Appendix D

Mitigation Measures

Appendix D – Mitigation Measures Table

SSD-35283699 – Sydney Olympic Park Metro Station – Over & Adjacent Station Development

The following section provides recommendation for mitigation measures in response to potential impacts identified in **Section 6** of the EIS. The structure of mitigation measures is based on the DPIE's hierarchy of approaches for managing impacts identified in the *Draft Environmental Impact Assessment Guidance Series* released by DPE in June 2017, as:

- **Performance based measure** – identify performance criteria that must be complied with to achieve an appropriate environmental outcome but do not specify how the outcome is to be achieved.
- **Prescriptive measure** – require action to be taken or specify something that must not be done.
- **Management based measure** – identify one or more management objectives that must be achieved through the implementation of a management plan.
- Following the implementation of appropriate mitigation measures as recommended, it is determined that the proposal will not result in any significant adverse impacts on the surrounding environment. The following table illustrates how the matters raised within the SEARs will be addressed.

This analysis comprises a qualitative assessment consistent with AS/NZS ISO 31000:2009 *Risk Management–Principles and Guidelines* (Standards Australia 2009). The level of risk was assessed by considering the potential impacts of the proposed development prior to application of any mitigation or management measures. In accordance with the SEARs, the Environmental Risk Assessment (ERA) addresses the following significant risk issues:

- The adequacy of baseline data;
- The potential cumulative impacts arising from other developments in the vicinity of the site; and
- Measures to avoid, minimise, offset the predicted impacts where necessary involving the preparation of detailed contingency plans for managing any significant risk to the environment.
- Risk comprises the likelihood of an event occurring and the consequences of that event. For the proposal, the following descriptors were adopted for 'likelihood' and 'consequence'.

Likelihood		Consequence	
A	Almost certain	1	Widespread and/or irreversible impact
B	Likely	2	Extensive but reversible (within 2 years) impact or irreversible local impact
C	Possible	3	Local, acceptable or reversible impact
D	Unlikely	4	Local, reversible, short term (<3 months) impact
E	Rare	5	Local, reversible, short term (<1 month) impact

The risk levels for likely and potential impacts were derived using the following risk matrix.

		LIKELIHOOD				
		A	**B**	**C**	**D**	**E**
CONSEQUENCE	**1**	High	High	Medium	Low	Very low
	2	High	High	Medium	Low	Very low
	3	Medium	Medium	Medium	Low	Very low
	4	Low	Low	Low	Low	Very low
	5	Very low	Very low	Very low	Very low	Very low

The results of the environmental risk assessment for the proposed development are presented in the below table and are based upon the range of technical and specialist consultant reports appended to the EIS. The table has directly related mitigation measures responding to each impact also based upon the range of technical and specialist consultant reports appended to the EIS.

N.B. 'O' – Operational; 'C' – Construction

'Pe' – Performance based mitigation measure; 'Pr' – Prescriptive based mitigation measure 'Ma' – Management based mitigation measure

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
Design quality	Potential built form and visual impacts from the proposed buildings.	C & O	D	4	Low	Future Detailed SSDA(s) to consider and implement the Design Guidelines and Design Excellence Strategy.	Pr	Low
Reflectivity	Potential glare impacting upon vehicle drivers	O	D	4	Low	Using a less reflective glazing will reduce the amount of light that is reflected from the façade. Using a non-reflective material or materials with increased roughness and will control the impact of reflections. Introducing a non-reflective structure, design, or landscaping that shields the glazed façade will help to control the impact of reflections. Incorporating different built forms can help disperse light reflections. Concave-built forms should be avoided as these will instead concentrate sunlight, exacerbating the glare risk.	Pr	Low
Wind	Potential wind tunnelling impacts caused by the proposed development	O	D	4	Low	Based on the wind tunnel results, some areas will require wind treatments to ensure the desired comfort and safety criterion are achieved. Potential mitigation measures for the Detailed SSDA(s) include: Fixed or retractable canopies or awnings to protect patrons.	Pr	Low

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
						Balustrading along the top of the podiums alongside the east-west through site link to funnel along the side of the buildings and away from the pedestrian link. Landscape screening in critical positions. These trees will need to be mature and evergreen to be an effective mitigation strategy. Roughing elements such as banners will diffuse the energy contained in the wind.		
Ecologically sustainable development	Potential increase in energy consumption associated with demolition, construction and operational phases	C & O	D	4	Low	ESD measures to be implemented through each stage of the project to minimise greenhouse gas emissions and achieve sustainability targets.	Pr	Low
Traffic and Transport	Impacts on road network from construction and operational phase. Additional demand on car parking spaces. Construction traffic impacts on car	C & O	D	4	Low	A Green Travel Plan is to be created to reduce car trips and encourage the use of sustainable transport as part of the future Detailed SSDA(s). A detailed Construction Traffic Management Plan is to be prepared as part of the future Detailed SSDA(s). Provision of car share spaces in basements to reduce the need for individual car	Ma	Low

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
	parking and local streets					ownership. Active travel user safety should be prioritised on Precinct Street B. Low speed limits and appropriate signage should be provided to reduce the likelihood of conflict with vehicles.		
Noise and vibration	Noise and vibration during construction and operation of the proposed development	C & O	D	4	Low	Traffic and plant should be treated to meet the established criteria with the use of standard acoustic treatments. Prior to the commencement of major construction works the contractor should develop a detailed CNVMP at the Detailed SSDA stage. Further investigation should be undertaken in the Detailed SSDA stage to manage predicted exceedances to non-residential sensitive receivers and nearby commercial receivers. Feasible and reasonable management measures and work practices should be implemented such as the standard mitigation measures outlined in the Sydney Metro Construction Noise and Vibration Strategy. Noise mitigations for the external façade will need to be explored at the Detailed SSDA stage based on the worst case scenario of	Pr and Ma	Low

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
						high noise events within the sporting and entertainments venues in Sydney Olympic Park. The indicative operational noise and vibration mitigation measures should be refined as part of the detailed design. These indicative mitigation measures include: • Acoustic treatment for mechanical plant such as cooling towers, heat pumps, stair pressurisation and generators. • Acoustic treatment for all major equipment installed, these could include acoustic barriers around rooftop plant, robust construction of plant room, acoustic louvers, acoustic attenuators for mechanical ductwork, acoustic mufflers in generator exhaust systems, internal lining of ductwork and selection of low noise plant. • All major equipment, installed as part of the proposed development, should be mounted on isolation mounts. • Acoustic treatments, such as attenuators, acoustic louvres and		

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
						mufflers, should be incorporated into the design as required to meet the emergency operations noise emission criteria. • Testing of emergency equipment, such as generators, should be scheduled during day-time periods to minimise sleep disturbance. • Incorporate an indicative glazing thickness of 10.38mm thick laminated glass for office and residential uses. • During detailed design where more information about traffic movements is available, car park noise emission should be assessed to ensure compliance with the environmental noise criteria. • During detailed design where more information about loading dock movements is available, these noise emissions should be assessed to ensure compliance with the environmental noise criteria.		
Ground and water conditions	subsurface ground condition and geotechnical	C & O	D	4	Low	Geotechnical information available within Building 1 footprint is considered reasonable. The geotechnical data available	Pr	Low

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
	risk associated with the Concept SSDA					within Buildings 2 and 3 footprints is limited but is considered adequate for the assessment at concept stage. While the site contains a number of geotechnical challenges including the presence of high groundwater table, acid sulphate soils and working in brownfield environment, it is considered that these challenges can be adequately addressed through the following mitigation measures: While the site contains a number of geotechnical challenges these challenges can be adequately addressed through the utilisation of industry standard design and construction techniques and practices. The ground conditions assumed in design can vary from actual site conditions that may be encountered during construction. To reduce the impact of such potential variations, further geotechnical investigation will need to be carried out prior to or as part of detailed design. Based on the assessment using available geotechnical data and experience on similar ground conditions, the proposed		

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
						development in the context of the existing geotechnical conditions on the site is considered suitable for its intended use.		
Stormwater and wastewater	Potential impacts of proposed development on existing stormwater flow and quality.	C & O	D	4	Low	Future work that is required to finalise the stormwater and water quality design includes: - design of connection to existing council drainage system - final on-site detention requirements based on the finalised architectural scheme - further authority coordination as required. The building design is subject to further design development and future developer(s) will need to prepare Detailed SSDAs which would need to assess the following: - final on-site detention requirements based on the finalised architectural scheme - design of Ecological Sustainable Design initiatives and coordination with stormwater strategy - further authority coordination as	Pr and Ma	Low

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
						required.		
Flooding	Potential localised flooding impacts to proposed development.	C & O	D	4	Low	The following recommendations and mitigation measures are proposed: Further consultation will be undertaken where relevant with the Sydney Olympic Park Authority and the City of Parramatta Council during the Detailed SSD preparation. To ensure the ground floor of the development proposal and entrance to the underground basement are flood free a 300mm freeboard above the 1% AEP flood level or top of kerb has been included. The 1% AEP including 300mm freeboard is higher than the PMF flood level on the site. An emergency management plan which considers high hazard in adjacent roads during very rare and extreme flood events will be required during detailed design to manage risk to life associated with access or egress from the site.	Ma	Low
Contamination and remediation	Risk of encountering contamination during construction and operation of the proposed	C & O	D	4	Low	Based on the available information, there is a moderate risk of groundwater contamination and a low risk of soil contamination within the Concept SSDA site. In accordance with *State Environmental Planning Policy (Resilience and Hazards)*	Pr	Low

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
	development. Potential risk the site is not suitable for development.					*2021*, it is likely that the Concept SSDA site can be made suitable for its proposed use, following the completion of any remediation works required.		
Waste management	Potential impacts from waste generated during construction and operational phases	C & O	C	4	Low	A detailed WMP for the operational phase of the development will be prepared and submitted as part of the Detailed SSDA(s).	Ma	Low
Aboriginal cultural heritage	Potential to impact Aboriginal heritage	C & O	D	4	Low	Based on the results of the assessment and in accordance with Aboriginal heritage guidelines mandated in the standard industry SEARs, the following recommendations are made: - As the proposal does not include excavation, there would be no impact on any Aboriginal archaeological heritage values and it is recommended that further assessment is not required until the Detailed SSDA stage. - If changes are made to the proposal that may result in impacts to areas not assessed by this ACHAR further assessment would be required. - Unexpected Aboriginal objects	Ma	Low

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
						remain protected by the National Parks and Wildlife Act 1974. If any aboriginal objects, or potential objects, are uncovered during the proposed development, all work in the vicinity should cease immediately. A qualified archaeologist should be contacted to assess the find. - If human remains, or suspected human remains, are found in the course of the activity, all work in the vicinity should cease, the site should be secured, and the NSW Police and Heritage NSW should be notified and The Sydney Metro Unexpected Heritage Finds Procedure should be followed.		
Social impact	Potential positive and negative social impacts associated with the proposed development.	C & O	C	4	Low	The following recommendations are provided to further manage the potential impacts from the proposal: - During subsequent SSD applications, develop an employment strategy to encourage end occupiers to include targets for local hires and inclusion and diversity. - As part of the preparation of detailed SSDA/s, assess the quantity of	PR and Ma	Low

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
						affordable housing achievable within the development. This should align with the amount required in relevant state and local policies and strategies. - Consider flexible residential floor plans to enable a diverse housing mix. - Implement all recommendations identified in the CPTED Assessment. - Provide key design principles around activation and safety in the Design Excellence Strategy or Design Guidelines to ensure these measures are incorporated through the subsequent detailed SSD applications. - Prepare and implement a Plan of Management/s for all key building uses as part of future detailed SSD applications to help further manage crime and safety on site. The Plan of Management may include details around operating hours, operational safety and security measures, noise management and patron capacity.		

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
						- Consult with the local resident and business community during future detailed SSD applications to understand the type of evening activity or retail uses which are desired on site, and to keep them informed of the new offerings to the area. - Assess the demand for social infrastructure and open space generated by future residents and workers within the development and the way in which future detailed SSDA/s can contribute to meeting this demand. - Identify the social infrastructure and open space provision, works in kind and/or development contributions to be provided to meet the needs of future residents and workers within the development, having regard to the SOP Master Plan 2050 and Sydney Olympic Park Infrastructure Contributions Framework (ICF). - Action the mitigation measures and recommendations provided by the NVIA.		

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
						- During the detailed SSDA stages, consider creation of retail spaces which could accommodate additional fresh food offerings.		
Infrastructure requirements and utiltiies	Increased demand for potable water, wastewater, power and gas services	O	D	4	Low	The assessment has concluded that servicing is available to the proposed development site with indicative connections for each service being: - new sewer gravity connections from the proposed station and development site to a proposed sewer main along Figtree Drive to a new pit at the intersection with Olympic Boulevard - new potable water connection to the proposed station and development site from the existing Sydney Water mains on Figtree Drive and Herb Elliott Avenue. Additionally, a number of existing services will require relocation as a part of the construction works and future work will be required to provide servicing for the proposed development. The building design of the proposed	Pr	Low

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
						development is subject to further design development as part of Detailed SSDAs, what is required to ensure adequate servicing includes: - further coordination with utility agencies on lead-in infrastructure connections and any amplifications of existing assets - further utility investigation including slit trenching and obtaining Quality Level A survey information of existing utility assets - implementation of selected sustainability initiatives in the building design and revised demand modelling to determine the impacts on the required lead-in infrastructure - formal connection applications for utility services through appropriate channels such as Water Service Coordinators and Accredited Service Providers - development of formal utility relocation and connection packages to the utility agencies including any protection details of existing utility		

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						assets. - Further information will be included as part of Detailed SSDAs.		
Construction, operation and staging	Construction traffic impacts on car parking and local streets.	C & O	D	4	Low	- Appropriate diversions would be established to safely guide pedestrians around work zones in accordance with Construction Traffic Management Framework (CTMF). - Appropriate diversions would be established to safely guide pedestrians around work zones in accordance with CTMF. - Limited construction vehicle movements during major events in accordance with CTMF. - Parking alternatives to be identified within the precinct in consultation with Sydney Olympic Park Authority (SOPA) and in accordance with parking management plan and CTMF. - CTMF outlines mitigation measures that would be implemented to minimise impacts during major events which would be detailed in future Construction Traffic	Pr	Low

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
						Management Plans.		