean guard / Enviropods pit inserts (or similar) & JellyFish JF3250-20-4 GPT to treat the road 01. The MUSIC screen shot also indicates that Enviropods (pit inserts) are proposed in both roads 1 and 2. Council will not accept the devices and should not be proposed if the road is intended to be dedicated for ongoing maintenance.	Jellyfish filters and pit inserts have been removed from the strategy to treat public roads. MUSIC model and plans are now consistent.
7e) It is recommended that additional details of the stormwater infrastructure are required. There appears to be inconsistencies between the plans and stormwater report (and MUSIC screen shot). This needs to be updated and addressed.	Noted. Both Civil plans and Water and Stormwater Management Plan have been updated to be consistent.
7f) Functional design drawings of the GPTs, temporary ponds, temporary irrigation systems and associated infrastructure needs to be provided. The plans should include additional details to demonstrate they can function and include details of levels, cross sections, access arrangements and landscape details and the like.	Additional detail of the temporary pond has been provided in sheets C250 and C302. OceanGuard functional detail can be seen in section Section 7.3.2. Further detail will be supplied by Ocean Protect as part of the Construction Certificate design of the allotments. Irrigation system is to be designed by a Hydraulic engineer as part of the Construction Certificate.
7g) This should include full details including a functional design and include an operation and maintenance manuals for the infrastructure. The maintenance manual should be provided prior to the approval of the development and conditions will need to be applied to ensure interim (and permanent) measures are maintained to the required standards.	All WSUD assets are to be privately maintained. GPT maintenance manuals are to be supplied by Ocean Protect alongside their future shop drawings. Trunk drainage channel upon ultimate completion is to be maintained by Sydney Water under their easement provisions.
7h) Rainwater tanks are proposed as interim measures until the delivery of the regional stormwater management scheme. At this stage additional details should be provided in relation to sizing and ability to meet demands. Conditions are also required to ensure they are designed to meet a minimum of 80% non-potable demand and that they are decommissioned once connection to the regional scheme once available.	Rainwater tanks have been removed from the strategy. It is understood that this will no longer impact green star ratings for the allotments.
7i) Passively irrigated street trees should be incorporated into the design of the streets. It is acknowledged this can be considered in detail as part of detailed designs. However, a condition needs to be applied to ensure that prior to completing detailed design the plans must be submitted to Council for review and approval (in the case the roads will be dedicated). It is our understanding that they have some reliance in the scheme.	See Section 7.3.5 regarding passively irrigated street trees. Note that designs from council and Sydney Water are not yet confirmed.
7m) With respect to controlled activities and waterways, it is noted that a mapped 2nd order waterway is located on the site. It is noted that this is proposed to be realigned. Clause 3 of section 2.3 of the DCP states that Waterways of Strahler Order 2 and higher will be maintained in a natural state, including the maintenance and restoration of riparian area and habitat, such as fallen debris. I suggest that any works or changes to the alignment will need to be undertaken in accordance with Water Management Act and the Department of Climate	Note that the Sydney Water scheme plan diverts additional catchment above existing flows into the estate, as such, the natural state of the waterway is not necessarily sufficient to convey the required flows long term without upgrading. The design of the naturalised trunk drainage channel has been accepted in

RTS Comment	Response
<i>Change, Energy, the Environment and Water (NRAR) requirements/guidelines and DCP provisions. It is acknowledged that a naturalised channel is proposed in place.</i>	principle via external correspondence with Sydney Water as shown in the 01/10/24 letter, on the provision that additional conditions are met in further design. The channel is being designed in line with all of the appropriate guidelines.
<i>7n) It's noted that the trunk drainage design is not consistent with the Sydney Water Scheme plan and additional information of the design should be sought. The Civil report and plans indicated that a 20m wide trunk drainage corridor is proposed. It is noted that this is a departure from Sydney Water's Scheme plan dated December 2023 which indicated that the trunk drainage should 30m to the north and west of the property and 40m along the southern Boundary.</i>	Channel widths have been adjusted as seen in Section 5.3 . The design of the naturalised trunk drainage channel has been accepted in principle via external correspondence with Sydney Water as shown in the 01/10/24 letter.
<i>7o) The EIS indicated there was some discussions about this departure with Sydney Water. In any case, full details should be provided, and Sydney Water will need to confirm they are satisfied with the design the departure from their recently drafted scheme plan is justified.</i>	The design of the naturalised trunk drainage channel has been accepted in principle via external correspondence with Sydney Water as shown in the 01/10/24 letter.
Department of Planning, Housing and Infrastructure	
Water Cycle Management	
<i>1. Section 3.2 of the Water Cycle Management Strategy (WCMS) states that Figure 4 identifies that there are no waterways in the site. This appears to be inaccurate and not consistent with the findings of the CTEEnvironmental 2020 report – please clarify. For any field-validated riparian corridors present, demonstrate consistency with Section 2.3 (Riparian Land) of the MRP DCP.</i>	Noted and adjusted.
<i>2. Update the WCMS to clearly outline how the water strategy and design of WSUD measures meet the requirements and recommendations of the Technical guidance for achieving Wianamatta–South Creek stormwater management targets (DPE 2022) (the Technical Guidance).</i>	Noted. Additional detail has been provided in Section 8.2 and 8.3 .
<i>3. Update the WCMS to include a detailed lifecycle cost assessment (including capital, operation/maintenance, and renewal costs over 30 years) and Maintenance Plan for WSUD measures, as required by control 4 of section 2.14 of the MRP DCP.</i>	Lifestyle costings have limited value in the SSDA. Number of pit baskets cannot be confirmed until the detailed design stage, and the interim measures including the evaporation pond and irrigation of residual land do not have a confirmed lifetime – subject to the delivery of the Sydney Water Regional Scheme. Life cycle costings have not been provided.
<i>4. Clarify whether the proposed underground on-site detention tanks for each lot are permanent or interim stormwater infrastructure. Provide details of the maintenance strategy of the underground tanks and if the infrastructure is temporary, outline how the tanks will be decommissioned and/or removed.</i>	On site detention tanks are permanent assets for all lots. Maintenance will be conducted by the private owners of the site. Arrangement and position may be varied in the Construction Certificate.

RTS Comment	Response
<i>Passively Irrigated Street Trees</i>	
6. Provide details of passively irrigated street trees provided in accordance with Council requirements.	Passively irrigated street tree specifications yet to be provided by Penrith City Council. Refer to Section 7.3.5 for further detail.
<i>Trunk Drainage</i>	
9. The proposed trunk drainage does not accord with the MRP DCP or Sydney Water's updated scheme plan, including with regard to alignment, channel widths, access and design. Provide evidence that Sydney Water, as the stormwater management authority, is accepting of the proposed trunk drainage design.	The design of the naturalised trunk drainage channel has been accepted in principle via external correspondence with Sydney Water as shown in the 01/10/24 letter, on the provision that additional conditions are met in further design.
10. Transgrid has advised the layout design in the easement must leave room for a stanchion to be constructed in the future, which may have implications for the proposed trunk drainage design and broader development layout. The Applicant is required to redesign the development layout and trunk drainage channel to address the requirements of Sydney Water and Transgrid. Provide: a. a revised development layout and trunk drainage design that incorporates a stanchion within the Transgrid easement b. evidence of consultation, including endorsement from Sydney Water and Transgrid on the revised development layout and trunk drainage design.	Transgrid have confirmed the acceptability of the site layout. Acceptance provided by the planner in separate document.
11. Section 3.4 of the WCMS states that the site will discharge at the western boundary to the Altis site and subject to further design coordination. As the Department understands that the adjoining land to the west is not owned by Altis, please clarify how the trunk drainage connection to the west will be designed and coordinated.	The discharge to the west will be built by others. ICON Oceania do not own this land and it is not subject to this SSDA. It is understood that the Mamre Rd culvert will be upgraded with the Mamre Rd upgrade. If the downstream trunk drainage channel is not constructed at the time of Westgate OC, the trunk drainage channel will pond to a maximum of 1.2m height and spill over into the existing waterway. The culvert under the Road 01 and Road 02 intersection will not be inundated by this ponding.
12. Section 3.4 of the WCMS states that overland flows may drain to the south until development on the adjoining property is constructed. Please clarify how this satisfies the requirements of sections 2.4 and 2.5 of the MRP DCP, including no impacts to upstream or downstream properties.	The overland flow in this location quickly travels into the trunk drainage channel as part of the Westgate development. These flows are only expected to occur before the development to the south is constructed, and only in very rare events above the 5% AEP. See the flood impact risk assessment report to demonstrate that the impacts to downstream properties are not unacceptable.

RTS Comment	Response
13. Please clarify whether the WCMS and civil plans are consistent with the current proposal for the development directly to the north (Frasers' Edge Estate), particularly with regard to trunk drainage connection and post-development catchments. The civil drawings do not show a discharge point from the Frasers development into the site at the north-eastern part of the site.	Frasers Edge Estate (SSD-17552047), is nearing approval, with a 1500dia outlet into the Westgate trunk drainage channel. Plans are consistent with the latest update.
14. Provide evidence that the trunk drainage channel connection to the east under Aldington Road will be undertaken under a separate approval.	The culvert discharge under Aldington Road will be constructed as part of the Aldington Road upgrade (Ref 21-843-C3000) which must be completed for Westgate Estate to provide its entry arrangement. The culvert will therefore be existing at the time of O.C. for Westgate estate.
15. As per Sydney Water and Transgrid's advice, provide dedicated maintenance access to the trunk drainage channel. Providing maintenance access via stairs is not supported by Sydney Water.	Maintenance access tracks have been provided within all of the trunk drainage channel reserves excluding within the Transgrid easement. The Transgrid easement access is via the circulation road of Lot 1B, with additional maintenance parking pad within the trunk drainage easement mid-way along the length.
16. Provide further consideration to the design of the development and trunk drainage channel in order to reduce the height of retaining walls along the naturalised channel in accordance with Control 17 in Section 2.4 of the MRP DCP.	The design of the naturalised trunk drainage channel has been accepted in principal via external correspondence with Sydney Water as shown in the 01/10/24 letter, on the provision that additional conditions are met in further design. Retaining wall heights are constrained by incoming invert levels and minimum channel grade, and have been minimised as much as possible.
Sydney Water	
Stormwater Servicing	
4. Stormwater Servicing The proposed stormwater infrastructure does not align with the Mamre Road Precinct Integrated Stormwater Scheme Plan and the proponent has provided insufficient information, evidence, or justification for Sydney Water to accept or endorse the changes. Sydney Water notes that the plans submitted request a reduction in the trunk drainage width and realignment of stormwater infrastructure that is substantially different to the December 2023 exhibited Mamre Road Stormwater Scheme Plan. Sydney Water recommends that the Department defer the approval of the SSDA application until these stormwater matters are addressed.	The design of the naturalised trunk drainage channel has been accepted in principal via external correspondence with Sydney Water as shown in the 01/10/24 letter, on the provision that additional conditions are met in further design.

RTS Comment	Response
Trunk Drainage Channel	
<i>1a. Lack of information on flow velocity and volumes to determine if downsizing of channel is possible. There is no information provided regarding the incoming flows from the north (Fraser) and east (east of Aldington Road). Note the channel from the north is not removed but is a hybrid channel and detention</i>	The design of the naturalised trunk drainage channel has been accepted in principal via external correspondence with Sydney Water as shown in the 01/10/24 letter, on the provision that additional conditions are met in further design.
<i>1b. Sydney Water does not agree with the statement on the EIS (p. 45) regarding the SWC endorsement of the trunk drainage solution. The Sydney Water letter indicates it would endorse the proposal if they were able to prove the flow can be contained within the channel and if the channel adheres to the design guidelines. At this point Sydney Water are not satisfied the proposed design meets the requirements provided in Attachment 1 of the letter.</i>	The design of the naturalised trunk drainage channel has been accepted in principal via external correspondence with Sydney Water as shown in the 01/10/24 letter, on the provision that additional conditions are met in further design.
<i>1c. Stormwater on road no2 will be flowing from Fraser sites before being captured by Oceania site. Sizing of road drainage and interconnection with trunk drainage to be documented and civil plans accordingly updated.</i>	The drainage stub for future road 2 catchment has been provided as part of the civil drawings, including longitudinal sections.
<i>1d. Please provide post-development catchment map to confirm Trunk Drainage Channel Catchment.</i>	Post development catchment map has been provided on sheet 21-860-C202
<i>1.2a Issues with the proposed trunk drainage design</i> <i>a. Sydney Water is not satisfied with the current design with the 1% flows touching both the retaining walls. This will impact the structural integrity of the walls during high flow events which could impact the performance of the channels. The 1% flows will need to be contained within the naturalised channel bank and not against any retaining wall.</i>	The design of the naturalised trunk drainage channel has been accepted in principal via external correspondence with Sydney Water as shown in the 01/10/24 letter, on the provision that additional conditions are met in further design.
<i>1.2b There is no dedicated maintenance access along the channel. This will need to be included in the updated channel concept design.</i>	The design of the naturalised trunk drainage channel has been accepted in principal via external correspondence with Sydney Water as shown in the 01/10/24 letter, on the provision that additional conditions are met in further design. The maintenance track provisions have been provided in Section 5.3.
<i>1.2c The channel having retaining walls with a fence on both sides provides a safety risk if someone is caught in the channel during high flow events. The designer is to ensure there are suitable egress options at regular intervals to reduce risk. Note maintenance access to the channel via stairs (current proposal) will not be supported by Sydney Water, however it would be supported if it was for public safety considerations.</i>	The design of the naturalised trunk drainage channel has been accepted in principal via external correspondence with Sydney Water as shown in the 01/10/24 letter, on the provision that additional conditions are met in further design.

RTS Comment	Response
<i>1.2d The longitudinal grades under the transmission easement will need to be discussed with Sydney Water. Noting that 15 to 20 metres between drop structures is unlikely to be the best solution due to maintenance issues.</i>	The design of the naturalised trunk drainage channel has been accepted in principal via external correspondence with Sydney Water as shown in the 01/10/24 letter, on the provision that additional conditions are met in further design.
<i>1.2e The connection from Frasers will need to be shown in more detail and coordinated with Frasers to minimise erosion potential.</i>	The design of the naturalised trunk drainage channel has been accepted in principal via external correspondence with Sydney Water as shown in the 01/10/24 letter, on the provision that additional conditions are met in further design. Detailed connection from Frasers to the channel will be further co-ordinated when the two sites are under the detailed design process to ensure correct specifications for the final designs.
<i>1.2f The design of all stormwater outlets into the trunk drainage channel should follow the Stormwater connections to natural waterways Guidelines. Note the example below does not have sufficient angle with the channel flow.</i>	Noted. Inflows from roads and allotments within the site are now proposed only at culverts to minimise impacts.
<i>1.2g There is a general lack of design and ideally more cross sections of the channel are required to be able to appropriately assess the design. In particular, regarding the western end of the channel, Sydney Water are uncertain as to why the channel batters have changed.</i>	The design of the naturalised trunk drainage channel has been accepted in principal via external correspondence with Sydney Water as shown in the 01/10/24 letter, on the provision that additional conditions are met in further design. Detailed cross sections are shown on sheets 21-860-C180 to C182.
<i>2.1a The basin inlet and outlet design will need to be approved by Sydney Water. The design will need to show no impact on Trunk Drainage Channel performance and flooding.</i>	The design of the naturalised trunk drainage channel has been accepted in principal via external correspondence with Sydney Water as shown in the 01/10/24 letter, on the provision that additional conditions are met in further design. Inflows from roads and allotments within the site are now proposed only at culverts to minimise impacts.
<i>2.1b Note the Inlet and outlet of temporary detention basin in Stage 1 are to be commissioned and decommissioned at the developer's expense, and will not be reimbursed.</i>	Noted. Works for decommissioning of the basin will occur with Lot 2 works, once the regional scheme is in place (or other approved timing).

RTS Comment	Response
<i>2.1c Sydney Water will need more information regarding how the temporary basin in Stage 1 will function regarding the use of the channel flows, which includes external catchments/lots. Sydney Water has concerns about the sizing of the basin and the impact of uncontrolled quantity of stormwater on the Oceania lot.</i>	The basin will now accept only the low flow channel flows from the trunk drainage channel. High flows will bypass the diversion and continue as per the ultimate trunk drainage design. Sizing is based on the MUSIC modelling required to develop Lots 1A, 1B, 1C. Volumes above the capacity for storage will spill back into the ultimate trunk drainage channel.
<i>NSW Department of Climate Change, Energy, the Environment and Water</i>	
<i>5. Recommendation - pre-determination</i> <i>The proponent should confirm the alignment of the watercourse in the western part of the site matches the proposed re-aligned watercourse. The site contains a mapped 2nd order watercourse which runs east to west through the length of the site. The proposed alignment of the watercourse should connect to the existing flow path to the west of the site. There is insufficient information to determine if this requirement has been met.</i>	The design of the naturalised trunk drainage channel has been accepted in principle via external correspondence with Sydney Water as shown in the 01/10/24 letter, on the provision that additional conditions are met in further design.

3. Compliance with SEARs

This report responds to the NSW Planning Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning, Industry and Environment (DPIE) on 12 May 2021. **Table 1** below summarises key issues relating to soil and water management that are listed in the SEARs, and where they are addressed in this report.

Table 1: Planning Secretary's Environmental Assessment Requirements addressed in this report

Key issues listed in the SEARs	Response
Waterway health and Water Sensitive Urban Design	
1) Development applications must demonstrate compliance with the stormwater quality targets in Table 4 (DCP) and the stormwater flow targets during construction and operation phases in Table 5 (DCP) and Table 6 (DCP) at the lot or estate scale to ensure the NSW Government's waterway objectives (flow and water quality) for the Wianamatta-South Creek catchment are achieved (see Appendix D). Where the strategy for waterway management is assessed at an estate level, the approval should include for individual buildings within the estate, which may be the subject of future applications.	Performance of the proposed water management strategy against the stormwater quality targets is presented in Section 8.3.1. Performance against the construction phase stormwater flow targets is presented in the erosion and sediment control plan "REP006-01-21-860-ESCP". Performance of the proposed water management strategy against the operational stormwater flow targets is presented in Section 8.3.3
2) The stormwater flow targets during operation phase (Table 5) include criteria for a mean annual runoff volume (MARV) flow-related option and a flow duration-related option. Applicants must demonstrate compliance with either option.	Performance of the proposed water management strategy against the operational stormwater flow targets is presented in Table 11 .
3) Development applications must include a Water Management Strategy (WMS) detailing the proposed Water Sensitive Urban Design (WSUD) approach, how the WMS complies with stormwater targets (i.e., MUSIC modelling), and how these measures will be implemented, including ongoing management and maintenance responsibilities. Conceptual designs of the stormwater drainage and WSUD system must be provided to illustrate the functional layout and levels of the WSUD systems to ensure the operation has been considered in site levels and layout.	The Water Management Strategy for the site is outlined in this report, and includes the approach to WSUD for the site, performance of the proposed stormwater management measures against the DCP targets, and description of delivery, ongoing management and maintenance of each proposed measure. Design drawings showing the layout and levels of the proposed stormwater management elements are included in the AT&L civil package.
4) The design and mix of WSUD infrastructure shall consider ongoing operation and maintenance. Development applications must include a detailed lifecycle cost assessment (including capital, operation/maintenance, and renewal costs over 30 years) and Maintenance Plan for WSUD measures.	Ongoing management and maintenance considerations are addressed in Section 9 All costs associated with the delivery, operation and maintenance of the estate-based water management measures will be borne by the proponent.
6) Development must not adversely impact soil salinity or sodic soils and shall balance the needs of groundwater dependent ecosystems.	Refer to Geotechnical Investigation Report prepared by PSM for details of soil salinity, sodicity and groundwater.

Key issues listed in the SEARs	Response
7) Infiltration of collected stormwater is generally not supported due to anticipated soil conditions in the catchment. All WSUD systems must incorporate an impervious liner unless a detailed Salinity and Sodicity Assessment demonstrates infiltration of stormwater will not adversely impact the water table and soil salinity (or other soil conditions).	The proposed water management strategy does not incorporate infiltration of collected stormwater. The TBC passively irrigated street tree design is to be compliant with Sydney Water and Penrith Council requirements.
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.	This item is understood to no longer be supported by DPIE and Sydney Water. No rainwater tanks have been provided, recycled water will only be supplied to allotments upon connection to the regional scheme. The development includes recycled water pipes for future connection.
9) Where a recycled water scheme (supplied by stormwater harvesting and/or recycled wastewater) is in place, development shall: - Be designed in a manner that does not compromise waterway objectives, with stormwater harvesting prioritised over reticulated recycled water; - Bring a purple pipe for recycled water to the boundary of the site, as required under Clause 33G of the WSEA SEPP. Not top up rainwater tanks with recycled water unless approved by Sydney Water; and - Design recycled water reticulation to standards required by the operator of the recycled water scheme.	The recycled water reticulation is to be compliant with all standards, and designed for future connection to the scheme.
Soil and Water	
– an assessment of the development’s potential impacts on soil and water resources, topography, hydrology, groundwater, groundwater dependent ecosystem(s), drainage lines, watercourses and riparian lands on or nearby to the site, including mapping and descriptions of existing background conditions and cumulative impacts and measures proposed to reduce and mitigate impacts	See Erosion and Sediment Control Plan report “REP006-01-21-860-ESCP”
– a detailed site water balance including identification of water requirements for the life of the development, measures that would be implemented to ensure an adequate and secure water supply is available for the development and a detailed description of the measures to minimise water consumption at the site	See Section 5.4
– demonstration satisfactory arrangements for drinking water, wastewater and, if required, recycled water services have been made	refer to Service Infrastructure Assessment prepared by LandPartners (March 2021)
– characterisation of water quality at the point of discharge to surface and/or groundwater against the relevant water quality criteria (including the Mamre Road Precinct Development Control Plan) and proposed mitigation measures, monitoring activities and methodologies	See Section 8.3.1
– a site-specific integrated water management strategy with details of stormwater/wastewater management system including how it will be designed, operated and	See Section 7.3

Key issues listed in the SEARs	Response
<i>maintained, including the capacity of on-site detention system(s), on-site sewage management and measures to treat, reuse (including indicative quantities) or dispose of water</i>	
– <i>demonstration of how stormwater discharge will comply with the trunk drainage infrastructure identified in the Mamre Road Precinct Development Control Plan, including concept stormwater plans for both the proposed development and the ultimate developed estate</i>	See Section 5.3
– <i>description of the proposed erosion and sediment controls during construction</i>	See Erosion and Sediment Control Plan report “REP006-01-21-860-ESCP”

Additional SEARS Items (25/03/2023)	Response
– You are reminded that the Department strongly encourages you to consult with Environment, Energy and Science Group and Sydney Water with regards to waterway health targets and trunk drainage requirements for the precinct and include evidence of this consultation as part of the EIS.	After consultation with Sydney Water and their design team, Sydney Water have provided a letter (Appendix A) giving in principle endorsement to lodge this SSDA.

DPIE Comments on the EIS (21/10/2021)	Response
– No additional comments for stormwater and waterway health.	–

4. Site Characteristics

4.1. Waterways and Vegetation

Based on large-scale topographic mapping (1:25,000 from NSW Six Maps), there is a minor series of dams and overflow paths within the site, refer to **Figure 2**.

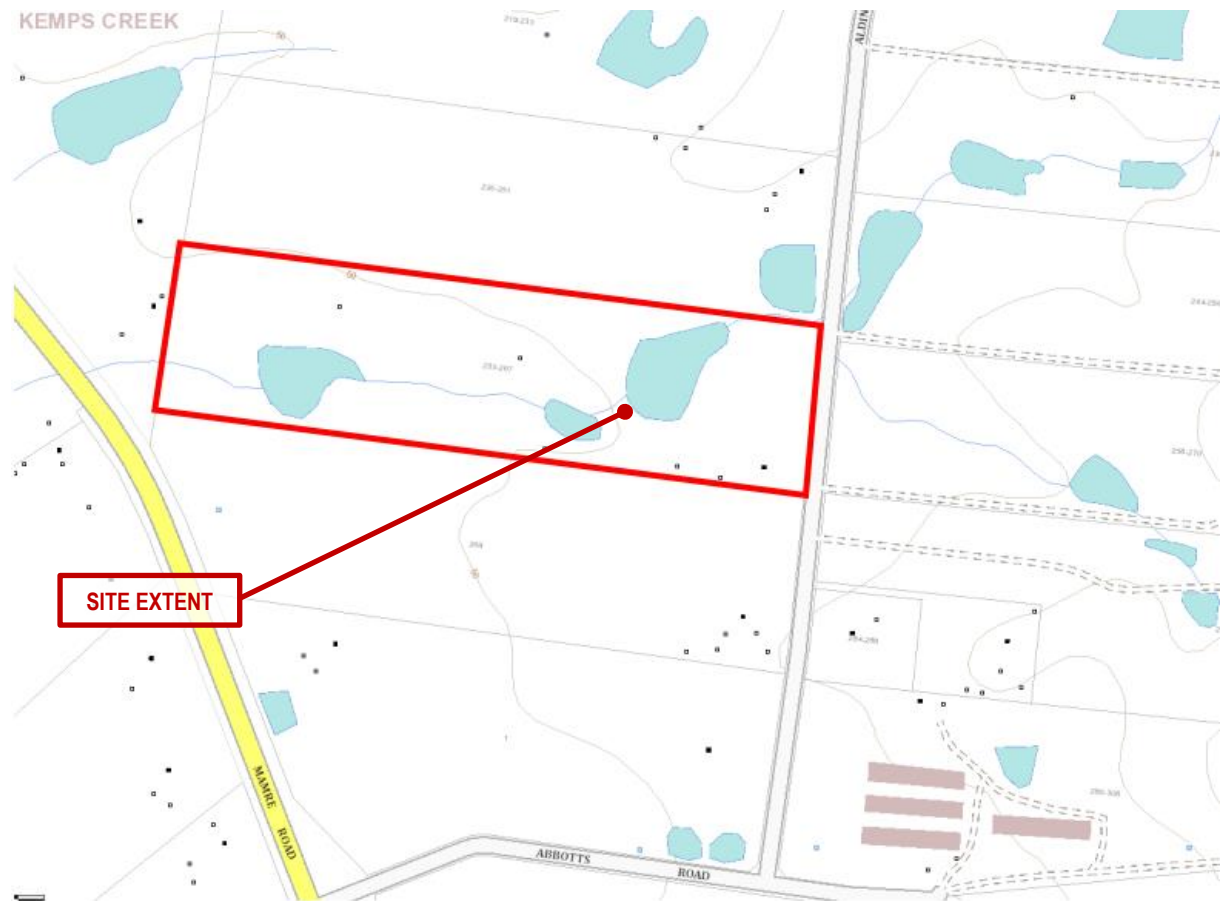


Figure 2: Topographic mapping showing drainage lines in the vicinity of the site (Source: NSW SIX Maps)

The *Mamre Road Precinct Waterway Assessment* (CTEnvironmental, April 2020), contained in the *Mamre Road Flood, Riparian Corridor, and Integrated Water Cycle Management Strategy* (Sydney Water, October 2020) presents the extents of waterways in the Mamre Road Precinct that have been the subject of a desktop review and field assessment to confirm the presence of mapped and unmapped waterways. An extract of mapping showing the extents of waterways in the Mamre Road Precinct is presented as **Figure 3**. This shows a Strahler order 2 waterway running through the site.

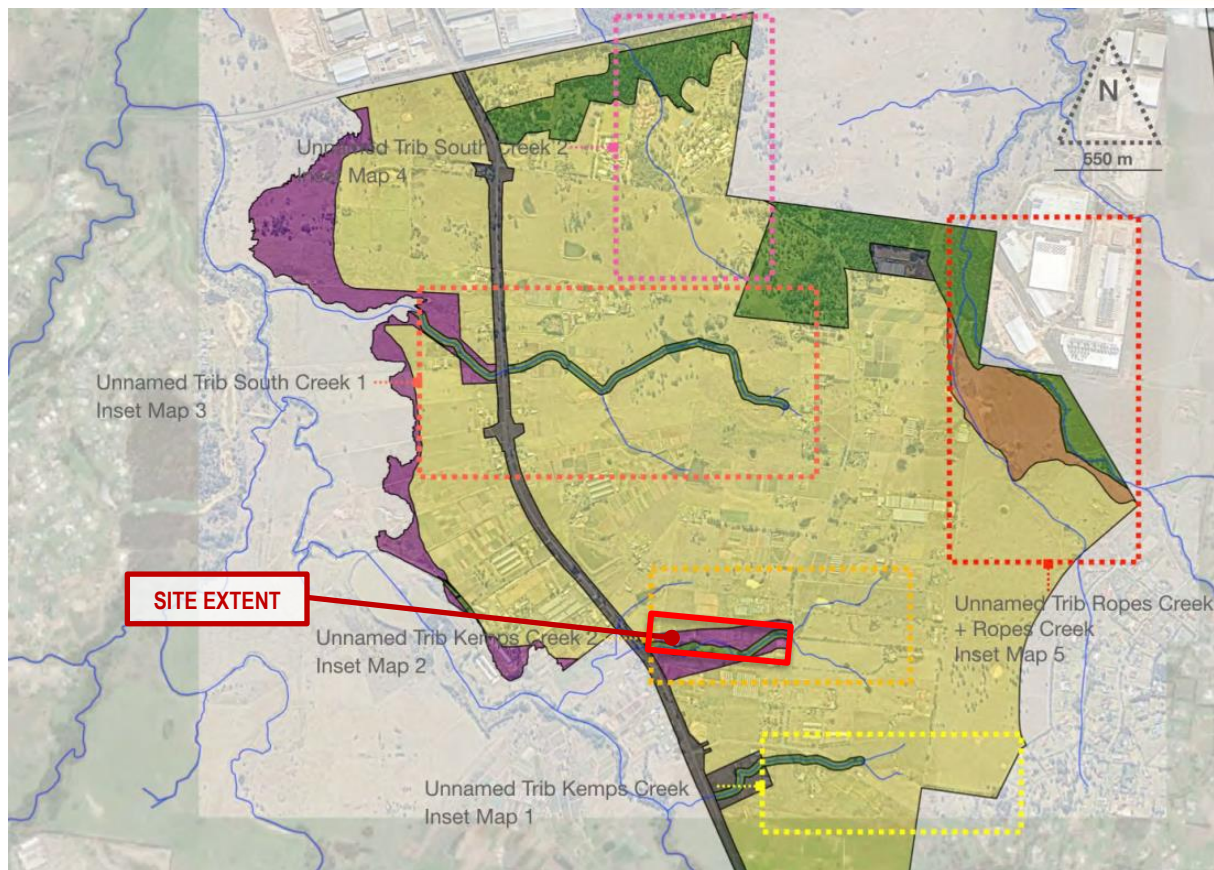


Figure 3: Extract of waterway mapping (CTEnvironmental, April 2020)

4.2. Existing Geology

A desktop study and geotechnical investigation has been prepared for the Site by Douglas Partners (July 2021). This study identified the following geological units within the Site extent:

- (Rwb) – Shale of the Wianamatta Group comprising carbonaceous claystone, claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff.

Douglas Partners undertook site investigation works in May 2021, consisting of 19 test pits.

Based on these tests, a summary of the inferred subsurface conditions across the Site is summarised below:

- A surficial layer of topsoil or topsoil fill to depths of up to 0.8m, although generally 0.2m – 0.3m;
- Uncontrolled fill to depths of up to 1.1m, also to be expected in dam walls;
- A residual clay profile, typically of stiff to hard consistency, to depths ranging from 1.9m to in excess of 3.0m across the site. Soft to firm clays were encountered in areas within the vicinity of dams, areas prone to waterlogging and low lying areas;
- Siltstone bedrock of low strength encountered from 2.6m in Pit 12 and very low to low strength from 1.9m in Pit 15;
- Groundwater at depths of 0.3m – 2.5m in pits 11, 14, 17 and 18 during excavation, possibly controlled by the adjacent dams.

Salinity and Sodicty are discussed in the Erosion and Sediment Control Plan report “REP006-01-21-860-ESCP”

4.3. Existing Topography and Catchments

The site in its existing condition is characterised by undulating topography. The ground slope across most of the site is between 3% and 6%. The northern part of the site (253-276 Aldington Road) is steeper than the majority of the site, with slopes of up to 10%.

Most of the site in its existing condition is pervious, other than some residential dwelling, sheds and access driveways.

Delineation of the internal drainage catchments and external catchment that drain through the site is presented in **Figure 4**.

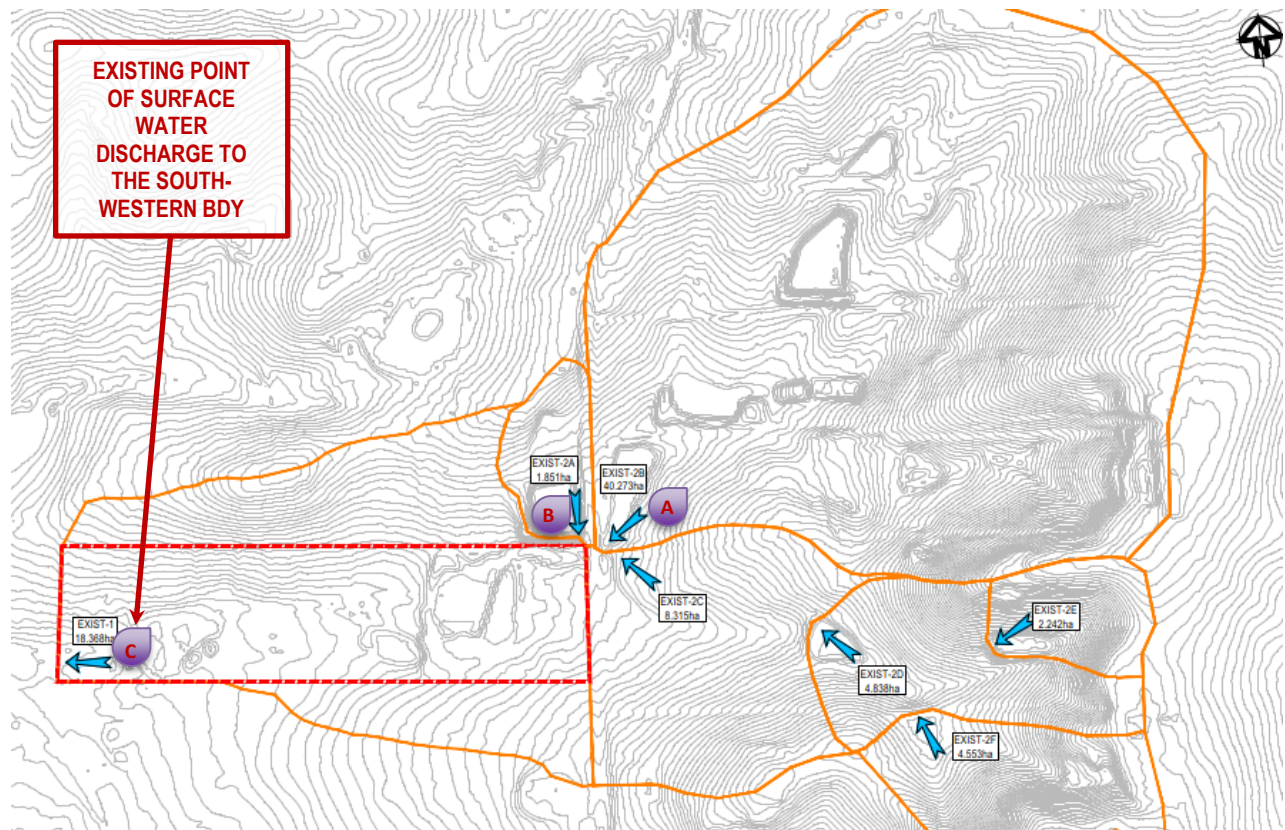


Figure 4: Catchment extents under existing conditions

A summary of the internal catchments under existing conditions is as follows:

- Existing Entry Point A (Total Catchment 60.221 ha) – discharges towards the north-eastern boundary.
- Existing Entry Point B (Total Catchment 1.851 ha) – discharges from eastern portion of 235-251 Aldington Rd.
- Existing Local Catchment Point (18.368 ha, including 10.145ha internal to the site) – discharges from the Site and local adjacent boundary flows at 235-261 (northern neighbour) and 269 Aldington Rd (southern neighbour).

There is currently no formal trunk stormwater infrastructure within the site.

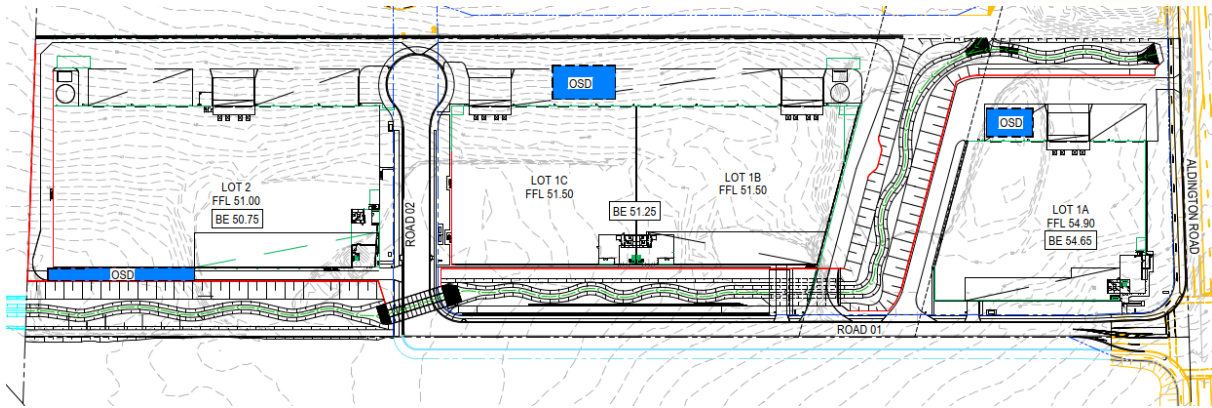


Figure 6: Ultimate Arrangement

5.2. Post-Development Catchment Extents

A post-development catchment plan based on the proposed site grading and the ultimate arrangement of the Sydney Water Stormwater Scheme Plan is presented as **Figure 7**.

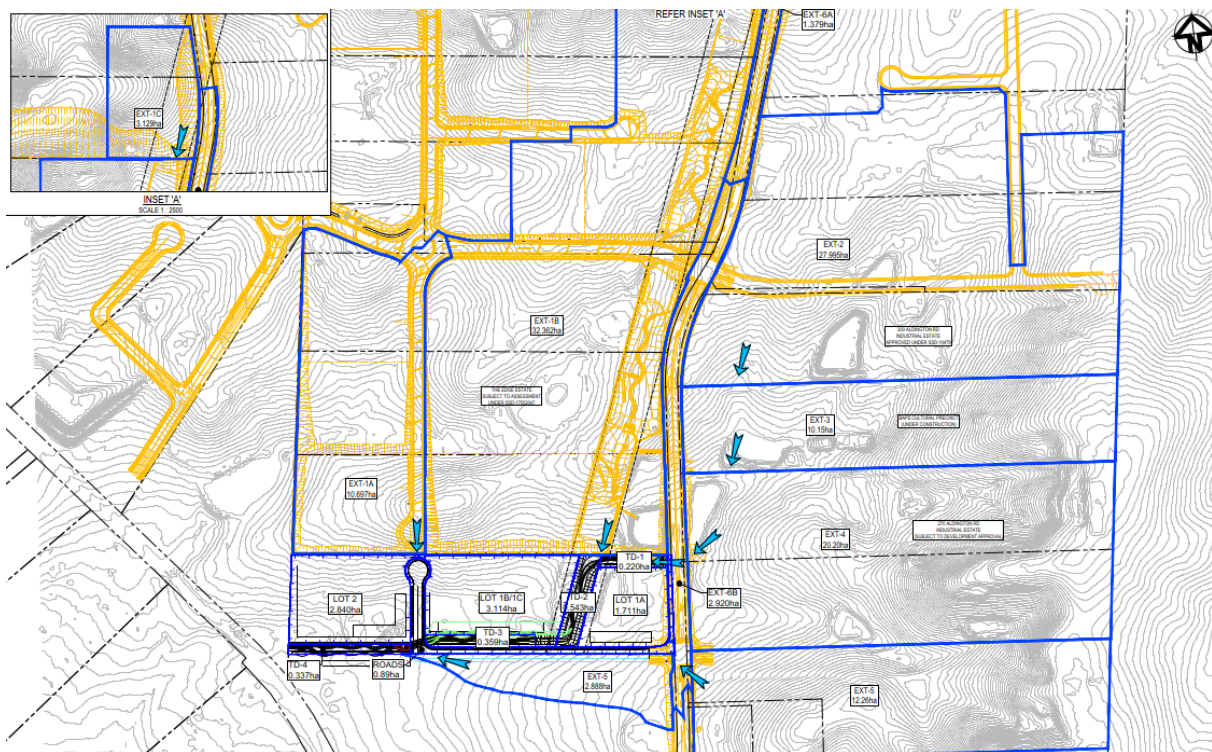


Figure 7: Post Development Catchment Plan

Under Ultimate development conditions there will be four points of inflow to the site from external catchments:

1. Incoming pipe north at the cul-de-sac. Once "The Edge" estate is complete, the pipe here will discharge 10.697ha of industrial catchment including allotments and public road. While Edge is incomplete, a reduced area of natural catchment is picked up via a swale into the system here.
2. Incoming channel diversion pipe north of catchment TD-2. When "The Edge" estate is complete, 32.362ha of industrial catchment including allotments, public road, and upstream trunk drainage will discharge here. While Edge is incomplete, minimal catchment is incoming at this point.

3. Incoming culvert at the north-east; the beginning of the internal trunk channel. This will be a total of 70.605ha of ultimately industrial catchment. It is likely that some or most of this catchment will be undeveloped at the commencement of the Westgate estate.
4. Incoming external existing catchment along the southern boundary of the site, totalling 2.888ha. This will be picked up into the trunk drain at catchment TD-4.

Based on the proposed site grading, there will be two main points of surface water discharge from the site:

- 1 At the southern boundary at the Road 2 partially constructed intersection. The majority of flows concentrating at this point will be captured by the minor drainage system. The low point of the half-road is adjacent to the boundary, so some overland flows will extend slightly into the adjacent property before the road is fully built. These flows will have a short path into the Westgate trunk drainage channel along the natural slope.
- 2 At the western boundary and towards the property at 930 Mamre Road. Discharge depends on the timing of development. If the downstream trunk drainage channel is not constructed at the time of Westgate OC, the trunk drainage channel will pond to a maximum of 1.2m height and spill over into the existing waterway to the existing Mamre Rd culverts. The culvert under the Road 01 and Road 02 intersection will not be inundated by this ponding. The discharge from the site is compliant with both the existing Mamre Rd culvert condition, as well as the future Mamre Rd upgraded culvert condition.

5.3. Trunk Drainage Infrastructure

The *Mamre Road Precinct DCP* includes indicative locations of trunk drainage infrastructure across the precinct, refer to **Figure 8**. The trunk drainage shown on the scheme plan relating to this site involves two incoming 30m open trunk channels consolidating into a 40m trunk channel through the Icon site, the northern one being a diverted catchment that does not run through the Westgate catchment under existing conditions. The incoming northern channel alignment has been rejected by Transgrid for being incompatible with its future pylon footings in their easement (60x60m footing required every 400m). The current assumption is that the catchment from the north will discharge via a pipe/culvert into the site trunk channel.

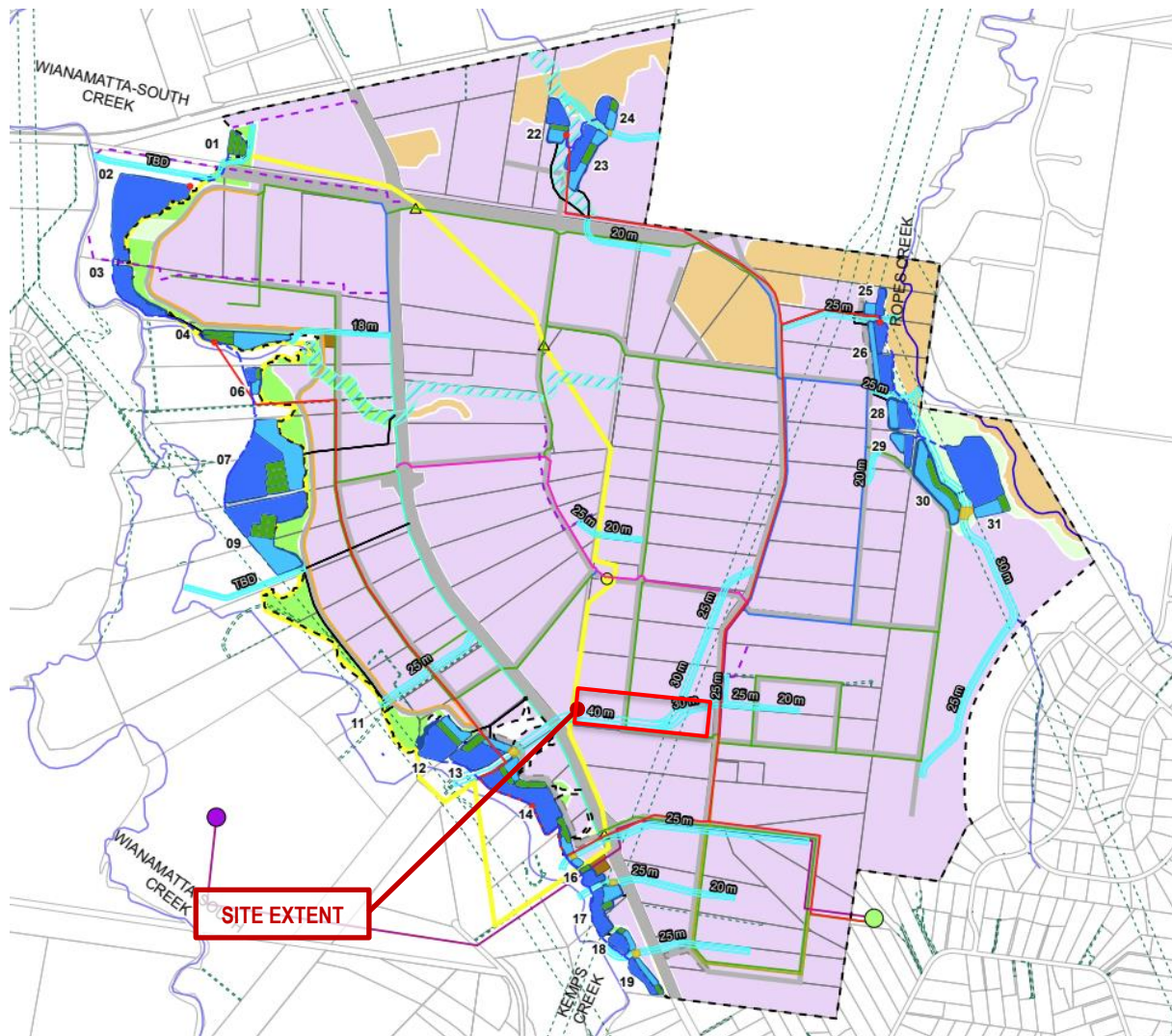


Figure 8: Mamre Road Precinct Stormwater Scheme Plan (Mayc 2024, Sydney Water)

The proposed subdivision infrastructure works will incorporate the naturalised trunk drainage channel alignment generally as shown on the scheme plan. In consultation with Sydney Water and as shown on drawings 21-860-C170 and C171, the following trunk drainage corridor widths have been adopted:

- Chainage 0 to 90 (approx.), adjacent to the northern boundary of the site between Aldington Road and the Transgrid easement, a trunk drainage corridor width of 20 metres has been adopted. This will include a maintenance access track adjacent to the southern edge of the channel.
- Chainage 90 to 225 (within the Transgrid easement) – a 32.8 metre wide trunk drainage corridor has been adopted. This will include a maintenance parking area adjacent to the internal access road that will service Lot 1B/1C.
- Chainage 225 to 480 (between Road 01 and proposed Lot 1B/1C) – a 25 metre wide trunk drainage corridor has been adopted. This will include a maintenance access track adjacent to the southern edge of the channel.
- Chainage 525 to 718 (between proposed Lot 2 and the southern boundary of the site) – a 30 metre wide trunk drainage corridor has been adopted. This will include a maintenance access track adjacent to the southern edge of the channel.

The geometry of the channel will be generally consistent with the indicative trunk drainage path cross-section documented in the Mamre Road Precinct DCP (reproduced below as **Figure 9**).

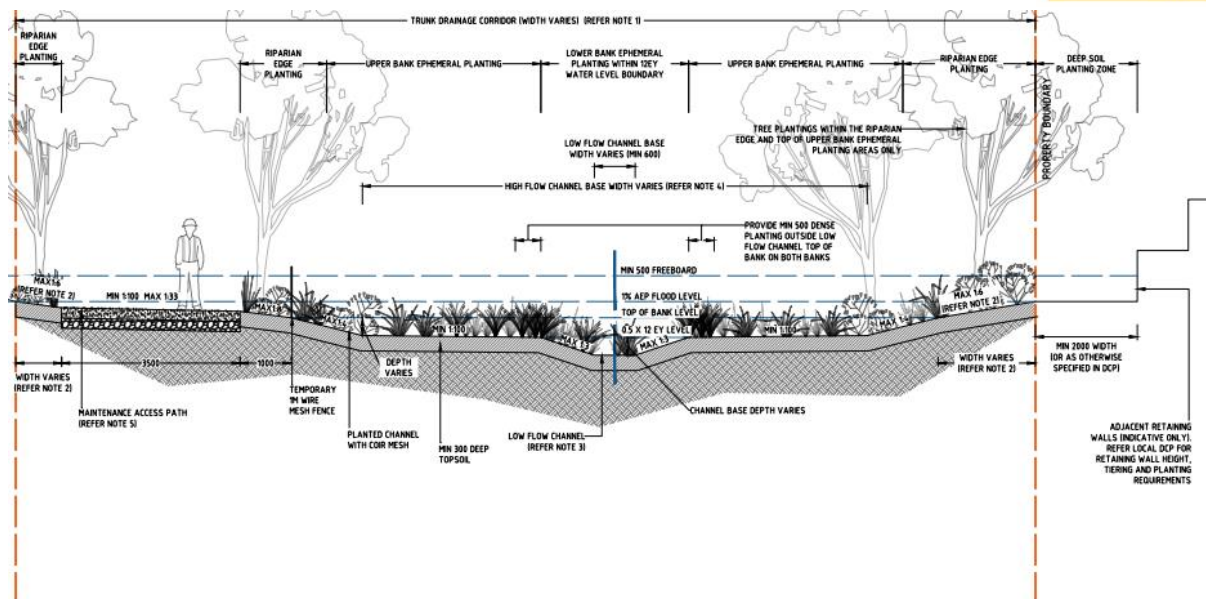


Figure 9: Draft Typical Trunk Drainage Channel Type 1 (Sydney Water, 2023)

A longitudinal section and spatial plans of the channel are included in the civil plan set, further details are included in the Flood Impact and Risk Assessment *REP004-04-21-860-20-776 FIRA (AT&L 2024)*, including 2D modelling of the channels. The FIRA shows that there are no significant negative impacts to upstream or downstream developments due to the Westgate development, flooding is managed sufficiently in the trunk drainage channels.

5.4. Water Sources and Demands

5.4.1. Water Requirements

Water requirements within the Westgate Kemps Creek site will be typical of large format warehouses and distribution centres. Sources of demand for water within the proposed allotments and public domain will include:

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

5.4.2. Water Sources

The primary source of water to Westgate Kemps Creek will be Sydney Water's potable water reticulation network. Details of existing and proposed infrastructure that will be required to service the estate is presented in the Civil Infrastructure Report, prepared by AT&L in support of SSD-23480429.

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.

5.4.3. 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 will apply to development within Summit at Kemps Creek:

- **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.

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

Stormwater quantity (flow) targets for Option 1 (mean annual runoff volume) and Option 2 (flow percentiles) are summarised in **Table 3**.

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

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

7. Water Management Strategy

This section summarises the proposed stormwater quality management strategy for the site, including details of the proposed stormwater treatment train and characterisation of water quality at the points of discharge at the site boundary against relevant water quality criteria (including the *Mamre Road Precinct DCP*).

The water management strategy for the scope of development for which consent is being sought under SSD-23480429 incorporates a series of stormwater management measures to address stormwater quality, quantity (peak flow attenuation) and flow volume. This Strategy should be read in conjunction with the following documents:

- Sydney Water, [Stormwater Management Framework for Aerotropolis and Mamre Road Precincts](#), December 2022.
- Sydney Water, Mamre Road Precinct Stormwater Scheme Plan (May 2024)
- Sydney Water, [Stormwater Scheme Infrastructure Design Guideline DRAFT](#) (Version No. 2024-1.0, August 2024)

7.1. Strategy Objectives

The main objectives pertaining to the management of stormwater within the proposed development site are outlined in Section 2.4 of the Mamre Road Precinct DCP. Controls relating to stormwater quantity management and the requirement to attenuate peak flow rates are outlined in Section 2.5 of the DCP.

Specific controls relating to water management, as well as a response to these controls, are summarised below in **Table 4**.

Table 4: Response to DCP controls relating to water management

DCP Controls	Response
Waterway health and Water Sensitive Urban Design	
1) Development applications must demonstrate compliance with the stormwater quality targets in Table 4 (DCP) and the stormwater flow targets during construction and operation phases in Table 5 (DCP) and Table 6 (DCP) at the lot or estate scale to ensure the NSW Government's waterway objectives (flow and water quality) for the Wianamatta-South Creek catchment are achieved (see Appendix D). Where the strategy for waterway management is assessed at an estate level, the approval should include for individual buildings within the estate, which may be the subject of future applications.	Performance of the proposed water management strategy against the stormwater quality targets is presented in Table 8. Performance against the construction phase stormwater flow targets is presented in Section 8.3.3. Performance of the proposed water management strategy against the operational stormwater flow targets is presented in Table 11.
2) The stormwater flow targets during operation phase (Table 5) include criteria for a mean annual runoff volume (MARV) flow-related option and a flow duration-related option. Applicants must demonstrate compliance with either option.	Performance of the proposed water management strategy against the operational stormwater flow targets is presented in Table 11.
3) Development applications must include a Water Management Strategy (WMS) detailing the proposed Water Sensitive Urban Design (WSUD) approach, how the WMS complies with stormwater targets (i.e., MUSIC modelling), and how these measures will be implemented, including ongoing management and maintenance responsibilities. Conceptual designs of the stormwater drainage and WSUD system must be	The Water Management Strategy for the site is outlined in this document, and includes the approach to WSUD for the site, performance of the proposed stormwater management measures against the DCP targets, and description of delivery, ongoing management and maintenance of each proposed measure.

DCP Controls	Response
<i>provided to illustrate the functional layout and levels of the WSUD systems to ensure the operation has been considered in site levels and layout.</i>	Design drawings showing the layout and levels of the proposed stormwater management elements are included in the AT&L civil package.
<i>4) The design and mix of WSUD infrastructure shall consider ongoing operation and maintenance. Development applications must include a detailed lifecycle cost assessment (including capital, operation/maintenance, and renewal costs over 30 years) and Maintenance Plan for WSUD measures.</i>	Ongoing management and maintenance considerations are addressed in the erosion and sediment control report "REP006-01-21-860-ESCP.pdf" All costs associated with the delivery, operation and maintenance of the estate-based water management measures will be borne by the proponent.
<i>5) WSUD infrastructure may be adopted at a range of scales (i.e., allotment, street, estate, or sub-precinct scale) to treat stormwater, integrate with the landscape and maximise evaporative losses to reduce development flow runoff. Vegetated WSUD measures, naturalised trunk drainage and rainwater/stormwater reuse are preferred. Acceptable WSUD measures to retain stormwater within the development footprint and subdivision are shown in Table 7 (DCP).</i>	A summary of the proposed WSUD infrastructure adopted in the water management strategy is presented in Table 5 .
<i>6) Development must not adversely impact soil salinity or sodic soils and shall balance the needs of groundwater dependent ecosystems.</i>	Refer to Geotechnical Investigation Report for details of soil salinity, sodicity and groundwater.
<i>7) Infiltration of collected stormwater is generally not supported due to anticipated soil conditions in the catchment. All WSUD systems must incorporate an impervious liner unless a detailed Salinity and Sodicity Assessment demonstrates infiltration of stormwater will not adversely impact the water table and soil salinity (or other soil conditions).</i>	The proposed water management strategy does not incorporate infiltration of collected stormwater.
<i>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.</i>	Refer to Section 7.3.1 for details of proposed rainwater tanks to meet at least 80% of non-potable water demand of each lot.
<i>9) Where a recycled water scheme (supplied by stormwater harvesting and/or recycled wastewater) is in place, development shall:</i> <i>■ Be designed in a manner that does not compromise waterway objectives, with stormwater harvesting prioritised over reticulated recycled water;</i> <i>■ Bring a purple pipe for recycled water to the boundary of the site, as required under Clause 33G of the WSEA SEPP. Not top up rainwater tanks with recycled water unless approved by Sydney Water; and</i> <i>■ Design recycled water reticulation to standards required by the operator of the recycled water scheme.</i>	Stormwater harvesting in the form of rainwater tanks on proposed lots 1A-1C will form one of the components of the Interim Arrangement, and its supply to non-potable uses within the development will be prioritised over reticulated recycled water. It is envisaged that reticulated recycled water would supply the shortfall in supply from the rainwater tank and would not top up rainwater tanks unless approved by Sydney Water.

DCP Controls	Response
Trunk Drainage Infrastructure	
10) Indicative naturalised trunk drainage paths are shown in Figure 4 (DCP)	Reproduced in this report for context as Figure 8 .
11) Naturalised trunk drainage paths are to be provided when the: - Contributing catchment exceeds 15ha; or 1% AEP overland flows cannot be safely conveyed overland as described in Australian Rainfall and Runoff – 2019;	Details of the proposed trunk drainage infrastructure are included in Section 5.3 Further detailed modelling will be conducted during the detailed design stage.
12) The design and rehabilitation of naturalised trunk drainage paths is to be generally in accordance with NRAR requirements (refer to Section 2.3) that replicates natural Western Sydney streams. An example of a naturalised trunk drainage path is shown in Figure 3.	Details of the proposed trunk drainage infrastructure, including a typical section, are included in Section 5.3 . Further details are provided in the Landscape Design package prepared by habit8.
13) Naturalised trunk drainage paths shall be designed to: - Contain the 50% AEP flows from the critical duration event in a low flow natural invert; - Convey 1% AEP flows from the critical duration event with a minimum 0.5m freeboard to applicable finished floor levels and road/driveway crossings; and - Provide safe conveyance of flows up to the 1% AEP flood event.	Design including hydraulics on cross sections are included within the civil drawings 21-860-C175 to C183.
14) Where naturalised trunk drainage paths traverse development sites, they may be realigned to suit the development footprint, provided that they: - Comply with the performance requirements for flow conveyance and freeboard; - Are designed to integrate with the formed landscape and permit safe and effective access for maintenance; - Do not have adverse flood impacts on neighbouring properties; and - Enter and leave the development site at the existing points of flow entry and exit.	The proposed naturalised trunk drainage channel follows an alignment that will: - Discharge across the western boundary at the lowest point along the boundary. - Will be aligned to suit the proposed development layout. - Has been designed to contain the 1% AEP peak flow with sufficient freeboard to finished floor levels, such that the flood prone land development controls will be satisfied. - Incorporate suitable points of access for maintenance.
15) Trunk drainage paths shall remain in private ownership with maintenance covenants placed over them to the satisfaction of Council (standard wording for positive covenants is available from Council). Easements will also be required to benefit upstream land.	The proposed trunk drainage channel will be incorporated into one or more of the proposed lots within the estate. Refer to the Plan of Subdivision for further details.
16) Where pipes/ culverts are implemented in lieu of naturalised trunk drainage paths, they must remain on private land and not burden public roads, unless otherwise accepted by Council.	Aside from culverts as required under proposed roads and vehicle crossovers, there are no pipes or culverts provided in lieu of open trunk drainage channels.

DCP Controls	Response
17) High vertical walls and steep batters shall be avoided. Batters shall be vegetated with a maximum batter slope 1V:4H. Where unavoidable, retaining walls shall not exceed 2.0m in cumulative height.	Based on the proposed site grading and drainage strategy, retaining walls will be required adjacent to the proposed trunk drainage channel to transition between the proposed lot levels and the drainage channel. The nature and extent of these walls will be subject to further design development and coordination with the project landscape designer and ecologist and will consider design issues such as maintenance access and overshadowing of the channel.
18) Raingardens and other temporary water storage facilities may be installed online in naturalised trunk drainage paths to promote runoff volume reductions.	A temporary evaporation basin in the position of the western side of Lot 2 shall be installed to also reduce runoff volumes. This basin has been sized to achieve stormwater quantity targets.
19) Subdivision and development are to consider the coordinated staging and delivery of naturalised trunk drainage infrastructure. Development consent will only be granted to land serviced by trunk drainage infrastructure where suitable arrangements are in place for the delivery of trunk infrastructure (to the satisfaction of the relevant Water Management Authority).	The proposed trunk drainage channel will be staged and delivered commensurate with the staging of earthworks and infrastructure across the estate. The trunk drainage channel will form a critical component of the site water management strategy throughout construction and will be incorporated into the Erosion and Sediment Control Plan and Construction Environmental Management Plan. The final form of the trunk drainage channel, including landscaping and any repair or remediation that may be required as a result of construction phase activities, will be undertaken at a suitable stage of development of the estate – nominally at completion of 80% of the development of the estate, and subject to further consultation with the Waterway Manager.
20) Stormwater drainage infrastructure, upstream of the trunk drainage, is to be constructed by the developer of the land considered for approval.	All stormwater drainage upstream of the proposed trunk drainage channel will be designed and delivered by the proponent, with the exception of upstream external catchments.
21) All land identified by the Water Management Authority as performing a significant drainage function and where not specifically identified in the Contributions Plan, is to be covered by an appropriate "restriction to user" and created free of cost to the Water Management Authority.	Noted – subject to further consultation with the Waterway Manager.

DCP Controls	Response
22) All proposed development submissions must clearly demonstrate via 2-dimensional flood modelling that: 1) Overland flow paths are preserved and accommodated through the site; 2) Runoff from upstream properties (post development flows) are accommodated in the trunk drainage system design; 3) Any proposed change in site levels or drainage works are not to adversely impact and upstream or downstream, or cause a restriction to flows from upstream properties; 4) There is no concentration of flows onto an adjoining property; and 5) No flows have been diverted from their natural catchment to another.	Refer to the Flood Impact Risk Assessment report by AT&L "REP005-01-860 WSMP.pdf"
Overland Flow Flooding	
23) Development should not obstruct overland flow paths. Development is required to demonstrate that any overland flow is maintained for the 1% AEP overland flow with consideration for failsafe of flows up to the PMF.	The proposed major and minor system drainage has been designed such that development within the estate will not obstruct any overland flow paths. Suitable allowance for overland flow has been made within the design of the major and minor system. Refer to the Flood Assessment report prepared by AT&L for further details of allowance for overland flow within the estate for events up to the PMF.
24) Where existing natural streams do not exist, naturalised drainage channels are encouraged to ensure overland flows are safely conveyed via vegetated trunk drainage channels with 1% AEP capacity plus 0.5m freeboard. Any increase in peak flow must be offset using on-site stormwater detention (OSD) basins.	Refer to Section 5.3 for details of the proposed trunk drainage infrastructure. Refer to Section 7.3.3 for details of the proposed detention tanks that will attenuate peak flows within the estate prior to discharge across the estate boundary.
25) 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.	The locations of the proposed detention basins within the estate are presented on the overall Interim and Ultimate Arrangement Stormwater Management Plans (drawings 21-860-C250,C251).
26) Stormwater basins are to be located above the 1% AEP.	The site is not subject to mainstream flooding, and therefore the proposed detention tanks will be located outside the extent of 1% AEP mainstream flooding.
27) 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.	The performance of the proposed detention basins against the stormwater quantity targets in the Mamre Road Precinct DCP is summarised in Section 7.1
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.	As demonstrated in Table 9, the proposed detention basins have been sized to ensure no increase in peak flows at the discharge point from the site.

7.2. Strategy Overview

The Water Management Strategy has been developed for two scenarios:

- a) An Interim Arrangement (refer to drawing 21-860-C250), for which approval is being sought under SSD-23480429. This Arrangement is intended to be implemented to satisfy stormwater quality, quantity and flow controls in the absence of regional stormwater management measures, which will be delivered by and/or on behalf of Sydney Water in future.
- b) An Ultimate Arrangement (refer to drawing 21-860-C251), which incorporates measures to address stormwater attenuation controls within the Estate. This Arrangement has been developed on the basis that a regional stormwater management scheme is in place to satisfy the stormwater quality and flow controls for the Mamre Road Precinct. This Arrangement is proposed to supersede the Interim Arrangement, without modification to any development approval in place, once regional stormwater management measures that will service the site have been delivered. If the regional scheme is in place, or otherwise by agreement with Sydney Water and DPHI, it may be built with the original works, removing the need for the evaporation pond to ever be constructed.

A summary of the proposed stormwater management measures that would be required to satisfy stormwater quality, quantity and flow controls under both the Interim and Ultimate Arrangements is presented in **Table 5**.

Table 5: Proposed water management measures under the Interim and Ultimate Arrangements

	Interim Arrangement		Ultimate Arrangement	
Rainwater tanks for non-potable reuse (refer to Section 7.3.1 for further details)	×	Not required	×	Not required
Gross pollutant traps (GPTs) (refer to Section 7.3.2 for further details)	✓	OceanGuard pit baskets to be installed for all surface drainage before discharge from the allotments to the road drainage. OceanGuard pit baskets are SQIDEP approved, and as such may provide their SQIDEP certified treatment. Road catchment is not required to provide GPTs before entering the trunk drainage channel.	✓	OceanGuard pit baskets to be installed for all surface drainage before discharge from the allotments to the road drainage. OceanGuard pit baskets are SQIDEP approved, and as such may provide their SQIDEP certified treatment. Road catchment is not required to provide GPTs before entering the trunk drainage channel.
On-Site Stormwater Detention (refer to Section 7.3.3 for further details)	✓	Required to satisfy stormwater attenuation requirements. No OSD provided within lot 2 in its undeveloped state.	✓	Required to satisfy stormwater quantity controls.
Interim evaporation pond (refer to Section 7.3.4 for further details)	✓	Required to satisfy stormwater flow duration curve controls. Irrigation to be supplied from the interim pond onto residual lot 2 and the trunk drainage channel upstream (east) of Road 02.	×	Will not be required on the basis that stormwater flow controls will be incorporated into the regional stormwater management scheme. Pond to be decommissioned before Lot 2 is constructed.

7.3. Proposed Stormwater Management Measures

A series of measures are proposed to be adopted within the site to satisfy the stormwater quality and flow volume controls listed in **Section 8.3.3**. A general description of the proposed stormwater treatment train components is presented in the following sections.

7.3.1. Rainwater Tanks

Issue 01 for RTS resubmission has removed the need for rainwater tanks, as it is understood they would need to be decommissioned when the regional scheme is connected. Additionally, the regional scheme recycled water is understood to satisfy green star requirements for the allotments.

7.3.2. Gross Pollutant Traps

The proposed stormwater treatment train would consist of gross pollutant traps (GPTs) as a means of primary and secondary stormwater treatment. GPTs are designed to capture litter, debris, coarse sediment, as well as some oils and greases. However, Sydney Water are unwilling to accept TSS, TP or TN treatment from GPTs unless there is a SQIDEP approval for the model proposed. The only SQIDEP approved GPT is the OceanGuard pit basket, and as such, this has been chosen for the on-lots.

Proprietary GPTs are proposed to be placed on each future inlet pit with in the allotments. Note that the roof catchment is modelled as bypassing the pit baskets, as each pit basket is designed for up to 1000m², where roof catchments can be significantly larger.

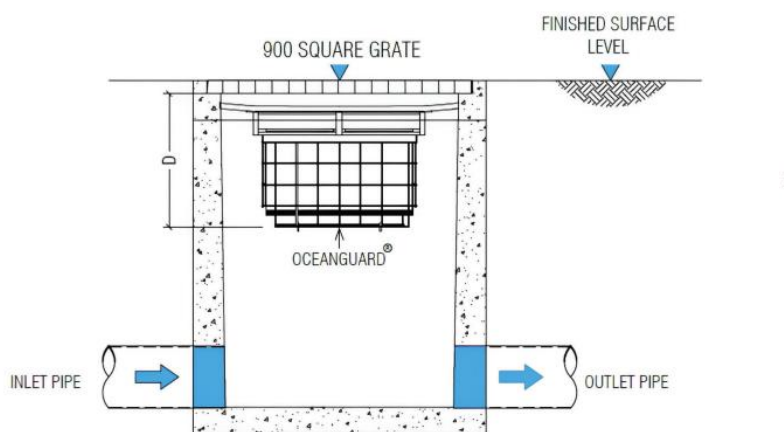


Figure 10: Ocean Guard typical arrangement

OceanGuard pit baskets require bi-yearly maintenance, which is generally conducted by Ocean Protect on a maintenance plan – to be drawn up as part of the on-lot Construction Certificate process.

The Road catchment is not treated by any GPT before discharging to the trunk drainage channel, as per the RTS comments.

7.3.3. On-Site Stormwater Detention

As discussed in **Section 8.3.2**, the site in its existing condition is broadly divided into three internal catchments incorporating the warehouse lots plus the internal road network, with external catchments draining through the site via the northern and eastern boundaries of the site.

The stormwater for each lot is proposed to be collected via pits and pipes and connect into one of three OSD tanks. Road catchments bypass directly into the trunk drainage reserve.

- **OSD Tank A** – Lot 1A, within the internal northern Hardstand area to the north of the proposed warehouse
- **OSD Tank B** – Lot 1B/1C, within the internal northern Hardstand/Loading Dock area to the north west of the proposed warehouses

- **OSD Tank C** – Lot 2, within the internal southern fire access road the south of the proposed warehouse. Note that this OSD is not present during the “interim” phase and is constructed with Lot 2 when the regional scheme is present.

Internal roads will be directed to a pit and pipe system towards the south-western channel outlet of the site

Existing catchment along the boundaries are to be picked up in catch drains. None of these catchments will be directed into the OSD tanks. Limited attenuation may occur in the interim case where flows are directed into the evaporation basin.

For the post-development scenario, it is proposed that the total of the discharges to the trunk drainage channel is less in the developed case than the previous case for all storms. This includes each on-lot OSD over-attenuating to compensate for the road catchments. Controlled outlets from the OSD tanks will include low and high flow orifices where necessary. Refer to Drawing 21-860-C160 for the OSD basin details.

7.3.4. Interim Evaporation Pond

Ponds are considered to provide an effective means of reducing runoff volume from the site as water would be lost via evaporation over a large area. A pond can be relatively cheap to construct with the potential to capture large quantities of stormwater runoff, while also being relatively easy to maintain.

The proposed interim evaporation pond will capture flow diverted from the trunk drainage channel towards the downstream (western) end of the site. All of the site catchment with the exception of the final trunk channel catchment will pass through this basin, as well as external flows into the site. The flow rate from the low flow channel passes directly into the basin, while flows above 12EY (i.e. above the low flow channel) will bypass and continue along the channel. While there will be some stormwater quality treatment benefit for the external flows present, this has not been included in our MUSIC model as a conservative assumption. Once the evaporation basin is full, it will overflow back to the trunk drainage channel.

This Stormwater Management Strategy, which addresses the stormwater flow targets adopted in the Mamre Road Precinct DCP, incorporates an evaporation pond under the Interim Arrangement on future Lot 2. Key parameters adopted for the pond are summarised below in **Table 6**. This pond would only be required as an interim measure, until the regional stormwater management scheme is in place, when it can be decommissioned in order for lot 2 to be constructed.

Evaporation ponds follow the same assumptions for reuse values and rates as **Section 7.3.1** where relevant.

Table 6: Adopted estate-wide evaporation pond parameters

Parameter	Lot 2 Interim Evaporation Pond
Inflow from:	Lots 1A, 1B, 1C, Lot2 Road 1 Road 2 All External Catchments
Outflow to:	Discharge point adjacent to western site boundary via trunk drain
Surface Area (m²)	5300
Permanent pool volume (m³)	7950
Exfiltration rate (mm/hr)	0 (Lined)
Evaporative loss (% of PET)	100
Outlet (equivalent pipe diameter)	N/A
Modelled irrigation	12,000 kL/y

The irrigation areas required to satisfy the modelled irrigation area include the full area of lot 2 excluding the evaporation basin and erosion & sediment basin (1.4ha) at 600mm/y irrigation, as well as the trunk drainage channel (1.2ha) at 600mm/y x 50% of area.

7.3.5. Passively Irrigated Street Trees

Advice received from Sydney Water are that passively irrigated street trees are an important component of their Regional stormwater drainage scheme. These street trees need to be designed to the Sydney Water Stormwater Scheme Infrastructure and Council's approval.

As the time of writing this report (October 2024) it is our understanding SWC and Penrith City Council have prepared a draft design for the passively irrigated street tree (PIST) which is on exhibition for comments. Whilst no design of the PIST are including within street infrastructure of Westgate as yet these trees will be incorporated into the street infrastructure design once finalised. These trees will be included within all public road reserves as per Sydney Water's requirements. The street trees are excluded from the MUSIC modelling as a conservative assumption until the details are confirmed.

8. Performance Assessment

8.1. 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 basins. 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:

- Rainfall intensities have been adopted using the Bureau of Meteorology Design Rainfall Data System (2016).
- Hydrological input parameters:
 - ▶ Paved (impervious) area depression storage: 1 mm
 - ▶ Grassed (pervious) area depression storage: 5 mm
 - ▶ Soil Type: 3
- Times of concentration for each sub catchment have been determined using the friend's equation.
 - ▶ Minimum tc: 5 minutes
 - ▶ Maximum tc: 20 minutes
- Pit Loss coefficients have been calculated in accordance with the Missouri-Hare Charts as documented in the Queensland Urban Drainage Manual.
- Onsite detention methodology: Post development flows are to be less than Predevelopment site flows for a range of design storm events between and including the 50% AEP and 1% AEP.

8.2. Stormwater Quality Modelling

8.2.1. MUSIC Model Parameters

The proposed stormwater treatment train has been modelled using the MUSICX software package (Version 1.1.0). The 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).

8.2.2. Scenario Modelling

A MUSIC model was created to simulate the post-development interim scenario. The post-development model has been created based upon the proposed post-development catchment extents presented in **Section 5.2**. Source nodes for each of the proposed lots have been adopted based on typical large-scale industrial land uses. The layout of the post-development scenario is presented in **Figure 11**. Note that the ultimate model is not required, as the assumption is that the regional scheme is in place satisfying both waterway health and stormwater quality targets downstream of the site.

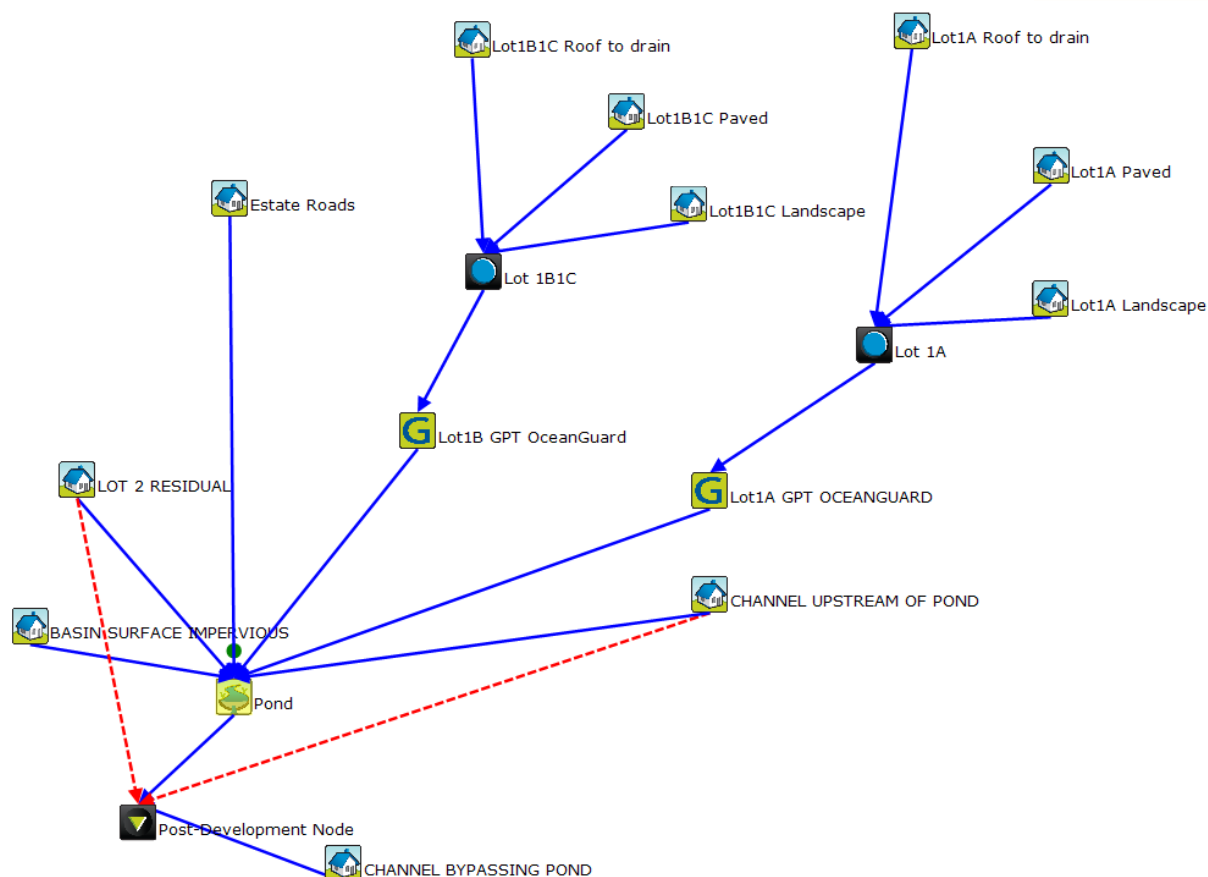


Figure 11: Stage 1 Post-development MUSIC model layout

The post-development (Interim Arrangement/ Stage 1) model has been created based upon the proposed post-development catchment extents presented in **Section 5.2**. Source nodes for each of the proposed lots have been adopted based on the *Technical Guidelines for Achieving Wianamatta South Creek Stormwater Management Targets* (DPE, 2022). The layout of the post-development scenario in MUSIC is presented in **Figure 10** above.

Table 7: Post-development scenario land use breakdown

Catchment	Total Area (ha)	Roof area – warehouses and offices (ha)	Hardstand/road area (ha)	Landscape area (ha)
Lot 1A	1.691	0.925	0.514	0.252
Lot 1B/1C	3.026	1.770	1.060	0.196
Lot 2	2.581	0	0	2.581
Roads (Total)	1.011	0	0.859	0.152
Channels (Total)	1.821	0	0.273	1.548

The post-development scenario model incorporates the following stormwater management measures:

- GPTs, as per the parameters described in Section 7.6.2.
- OSD tanks, as per the parameters described in Section 7.6.4 (not present in MUSIC)
- Interim evaporation pond on proposed lot 2, as per the parameters presented in **Table 6**.

The attributes for each of the proposed stormwater management measures have been determined such that they will satisfy the pollutant reduction targets and waterway health targets as outlined in **Section 7.1**.

8.3. Performance against stormwater targets

8.3.1. Stormwater quality

MUSIC model results presented as mean annual loads are presented in **Table 8**.

Table 8: Summary of MUSIC modelling results against stormwater quality targets

Parameter	Sources – Post-Development	Residual Load – Post-Development	Reduction (%)	Target Option 1 – annual load reduction	Residual load per unit area (kg/ha/yr)	Target Option 2 – allowable mean annual load
TSS (kg/yr)	6308	525	91.7	90	51.8	< 80kg/ha/yr
TP (kg/yr)	12.70	2.10	83.4	80	0.21	< 0.3kg/ha/yr
TN (kg/yr)	85.9	25.47	70.3	65	2.51	< 3.5kg/ha/yr
Gross Pollutants (kg/yr)	1089.2	28.17	97.4	90	2.78	< 16kg/ha/yr

NB: shaded cells indicate compliance against the operational phase water quality targets outlined in the MUSIC Modelling Toolkit – Wianamatta (NSW DPE, April 2022).

The MUSIC model results presented above demonstrate that the proposed on-lot and interim estate-wide stormwater management measures would satisfy the Option 2 (allowable mean annual load) stormwater quality targets at both the discharge points from the site.

8.3.2. Stormwater quantity

Table 9 presents the pre-development and post development flow rates for all storm events at the outlet of the proposed OSD tanks. The OSD within the tank has been designed to achieve the following outcomes for all pre and post developed cases.

Table 10 shows the OSD tank volumes for each area. The Allotment OSD is compensating for the un-attenuated road catchments, as can be seen by the over-achieved targets.

Table 9: Pre-development and post-development peak flow rates from the proposed development

Design Storm Event	Pre-Development Peak Flow Rate (m ³ /s)			Post-Development Peak Flow Rate (m ³ /s)		
	Discharge Pt Lot 1A	Discharge Pt Lot 1B/1C	Discharge Pt Lot 2	Discharge Pt Lot 1A	Discharge Pt Lot 1B/1C	Discharge Pt Lot 2
50%AEP	0.117	0.176	0.16	0.108	0.15	0.13
5% AEP	0.448	0.737	0.672	0.344	0.445	0.612
1% AEP	0.662	1.08	0.986	0.554	0.644	0.658

Table 10: OSD Tank Volumes

Warehouse Area	OSD Tank Volume
Lot 1A	750 m ³
Lot 1B/1C	1375 m ³
Lot 2	1250m ³

Allotment OSD volumes may be optimised in the detailed design provided that the post development peak flows are met as per **Table 10**.

Estate scale peak flow attenuation is difficult to determine due to the presence of the trunk drainage channels and the scale of the external catchments that drain through Westgate Kemps Creek relative to the area of the site. Trunk drainage channels have not been considered in the DRAINS attenuation calculations due to the high perviousness and large upstream flows from external developments passing through. Refer to the Flood Impact and Risk Assessment report (AT&L, 2024) which presents an assessment of flooding under existing and proposed development conditions (incorporating OSD).

8.3.3. Stormwater flow volume

MUSIC model results demonstrating performance of the proposed stormwater management measures in the Interim Arrangement against the stormwater flow targets are presented below in **Table 11**. The resultant flow duration curve is presented as **Figure 12**.

Table 11: Summary of MUSIC model results against stormwater flow targets under the Interim Arrangement

Parameter	Result	DCP Target	Complies with DCP target	
			Option 1	Option 2
Mean annual runoff volume (ML/ha/yr)	1.89	2.0	✓	n/a
95%ile flow (L/ha/day)	27,685	3000 to 15000	n/a	×
90%ile flow (L/ha/day)	1,655	1000 to 5000	✓	✓
75%ile flow (L/ha/day)	188	100 to 1000	n/a	✓
50%ile flow (L/ha/day)	21	5 to 100	✓	✓
10%ile flow (L/ha/day)	0	0	✓	n/a
Cease to flow	23%	10% to 30%	n/a	✓

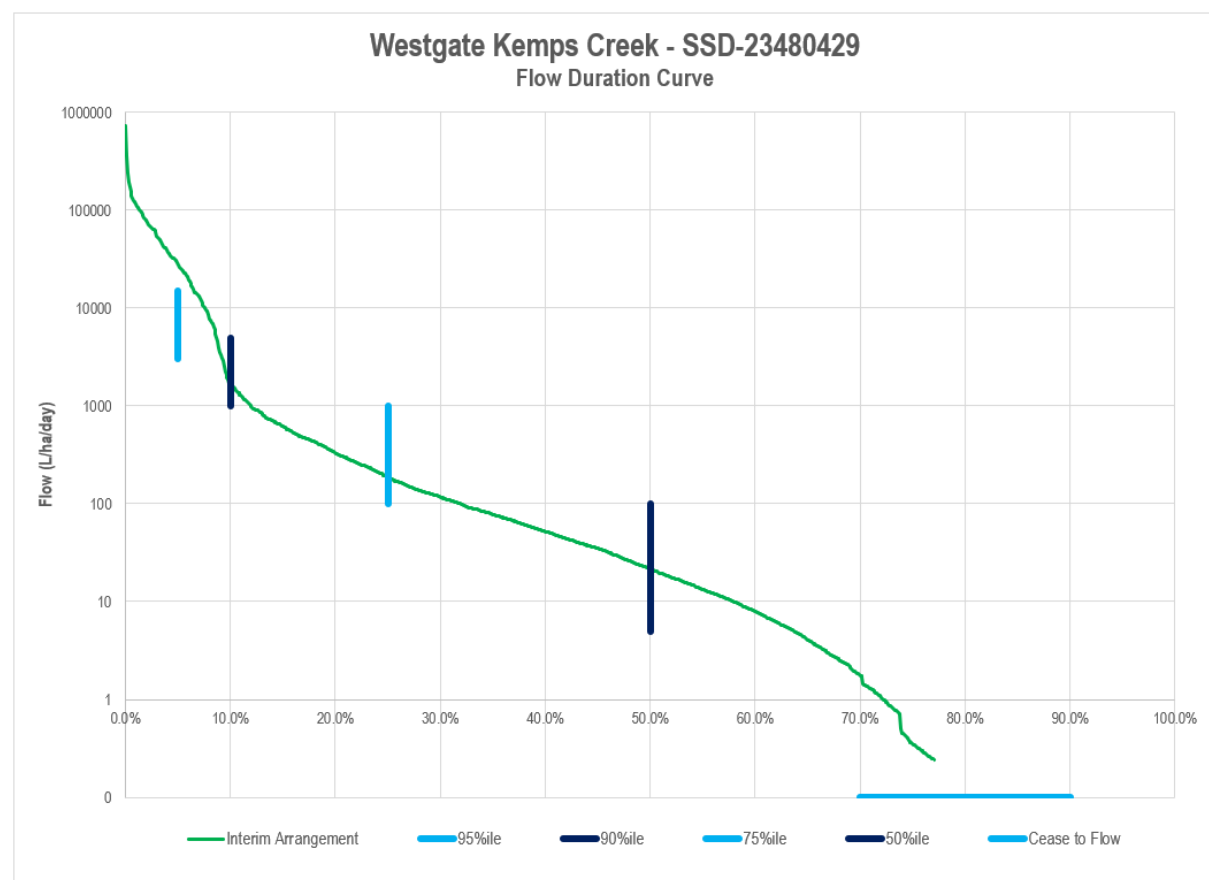


Figure 12: Flow duration curve for the proposed Interim Arrangement

The results presented in **Table 11** demonstrate the proposed stormwater management measures that will be implemented under the Interim Arrangement will satisfy both the Option 1 and Option 2 stormwater flow targets for the site.

9. Maintenance and Operations

All proposed water management measures that make up the Interim Arrangement of the water management strategy would be managed and maintained by the proponent. An Inspection and Maintenance Plan will be prepared and lodged with the construction certificate for the subdivision works once final design details and the extent and layout of all proposed water management measures is confirmed.

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* (Penrith City Council, 2020) 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.

Estate-based and on-lot measures such as the GPTs will be managed and maintained by the Proponent, with inspection and maintenance requirements consistent with those described above.

The planned regional stormwater management scheme, which would incorporate measures to manage stormwater quality and volume across the Mamre Road Precinct, would be managed and maintained by Sydney Water.

Trunk drainage channels are to be maintained by Sydney Water under their easement provisions.



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