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## **Draft Aerotropolis Precinct Plan – Submission on exhibition**

Dear Anthony

We thank you for the opportunity to make this submission regarding the exhibited Western Sydney Aerotropolis (WSA) draft Precinct Plan. At Arcadis, we are very interested in the development of the Aerotropolis and the broader Western Parkland City, and how this is shaping the development industry in NSW. The ambitious vision of developing the Aerotropolis as a new benchmark for a liveable, sustainable and advanced urban hub in NSW lines up well with our global strategy of providing leadership in sustainable and digitally enabled solutions.

Our submission, presented below, aims to identify the opportunities and constraints posed by the draft Precinct Plan, and outlines our innovative initiative we are currently pursuing to facilitate the integration and coordination of multi utilities in the Aerotropolis so as to achieve the advanced vision in the Aerotropolis Plan (2020).

### **1. Introduction**

The WSA Precinct Plan is the next step following the WSA Plan in realising the vision for the Western Parkland City as a green, connected and advanced city built around the Aerotropolis as Australia's next global gateway. The WSA Plan (2020) has set the planning framework for the Aerotropolis including specific objectives to shape decision-making across four central themes: productivity, sustainability, infrastructure & collaboration, and liveability.

While the draft Precinct Plan clearly represents a step forward towards implementing the objectives of the WSA Plan (2020), we believe that clearer guidance is still required in terms of specific strategies, tangible targets, and provision for effective coordination platform.

In this regard, our submission is focusing on identifying issues within the exhibited draft Precinct Plan, which could challenge implementing and achieving the planning principles and objectives of the WSA Plan (2020) related to sustainability, and infrastructure & collaboration themes. In each of these two themes, our submission presents the relevant sections in the draft Precinct Plan, our comments regarding how effectively the draft Precinct Plan has addressed these issues, and our recommendations to ensure these issues are effectively addressed in the final Precinct Plan.

## 2. Sustainability

The WSA Plan (2020) addressed the sustainability theme through various objectives including:

- A landscape-led approach to urban design and planning
- A sustainable, low carbon Aerotropolis that embeds the circular economy
- A resilient and adaptable Aerotropolis

The following issues are addressed in our submission related to the above sustainability theme objectives:

### 2.1 Greenhouse Gas (GHG) Emissions

#### 2.1.1 Relevant sections in the draft Precinct Plan

Section 3.6 – Sustainability and Resilience Framework

Section 5 – Infrastructure delivery and staging.

#### 2.1.2 Submission comment

The draft Precinct Plan includes the objective of supporting opportunities for sustainable and efficient use of resources to minimise waste and deliver a circular economy, and water and energy from development to result in a carbon positive precinct by 2050.

This is consistent with Objective 5 of the WSA Plan (2020): *A sustainable, low carbon Aerotropolis that embeds the circular economy*, which requires using low carbon, high efficiency strategies to reduce emissions and energy use in line with NSW net zero emissions target. However, the requirements in the draft Precinct Plan do not provide specific strategies or performance targets on how to achieve this objective.

The Plan includes the targets of achieving BASIX (energy) at 45-60, and GreenStar at 6+ for 2026 and beyond. While achieving these targets would certainly reduce GHG emissions compared to current levels, yet this does not warrant achieving the set objective of net zero carbon emissions by 2050. It is noted here that the draft Precinct Plan did not incorporate the target of 100% local renewable energy generation, indicated by the exhibited *Draft Sustainability and Heat Report* for the Sustainable Regenerative scenario.

According to the WSA Precinct Plan, the main suppliers of power to the WSA are the large utilities such as Jemena for gas and Endeavour Energy / Transdrid for electricity. Yet, considering that these utilities are the major contributors to GHG emissions, the Plan does not indicate a requirement for these utilities to meet specific renewable energy targets.

We believe it is important to undertake the task of estimating the collective GHG emissions for the WSA from the various contributors/users such as utilities, development buildings, and transport, so that clear measurable targets are set for each precinct to show how the objective of net zero or positive carbon is being addressed.

Failing to do so could undermine achieving the set objective of net zero carbon emissions by 2050, as developers and utilities would most likely implement the minimum standards required by the WSA Precinct Plan.

### 2.1.3 Submission recommendations

- A. The draft WSA Precinct Plan to be updated to reflect the importance of undertaking the task of estimating the collective GHG emissions for the various utilities, development buildings, and transport facilities, so that clear measurable targets are set for each precinct to show that the objective of net zero or positive carbon is being addressed.
- B. Incorporate the target of 100% local renewable energy generation, stated by the exhibited *Draft Sustainability and Heat Report* for the Sustainable Regenerative scenario.

## 2.2 Water Cycle Ecological Impacts

### 2.2.1 Relevant sections in the draft Precinct Plan

Section 3.2 – Blue-Green Infrastructure Framework

Section 3.6 – Sustainability and Resilience Framework

Section 5 – Infrastructure delivery and staging

### 2.2.2 Submission comment

The draft Precinct Plan has positively addressed the objectives set in the WSA Plan (2020) of minimising impacts on the ecology/ water quality of the waterways and the natural water cycle, as well as adopting an integrated water management approach to achieve these objectives.

The draft Precinct Plan has included outcome-based quantitative performance criteria in relation to ambient water quality and ambient stream flows (BG4 & BG5 of Section 3.2.3 Water in the landscape). Design guidance was also provided on how to achieve the set objectives related to shifting away from the current traditional stormwater filtration approach to a water retention approach with multiple functions. Additionally, the draft Plan set water reduction target of BASIX (water) – 60, which exceeds current standard of BASIX (water) – 40.

However, some gaps still need to be considered to add certainty towards achieving the water cycle objectives in the WSA Plan (2020), while truly reflecting outcomes of water sensitive cities and 21st century integrated water management approach:

- A. The draft Precinct Plan did not include clear performance targets for the reduction of wastewater volumes and pollutant loads compared to business-as-usual levels. Significant reductions in wastewater volumes and pollutant loads are realised when treated wastewater is recycled in the WSA, otherwise discharged to the receiving waterways. Yet, the draft Precinct Plan did not have clear performance targets for recycled water.
- B. The draft Precinct Plan did not clarify the basis for, or the methodology used in arriving at the adopted performance criteria for the ambient water quality and ambient stream flows presented in BG4 & BG5 of Section 3.2.3 of the draft Plan. In principle, these criteria should have been developed using the protocols outlined in the *Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions* (OEH/EPA, 2017). As the latter provides a comprehensive risk-based process linking water quality and ecological indicators (such as pollutant concentrations and flow regimes) to local ecological values on catchment or sub-catchment basis.

It is also worth noting that Sydney Water's exhibited study report did not clearly show how the adopted management measures in the report would meet these adopted performance criteria. The MUSIC modelling presented in the exhibited report included estimation of pollutant reduction loads in Kg/year, while the adopted performance criteria were pollutant concentrations in mg/L.

- C. It is important to undertake integrated water cycle assessment for each precinct to calculate its water and pollutant balance in terms of:
- Potable and recycled water use
  - Stormwater discharge volumes and pollutant loads
  - Wastewater discharge volumes and pollutant loads

This way, the results can be easily aggregated to reflect whole of WSA performance, while also can be readily linked to the relevant ecological indicators such as pollutant concentrations, flow regimes, and biodiversity protection.

Once water cycle performance criteria (in terms of water and pollutant balance) are set in the Precinct Plans, developers and utility providers can demonstrate how their developments and infrastructure would meet these performance criteria. This would set a clear outcome-based planning framework, but also flexible to allow adopting strategies and measures different from the ones used to set the precinct performance criteria. Failing to have clear precinct-based water cycle performance criteria, would raise the risk of driving developments to pursue the business-as-usual approach or adopt new measures without clearly demonstrating the effect they have in meeting the WSA Plan vision and objectives.

### 2.2.3 Submission recommendations

- A. The draft WSA Precinct Plan to be updated to remove the performance criteria for the ambient water quality and ambient stream flows presented in BG4 & BG5 of Section 3.2.3 of the draft Plan, unless these performance criteria are based on a publicly exhibited document relevant to the WSA.
- B. Provide clear guidance to develop precinct-based water cycle performance criteria, which can be collectively undertaken for the WSA and adopted in the Precinct Plan later, including:
- i. Stormwater discharge volumes and pollutant loads to meet the stream water quality and flow objectives as outlined in the *Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions* (OEH/EPA, 2017).
  - ii. Potable and recycled water use to meet specified reduction targets in potable water use and wastewater discharges compared to BAU levels.

## 2.3 Urban Cooling and Microclimate

### 2.4 Relevant sections in the draft Precinct Plan

Section 3.2 – Blue-Green Infrastructure Framework

Section 3.6 – Sustainability and Resilience Framework

### 2.4.1 Submission comment

The draft Precinct Plan has positively addressed the objective in the WSA Plan (2020) of supporting urban cooling by using stormwater or recycled water to irrigate streets and public open space. It included requirements to consider urban cooling in the multi-functions of detention assets in the public realm, as well as in setting the requirements for the urban typologies by ensuring having sufficient areas of tree canopy and water to sustain the landscape. Additionally, Sydney Water's exhibited *Stormwater and Water Cycle Management Study Interim Report* included allowance for urban cooling in their estimation of the water demand options.

However, the draft Precinct Plan did not include clear tangible performance targets for urban cooling and reducing heat island effects within the initial precincts of the WSA.

A measurable target per precinct is needed to drive the hydraulic and landscape design of public open space such as collective area of irrigated public space with specific tree canopy and soil moisture requirements, or a specific drop in microclimate temperature. It is worth noting here that the exhibited *Draft Sustainability and Heat Report* provided some tangible outcomes for the Sustainable Regenerative scenario that can be used as such measurable targets. These include up to 7 degrees of cooling on extreme heat days and a reduction in extreme and very strong heat stress days per summer from 47 to 19 days.

### 2.4.2 Submission recommendations

The draft WSA Precinct Plan to be updated to include clear precinct-based tangible performance targets for urban cooling and reducing heat island effects within the initial precincts of the WSA. In this regard, the tangible outcomes for the Sustainable Regenerative scenario in the exhibited *Draft Sustainability and Heat Report* can be used for this purpose. These include up to 7 degrees of cooling on extreme heat days and a reduction in extreme and very strong heat stress days per summer from 47 to 19 days.

## 3. Multi Utility and Infrastructure Collaboration

The WSA Plan (2020) addressed the infrastructure and collaboration theme through the following objectives:

- Infrastructure that connects and services the Western Parkland City as it grows
- A collaborative approach to planning and delivery

Our submission is tackling this theme by focusing on our Multi Utility Digital Solution, an innovative initiative Arcadis is currently pursuing to facilitate the integration and coordination of infrastructure delivery in the Aerotropolis.

### 3.1 Comment

The draft Precinct Plan primarily addressed infrastructure and collaboration in Section 5 (*Infrastructure delivery and staging*). It sought optimising infrastructure through "a beyond business-as-usual approach" with consideration of all infrastructure together, as well as identifying areas where a multi-use corridor can be used to integrate multi utility infrastructure. Additionally, The *Western Sydney City Deal Utilities Collaboration Group* has been established to align the provision of utilities more closely, focussing on an infrastructure led approach, rather than on individual provider approach.

While the aforementioned measures are commended as important first steps towards optimisation and the collaborative delivery of infrastructure in the WSA, however, these

do not seem to comprehensively address the issues identified by the WSA Plan (2020) in relation to infrastructure interdependencies and the need for infrastructure optimisation and adaptability. The WSA Plan (2020) called for collaborative planning and exploring “alternative and innovative servicing solutions including integrated and co-located utility approaches” (Section 4: Infrastructure, Section 8.4: Utilities and Services).

Based on our discussion with the industry here in Australia and overseas, we believe there are a number of issues need to be considered to achieve a true optimum and collaborative infrastructure delivery in the Aerotropolis including:

- A. Interdependencies and sharing of digital infrastructure are critical for achieving smart-cities and for the efficient operation of infrastructures. This requires sensors and communications technology to be shared across the various infrastructures especially at the urban typology (subdivision) level.
- B. Achieving the ambitious sustainability targets of the Aerotropolis requires localised assets – within urban typologies – with integrated sustainability roles, but their ownership and management are fragmented such as vertical gardens, stormwater ponds, rainwater tanks, irrigation systems and solar systems. However, large utilities and local councils are generally not in favour of owning and maintaining these assets. It is likely that private multi utilities would utilise the concept of “embedded network” to own and manage these various localised assets possibly also including water cycle, power, and waste services within urban typologies. So, procurement and asset management of such infrastructures including their interdependencies are important issues to consider.
- C. It is for a valid reason that the exhibited *Draft Sustainability and Heat Report* (prepared by Mosaic Insights, ISF and Alluvium) put current and future management of the Aerotropolis as the main focus area, while their first recommendation was appointing a coordinating body. Their report emphasises the significance of integration and coordination in the successful delivery of the sought sustainability outcomes, especially in relation to infrastructure. A clear custodian needs to be identified with a clear responsibility for delivering the sustainability vision and ensuring that the various infrastructures are integrated and coordinated at the planning, delivery, and operational stages, and that their interdependencies are accounted for.
- D. Utilising shared corridors/trenches for co-locating and multi-using the infrastructures for the various utilities is an excellent idea, but implementing it is not an easy task based on discussions with our global partners. Especially, when considering the aforementioned complexities of interdependencies, smaller private utilities and the engrained culture of single utility provision.

These issues are not well-addressed by the draft Precinct Plan, which would pose a serious risk threatening the successful integrated and coordinated delivery of the various infrastructures and eventually achieving the collective sustainability outcomes sought by the WSA Plan (2020).

### **3.2 Multi Utility Digital Solution for the Aerotropolis**

To facilitate coordinating the planning, delivery and management of the various infrastructures and their interdependencies, operated by a diversity of private and public utilities of different sizes, an integrated digital platform is needed. For this purpose, we are proposing our Multi Utility Digital Solution, which would:

- Adopt the Multi Utility Approach for smart infrastructure including allowing for the interdependencies between various infrastructures and the multiplicity of utility service provision and procurement models.
- Evaluate and rate infrastructure strategy options at the city, precinct and urban typology levels based on physical, ecological, and economic performance metrics.
- Facilitate the integration and coordination of the utility infrastructure delivery within the Aerotropolis and the Western Parkland City.
- Enable the development of the Aerotropolis and the Western Parkland City as a fully realised 22nd century city with ambitious sustainability, resilience, and connectivity objectives.

Our proposed Multi Utility Digital Solution comprises the following:

### 3.2.1 GIS/Data Portal

This is a platform where all the relevant data and available GIS layers would be captured, collated and stored in a standardised GIS format to make them accessible/usable by all relevant stakeholders and approved users. This task will build on the work already being undertaken by the *Western Sydney City Deal Utilities Collaboration Group* regarding sharing GIS data between the relevant utilities to direct the pilot strategy undertaken by the group.

This GIS/Data Portal will have two main functions:

- A. Map the assets of the various utility infrastructures in a single portal, thus providing common GIS platform for the various utilities to share information and coordinate design work for the shared multi-utility corridors.
- B. Prepare the data to be used by the various analytical tools undertaking modelling and data analysis.

### 3.2.2 Analytics Toolbox

The main purposes of this part of our digital solution involve:

- A. Undertaking analysis to assess the physical, ecological, and economic implications of the infrastructure strategies for the various utilities. This can be undertaken via linking to specific mathematical models used by project partners such as Sydney Water, power utilities, local councils, etc, or via building own mathematical models to undertake required analysis.
- B. Measuring the investigated infrastructure strategy options by place-specific performance metrics at urban typology, precinct, and city-wide levels. At a minimum, these could include potable and recycled water use, wastewater discharges/ pollutant loads, stormwater discharges/ pollutant loads, greenhouse gas emissions, energy demand, and capital & operational cost.

### 3.2.3 Metrics Dashboard

The performance metrics of the investigated infrastructure strategy options developed by the Analytics Toolbox, are used to measure, display, and report on how these infrastructure strategies are tracking to sustainability and social wellbeing targets derived from the WSA Plan (2020).

The concept of donut economics utilising two concentrated rings: a social foundation and an ecological ceiling can be used to develop bespoke indicator targets for the Aerotropolis and the Western Parkland City to ensure that the adopted multi utility

strategies are achieving the sought WSA Plan (2020). Examples of ecological indicators include freshwater use, biodiversity protection, microclimate temperature, climate change, waste generation, nutrient loading, and others. While social indicators could include community engagement, community acceptance, recreational values, community wellbeing, provision of affordable services and others.

Performance -based specification report (similar to the BASIX certificate) would be generated, which can be used as part of the DA assessment process to ensure that the constructed infrastructure complies with the design information provided at the planning stage. All utilities regardless of their type, ownership, and scale will have to generate such specification reports, thus provides for the adaptability of public/private and decentralised utility service.

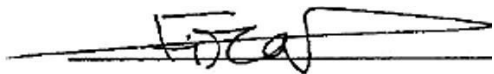
### 3.2.4 Digital Twin

Once the utility infrastructure assets are constructed, a digital twin, which is a digital representation of the constructed infrastructure assets, can be developed in our system. Using sensors and communications technology embedded in key locations of the constructed infrastructure, realtime performance monitoring are captured and fed into our system. Thus, provides for benchmarking performance targets against actual data, which helps in evaluating and the review of infrastructure strategies and performance targets for the next stages of infrastructure delivery. This also helps to engage the local community and the various stakeholders in the management of their infrastructure.

### 3.3 Next Steps

We are happy to extend our discussion with DPIA, WPCA and the various stakeholders and project partners to explore the possible implementation of our proposed Multi Utility Digital Solution and align it with the stakeholder's view of how to coordinate and integrate the delivery of smart and sustainable infrastructures in the Aerotropolis and the Western Parkland City.

Yours sincerely,



Firas Naji  
Principal Engineer  
