NSW Department of Planning & Environment
Industry Assessments
4 Parramatta Square
12 Darcy Street
Parramatta NSW 2150

Friday, 16 September 2022

Integrated Water Cycle Management Review of the Yiribana Logistics Estate in the Mamre Road Precinct

1 Introduction

The following is a summary of our review of the documentation provided to us by DPE against the Mamre Road DCP (Nov 2021). This proceeds from additional information supplied in response to our review from 9 June 2022, with supplementary assessments and modelling updates provided. This summary document will be laid out following the Controls laid out in the DCP.

The scope of this review is limited to technical compliance against the relevant DCP clauses and modelling guidelines prepared by EES and/or Penrith City Council. Where these documents do not provide sufficient guidance, we will recommend industry best practice requirements.

The documents sighted in this review include those listed on the NSW DE Major Projects website: https://pp.planningportal.nsw.gov.au/major-projects/projects/yiribana-logistics-estate with particular focus on the following key documents:

- *Appendix A_Revised Architectural Drawings.pdf (28 May 2021)*
- *Appendix B_MRP DCP Compliance Table.pdf (undated)*
- *Appendix E_Revised Estate landscape Plans.pdf (Apr 2022)*
- *Appendix H_Revised Civil Engineering Drawings (7 Apr 2022)*
- *Appendix J_Revised Civil Engineering Report and Water Cycle Management Strategy.pdf (Rev B - 8 Apr 2022)*
- *Appendix K_Revised MUSIC Modelling.mxproj*
- *Appendix L_Revised Drainage Modelling.drn*

In response to the request for additional information, the following supplementary documents have been provided for our review:

- *Appendix E_Revised Estate Landscape Plans.pdf (June 2022)*
- *Appendix J_Revised Civil Engineering and WCM Strategy.pdf (Rev C - 8 July 2022)*
- *Appendix K_Revised Music Modelling.mxproj*
- *Appendix L_Revised Drainage Modelling.drn*
- *Appendix O_Revised Riparian Lands Assessment.pdf (31 May 2022)*
- *Appendix P_Revised Vegetation Management Plan.pdf (31 May 2022)*

- *Appendix U_NRAR Correspondence.pdf (8 March 2022)*
- *Appendix W_Response to IDC Review.pdf (8 July 2022)*
- *Appendix X_Section 37 Request to Amend SSD-10272349.pdf (11 July 2022)*
- *SSD-10272349_Submissions Report.pdf (15 July 2022)*

Subject of the Application

Consent is sought for:

- Concept masterplan comprising five (5) industrial warehouses, internal road network, 25m riparian zone, building location, GFA, setbacks, car parking and built form parameters.
- Stage 1 consent for:
  - Construction and use of Warehouse 3 for the purposes of other manufacturing industries and/or warehouse and distribution centres which will operate 24 hours/day, seven days/week
  - Provision of site servicing infrastructure to allow the operation of the industrial unit for warehouse and distribution and/or other manufacturing industries
  - Bulk earth works
  - Construction of retaining walls
  - Internal road network (north-south)
  - Associated carparking
  - Signage and
  - Landscaping to the site and adjacent E2 Zone
- Stage 2 of the Estate, including construction of warehouse buildings 1, 2, 4 and 5 will be subject to separate development applications.

2 DCP Compliance Matrix

Section 2.4 Integrated Water Management

Waterway Health and Water Sensitive Urban Design				
No.	**Control**	**Complies?**	**Commentary**	**Updated Review (16/09/2022)**
1)	Development applications must demonstrate compliance with the stormwater quality targets in Table 4 and the stormwater flow targets during construction and operation phases in Table 5 and Table 6 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.	**No**	*The modelling demonstrates compliance with the Option 1 MARV targets and Option 1 of the Pollution Removal Rates of the EES requirements, however, there appear to be a number of issues that need to be resolved with the MUSIC modelling.*	Revised modelling reviews have been summarised in Section 3 below. There remain several significant issues that need to be closed out.
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.	**No**	*Refer to Commentary for Waterway Health and Water Sensitive Urban Design Point 1 above.*	Refer to comment above.
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.	Yes	This has been provided, reviewed and accepted as part of this assessment.	
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.	Yes	This has been provided, reviewed and accepted as part of this assessment.	
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.	Yes	The water sensitive urban design measures proposed are consistent with the DCP.	
6)	Development must not adversely impact soil salinity or sodic soils and shall balance the needs of groundwater dependent ecosystems.	**No**	*Section 7.4 of the Civil Engineering and Water Cycle Management Report seems to indicate that rainwater harvesting is not proposed for the estate development, but the MUSIC model has significant rainwater re-use in the Riparian Storage node.* *This needs to be clarified and if infiltration and landscape irrigate are proposed then the salinity/sodicity assessment should be updated specifically addressing this component of the WSUD.*	We note that in Appendix J, Section 7.4 has been updated with proposed rainwater harvesting within the estate basins for irrigation of landscaped areas and non-potable re-use on individual lots. *"Refer to separate response letter from Arcadis for responses relation to groundwater and salinity"* – Arcadis document (30081949_GMP_FINAL dated 30 April 2021) has not been sighted for review.
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).	Yes	Typical Bioretention detail shows a HDPE liner as part of the construction of the basins.	
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.	Note	N/A. We understand that a reticulated recycled water scheme will service the Precinct.	
9)	Where a recycled water scheme (supplied by stormwater harvesting and/or recycled wastewater) is in place, development shall:	Note	N/A	
	• Be designed in a manner that does not compromise waterway objectives, with stormwater harvesting prioritised over reticulated recycled water		N/A	

	• 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		N/A	
	• Design recycled water reticulation to standards required by the operator of the recycled water scheme.		N/A	
Trunk Drainage Infrastructure				
	Where applied strictly in accordance with the below controls, naturalised trunk drainage paths can count towards the required contributions to canopy cover and site perviousness			
10)	Indicative naturalised trunk drainage paths are shown in Figure 4.	Note	N/A	
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; unless otherwise agreed by the consent authority.	Yes	The mapped watercourse has been re-aligned and retained in coordination with the downstream developers (Mirvac – Aspect Industrial Estate)	
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.	Yes	This has been provided, reviewed and accepted as part of this assessment.	
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;	Yes	The 2-d flood assessment has demonstrated compliance with this requirement.	
	• 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	Yes	The 2-d flood assessment has demonstrated compliance with this requirement.	
	• Provide safe conveyance of flows up to the 1% AEP flood event.	Yes	The 2-d flood assessment has demonstrated compliance with this requirement.	
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;	Yes	The 2-d flood assessment has demonstrated compliance with this requirement.	
	• Are designed to integrate with the formed landscape and permit safe and effective access for maintenance;	Yes	The 2-d flood assessment has demonstrated compliance with this requirement.	
	• Do not have adverse flood impacts on neighbouring properties; and	Yes	The 2-d flood assessment has demonstrated compliance with this requirement.	
	• Enter and leave the development site at the existing points of flow entry and exit.	Yes	The 2-d flood assessment has demonstrated compliance with this requirement.	
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.	Yes	Require written confirmation that the proposed trunk drainage path will remain in private ownership.	Civil drawings in Appendix H are compliant.
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.	Note	N/A	
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.	*No**	*The batter slopes comply with the requirements, but the retaining walls around the basin are considerably in excess of the maximum of 2.0m set in the DCP. However the walls are proposed to be tiered and are integral with building/pavement retaining walls (i.e. not stand*	

			alone basin walls). We believe that this is acceptable in these circumstances.	
18)	Raingardens and other temporary water storage facilities may be installed online in naturalised trunk drainage paths to promote runoff volume reductions.	Yes	An online basin is proposed as part of these works.	
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)	Yes	The trunk drainage channel as mapped in the DCP has been relocated and rehabilitated to the satisfaction of NRAR.	
20)	Stormwater drainage infrastructure, upstream of the trunk drainage, is to be constructed by the developer of the land considered for approval	Yes	The relevant upstream catchments have been taken into account in the drainage designs.	
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	Note	N/A	
22)	All proposed development submissions must clearly demonstrate via 2-dimensional flood modelling that: • Overland flow paths are preserved and accommodated through the site • Runoff from upstream properties (post development flows) are accommodated in the trunk drainage system design • 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 • There is no concentration of flows onto an adjoining property and • No flows have been diverted from their natural catchment to another	Yes	This has been demonstrated.	

Section 2.5 Flood Prone Land

Flood Prone Land				
No.	**Control**	**Complies?**	**Commentary**	**Updated Review (16/09/2022)**
1)	A comprehensive Flood Impact Risk Assessment (FIRA) (prepared by a qualified hydrologist and hydraulic engineer) is to be submitted with development applications on land identified as fully or partially flood affected. The FIRA should utilise Council's existing data and data arising from the Wianamatta (South) Creek Catchment Flood Study to provide an understanding of existing flooding condition and developed conditions consistent with the requirements of the NSW Flood Prone Land Policy and Floodplain Development Manual. The FIRA shall determine: • Flood behaviour for existing and developed scenarios for the full range of flooding including the 5% Annual Exceedance Probability (AEP), 1% AEP, 0.5% AEP, 0.2% AEP and Probable Maximum Flood (PMF) • Flood Function (floodways, flood fringe and flood storage areas) • Flood Hazard and • Flood constraints, including evacuation constraints (if applicable)	Yes	The flood study contained in the Civil Engineering Report and Water Cycle Management Plan contains the relevant information for a Flood Impact Assessment and demonstrates compliance with the relevant criteria.	
2)	The FIRA shall adequately demonstrate to the satisfaction of the consent authority that • Development will not increase flood hazard, flood levels or risk to other properties • Development has incorporated measures to manage risk to life from flooding • For development located within the PMF, an Emergency Response Plan is in place • Structures, building materials and stormwater controls are structurally adequate to deal with PMF flow rates and velocities (including potential flood debris) • Development siting and layout maintains personal safety during the full range of floods and is compatible with the flood constraints and potential risk	Yes	See Commentary for Flood Prone Land Point 1 above.	

	• The impacts of sea level rise and climate change on flood behaviour has been considered • Development considers Construction of Buildings in Flood Hazard Areas and accompanying handbook developed by the Australian Building Codes Board (2012) and • Fencing does not impede the flow of flood waters/overland flow paths			
Flood Constraints				
3)	New development in floodways, flood fringe and/or flood storages or in high hazard areas in the 1% AEP flood event considering climate change is not permitted.	Yes	The development and earthworks are clear of the regional PMF flood event and only subject to overland flows which compliance has been satisfactorily demonstrated.	
4)	Development applications are to consider the depth and nature of flood waters, whether the area forms flood storage, the nature and risk posed to the development by flood waters, the velocity of floodwaters and the speed of inundation, and whether the development lies in an area classed as a 'floodway', 'flood fringe area' or 'flood storage area'.	Yes	See Commentary for Flood Constraints Point 1 above	
Subdivision				
5)	Subdivision of land below the flood planning level will generally not be supported	Yes	All subdivided lots are above the FPL	
6)	Subdivision must comply with Designing safer subdivisions guidance on subdivision design in flood prone areas 2007 (Hawkesbury-Nepean Floodplain Management Steering Committee).	Yes	The development and earthworks are clear of the regional PMF flood event and only subject to overland flows	
New Development				
7)	Finished floor levels shall be at 0.5m above the 1% AEP flood	Yes	All FFLs are above this FPL (i.e. 0.5m above the 1% AEP flood)	
8)	Flood safe access and emergency egress shall be provided to all new and modified developments consistent with the local flood evacuation plan, in consultation with Council and the State Emergency Services (SES).	Yes	All buildings are flood free from mainstream flooding in the PMF	
Storage of Potential Pollutants				
9)	Potential pollutants stored or detained on-site (such as on-site effluent treatment plants, pollutant stores or on-site water treatment facilities) shall be stored above the 1% AEP flood. Details must be provided as part of any development application.	N/A	Not proposed as part of this DA, could form a condition of consent if required.	
Overland Flow Flooding				
10)	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	Yes	Overland flow paths have been accommodated from upstream and within the site.	
11)	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.	Yes	The mapped watercourse has been re-aligned and restored to the satisfaction of NRAR and in accordance with other requirements.	
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.	Yes	Combined detention/water quality basins and an online OSD basin has been provided at the estate level satisfactorily	
13)	Stormwater basins are to be located above the 1% AEP.	Yes	This has been demonstrated	
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.	Yes	This has been demonstrated	
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.	Yes	This has been demonstrated	
Filling of Land At or Below the Flood Planning Level				

16)	Earthworks up to the PMF must meet the requirements of Clauses 33H and 33J of the WSEA SEPP as well as Sections 2.5 and 4.4 of this DCP		Compliance has been achieved with all of these requirements, except for flood storage analysis (see below) and climate change analysis	
17)	Filling of floodways and/or critical flood storage areas in the 1% AEP flood will not be permitted. Filling of other land at or below the 1% AEP is also discouraged, but will be considered in exceptional circumstances where: The below criteria have been addressed in detail in the supporting FIRA • The purpose for which the filling is to be undertaken is adequately justified • Flood levels are not increased by more than 10mm on surrounding properties • Downstream velocities are not increased by more than 10% • Flows are not redistributed by more than 15% • The cumulative effects of filling proposals is fully assessed over the floodplain • There are alternative opportunities for flood storage • The development potential of surrounding properties is not adversely affected • The flood liability of buildings on surrounding properties is not increased • No local drainage flow/runoff problems are created and • The filling does not occur within the drip line of existing trees	Yes	The development and earthworks are clear of the regional PMF flood event and only subject to overland flows	

3 MUSIC Modelling Review

The following is a summary of the issues noted during our review of the MUSIC modelling and summary reports and design drawings. An updated review (16/09/2022) has been provided respectively below each concern outlined in the initial assessment, in response to the supplementary modelling and documentation provided to us.

High Flow By-Pass

Several WSUD devices have a high flow by-pass of 100m^3/sec. This is impossible and forces far more water through the WSUD devices that could ever physically drain through them. This provides inflated treatment train effectiveness. Street Trees have been updated, but all high flow by-passes must be individually calculated and presented in a revised summary report and MUSIC modelling.

Riparian Storage Area

The Riparian Storage Area is responsible for the vast majority of flow reduction on site for compliance with the MARV targets. There are some issues that require further information and/or justification:

Exfiltration Rate

The exfiltration rate in MUSIC is listed as 1mm/hr which is significantly larger than MUSIC modelling parameters used by other consultants in the Mamre Road Precinct. In addition to this the exfiltration rate for the street tree irrigation is 0.36mm/hr which is consistent with this other work. Site specific saturated hydraulic conductivity testing should be provided to justify these rates and a single rate adopted for the site.

Furthermore, an analysis of the earthworks model in the vicinity of the Riparian Storage shows excavation to depths of 2m-5m. It is therefore unlikely that a sufficient soil profile will be available for water to infiltrate in to. The proposed infiltration rates must also be justified with this in mind.

Updated response (16/09/2022):

The exfiltration rate in the model has been revised to the lower value of 0.36mm/hr. A single rate for saturated hydraulic conductivity has been adopted in the model however saturated hydraulic conductivity testing has not been provided, nor has an assessment or commentary on the location of bed rock in relation to infiltration areas.

We note that reference has been made to a document by Arcadis to justify infiltration rates: "*Refer to separate response letter from Arcadis for responses relating to groundwater and salinity*", however this document has not been sighted.

Evaporative Losses

The evaporation rate is listed as 125% of PET, however standard engineering practice is that evaporative loss should normally range from 75% of PET for completely open water to 125% of PET for heavily vegetated water bodies.

For this basin we would expect evaporation to be 100% of PET, as has been modelled in other estates in the Precinct. The proponent should provide justification for this assumption or adjust the modelling to suit.

Updated response (16/09/2022):

Evaporation rates used in the MUSIC modelling have been revised to value of 100% PET and are deemed acceptable.

Re-Use (Irrigation)

The irrigation re-use for this node is distributed as PET, rather than PET-Rain. This should be updated and resubmitted in a revised model, along with a detailed breakdown of the 6,250kL/year of re-use with a landscape plan clearly showing the areas proposed for irrigation.

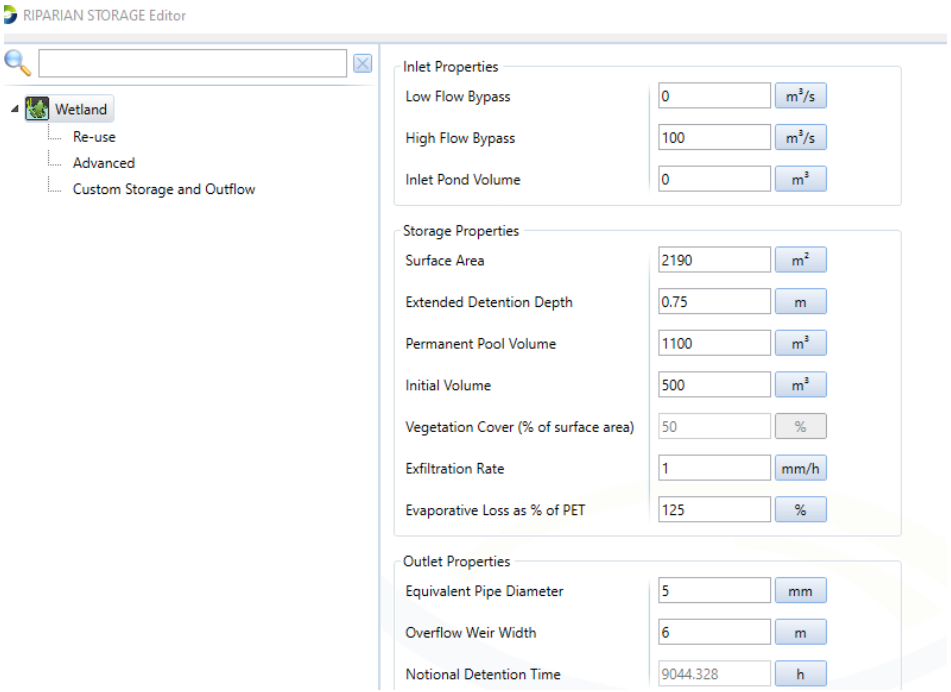
Updated response (16/09/2022):

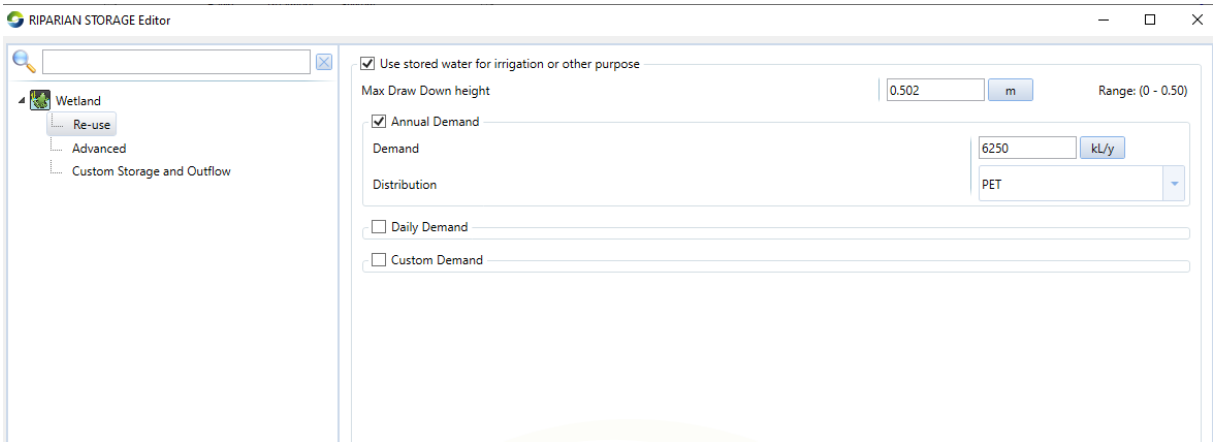
The irrigation re-use distribution used in the model has been revised to PET-Rain.

A total area of 16,500m^2 has been proposed for irrigation (via Basin 2) that relates to a demand of 6,600 kL/year. However, a clear breakdown of the re-use demand has not been provided, please provide additional details including WSUD Summary Plan that clearly shows MUSIC modelling catchment boundaries, pervious/impervious areas, areas proposed for landscaped irrigation, location of all WSUD devices, etc. In addition, summary calculations for internal re-use figures should also be provided.

Basin Volume

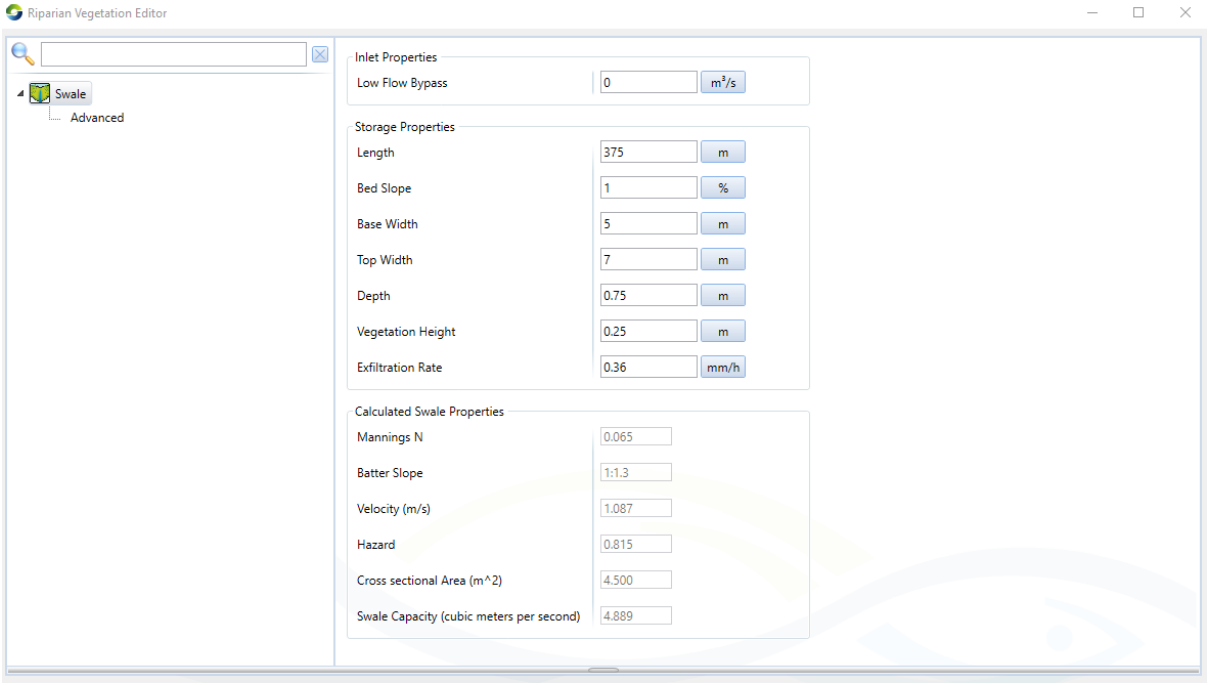
The initial Volume of the Basin is set to 500m^3 which is less than the permanent pool volume of 1,100m^3. The initial volume should be equal to the permanent pool.





Updated response (16/09/2022):

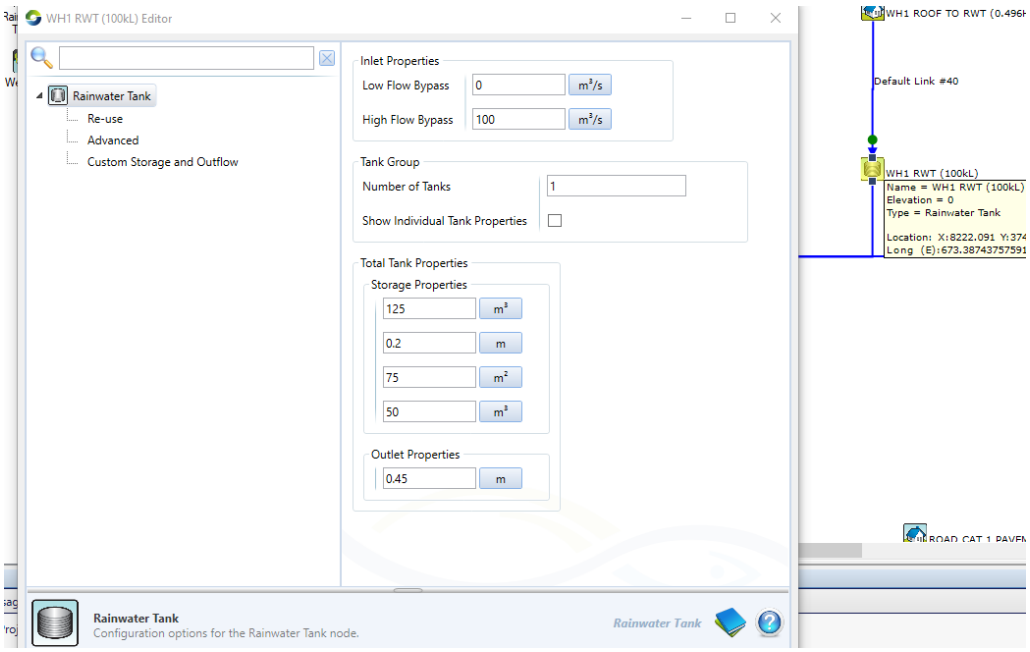
The 'Riparian Storage' node has been modified, now represented as a swale instead of a wetland.



Rainwater Tank – Re-use

The proponent should confirm the rainwater tank volumes in MUSIC vs what is proposed on plan (e.g. WH1 RWT is noted as 100kL but the volume is modelled as 125kL). The modelled volume should be 80% of the physical rainwater tank volume, therefore if the notation of 100kL tank is correct, then the modelled volume should be 80kL.

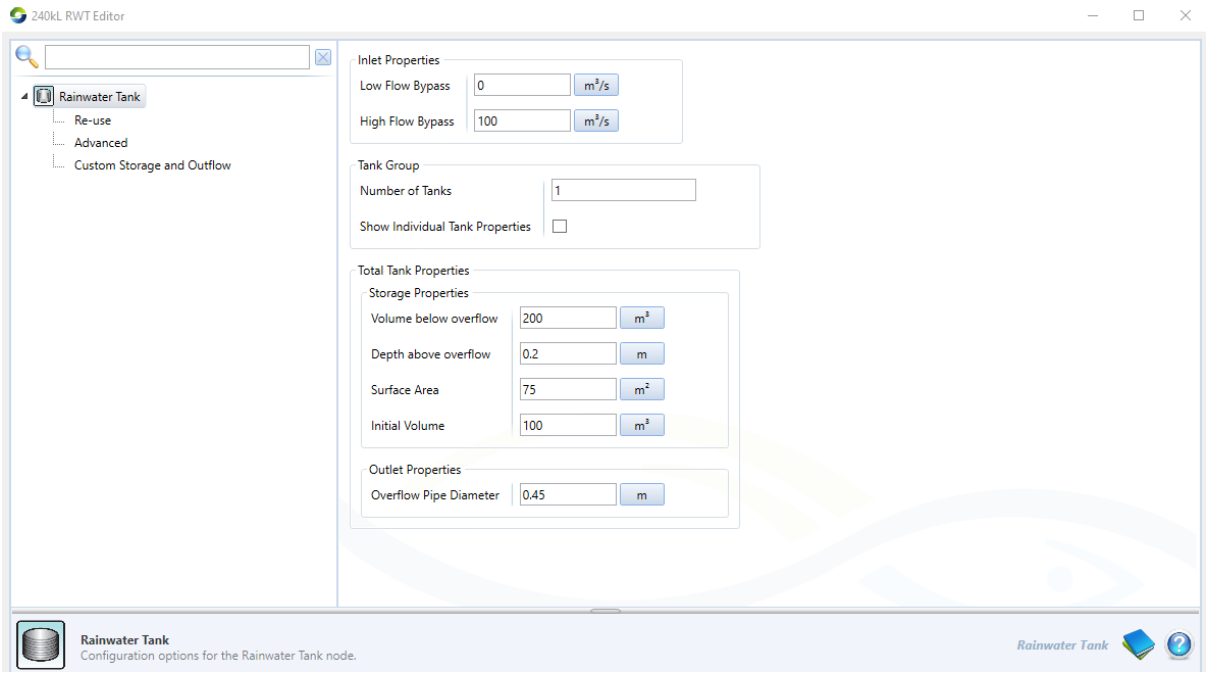
Additionally, the size of rainwater tank in the Civil Engineering Plans appears to be relatively small in plan area. The tank dimensions should be confirmed as part of a response to this review.

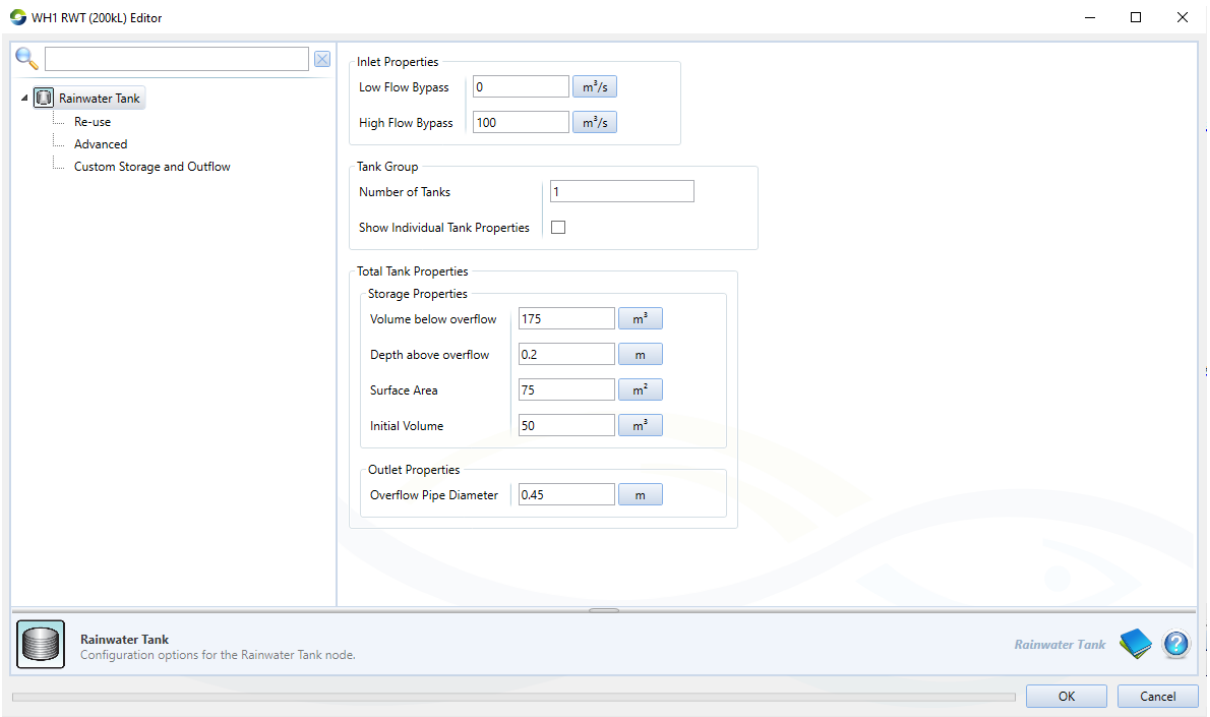


Updated response (16/09/2022):

We acknowledge the following response received from the proponent *"The modelled volume of rainwater tanks is based on 80% of that nominated on plan. The size of the rainwater tank on plan is nominal only. The final dimensions of the tank will be confirmed as part of detail design, or post approval, stage."*

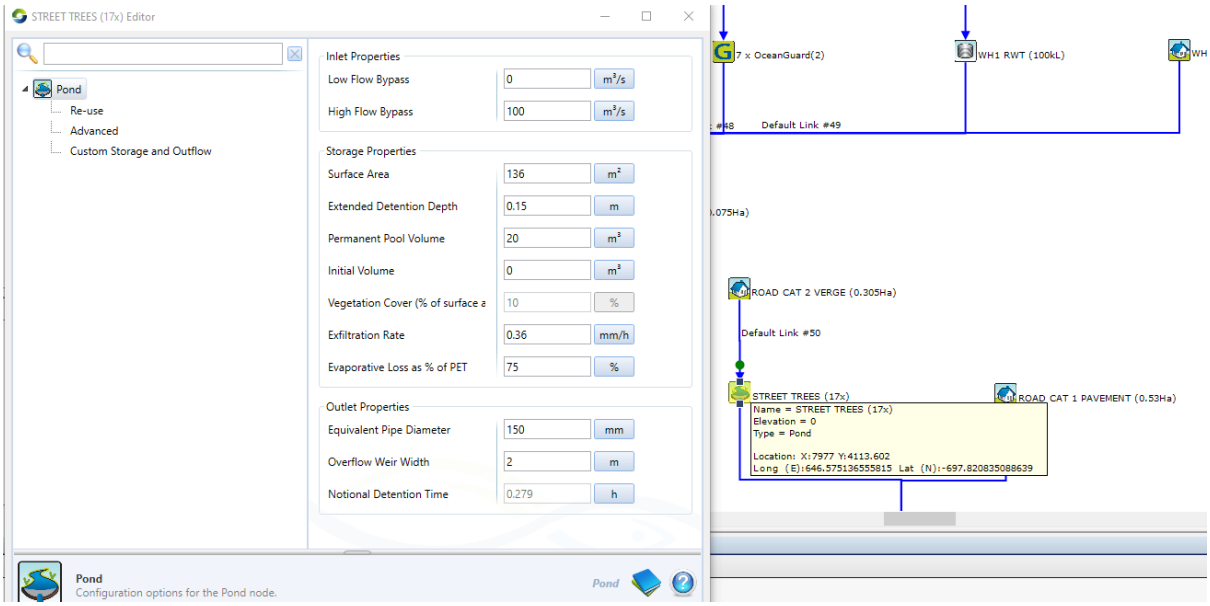
Details for rainwater tank properties are required to be confirmed to ensure the design satisfies water quality target objectives. This must include accurate high-flow bypass rates, noting that the proponent has 100m^3/s for all tanks which is impossible and inflates results (as outlined above).





Street Tree Irrigation

The proponent should confirm the high flow bypass rate of the street trees and bioretention (currently modelled as 100m^3/s). Based on area and extended detention depth we would expect bypass to be closer to 3-month ARI.



Updated response (16/09/2022):

We note that the high flow by-pass has been updated to 0.75m^3/s to suit the 3-month ARI design flow rate.

MUSIC Results

Pollutant Load Concentrations

Results from the updated MUSICX model indicate that Total Phosphorus (TP) reduction does not meet minimum target objectives. Appendix J includes an assessment, noting the shortfall in reduction for TP, attributed to the large area of landscaping present on site. However, the Mamre Road Precinct DCP (2021) requires the minimum targets to be met, in this case an 80% reduction in mean annual load for TP as has been demonstrated by other proponents.

A total area of 16,500m^2 has been proposed for irrigation/internal re-use, however a detailed breakdown clarifying each land-use area is required to clearly illustrate the catchments being treated. The model needs to be revised, with inclusion of a WSUD Summary Plan as outlined above.

Treatment Train Effec

(1) 2 - STAGE 1 DELIVERY : Treatment Train Effectiveness : RECEIVING

	Sources	Residual Load	% Reduction
Gross Pollutants (kg/yr)	2484	0	100
Total Phosphorus (kg/yr)	30.17	6.573	78.21
Flow (ML/yr)	86.58	51.73	40.25
Total Nitrogen (kg/yr)	194.8	67.77	65.2
Total Suspended Solids (kg/yr)	1.574E+04	1018	93.53

Results as shown in Appendix J:

Table 7.1. MUSIC analysis results – Allowable Load Reduction

	Total Source Load (kg/yr)	Total Residual Load (kg/yr)	Reduction Achieved (%)
Total Suspended Solids (kg/yr)	16090	1031	93.48
Total Phosphorus (kg/yr)	30.52	6.577	78.11
Total Nitrogen (kg/yr)	196.3	65.14	65.14
Gross Pollutants (kg/yr)	2494	0	100

We also confirm that the MARV results and flow duration targets are shown to be compliant, however this will likely change with the above errors and omissions to be closed out..