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12 March 2021

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Our ref: *D2021/18050*

Department of Planning, Industry and Environment
Western Sydney Aerotropolis Precincts Submission
Locked Bag 5022,
Parramatta NSW 2124

Dear Sir/ Madam

RE: Western Sydney Aerotropolis Precincts Submission

I refer to the exhibition of the Western Sydney Aerotropolis Precincts including the Draft Plan and supporting maps, plans, brochures and technical studies.

WaterNSW owns and manages the Warragamba Pipelines, which form the northern boundary of the Aerotropolis including the Northern Luddenham Precinct (excluded from this initial precinct planning process), and the Northern Gateway and Wianamatta-South Creek Precincts. These two Pipelines and associated corridor lie immediately downstream of the Aerotropolis. They are critical water supply infrastructure that transfer bulk raw water from Warragamba Dam in the west to Prospect Water Filtration Plant and Prospect Reservoir in the east. The Pipelines provide the conduit for about 80% of Sydney's drinking water supply. The Pipelines corridor is a Controlled Area under the *Water NSW Act 2014* and Water NSW Regulation 2013, where public access is prohibited.

In March 2020, WaterNSW provided comments on the Draft Western Sydney Aerotropolis Plan (Draft WSAP), Western Sydney Aerotropolis Discussion Paper on the proposed State Environmental Planning Policy (SEPP Discussion Paper) and Draft Western Sydney Aerotropolis Development Control Plan (Draft DCP) Phase 1 (our ref: D2020/18400). This followed on from our October 2018 comments on the earlier Draft Western Sydney Land Use and Infrastructure Implementation Plan (LUIIP) which was released in August 2018 (our ref: D2018/105462). As raised in our March 2020 correspondence, it is critical this water supply infrastructure is protected from the potential impacts of development on adjoining land and from potential increased flooding risks arising from development upstream. It is also essential that this critical water supply infrastructure be considered during all stages of planning and development.

Our prime concern is protecting the Warragamba Pipelines and its associated corridor from the cumulative increased flooding risks arising from upstream development of the Aerotropolis. Studies commissioned by WaterNSW have found that current hydrological flows are increasing the risk of pipeline failure through the limited conveyance of runoff from local catchments within the pipeline corridor, and backwater effects due to the pipeline corridor's proximity to large creeks or rivers. WaterNSW audits of the corridor have also identified that scouring and misalignment of sills due to flooding impacts can lead to failure of the Pipelines. Any increase in water velocity through this area could intensify the risk of failure by knocking the Pipelines off their sills and anchor blocks.

While the likelihood of the Pipelines coming away from anchor blocks or sills is low, the consequences could be catastrophic as Sydney could be deprived of its main water supply with the Pipelines supplying 80%, and at times, 100% of Greater Sydney's bulk water supply. Downstream areas could also be flooded due to the volumes of water released from the Pipelines above that of the stormwater or flooding volumes leading to failure. In addition, if one fully charged Pipeline failed, the volume of water released could cause the second Pipeline to also fail. Prospect Reservoir only has a 1-month back-up supply provided that the reservoir was full at the time of the failure.

We note that there has been no supporting flood risk technical study provided as part of the exhibition of the Precinct Plans. In our comments of March 2020, we identified the risk of development causing increased flooding to the Warragamba Pipelines and recommended that a flood risk study be commissioned to predict the effect of the proposed land uses of the Aerotropolis on stormwater and floodwater. Without this information, it is therefore unknown how development in accordance with the proposed Precinct Plans will affect flood volumes, velocities and behaviour.

The Landscape led approach to planning also requires flooding and stormwater management to be integrated. One relies on the other to ensure adequately sized systems and enough space for flood detention without impacting on upstream or downstream properties. While there is supporting Stormwater and Water Cycle Management Study, without a supporting flood study there is no guarantee that the two are integrated and whether the stormwater measures proposed increase or reduce flooding risk to the Warragamba Pipelines corridor. Current pre-development volumes do not appear to be provided for the Western Parkland City modelling scenarios. It is therefore not possible to determine the degree to which water volumes and run-off will increase across the Aerotropolis relative to its current land uses and conditions. The implications of stormwater runoff volumes for the Warragamba Pipelines corridor are therefore unknown.

Heavy reliance is placed on public land and the Wianamatta-South Creek (WSC) Precinct in providing necessary stormwater and flood mitigation measures. Much less onus is placed on developers needing to incorporate on-site stormwater management measures. WaterNSW also has concerns about the lack of volumetric controls applied within the precinct objectives, the potential to shift the stormwater load into the WSC Precinct and the expected impact this will have on downstream assets, specifically the Warragamba Pipelines. Additionally, the WSC Precinct is not afforded its own Precinct Plan but is integrated with the Aerotropolis Core and Badgerys Creek Precinct Plan. This risks the WSC Precinct not being treated holistically and being susceptible to stormwater measures being offset from the developable Precincts to the WSC Precinct.

Two new road crossings of the Warragamba Pipelines corridor are also proposed in the Draft Precinct Plan. These are depicted throughout the Draft Plan and supporting documents, although their nominations as either primary or local collector roads are inconsistent between the Layout and Structure Plan for the Northern Gateway Precinct and the Precinct Plan. Further clarification of the nature of these roads is required.

Based on the information currently available, WaterNSW does not support additional road crossings of the corridor. Strict requirements for any crossings are in place to address the potential impacts on operations and maintenance of the corridor, as well as avoiding restricting potential augmentation of bulk water supply. More detail is required regarding the option of proceeding with the current design of the Northern Gateway Precinct but without the two new proposed road crossings. Any crossings will also need to meet the requirements of the *Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines* (the Guidelines) and be designed and implemented in close consultation with WaterNSW.

We appreciate that that refinement of the planning process to date has helped protect the corridor from the impact from adjoining development. This includes refinements from the Structure Plan to the zoning under the SEPP, which zones adjoining land either 'Enterprise' or 'Environment and

Recreation' to the Precinct Plan for the Northern Gateway Precinct itself, which predominantly buffers the corridor through perimeter roads and open space.

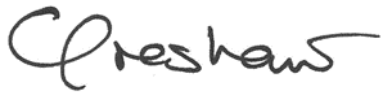
In terms of the actual design of the Northern Gateway Precinct, we note and are supportive of the fact that the Warragamba pipelines Corridor has been separated from developable areas of the Precinct by boundary roads, road reserves and open space. This will assist in protecting the Pipelines corridor through separation, secure fencing and visibility (passive surveillance).

In light of the above, we ask that WaterNSW be given further opportunity to comment on the Precinct Plans once a flood study has been completed that considers the impact of the Precincts on the Pipelines as well as other users and uses downstream. We would also welcome the opportunity to meet with the Department to discuss our concerns in more detail.

State Environmental Planning Policy (Western Sydney Aerotropolis) 2020 (clause 30) requires the concurrence of WaterNSW for any development occurring on the Warragamba Pipelines corridor, and requires development not to adversely affect the quantity and quality of water in the Controlled Area nor the operation or security of the Pipelines.

Detailed comments are provided in Attachment 1. Should you have any questions regarding the above matters please contact Stuart Little (stuart.little@waternsw.com.au).

Yours sincerely



CLAY PRESHAW
Manager Catchment Protection

Attachment 1 – Aerotropolis: Detail Review of Precinct Planning documents

Document	Page Ref.	Section	Comment/ Recommendation
Draft Aerotropolis Precinct Plan	N/A	**General Comments**	
		Layout and Structure Plans	The separately exhibited Layout and Structure Plans for each of the Precincts are not included in the Draft Aerotropolis Precinct Plan (November 2020) document, so it is unknown if and whether the Layout and Structure Plan are the actual plans that will be used in the development of the Precincts. The Layout and Structure Plans are also not definitive (discussed separately, later). **Recommendation**: When finalised, the Layout and Structure Plans should be incorporated as part of the overall Aerotropolis Precinct Plan.
	N/A	Approach to Wianamatta-South Creek Precinct	WaterNSW holds a concern that Wianamatta-South Creek Precinct is addressed through integration with the Aerotropolis Core and Badgerys Creek Precincts. This risks the management objectives and requirements of the Wianamatta-South Creek Precinct not being considered or applied across its full area. The approach adopted does not appear to address the planning controls for the Wianamatta-South Creek Precinct holistically, including impacts from the Northern Gateway Precinct and Agribusiness Precincts and from the separate development of the Mamre Road Precinct in the east. It also potentially makes the Wianamatta-South Creek Precinct more susceptible to cumulative impacts if each neighbouring developable Precinct seeks to maximise the Wianamatta-South Creek Precinct for stormwater management and flood mitigation in place of on-site stormwater management controls. Incremental offsetting of stormwater and flood mitigation controls are likely to arise in the Wianamatta-South Creek as a result of the piecemeal approach taken to the Precinct. This in turn is likely to have cumulative stormwater and flood risk impacts on the Warragamba Pipelines downstream. **Recommendation:** That the Wianamatta-South Creek Precinct be afforded its own individual Precinct Plan.
		Design Plans showing two New crossings over the Warragamba Pipelines	Street designs incorporate two new crossings over the Warragamba Pipelines Corridor. The incorporation of these crossings into Precinct Designs Plans covers multiple maps (Figures 14, 15, 16, 19, 20, 21, 22, 23, 51, 52, 53) creates an expectation that developers will be able to implement these crossings as proposed. WaterNSW seeks the creation of alternative Precinct layout designs where local collector and sub-arterial roads do not cross the Warragamba Pipelines Corridor. **Recommendation**: That further options analysis be undertaken based on the current layout and street designs for the Northern Gateway Precinct but without the two new crossings over the Warragamba Pipelines. Further evidence also be provided to justify why the two new crossings are required.
		Warragamba Pipelines (plural)	The Warragamba Pipeline is depicted on Figure 1 (p. 14), Figure 3 (p. 17), Figure 51 (p. 181), Figure 52 (p. 183), and Figure 53 (p. 185). The term is also used in the glossary in the definition of the Western Sydney Aerotropolis (p. 225). The term pipeline should read 'pipelines' (plural) throughout the document as there are two pipelines within the Corridor.
	N/A	Specific Comments	
	18	1.7.3 Aerotropolis SEPP	There appears to be inconsistencies between the land uses shown in the Precinct Plans and overall Layout and Structure Plan to the land use zoning of the *State Environmental Planning Policy (Western Sydney Aerotropolis) 2020* (the Aerotropolis SEPP) (see also Figure 4, p. 18). For example, the Northern Gateway Precinct Layout and Structure Plan shows areas of green space in areas afforded the Enterprise land use zoning, particularly in the south-west. We are supportive of allocating additional green space to help reduce imperviousness and stormwater runoff in the South Creek Catchment, and thereby reduce potential stormwater and flooding impacts to the Warragamba Pipelines. However, the reasons for these differences in mapping and the relationship between the Precinct Plans and the land use zoning imposed by the SEPP could be better explained. We are concerned that the areas of green space afforded by the Precinct Structure Plans, and which play a major role in water management, may be undermined over time by the underpinning zoning. Similarly, the underpinning zoning would predispose certain 'green' areas to be developed by amending the Precinct Plans through masterplans and by the allowance offered development applications to be inconsistent with Precinct Plans subject to amendment through a Planning Proposal. It also appears that stormwater modelling is largely based on the Precinct Plan designs rather than the zoning. **Recommendation**: That the Precinct Plan layout and Structure Plans be overlain with the zoning map of the Aerotropolis SEPP with a view to revising the zoning to aligning the zoning with the layout plans.
	20 & 22	1.8 Initial Precinct Planning	Mamre Road: The Draft Precinct Plan states (p. 20) that as Mamre Road precinct is already zoned, it is excluded from the Precinct Plan. However, there is a dedicated section on Mamre Road under section 1.9 (p. 22) which discusses the past zoning (under the Western Sydney Employment Area (WSEA) SEPP) and structure plan prepared for the site. It should also be noted that the Mamre Road Precinct boundary stops at its junction with the Wianamatta-South Creek. The Wianamatta-South Creek Precinct is therefore the recipient of any excess stormwater or floodwater effects from development of the Mamre Road Precinct as well as development in the Aerotropolis. This reinforces the need for the Wianamatta-South Creek Precinct to be afforded its own Precinct Plan in order to protect it from incremental encroachment of development and related stormwater and flood mitigation measures from development associated within individual adjoining precincts (discussed separately, above). This section also mentions an area of unzoned land between the Mamre Road and Kemps Creek Precinct. It is unclear From Figure 6 (page 23) where this unzoned land occurs. **Recommendation**: The information on page 20 would benefit by cross-referencing the information on page 22, noting that the draft Precinct Plan provides a brief overview of the Mamre Road Precinct on page 22. The information on page 22 would benefit by recognising that the Mamre Road

Document	Page Ref.	Section	Comment/ Recommendation
			Precinct boundary stops at its junction with the Wianamatta-South Creek. The Wianamatta-South Creek Precinct is therefore the recipient of any excess stormwater or floodwater effects from development of the Mamre Road Precinct as well as development in the Aerotropolis. **Recommendation**: Figure 23 would benefit by distinguishing the area of unzoned land as mentioned on page 22 and including this in the key to the map, as well as identifying that the hatched black line indicates the Mamre Road Precinct boundary.
	36	2.2 Place-based Opportunities and Constraints	This section positions all dot-points as opportunities. In other words, there are no constraints listed as suggested by the title of the section. **Recommendation:** This section would benefit by distinguishing which dot points are opportunities and which one are constraints. The report would also benefit by the following additional constraint: • the Warragamba Pipelines Corridor as a barrier and therefore a constraint to development in the north.
	47	2.4.2 Northern Gateway Precinct	We note and support objective O9 that seeks to 'preserve and protect the water assets and the landscape ecology'. However, reading Objective O12 (which promotes the role of water within the Wianamatta-South Creek (WSC) Corridor) in conjunction with Objective 17 (which promotes a landscape-led design approach for stormwater management) risks stormwater management being offset to the WSC precinct, taking the onus off developers to manage stormwater on-site. This risks water volumes and velocities being increased within the WSC Precinct, which in turn increases the risk of stormwater and flooding impacts on the Warragamba Pipelines which occur immediately downstream. **Recommendation:** To counteract the above risk, consider adding an additional objective: • O18 (*New*). Support on-site management of stormwater so that post-development flows equate with pre-development flows exiting development areas.
	50	2.4.2 Northern Gateway Precinct	Opportunities and Challenges for the Northern Gateway Precinct are provided on page 50. The eighth listed opportunity states 'Create strategic connections over the Warragamba Pipeline Corridor'. This is tempered by the adjacent Challenge to 'Retain and protect the 60m wide TransGrid easement and investigate opportunities for strategic connection from the Precinct northwards over the existing Warragamba Pipelines into Greater Penrith to Eastern Creek Investigation Area'. Several points are relevant here. • The Requirement for TransGrid does not relate to the Opportunity for the Pipelines. • The Opportunity is building the case for connections across the Pipelines corridor. We note particularly that two new crossings are being proposed for the Northern Gateway Precinct. The number of crossings needs to be minimised as much as possible and any crossing will need to meet the requirements of the WaterNSW Guidelines. **Recommendations:** 1. There should be a separate objective and requirements for the TransGrid corridor. 2. That the Opportunity be repositioned to state: Protect the Warragamba Pipelines by limiting new connections over the Warragamba Pipelines Corridor. 3. That the associated Challenge opposite Opportunity No 8 be reworded to state: Retain and protect the WaterNSW Warragamba Pipelines Corridor and ensure the number of strategic connections from the Precinct northwards over the existing Warragamba pipelines into Greater Penrith to Eastern Creek Investigation Area are minimised. Any proposed crossings to be undertaken in consultation with WaterNSW and meet the requirements of the WaterNSW *Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines*.
	65-66	Section 3.2 Blue-Green Infrastructure Framework	The overarching principles for soil perviousness are given for different typologies at Principle 12. These relate to section 3.4.6 which deals with Typologies in more detail. The typologies in Principle 12 do not equate with those given in Table 5. **Recommendation**: Align the wording of the Typologies of Principle 12 with that given in Table 5.
	66	Section 3.2 Blue-Green Infrastructure Framework	The current wording of Principle 17 urges developers to locate waterbodies and major stormwater infrastructure in the public domain implying that developers will not have to manage stormwater on the site of their developments. This will affect not only water velocities and flows into the WSC Corridor but will potentially make the Northern Gateway and other precinct more susceptible to localised flash flooding from overland flow due to increased imperviousness in the developable areas. **Recommendation:** We recommend that Principle 17 to be worded more cautiously to recognise the need for integrated stormwater management measures and make developers responsible for stormwater management measures on-site. Major stormwater infrastructure in the public domain should be used as supporting measure for treatment and not be solely relied upon as the sole solution to stormwater management.
	72	3.2.3 Water in the Landscape	Objective (BG O3) (p. 72) seeks to 'Provide a landscape-led approach to integrated stormwater management and water sensitive urban design'. We note that there is no corresponding requirement to achieve this. **Recommendation**: Add an additional requirement responding to Objective BG O3.
	77	3.2.5 Integrated water management and water sensitive urban design	General: Currently, the Precinct Plan itself gives little attention to on-site detention measures and offers significant flexibility for developers to offset stormwater protection measures to public lands. That approach is inconsistent with the recommendations of the Draft Stormwater and Water Cycle Management Study Interim Report which recommends that detention in the landscape requires a combination of on-site detention (for industrial areas), on-line

Document	Page Ref.	Section	Comment/ Recommendation
			detention (on 1st and 2nd order creeks) through natural drainage design and local stormwater assets in order to sufficiently manage precinct scale runoff. The approach to stormwater management includes trunk drainage and preferred water sensitive urban design (WSUD) methods. The document notes that achieving stormwater management objectives will require a shift away from filtration to more reliance on retention in the landscape. This implies that measures will need to be applied on both public and private land. However, there are no requirements alerting developers to the need to provide for the on-site management of stormwater. There are also no target volumetric controls established for stormwater management. These matters are incorporated into the comments on individual objectives and requirements below.
	77	As above	Objective BG O2 (p. 77) seeks to encourage retention of on-site stormwater for use as an alternative water source for appropriate use in the landscape. **Recommendation**: Enhance the strength of the wording by replacing the word 'encourage' should be replaced by the word 'promote' or 'improve'.
	78	As above	BGO7 advocates 'Provide an allocation of suitably located land area to allow for stormwater assets'. This translates into Requirement BG6 which uses the same wording and does not progress the Objective. We support the intention of requiring developers to provide enough, suitably located land area to allow for stormwater assets. However, there are currently no explicit requirements for developers to place stormwater management measures on their development sites. This risks all stormwater management measures being offset to public land. **Recommendation**: Based on information in the supporting Stormwater and Water Cycle Management Study, we recommend the following revised Requirement for BG6: • Provide suitable land areas for stormwater management through a combination of on-site detention (for industrial areas), on-line detention (on 1st and 2nd order creeks) to sufficiently manage precinct scale runoff NB. The requirement to provide an allocation of enough, suitably located land area to allow for stormwater assets should also align with the recommendations in the *Draft Stormwater and Water Cycle Management Study Interim Report* (Sydney Water, 2020) p102 & 103. • Detention basins to be multifunctional. • Volumetric controls. • Requirement to prove 'enough' space has been allocated.
	78	As above	Objective BG O8 – states that stormwater systems should manage peak flows for frequent events to minimise the risk of impacts to stream morphology. We note that downstream impacts are not considered here and generally does not feature in the Precinct Plan. **Recommendation**: Objective BG O8 be expanded to include impacts on downstream users and uses.
	78	As above	Requirement BG5 is a repeat of the BG O8 Objective and does not operate as a Requirement. Performance-based or prescriptive requirements should be included here to meet objective BG O8. **Recommendation:** That the following requirements are provided for BG O8: • Post-development flows must be equal to or less than the pre-development flows for each storm event up to and including 1% AEP event OR • stormwater systems should prevent stormwater flows exceeding the pre-development state
	81	3.2.7 Public Domain and Canopy Cover	Figure 15 (p. 81) shows the open space network. The map is given effect by Requirement BG2 (p. 82). This map does not correspond with the current ENZ Environment and Recreation zoning of the zoning map of the Aerotropolis SEPP (see also Figure 4, p. 19) and appears to show additional areas of open space which we assume to have arisen during the more detailed precinct planning process. Also, it is very hard to distinguish between the different types of open space and the extent of the open space network due to the similar green colours being used and the underpinning green shades of the base map. Based on the colours, it is also unclear whether the Wianamatta-South Creek Precinct is included or excluded from the map. **Recommendations:** • That the environment and recreation zoning of the Aerotropolis SEPP be updated to reflect the open space areas depicted in Figure 15. • That Figure 15 be amended to more clearly distinguish between the areas that are and are not proposed for open space by removing the background green shading of the base map more clearly defining the boundaries of the areas being covered by the open space mapping.
	91	Section 3.3 Access and Movement Framework	Section 3.3 Access and Movement Framework (p. 91) lists a number of broad principles/ guidelines for the planning and design of Precincts. Principle 16 states 'Ensure constrained and limited crossings over the Warragamba pipeline' (this should read 'pipelines'). We believe that crossings should be avoided in the first instance. **Recommendation**: Principle 16 be repositioned to state: 'Design access and to avoid crossings of the Warragamba Pipelines Corridors'.
	93	3.3.1 Transport Strategy	Figure 19 (p. 93) depicts local bus routes and primary arterial road crossing the Warragamba Pipelines Corridor (see other comments above).

Document	Page Ref.	Section	Comment/ Recommendation
	95	3.3.2 Active Transport	Figure 20 (p. 95) identifies regional cycle paths and cycle paths within streetscape crossing the Warragamba Pipelines at the two new crossings that have been proposed (see other comments above).
	99	3.3.5 Road Network	Requirement AM7 (p. 99) states to 'Match street networks to accord with the hierarchy and street network plan in Figure 22'. Figure 22 (p. 103) depicts two new crossings of the Warragamba Pipelines Corridor: a local collector road in the west (coloured purple) and a sub-arterial road in the east (coloured green) adjacent to the Metro. As raised above, these crossing proposals have not been developed in consultation with WaterNSW (please see other comments above). Further to the above, the Layout and Structure Plan for the Northern Gateway depicts both roads as primary roads which is different to the classification of these roads as presented in Figure 22 of the Precinct Plan. The nature and categorisation of these roads needs to be consistent between the Precinct Plan and the Layout and Structure Plan. If the western road is likely to be a local collector road only, it is likely to have more difficulty in meeting the requirements (e.g. height) of the WaterNSW publication Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines. **Recommendation**: That DPIE clarify whether the westernmost crossing is proposed to be a local collector road or primary road and that the description and categorisation of the proposed two new crossings of the Warragamba Pipelines be kept consistent between the Precinct Plan and the accompanying Layout and Structure Plan for the Northern Gateway.
	102, 103	3.3.8 Street Hierarchy and Typology (including widths)	Section 3.3.8 Street Hierarchy and Typology (including widths) (p. 102) lists Requirement AM1 which ties the hierarchy of streets to Figure 22 and requirement AM 4 'Constrain road crossings over the Warragamba pipeline (should read 'pipelines' plural) and only allow them with formal approval from WaterNSW'. WaterNSW strongly supports the inclusion of the need to consult with us regarding any proposed crossing of the Warragamba Pipelines Corridor. Our concerns over the two crossings are outlined above.
	119	3.4 Land Use and Built Form Framework	Section 3.4 Land Use and Built Form Framework (p. 119) includes Principle 23 'Limit crossings over the Warragamba pipeline' (should read 'pipelines' plural). **Recommendation**: We believe that this Principle 23 should be reframed to state: • Avoid crossings over the Warragamba Pipelines Corridor.
	140	3.4.8 Subdivision and Block Structure	Section 3.4.8 Subdivision and Block Structure (p. 140) lists objectives and requirements for subdivision design. To help ensure that that the design of the Northern gateway Precinct is not altered at its boundary with the Warragamba Pipelines Corridor through later masterplans or development applications/ planning proposals, we ask additional objectives and requirements be added to protected the Corridor. **Recommendation**: That an additional objective be added: • Ensure critical infrastructure and easements for public utilities are protected from new development. **Recommendation:** That a new requirement be added: • Where subdivisions adjoin the Warragamba Pipelines corridor, ensure the subdivision layout includes a perimeter or reserve separating building and industry (enterprise) allotments from the Warragamba Pipelines Corridor. Please see Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines (p. 24) for guidance on subdivision design for lands adjacent to the Corridor.
	180	4.2 Northern Gateway and part Wianamatta – South Creek	
	184-185	4.2.4 Transport framework	Objective NG 03 (p. 184) states 'any streets crossing over the major pipeline is constrained and needs formal approval by the relevant Authority'. Associated Requirement NG1 states that 'Two street connectivity crossings over the pipeline as shown in Figure 53 will be provided, subject to approval by the relevant Authority'. We support the references to the need for approval by the relevant authority. Figure 53 (p. 185) shows the Northern Gateway Precinct with infrastructure connections across the Warragamba Pipelines. The western arrow reflects a proposed road crossing and the eastern arrow reflects the proposed Metro train line and an accompanying road. Further to the above, the suggested road crossings are depicted on Figures 51 (p. 181) and 52 (p. 183). NB. Figure 51 is not given effect by any particular objective or requirement. Please see other comments above in relation to the proposed two crossings. **Request:** We seek further justification for the two proposed road crossings of the Warragamba Pipelines Corridor and why traffic cannot be directed to the existing crossings at Luddenham Road and The Northern Road. Have any traffic projections been undertaken to justify the need for the crossings? What are the implications if transport framework designs for the Northern Gateway did not include the two crossings of the Warragamba Pipelines?
	208	5 Infrastructure Delivery and Staging	Objective IO3 (p. 208) states 'Protect existing utility infrastructure, including the Warragamba pipeline corridor (should read 'pipelines' plural) and Transgrid transmission lines'. WaterNSW supports the inclusion of this Objective. However, we note that there is no corresponding requirement. We note and support the generic provisions of Requirement 11 which state that 'development near a utility service should be in accordance with the relevant service authority's guidelines and requirements. **Recommendation**: That a more specific requirement (new Requirement 17) be included for the Warragamba Pipelines, stating:

Document	Page Ref.	Section	Comment/ Recommendation
			• Development on or adjoining the Warragamba Pipelines should meet the requirements of the WaterNSW guideline Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines.'
Overview of the Northern Gateway Precinct Plan (Brochure)	**4-5**	The Northern Gateway Precinct	On page 4, and with reference to the map on page 5, Points 13 & 14 identify 'Potential Strategic crossings over the Warragamba Pipelines'. As raised above, this is pre-emptive and raises the expectation to developers and the general community that these crossings can and will be made. As raised above, further investigation and evidence is required as to whether the Northern Gateway can be developed without the need for the two crossings proposed.
	5	As above	We note and appreciate that that the Warragamba Pipelines Corridor has been separated from developable areas of the Precinct by boundary roads, road reserves and open space and the precinct has been incorporated into the plan, and that street frontage or open space occurs along the full length of the common boundary. This will assist in protecting the Pipelines corridor through separation, secure fencing and visibility (passive surveillance).
	9	Land Use Framework	The Land Use Framework on page 9 shows distinct purple areas on the map. There is no key in the legend for these colours so it is unknown what is envisaged for areas coloured purple. **Recommendation**: The Land Use framework on page 9 include a full key to all the colours depicted on the map to help readers understand the uses envisaged.
Northern Gateway – Layout and Structure Plan	N/A	N/A	The Layout and Structure Plan shows two primary roads crossing the Warragamba Pipelines Corridor, one in the west the other in the east. See earlier comments in relation to the two crossings.
			The key to the Layout and Structure Plans is incomplete. It is unclear what the light green and white areas indicate. Does light green indicate environmental and recreation zoning or simply the existing vegetation cover or proposed 'green' areas regardless of zoning? Approximately half the apparent developable areas are shaded white and are obviously *not* secondary roads and streets as suggested by the legend. The absence of this information leaves the Layout and Structure Plan open to interpretation. **Recommendation**: The Layout and Structure Plan needs to be more definitive in terms of what it is expecting in terms of design outcomes and land uses/ typologies. Green and white shaded areas need to be included and identified in the key.
			The Northern Gateway Layout and Structure Plan currently includes a subdivision design whereby perimeter roads or reserves separate the Warragamba Pipelines corridor from developable areas. This approach is supported. For security and surveillance reasons it is imperative that the urban designs include a perimeter road or reserve and do not provide designs where urban/industry/ commercial allotments directly back onto the Warragamba Pipelines corridor. Please see Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines (p. 24).
Overview of the Aerotropolis Core, Badgerys Creek and Wianamatta-South Creek Precinct Plans (Brochure)		General	The Overview of the Aerotropolis Core, Badgerys Creek and Wianamatta-South Creek Precinct Plans and associated Layout and Structure Plan for these Precincts do not cover the Wianamatta-South Creek Precinct across its full area, particularly north of the M12 motorway (see Figures on pp. 5, 8, 9, 10 and 12 of the Overview document). The Layout and Structure Plan even notes that the Wianamatta-South Creek Corridor has only been considered to the extent it adjoins the adjacent initial precincts, and that further land use, urban design and landscape outcomes will occur though the future Rossmore and Kemps Creek Precincts. Consideration of the Precinct also appears to be missing in the areas where it adjoins the Northern Gateway and Mamre Road Precincts.
	9	Land Use Framework	The Land Use Framework on page 9 has no legend so it is unknown what is actually being depicted here. **Recommendation**: The Land Use framework on page 9 include a legend.
Draft Urban Design and Landscape Report	92	Northern Gateway Scenarios	The Northern Gateway Scenarios are discussed on page 92. Scenario 1 excludes new crossings over the Warragamba Pipelines Corridor whereas Scenarios 2 and 3 propose new road crossing/ connections over the pipelines. Similarly, the section on Street Typologies (p. 146) depicts two road crossings over the pipelines. The scenarios presented are very high level and propose different layout plans for the development of the Northern Gateway Precinct. For example, a scenario is not presented for the Northern Gateway Precinct based on the proposed layout and structure plan but solely relying on The Northern Road and Luddenham Road crossings of the Warragamba Pipelines Corridor, and therefore without the two new proposed road crossings. It is therefore unknown whether the same proposed urban designs and project lot yields could equally be achieved by solely relying on the existing crossings of along The Northern Road and Luddenham Road. The cost and benefits of the alternative scenario designs are not detailed in any meaningful way in terms of providing a full list of social, environmental and economic costs and benefits both qualitatively and quantitatively. **Request:** WaterNSW seeks to be provided with a more detailed justification and consideration of alternatives with regard to the two proposed road crossings of the Warragamba Pipelines Corridor. Ideally, this should include and examination of the economic, social, and environmental implications of the proposed Northern Gateway Precinct Layout and Structure Plan comparing the option of excluding the two new proposed road crossings to the option that include these. It should also be supported by traffic modelling of the two alternative scenarios.
Draft Stormwater and Water Cycle Management Study Interim Report (Sydney Water, 2020)		**Overall Comment**	The Stormwater and Water Cycle Management Study (WCMS) Interim Report is very high level and aimed at providing principles and guidance for use in the Draft Precinct Plan. The WCMS (p. 8) states that a finalised version of the document will be provided in early 2021 which will include more detail and refinement following key decisions being made on waterway health objectives and targets, the role that stormwater harvesting will play in delivering those objectives and demands for recycled water within the precincts. Ideally, the next stage of the WCMS should deliver more practical, tangible modelling as the recycled wastewater quantity may impact the needs/drives for stormwater harvesting and reuse. But this could change the direction of

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			the WCMS. Without a more defined approach, it is very difficult to ascertain the implications of the stormwater on volumes and velocities leaving the Precinct and the overall contribution of stormwater flows to the flooding risk of the Warragamba Pipelines. The Study is based on various scenarios (6 scenarios) on recycled water usage, on-lot stormwater usage, delivering various options but without any certainty on which scenario will apply and how this will interact with other elements of Precinct designs. As there is no flood study report, it is not possible to understand how stormwater management and flood mitigation measures inter-relate in the landscape and what whether the stormwater measures and approaches proposed will increase or decrease flooding risk and the impact on downstream users and uses. Consequently, it is not possible to understand the potential impacts of the proposed development of the Precincts on stormwater runoff and the consequential effect on the Warragamba Pipelines. This matter is further complicated by the fact that the area contains many existing farms dams, many of which are proposed for retention but without due consideration of how they will be managed or whether they will be fit for purpose for stormwater management, particularly given the changes in upslope land uses. The Phase 2 DCP should include restrictions on the impervious areas allowed by development. This is a precinct or sub-catchment level of model but once the development starts, the "assigned" imperviousness may vary (NB. usually larger) and its impact on downstream will dramatically change. **Request:** It is requested that WaterNSW be provided a copy of the Flood Risk Study when it is finalised. **Recommendation:** That the Final WCMS incorporate and give consideration to the information and outcomes of the Flood Risk Study.
	3	Executive Summary	The report (p. 3) also notes that 'the Flood Risk and Impact Assessment will consider the impacts of development on overall timings of flows from contributing tributaries of Wianamatta-South Creek. This work and the subsequent strategy derived from this work may result in changes to the precinct-scale stormwater quantity management strategy and will inform the final report'. Again, in the absence of the Flood Risk and Impact Assessment, it is unclear how stormwater management will interact with flow volumes and velocities entering the WSC Precinct and affect the flooding risk of the Warragamba Pipelines.
	19	1.5.4 Stormwater quantity management for precinct-scale storm events	The WCMS notes that the strategy requires consistency with the Flood Risk and Impact Assessment which has a stronger focus on flood risks at a regional Wianamatta-South Creek scale. It also notes that 'the Flood Risk and Impact Assessment will consider the impacts of development on overall timings of flows from contributing tributaries of Wianamatta-South Creek. This work and the subsequent strategy derived from this work may result in changes to the precinct-scale stormwater quantity management strategy'. Again, this reiterates the need for Flood Risk Study to be completed and its interaction and integration to be taken into account in the Final WCMS (see above recommendations).
	21		For the Northern Gateway Precinct, the zoning layout and boundaries used in Figure 2-1 (p. 21) of the WCMS is different to the land use zoning layout given effect by the Aerotropolis SEPP, which is different to the zoning classifications depicted in the Structure and Layout Plan. Currently, the land uses used in Figure 2-1 reasonably align with those depicted in the Northern Precinct Layout and Structure Plan. However, the environment and recreation areas depicted in the south of the precinct do not align with the Enterprise zoning under the Aerotropolis SEPP. Hence, there may be more land developed for industrial uses than predicted, increasing the overall area of imperviousness. In this sense, the modelling may underestimate the volumes of stormwater runoff expected. It also reinforces the need for on-site detention measures to be incorporated as development controls into new development as the areas of public open space may not be as great as predicted. **Recommendation**: That DPIE liaise with Sydney Water and check the underpinning zones used in the Layout and Structure Plans for the Precincts and the underlying zoning to ensure that the modelling and data presented in Table 2-1 equates with expected land uses and associated permeability values.
	22-23	2.2 Imperviousness	Section 2.2 discusses the vision for the Western Parkland City and the role of urban form in stormwater runoff volumes. Section 2.2 would benefit by listing to which of the modelling scenarios the 'Western Parkland City' imperviousness values relate. Table 2-2 list the imperviousness values adopted for the Wianamatta-South Creek Flood Model across a precinct/ catchment. The Western Parkland City imperviousness values for the Western Parkland City will need to be stated as performance criteria for the forthcoming DCP Phase 2. We hold a concern that as the Precinct Plan provides significant opportunity for developers to offset their stormwater management control and treatment measures to open space and the Wianamatta-South Creek Precinct, that the imperviousness value for the Western Parkland City may not be achievable. Also, it needs to be clarified whether the Western Parkland City and Business as Usual impervious values presented include or exclude provision for the stormwater management measures required for development in the land use zones listed. Inclusion of the impervious values used for the overall stormwater modelling, including the 'Business as Usual' baseline may not be appropriate for stormwater modelling at the site scale. Further site scale modelling will need to be undertaken by developers to ensure the Western Parkland City impervious values can be met. This local modelling may need to include higher levels of imperviousness (e.g. 90%) for more intensive uses. **Recommendations**: • That Section 2.2 identifies to which of the modelling scenarios the 'Western Parkland City' imperviousness values relate, • That Western Parkland City impervious values for the Western Parkland City (per Table 2-2) be stated as performance criteria for the forthcoming DCP Phase 2. • For the WCMS report to clarify whether the Western Parkland City and Business as Usual imperviousness values presented in Figure include or exclude provision for the stormwater management measures required for development in the land use zones listed. • That the WCMS note, and Phase 2 DCP make provision for, further site scale stormwater modelling needing to be undertaken by developers to ensure the Western Parkland City impervious values can be met. This local modelling may need to include higher levels of imperviousness (e.g. 90%) for more intensive uses.

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	31	Initial Precinct Water Balance	The Initial high-level water balance for the 5 Precincts is provided in Figure 2-4 (p. 31). The WCMS notes that the initial precincts will generate significantly more stormwater and wastewater than could feasibly be recycled and re-used. An excess of stormwater is likely to be generated from the development and should be managed in ways other than reuse. Figure 2-4 shows that the stormwater generated above baseline is 5464 ML/yr for the Aerotropolis core, 4578 ML/yr for the Agribusiness Precinct, 2394ML/yr for Badgerys Creek and 4088ML/yr for Northern Gateway. However, the baseline figures are not provided so it is impossible to understand what percentage increase this means in terms of current flow volume estimates. The report later (p. 68) goes on to state that Figure 6-1 shows that the preservation of baseline stormwater discharge rates would most likely require a reduction in stormwater volumes by approximately up to 80% which may not be achievable. We can only deduce that the stormwater flows could be as high as 4 or 5 times that currently occurring. **Recommendation**: That the report clarify the baseline flows (ML/yr) for Figure 2-4 and clarify the overall volume increases (expressed in ML/yr and as a percentage) expected from the development of the Aerotropolis Precincts under the BAU arrangement and the 5 other options canvassed.
	35	3.6 farm dams and water bodies	The WCMS recognises the desire to retain farm dams and repurpose or rebuild them (p. 35). However, the report notes that most dams have not been designed for amenity function or to be located near residential developments and that many will need to be redesigned to address issues such as dam stability, safe access and water quality etc. WaterNSW supports the cautious approach now advocated for relying on farm dams for stormwater retention purposes. We note that these aspects, including responsibility and funding arrangements, are deferred to later planning responsibilities.
	47 & 51		We note that based on the ecological assessment, one of the two large farms dams immediately upstream of the pipelines is suitable for retention on ecological grounds (lot 202 DP 1152191) whereas the other is not (Figure 4-4). However, dam safety aspects with regard to retention still need to be investigated.
	64	5.7.1 Harvesting and reuse	The precinct-scale stormwater harvesting in the Parkland A5, A6 and A8 scenarios is such that the stormwater harvesting, and reuse is provided to achieve the mean annual runoff volume (MARV) target of 2.0 ML/ha/yr. Baseline - typical stormwater runoff rates for commercial and industrial land uses are as high as 4 to 5 ML/Ha/yr. WaterNSW supports the concept of lot-scale stormwater management including stormwater harvesting and reuse to reduce overall run-off to the downstream but derivation of the run-off volume target (2.0 ML/ha/yr annual) needs to be clarified: **Recommendation**: that the WCMS clarify how the 2.0 ML/ha/yr is derived.
	68	6.1 Meeting new development controls	The draft stormwater objectives specify that development upstream of 1st and second order waterways must discharge only 0.9 ML/Ha/yr to waterways. Figure 6-1 shows that the preservation of baseline stormwater discharge rates would most likely require a reduction in stormwater volumes by approximately up to 80% which may not be achievable. This will likely require that stormwater exceeding this annual flow rates must be diverted around 1st and 2nd order waterways to downstream waterways. In doing so, this effectively concentrates the collection of stormwater at the number of basins. Interim stormwater management objectives for 3rd order waterways allow a moderate flow volume objective of 2.0 ML/Ha/yr. While this objective is more attainable, it would still require that new industrial development reduces stormwater runoff volumes by more than half. It is unclear if this objective is achievable and further justification is required. **Recommendation**: that the WCMS clarify how development controls can achieve the required reductions in stormwater volumes as per the Objective.
	69	6.3 Treatment Train Shortlist	Regional scale of bioretention basins and wetlands are the preferred treatment train options for Penrith and Liverpool Councils, but it should be noted that bioretention basins and wetlands need regular maintenance (i.e. labour and expertise) to achieve their expected functions. Without maintenance, the functionality of these measures is compromised in terms of both water quality and quantity.
	71	WSUD Effectiveness	The WCMS shows that it may be possible to reduce mean annual runoff rates by up to 3 ML/Ha/yr through a range of WSUD and modest stormwater harvesting and reuse approaches. Further, as illustrated in Figure 6-1, several typologies will require mean annual runoff volume reductions up to 3.8 ML/Ha/yr to achieve the interim mean annual runoff volume target for third order waterways. This implies that a catchment made up entirely of large format industrial, strata industrial and commercial typologies would fall short achieve the interim target discharge of 2.0 ML/Ha/yr (from table 1-2). As such, the link between actual and target discharge rates is unclear, as is the ability of the precincts to actually meet the flow objectives. **Recommendation**: that volumetric controls and target discharge rates, derived from the modelling in the WCMS, be included within the Precinct Plan.
		General	The WCMS gives limited consideration to downstream impacts on land use, users and assets. **Recommendation:** Downstream impacts of The WCMS would benefit by including greater consideration of contingency measures to protect downstream assets such as the Warragamba Pipelines.