

NSW Department of Planning & Environment
Industry Assessments
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Tuesday, 29 March 2022

Integrated Water Cycle Management Review of Aspect Industrial Estate SSDA 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 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://www.planningportal.nsw.gov.au/major-projects/projects/aspect-industrial-estate> and the following supplemental information (provided by DPE on 11 March 2022):

- *21-03-31 - EES Group comments on the RtS.pdf*
- *21-07-02 - EES Group comments on the Supplementary RtS.pdf*
- *21-11-22 - NRAR Comments (MS Outlook e-mail)*
- *21-12-15 - EES Group Comments.pdf*
- *21-12-20 - EES Group Comments.pdf*
- *22.02.28 - SSD10448 AIE Consolidation Report.pdf*
- *22-02-18 - EES Group Comments (MS Outlook e-mail)*
- *A1. Estate Masterplan.pdf*
- *A2. Estate Works Stage 1 Plan.pdf*
- *D1. Revised Civil Plans.pdf*
- *D2. Civil Statement.pdf*
- *J - Waterway Health Summary for EES NOT FOR PUBLIC EXHIBITION.pdf*
- *Option 1 - Config26 - Flow Duration Curve - Post processing spreadsheet*
- *Option 1 - Config26 - MUSIC model.sqz*
- *Option 2 - Config 26a - Flow Duration Curve - Post processing spreadsheet.xlsx*
- *Option 2 - Config26a - MUSIC modelst.sqz*

- *Option 3 - Config30 - Flow Duration Curve - Post processing spreadsheet.xlsx*
- *Option 3 - Config30 - MUSIC model Forest.sqz*
- *Option 4 - Config 30a - Flow Duration Curve - Post processing spreadsheet.xlsx*
- *Option 4 - Config30a - MUSIC model.sqz*
- *Option 5 - Config30b - Flow Duration Curve - Post processing spreadsheet.xlsx*
- *Option 5 - Config30b - MUSIC model.sqz*

2 DCP Compliance Matrix

Section 2.4 Integrated Water Management

Waterway Health and Water Sensitive Urban Design			
No.	Control	Complies?	Commentary
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	Please refer to the detailed MUSIC modelling review section later in this document.
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.	Yes*	The operational targets have been met, however these are based on MUSIC modelling that we believe needs to be amended to comply with other requirements of this DCP.
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	The civil engineering plans, civil statement and <i>Waterway Health Summary for EES</i> contain these details.
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.	No	No analysis or discussion has been sighted in the documentation provided. This can be conditioned in a potential consent.
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	Note	Despite infiltration being proposed, a salinity/sodicity assessment has not been provided

	rainwater/stormwater reuse are preferred. Acceptable WSUD measures to retain stormwater within the development footprint and subdivision are shown in Table 7.		
6)	Development must not adversely impact soil salinity or sodic soils and shall balance the needs of groundwater dependent ecosystems.	No	Despite infiltration being proposed, a salinity/sodicity assessment has not been provided
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).	No	Despite infiltration being proposed, a salinity/sodicity assessment has not been provided
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
9)	Where a recycled water scheme (supplied by stormwater harvesting and/or recycled wastewater) is in place, development shall:	Note	N/A
	<ul style="list-style-type: none"> Be designed in a manner that does not compromise waterway objectives, with stormwater harvesting prioritised over reticulated recycled water 		N/A
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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	Note	In order for the naturalised trunk drainage channels to be counted towards the site imperviousness all off the below requirements must be strictly met
10)	Indicative naturalised trunk drainage paths are shown in Figure 4.	Note	N/A

11)	<p>Naturalised trunk drainage paths are to be provided when the:</p> <ul style="list-style-type: none"> Contributing catchment exceeds 15ha; or 1% AEP overland flows cannot be safely conveyed overland as described in Australian Rainfall and Runoff – 2019; <p>unless otherwise agreed by the consent authority.</p>	Note	The proposal deletes a mapped natural trunk drainage channel and is subject to “authority approval”. Noting that the upstream catchment of the channel to be deleted is approx. 25Ha.
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	NRAR have given acceptance of the strategy (assuming e-mail from NRAR 22/11/2021 relates to the current proposal) within the E2 riparian corridor.
13)	Naturalised trunk drainage paths shall be designed to:		
	<ul style="list-style-type: none"> Contain the 50% AEP flows from the critical duration event in a low flow natural invert; 	Yes	The FIRA demonstrates compliance with this.
	<ul style="list-style-type: none"> 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 FIRA demonstrates compliance with this.
	<ul style="list-style-type: none"> Provide safe conveyance of flows up to the 1% AEP flood event. 	Yes	The FIRA demonstrates compliance with this.
14	Where naturalised trunk drainage paths traverse development sites, they may be realigned to suit the development footprint, provided that they:		
	<ul style="list-style-type: none"> Comply with the performance requirements for flow conveyance and freeboard; 	Yes	The FIRA demonstrates compliance with this.
	<ul style="list-style-type: none"> Are designed to integrate with the formed landscape and permit safe and effective access for maintenance; 	Yes	Although a consistent access road has not been provided to the full length of the creek, several access points are provided and are deemed satisfactory.
	<ul style="list-style-type: none"> Do not have adverse flood impacts on neighbouring properties; and 	Yes	The FIRA has demonstrates compliance with this requirement
	<ul style="list-style-type: none"> Enter and leave the development site at the existing points of flow entry and exit. 	Yes	This has been complied with for the re-aligned creek, noting the deletion of the second mapped naturalised trunk drainage path.

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	No	The proponent is proposing the removal of a trunk drainage channel and replacing it with culverts within the public road reserve which Penrith Council would inherit ownership of.
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.	No	The proponent is proposing trunk drainage culverts within the public road reserve which Penrith Council would inherit ownership of. No evidence has been provided that Penrith City Council accept this arrangement.
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.	Yes	Batter slopes on the revised civil plans are noted as 1:4 (temp) and 1:5 (permanent) UNO. Without specific notations on the slopes we have interpreted these to be 1:5 batter slopes. A retaining wall is proposed to the lot interface with the channel in the vicinity of the proposed basin. This is deemed acceptable.
18)	Raingardens and other temporary water storage facilities may be installed online in naturalised trunk drainage paths to promote runoff volume reductions.	Yes	This solution is proposed in all options.
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 works are proposed to be included in the scope of works.
20)	Stormwater drainage infrastructure, upstream of the trunk drainage, is to be constructed by the developer of the land considered for approval	Yes	The FRA and FIA show that this had been addressed
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:	Yes	The FRA and FIA show that this had been addressed

	<ul style="list-style-type: none"> • 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 		
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Section 2.5 Flood Prone Land

Flood Prone Land			
No.	Control	Complies?	Commentary
1)	<p>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 Study⁵ 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:</p> <ul style="list-style-type: none"> • 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) 	Note	Not Applicable – Not Flood Prone Land
2)	<p>The FIRA shall adequately demonstrate to the satisfaction of the consent authority that</p> <ul style="list-style-type: none"> • 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) 	Note	Not Applicable – Not Flood Prone Land

	<ul style="list-style-type: none"> • Development siting and layout maintains personal safety during the full range of floods and is compatible with the flood constraints and potential risk • 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.	Note	Not Applicable – Not Flood Prone Land
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'.	Note	Not Applicable – Not Flood Prone Land
Subdivision			
5)	Subdivision of land below the flood planning level will generally not be supported	Note	Not Applicable – Not Flood Prone Land
6)	Subdivision must comply with Designing safer subdivisions guidance on subdivision design in flood prone areas 2007 (Hawkesbury-Nepean Floodplain Management Steering Committee).	Note	Not Applicable – Not Flood Prone Land
New Development			
7)	Finished floor levels shall be at 0.5m above the 1% AEP flood	Note	Not Applicable – Not Flood Prone Land
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).	Note	Not Applicable – Not Flood Prone Land
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.	Note	Not Applicable – Not Flood Prone Land

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	The FIA and FRA demonstrate that the upstream overland flow paths have been maintained and comply with the no worsening requirements for neighbouring properties.
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.	Note	No additional naturalised trunk drainage channels are proposed.
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	OSD has been provided on lot.
13)	Stormwater basins are to be located above the 1% AEP.	Yes	The flood modelling shows that the basin operates effectively in the 1% AEP event, including
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	Although the OSD modelling or details of <i>Appendix E – Drains Results</i> were not available for interrogation, the drawings and report indicates that this has been met.
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	Although the OSD modelling or details of <i>Appendix E – Drains Results</i> were not available for interrogation, the drawings and report are consistent and indicate that the proposed on-site detention system complies with the requirements of the Mamre Road Precinct DCP.
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	Yes	The FIRA has demonstrated compliance with these clauses.

17)	<p>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</p> <ul style="list-style-type: none"> • 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 	N/A	<p>Although the diversion of the E2 channel has been proposed as part of the works, we do not believe that this is relevant as the FIRA demonstrates that a satisfactory outcome has been achieved.</p>
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3 MUSIC Modelling Review

The following is a summary of the major issues noted during our review of the MUSIC modelling and summary reports and presentation materials.

Applicable DCP Controls

The MUSIC modelling output summaries appear to be comparing the treatment train effectiveness with the Penrith City Council DCP 2014, instead of the Mamre Road Precinct DCP 2021. These water quality targets are inconsistent and presented below with the Mamre Road Precinct DCP targets more onerous than the previous Penrith City Council DCP 2014.

Pollutant	Penrith City Council DCP Req	Mamre Road Precinct DCP Req
Gross Pollutants	90% reduction	90% reduction
Total Suspended Solids	85% reduction	90% reduction
Total Phosphorous	60% reduction	80% reduction
Total Nitrogen	45% reduction	65% reduction

Recommendation 1: *That the proponent demonstrate compliance with the Mamre Road Precinct DCP pollution*

Infiltration

The DCP is clear that any infiltration of stormwater into the soil profile will not be accepted, unless the proposal includes a salinity and sodicity assessment of the soil. This has not been sighted and therefore any option including infiltration of stormwater cannot be accepted.

Recommendation 2: *That the proponent prepare a salinity/sodicity assessment of the soil demonstrating that the existing soil profile is capable of receiving infiltration safely, or that all infiltration be removed from the proposed treatment train and MUSIC modelling.*

Rainwater Reuse

Some of the landscape irrigation areas in the MUSIC model do not appear to correlate with the re-use demands. Also, they are not presented on a plan that demonstrates that the necessary landscaped areas are available for irrigation.

Recommendation 3: *MUSIC model is checked and irrigation areas aligned with re-use numbers. Additionally, that a site plan is prepared illustrating that sufficient areas are available on site for the landscape irrigation proposed in the MUSIC model.*

2.14 kL/day of toilet flushing has been proposed in each development building/lot = 25 toilets per building. The proponent should provide justification for these quantities, given that the buildings range from 34,970m² to 12,050m² but have the same number of toilets proposed.

Recommendation 4: *That the 25 toilets per building be justified based on similar buildings/empirical data (per square metre of GFA, for example).*

The roof irrigation rate of 19.1ML/Ha/yr does not take rainfall into account and only includes PET. This should be changed to PET – Rain to ensure that roof irrigation is not occurring during rainfall events and overestimating the amount of water “lost” from the system.

Recommendation 5: *That roof misting/irrigation rate needs to be updated, re-modelled and resubmitted for approval to ensure that no irrigation is occurring during rainfall events.*

Some rainwater tank landscape irrigation inputs nodes are set to PET rather than PET-Rain (for example, Lot 8A & 8C in option 4 have modelled PET instead of PET-Rain for irrigation modelling).

Recommendation 6: *All MUSIC modelling files should be reviewed to ensure that the correct evaporation factors are used for all nodes. These should then be updated, re-modelled and resubmitted for approval.*

NSW MUSIC modelling guidelines specify that only 80% of rainwater tank volumes may be counted as usable volume to account for mains top up, sediment storage, etc. the current modelling has the tanks modelled as 100% effective.

Recommendation 7: *These should be updated, but at the same time can be treated via a Condition of Consent.*

4 Other Matters

Trunk Drainage on Public Roads

The DCP is clear that whilst naturalised trunk drainage channels may be replaced with trunk drainage pipes/culverts that they must remain on private land (with easements created if necessary), unless authorised by Council.

We understand that Penrith City Council do not accept ownership of the trunk drainage pipes as proposed in this application and the pipes/culverts should be moved on to privately owned land as per the DCP.

Riparian Swamp Forest Planting

We also recommend that although NRAR have provided approval of the proponent’s strategy to have a swamp forest created online, that careful consideration be given to the appropriate plant species to ensure that a full hierarchy of ground cover, shrubs and trees can be supported.