

Mitigation Measures

The collective measures required to mitigate the impacts associated with the proposed works relating to the proposal are detailed in the table below.

Ref No.	Mitigation Measures									
Design and Operation										
DO-BC	Bio-Certification									
DO-BC	A Construction Environmental Management Plan (CEMP) will be required for the construction phase of the project, and will be prepared prior to issue of the Construction Certificate. The CEMP would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds and pollutants, as well as site-specific measures, including the procedures outlined below. The proposed mitigation measures would include environmental safeguards for protection of neighbouring properties and nearby waterways in accordance with relevant policy documentation and Government guidelines.									
DO-GC	Ground Conditions									
DO-GC1	Based on the evidence obtained during this Preliminary Site Investigation (Revision 1, 13.02.2024, Environmental Consulting Services) and in accordance with AS1170.4 (2007) Structural design actions Part 4: Earthquake actions in Australia, we recommend that structures be designed for the following classifications: Hazard Factor (z): 0.08 Sub-soil Class: Class Be – Rock to Class Ce – Shallow soil site.									
DO-GC2	Bored piles are the recommended piling method for the proposed development and existing ground conditions. Casing is not expected to be required to maintain a stable borehole in the encountered ground profile, however where sand layers or fill is encountered (particularly below the water table) casing may be required to maintain a clean pile base for socketing into the bedrock.									
DO-GC3	Bored piles should be supported within HW or better BS, heavily loaded piles should adopt the MW-SW BS as the founding medium. Bored piles founded in BS shall be socketed into stratum to adopt pressures. Where alternative piling options are considered, Intrax should be contacted for commentary on their suitability and necessary design considerations.									
DO-GC4	Pile design and installation should be conducted in accordance with AS2159 (2009) Piling – Design and installation. AS2159-2009 requires that a geotechnical strength reduction factor (ϕ_g) be applied to the design ultimate geotechnical strength ($R_{d,ug}$) of the pile to provide the design geotechnical strength ($R_{d,g}$) of the pile. The $R_{d,g}$ should be less than the design action effect (E_d) on the pile.									
DO-GC5	Intrax recommend that a geotechnical strength reduction factor (ϕ_g) of 0.4 is adopted where no further assessments are undertaken. The design engineer may determine an alternative ϕ_g following the methodology of Section 4.3 of AS2159. For estimation of the design ultimate geotechnical strength, the ultimate shaft resistance (F_s) and ultimate base resistance (F_b) are provided in the table below									
	<table border="1"> <thead> <tr> <th>Unit</th> <th>Ultimate Shaft Resistance (kPa)¹</th> <th>Ultimate Base Resistance (MPa)¹</th> </tr> </thead> <tbody> <tr> <td>HW-MW BS</td> <td>200</td> <td>6</td> </tr> <tr> <td>MW-SW BS</td> <td>500</td> <td>20</td> </tr> </tbody> </table>	Unit	Ultimate Shaft Resistance (kPa) ¹	Ultimate Base Resistance (MPa) ¹	HW-MW BS	200	6	MW-SW BS	500	20
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HW-MW BS	200	6								
MW-SW BS	500	20								
DO-GC6	The contribution of the uppermost soil profile shall be considered ineffective in providing geotechnical shaft resistance, given the large stiffness variation between EW BS and the underlying HW or better BS. Intrax recommends its contribution to shaft friction is ignored in axial capacity determination.									

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DO-GC7	Ultimate shaft friction values provided in the table above shall be reduced by a factor of 0.7 for determination of tensile capacity. The pile self-weight may be included in tension capacities. The tension capacity shall also be limited by the self-weight of cone pull-out. A pull-out angle of 30 degrees from vertical commencing at the base of the pile may be adopted for initial estimation. Consideration of defect orientation and block sizes shall be made for pull-out in rock.											
DO-GC8	Engagement of shaft resistance requires mobilisation of the pile. It is anticipated that settlement of at least 1% of the pile diameter is required to mobilise full shaft friction.											
DO-GC9	Ultimate base resistance values provided in the table above assume a minimum embedment of 0.3 m into the rock layer. Socks must be clean and roughened to achieve design values. Pile inspection by an experienced geotechnical engineer is recommended during construction of heavily loaded piles.											
DO-GC10	It is likely that ultimate pile loads presented above would result in settlement exceeding typical tolerance levels (i.e. in the order of 5% of pile diameter). The settlement should be determined adopting modulus values presented in the ground model with serviceability loads.											
DO-GC11	The values in the table above assume that pile shafts are clean (free from remoulded material) and that the pile base is clean (free of water, loose or softened material).											
DO-GC12	<p>Spread footings founded on bedrock (HW-MW BS or MW-SW BS) may be adopt allowable bearing pressures in the table below. Spread footings adopting these allowable pressures should assume a settlement in the order of 1% of the minimum footing dimensions. Spread footings shall achieve a minimum embedment of 0.3 m into the nominated rock unit to adopt pressures. Where shaft friction is included in spread footing computations the side wall shall be roughened to at least R2 level.</p> <table border="1"> <thead> <tr> <th rowspan="2">Unit</th> <th colspan="2">Allowable Capacity (kPa)</th> </tr> <tr> <th>End Bearing</th> <th>Shaft Friction</th> </tr> </thead> <tbody> <tr> <td>HW-MW BS</td> <td>1000</td> <td>100</td> </tr> <tr> <td>MW-SW BS</td> <td>2000</td> <td>200</td> </tr> </tbody> </table>	Unit	Allowable Capacity (kPa)		End Bearing	Shaft Friction	HW-MW BS	1000	100	MW-SW BS	2000	200
Unit	Allowable Capacity (kPa)											
	End Bearing	Shaft Friction										
HW-MW BS	1000	100										
MW-SW BS	2000	200										
DO-GC13	Where detailed settlement predictions are required, modelling in appropriate stress-strain software such as PLAXIS should be conducted with the specific project loads and footing dimensions. It is recommended that further laboratory testing or insitu testing is undertaken to accurately determine soil stress strain characteristics where stress-strain modelling is proposed.											
DO-GC14	<p>Spread footings on soil for surface level structures or separate smaller auxiliary buildings may adopted an allowable bearing pressure of 200 kPa in residual soil and 300 kPa in EW BS. A minimum embedment of 100 mm into the material medium, maintaining a minimum depth below adjacent surface level of 0.4 m. Higher bearing pressures may be possible in areas of the site, to adopt higher values specific assessment of the ground profile or inspection of footing excavations should be conducted.</p> <p>At these pressures a settlement in the order of 25 mm may be assumed in the absence of settlement modelling and further investigation. Where detailed settlement predictions are required, modelling in appropriate stressstrain software such as PLAXIS should be conducted with the specific project loads and footing dimensions. It is recommended that further laboratory testing or insitu testing is undertaken to accurately determine soil stress strain characteristics where stress-strain modelling is proposed.</p>											
DO-GC15	Note that it is our preference for the design engineer to adopt the same founding material throughout the entire foundation. Where footings are founded in different materials, especially materials with highly variable stiffness (soil and rock) or reactive soils (clay) and non-reactive soils (sand/gravel/rock), the designer should provide articulation for the structure to avoid potential damages which could be caused by differential movements due settlement or seasonal reactivity. Intrax recommends that all piles or spread footings are inspected by a geotechnical engineer prior to pouring concrete to confirm the quality and strength of soil/rock meet design assumptions.											
DO-GC16	All excavation work must be completed in accordance with the relevant and current SafeWork guidelines at the time of completing the works.											
DO-GC17	Excavation to approximately 6 to 7 m is anticipated to be required for the proposed basement, footings and service trenches. Excavation of the soil profile will be readily achievable using standard earthworks equipment (digging buckets attached to hydraulic excavators). Excavation of extremely weathered rock or very low strength rock (if encountered) may require ripping. Reduced productivity and higher wear on attachments should be anticipated where ripping is required. Excavation of low strength rock or better should assume that hydraulic											

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impact breaker (rock hammer), predrilling or saw cutting will be required.

DO-GC18 Where groundwater is encountered, excavations will require temporary dewatering which may include pumping or gravity drainage where the excavation geometry allows. 'Perched water' can occasionally be trapped in permeable fill above the water table or in localised depressions underlain by bedrock or low permeability soils. Perched water is typically of a finite volume, however, may be 'recharged' by infiltration of surface water following rainfall. Increased rates of groundwater seepage and release of perched water are common following heavy or prolonged rainfall and may persist for some time following inclement weather.

DO-GC19 Based on the groundwater measurements obtained to date, a 6 m basement excavation may intersect with the groundwater in the south portion (BH03) of the site below 3 m (RL 61 mAHD) or below 6.5 m over the northern portion (BH01, BH06) of the site (RL 62.5 mAHD). Therefore, allowance for at least partial dewatering should be considered during the construction planning and permanent basement design. Subject to the groundwater assessment (separate ECS report) it may be prudent to limit the double storey portion of the basement to the northern portion of the site or allow for tanking/permanent drainage design within the basement design over the southern portion of the site for at least the lower basement level.

DO-GC20 Ingress of water from any source (including damaged plumbing) should be investigated and rectified without delay to prevent avoidable delays or complications throughout the project. Where applicable, temporary cut-off drains at existing surface level near the perimeter of the site or outside the footprint of the proposed development will help to reduce the volume of water requiring management within the excavation.

DO-GC21 Intrax recommends the following batter angles for temporary slopes. Angles presented assume that the batter is not subject to surcharge loads and located above the water table. Any excavations requiring steeper grades shall be supported by suitable retaining walls or shoring – such as a piled retaining wall or trench shield. Where doubt exists regarding excavation safety, Intrax recommends that an experienced geotechnical engineer or engineering geologist inspects the excavation to provide further guidance.

*Excavations in rock may be conducted in a vertical manner, subject to onsite supervision of the excavation progression by an experienced geotechnical engineer, to monitor for and assign appropriate support for unfavourable defects in the rock mass.

Unit	Short-Term Better Angles
Fill	2:1
RS	1:1
EW BS	1:1
HW-MW BS	Vertical*
MW-HS BS	Vertical*

DO-GC22 Intrax recommends that any excavation with structures or personnel within the zone of influence, any benched excavations or any batters steeper than 45° are inspected after the below events.

- Rainfall events in excess of 30 mm over a 24-hour period.
- At any sign of instability including but not limited to:
 - o Water seepage through the excavation face
 - o Fallen or slumped material observed at the base of the excavation
 - o Tension cracks observed at the surface (behind the crest of the excavation)
 - o Visible deflection of retention or measured movement beyond design intents

The zone of influence of an excavation can be determined the area rising upwards from the toe of the excavation at a gradient of 30 degrees for non-cohesive materials (sands) and 45 degrees cohesive materials (clays).

DO-GC23 Preliminary retaining walls may be designed in accordance with AS4678 (2002) Earth Retaining Structures following parameters established from Rankine's theory are considered appropriate for the design of retention systems. The below values assume a vertical wall with horizontal ground surface. The design engineer should confirm their suitability for adoption based on the specifics of the design.

Unit	Ka	Kp	Ko
Fill	0.36	2.77	0.53
RS	0.36	2.77	0.53
EW BS	0.36	2.77	0.53
HW-MW BS	0.33	3.00	0.5 ³
MW-HS BS	0.33	3.00	0.5 ³

Ref No.	Mitigation Measures
DO-GC24	Retention systems for basements generally comprise a piled outer wall which is either cantilevered for supported with anchors/props as excavation continues from top down. Preliminary design of ground anchors can assume an ultimate bond stress of 300 kPa and 600 kPa for HW-MW BS and MW-SW BS respectively. The bond length shall be not less than 3 m and not more than 7 m, and anchors stressed to 1.4 times the design working load before locking off at the design load.
DO-GC25	Preliminary lateral earth pressure estimates may assume a uniform pressure of 4H kPa, where H is the total height of the wall in metres or anchored or propped walls. Walls adjacent to sensitive structures should adopt a uniform load of 6H kPa. Surcharge loads should be added to lateral earth pressures. This assumes positive drainage behind the wall (i.e. strip drains, permanently drained basement), tanked basement wall designs must consider hydrostatic forces and any uplift pressures on the basement slab.
DO-GC26	The extent of impacted land surrounding an excavation is typically 1 to 1.25 times the depth of the excavation. Negligible settlement typically occurs beyond this range. Given the limited developments surrounding the project site, shallow rock and the available offset from boundary the development is not anticipated to have significant negative impact on surrounding land from settlement induced by basement excavation. If surrounding sites change prior to construction and sensitive structures are present, dilapidation surveys and rigorous monitoring programs should be put in place.
DO-GC27	As a guide, lateral deflection of retaining walls is typically in the order of 0.1% to 0.2% of the retained height. The magnitude of ground movements is highly dependant on the wall design, construction sequence and ground conditions. Mitigation of surface settlements can be achieved through use of systems such as anchored or tieback walls, adoption of higher lateral earth pressures and groundwater recirculation/recharge.
DO-GC28	Where settlement outside the excavation occurs due to loss of material through or under the retaining wall, work within the excavation must cease and Intrax must be contacted immediately. If detailed settlement analysis is required, analysis using numerical stress-strain software such as PLAXIS may be appropriate.
DO-GC29	Survey monitoring of the retention system is recommended for all basement constructions, it should be undertaken prior to commencement of excavation, and at regular intervals during excavation until such time as the permanent support is applied. Survey points will need to be installed along the retaining walls (typically on the capping beam) at midspan and at approximate intervals of between 5 m (high sensitivity) and 10 m (low sensitivity). Baseline monitoring should be undertaken prior to commencement of excavation and subsequent monitoring should be completed at intervals of either one week (high sensitivity) or two weeks (low sensitivity) from the time that excavation commences until temporary ground anchors are destressed, or the retaining walls are propped by the basement structure / floor slabs. Maximum deflection criteria should be defined by the structural engineer in coordination with a design engineer experienced in soil-structural engineering design. The following alarm procedure are typical for basement projects: <ul style="list-style-type: none"> • Amber Alarm: Lateral deflections reach 60% of the maximum anticipated lateral deflections. Frequency of monitoring should be increased to twice weekly. • Red Alarm: Lateral deflections reach 95% of the maximum anticipated lateral deflections. Construction must be ceased, and this office and relevant authorities must be notified immediately. Frequency of monitoring should be increased to daily.
DO-GC30	Basement excavation and construction equipment induce vibrations which can cause detrimental effects to nearby structures or human experience if over certain limits. Given the greenfield natures of this development site there are not any significant receptors therefore vibrations are not anticipated to be major factor of the proposed construction methodology. However, where site conditions change, and critical receptors develop adjacent to the site vibration monitoring and management plans should be implemented.
DO-GC31	Basement flood slabs may be designed as rigid slabs, it is anticipated that the floor slab shall be supported on a compacted imported crushed rock medium which would be placed above the HW-MW BS. Pavement design may assume a 20% CBR where the HW-MW BS is adopted as the subgrade.
DO-HYD	Hydrology
DO-HYD1	Measurement of groundwater level beneath site was undertaken in site bores installed in siltstone, with groundwater table ranging from 62 mAHD m to 64.5 mAHD. Dewatering will be required as the basement is at 61 to 55 mAHD (allowing for concrete slab).
DO-HYD2	It is recommended that inflow be managed by sumps with water pumped to a sediment settling pond/tank prior to discharge due to high suspended solids.

Ref No.	Mitigation Measures
DO-HYD3	The most suitable water disposal option is considered to be discharge to stormwater however settlement of solids in sediment ponds will be required before discharge to stormwater. Water treatment and removal of heavy metals, phosphorous and nitrogen can be undertaken in small treatment plants using methods such as DMI-65water filtration media, modified clay sorbent, or reactive filter, biological advanced treatment;
DO-HYD4	Based on the groundwater levels and proposed depth of the basement it is preferred that a tanked basement is constructed. DECCW (former DPIE, 2021) asserts that basement should be watertight (fully tanked) to reduce energy demand, ongoing required maintenance and energy and additional administration related to licences, monitoring, and approvals. If a tanked design is adopted, the constructed basement must not cause the obstruction to predevelopment groundwater flow. The ultimate design selection will involve the input by geotechnical and structural engineer.
DO-HYD5	Monitoring groundwater plan is required (as part of the dewatering management plan) to ensure that drawdown does not exceed the predicted, that no impact is caused by settlement and that discharge complies with Council approval.
DO-HYD6	Given the predicted inflow of less than 3 ML/year no water access (aquifer interference) licence is required from WaterNSW.
DO-HYD7	Water works supply licence needs to be obtained prior to dewatering from WaterNSW irrespectively whether the basement is tanked or drained.
DO-SW	Feasibility Letter – Sydney Water
DO-SW1	Obtain development consent Development consent will be issued for the development before Sydney Water can issues a Notice of Requirements of a Certificate
DO-SW2	Engage a Water Servicing Coordinator (WSC) You must engage your current or another authorised WSC at your cost to manage your application and to meet the requirements. If you wish to engage another WSC (at any point in this process) you must write and tell us. A Water Servicing Coordinator will be engaged or another authorised WSC at the developer cost t mange the application and meet the requirements. If the developer seeks to engage another WSC at any point in the process, Sydney Water will be written to and told. The WSC will be the point of contact. They can answer most questions that the developer has about the process and can quote or provide information about costs associated with meeting the requirements (including Sydney Waster’s costs).
DO-SW3	Water The development is located within the Western Sydney Aerotropolis Growth Area (WSAGA). The proposed development is currently fronting a DN100 water main in The Retreat Unset supplied from Leppington water supply zone. This water main does not have capacity to supply the proposed development. Sydney Water is delivering trunk infrastructure in stages to service the WSAGA. The ultimate servicing of this area will be from the new Badgerys Creek reservoir and trunk mains from that reservoir to the developments. This infrastructure is currently proposed to be delivered in 2030/2031. Prior to the delivery of new Badgerys Creek reservoir, the proposed development can be serviced via the following interim servicing arrangement: <ul style="list-style-type: none"> • A new Oran Park reservoir (WS0477 and WS0478) is currently proposed to be delivered in 2025. • From the Oran Park reservoir, a Pressure Reducing Valve (PRV) on DN450 main in Badgerys Creek Rd is required (currently proposed to be delivered by end of quarter 2 2024). • An extension main from the DN450 in Badgerys Creek Rd to the proposed development will be required. The first section of this extension main is expected to be delivered by Western Parkland City Authority (WPCA) for the Bradfield development. A further section of the extension main will be required from the Bradfield development to your proposed development. Once the ultimate servicing infrastructure is available, the development will need to disconnect from this interim arrangement and connect to the ultimate servicing infrastructure at your cost. Please note that the dates and road layouts are indicative and are subject to change. Sydney Water will determine the exact location of the trunk water carrier once the road is upgraded by TfNSW.

Ref No.**Mitigation Measures**

DO-SW4

Recycled Water

The development is located within the Aerotropolis Initial Precincts, which will be provided with recycled water for non-drinking water uses sourced from stormwater harvested from across the Precincts, and from our new Upper South Creek Advanced Water Recycling Centre (AWRC), as recommended by the Sub-Regional Planning Study. Sydney Water is currently undertaking an Integrated Water Servicing Options analysis to determine the preferred servicing option.

Sydney Water will be able to confirm the requirements for recycled water mains and connections for the development, on finalisation of the preferred recycled water servicing option and scheme plan for the Aerotropolis Initial Precincts. You may be required to deliver some of this infrastructure as developer delivered works under a developer works deed. Your development will be required to connect to the recycled water mains when the infrastructure is available.

It is likely that the requirements will include that:

- Each lot in the development must have a frontage to a recycled water main that is the right size and can be used for connection of the lot to the recycled water main.
- The on-lot plumbing and service connections for drinking and recycled water pipes will be required to comply with the standards for Dual Water Reticulation Systems that are set down in the Water Supply Code of Australia Sydney Water Edition – 2014 and satisfy the administrative requirements of the New South Wales Code of Practice for Plumbing and Drainage. The installation of these services must either be carried out or supervised by a licensed plumber.
- Prior to the AWRC being ready to supply recycled water, the recycled water reticulation network will be supplied with water from the adjacent potable water network. Once the recycled water supply is established from the AWRC, the cross-connections between the potable water network and the recycled water network must be decommissioned at your cost. You must clearly show the locations of any cross connections between the potable water network and recycled water network on submission of the design plans.

DO-SW5

Sewer

The proposed development is within the Thompsons Creek wastewater catchment within WSAGA. Currently there is no wastewater servicing to this area.

Wastewater services will be provided to the WSAGA area via the new AWRC, and a new wastewater carrier east of the proposed development.

The carrier will transfer flows to the AWRC via a proposed interim pumping station SP1228 and an ultimate pumping station SP1241. The trunk wastewater infrastructure scheduled to be completed in 2027/28.

The timeframes and road layouts are only indicative and subject to change. During further stages of this design, we will consult with landowners regarding servicing of their land and the final location of the trunk wastewater carrier.

The developer may be required to deliver some of this infrastructure as developer delivered works under a Developer Works Deed

Each lot in the development will be required to have a sewer main available for connection that is the right size and can be used for connection.

DO-SW6

Connection Required to Regional Scheme

- The proposed development must satisfy all stormwater and trunk drainage requirements set out in the Western Sydney Aerotropolis Development Control plan – Phase 2 2022 (DCP).
- All public roads within the development site must be clearly identified in the plans and include integration of passively irrigated street trees per Council's adopted design(s).
- The development must meet the appropriate pervious area requirement for its development type as per the DCP, and this must be clearly documented.
- The site must include private Gross Pollutant Traps per the Technical guidance for achieving Wianamatta - South Creek stormwater management targets (DPE, 2022). SYDNEY WATER CORPORATION 10 Case No: 208309.
- The proposed development must satisfy all stormwater and trunk drainage requirements included in Sydney Water's Draft Stormwater Scheme Infrastructure Design Guidelines (Please note that updates to this document are anticipated to be released publicly early 2024).
- The development must not preclude the efficient delivery of Regional Scheme.

Ref No.	Mitigation Measures
	<ul style="list-style-type: none"> As part of your development application, the developer must prepare a Water and Stormwater Management Plan report for your development application consistent with the requirements specified in the Technical guidance for achieving Wianamatta - South Creek stormwater management targets (DPE, 2022). This report and the civil plans for your development must document how the development will connect to the Regional Scheme in the ultimate state. Sydney Water will require registration of easements under section 88A and/or restriction or public positive covenant under section 88E of the Conveyancing Act 1919 on title of the land in favour of Sydney Water for the purpose of the Regional Scheme, using Sydney Water's standard memoranda. This will be at no cost to Sydney Water. These easements and/or public positive covenants will use Sydney Water's standard memoranda and are to provide for drainage of stormwater and appropriate access for Sydney Water to maintain any Regional Scheme trunk drainage channel (constructed or natural) within the development site.
	<p>Prior to the delivery of the Regional Scheme If the proposed development is to progress before the delivery of the Regional Scheme, the development will:</p> <ul style="list-style-type: none"> Have interim stormwater management works in place so that the development is able meet the NSW Government waterway health objectives (see Technical guidance for achieving Wianamatta - South Creek stormwater management targets (DPE, 2022). These interim works will not preclude the efficient delivery of the Regional Scheme as determined by Sydney Water. <p>Sydney Water's confirmation is required if any of the interim stormwater works (e.g. on-site water harvesting and re-use assets) can form part of the Regional Scheme. Those assets that cannot form part of the Regional Scheme must be decommissioned once the Regional Scheme becomes available at your cost.</p>
DO-ASS	Acid Sulfate Soils
DO-ASS	Acid sulfate and salinity testing prior to detailed design. Low risk. Testing is not recommended.
DO-VI	Visual Impacts
DO-VII	Ensure materials, colours, textures and other architectural detail is respectful of Kelvin Park Homestead, with overly bright colours to be avoided.
	Where possible considering the overall landscape strategy and canopy coverage objectives, locate and select vegetation species to enable views from the collector road through the site to Kelvin Park Homestead.
DO-SEC	Safety and Security
DO-SEC1	The proposal is to maintain sightlines to and from the proposed development and the surrounds by ensuring signage and equipment do not create a significant visual obstruction.
DO-SEC2	The development is to ensure circulation spaces (internal and external publicly accessible areas, such as the turf area, pick up and drop off zone, meditation area, fitness stations, all pathways, and throughout basements and car park ingress/egress points) are unobstructed by structures, to remove opportunities for concealment and ensure that pedestrians can move freely with clear sightlines of their surrounds.
DO-SEC3	The glazed facades of the building at ground level should be free of clutter and signage to allow sightlines between the development and public domain, retail tenancies, lobbies, ancillary residential areas, the wellness room, gym and landscape areas.
DO-SEC4	A CCTV network is essential for the loading dock and car park area, and anywhere that is able to be traversed by the general public, including back of house areas and within the basement. The CCTV network is to be designed in consultation with a suitably qualified security consultant with a Class 2A licence under the Security Industry Act 1997 who can provide specific advice on the placement, installation, monitoring and maintenance of the CCTV network.
DO-SEC5	The CCTV network should endeavour to ensure blackspots of coverage are not created.
DO-SEC6	The CCTV network strategy should be partnered with the internal and external lighting strategy to ensure facial recognition is achieved in all lighting conditions.
DO-SEC7	Discrete CCTV systems such as small dome cameras are recommended.

Ref No.	Mitigation Measures
DO-SEC8	All lighting is to be installed and comply with Australian Standard AS4282:1992: Control of Obtrusive Effects of Outdoor Lighting.
DO-SEC9	Maintain that building entrances are highly visible from the streetscape frontages and internal paths of travel as well as avoid any entrapment areas associated with entries.
DO-SEC10	Display CCTV security notice signs to convey that the site is under constant surveillance (if applicable).
DO-SEC11	Clearly delineate between publicly and privately accessible areas via passive boundaries that do not appear to over fortify an environment (such as through landscaping provisions). High fencing is discouraged in these areas.
DO-SEC12	Provide signage throughout the precinct to direct pedestrian movements and deter loitering where it is not designated.
DO-SEC13	Ensure that pathways around the building curtilage, and within internal corridors are unobstructed at all times to avoid blind spots.
DO-SEC14	Ensure an effective and prompt response to environmental maintenance for the development is clearly specified through a Plan of Management (or the like). Environmental maintenance should acknowledge the principles of CPTED and ensure general building maintenance and cleanliness is maintained throughout the precinct.
DO-SEC15	Ensure mechanisms are in place to facilitate the on-going maintenance of the building, including the implementation of a rapid removal policy for vandalism repair and the removal of graffiti.
DO-SEC16	Ensure business, building and wayfinding signage is appropriate to deter access to private spaces and direct pedestrian movements to desired locations.
DO-SEC17	Ensure business, building and wayfinding signage is appropriate to deter access to private spaces and direct pedestrian movements to desired locations.
DO-SEC18	Ensure that the Strata Body or Building Management Committee prepare a Plan of Management which should document relevant guidelines to govern behaviour on site and should include emergency evacuation details, maintenance procedures and regulation details of various communal and shared spaces.
DO-SEC19	Ensure that any access control does not appear to fortify the environment. Indeed, any future fencing along internal street boundaries be visually attractive and low in height.
DO-SEC20	Ensure all residents are afforded secure access with security swipe cards that grant private access into the basement levels and all ancillary residential components of the development such as the gym and wellness room.
DO-SEC21	Consider installation of an appropriate bollard/barrier system at the future local road pedestrian entrances and within components of the share way to prevent vehicles driving into spaces not designed for vehicles. A security consultant with a Class 2A licence under the Security Industry Act 1997 is recommended to be engaged to provide specific advice on the type, placement and installation of this bollard/barrier system to ensure vehicles moving at high velocity cannot enter the site in locations not intended for vehicles, if need be.
DO-SEC22	Security, general staff personnel and employees of the building are advised to do routine parole of the site (including perimeter laps of the public open space areas throughout the development) regularly to minimise opportunities for anti-social behaviour. This should be included in any Plan of Management created for the site.
DO-SEC23	Ensure clear way finding signage is provided at the ingress and egress points of the site. Wayfinding signage should also be provided throughout all areas of the site including all basement levels, internal and external circulation areas such as lobbies, hallways, outdoor public spaces including pathways, turf areas, exercise stations and at the pick up and drop off zone.
DO-OW	Operational Waste
DO-OW1	All waste going to landfill from retail: stream separation of general waste, mixed recycling and organics will be undertaken.
DO-OW2	Each retail tenancy will have a separate waste room within tenancy to eliminate need for travel.

Ref No.	Mitigation Measures
DO-OW3	Each retail tenancy will have a separate waste room within tenancy with direct access to the adjacent road making for safe and convenient collection by waste contractor.
DO-OW4	All waste going to landfill from residential: stream separation of general waste, mixed recycling and organics will be undertaken.
DO-OW5	Residential waste: mixed use recycling and organics bins will be located on each residential level .
DO-OW6	Residential waste: Waste rooms will be made to size to accommodate the number of bins required.
DO-OW7	Residential waste: waste chutes will be located on each residential level.
DO-OW8	Residents are not permitted in waste rooms with a linear track without facility management or staff.
DO-OW9	Bulk waste rooms will be made with separate entrances to minimise the need for use of waste room by residents.
DO-OW10	Waste will only be transferred to waste holding areas, prior to collection by appointed qualified staff on approved equipment.
DO-NV	Noise and Vibration
DO-NV1	A detailed noise management plan should be developed by the main contractor that describes the construction phases.
DO-WSM	Water and Stormwater Management
DO-WSM1	On-Site Detention tanks are proposed within the site during the interim stage to ensure the flows generated from site is not worsened compared to the existing flows from site. As a result, stormwater impacts downstream of the development will be mitigated.
DO-WSM2	In the ultimate scenario, once Stage 2 is built, the stormwater discharge from site will be addressed by the Sydney Water regional stormwater scheme.
DO-WSM3	Water quality, quantity and flow targets have been met in accordance with the Western Sydney Aerotropolis Development Control Plan 2022 to mitigate adverse effects to downstream properties. This has been done via the use of SQUIDEP approved water quality devices, landscaped channels and raingardens
DO-SI	Social Impact
DO-SI1	Exploration of the opportunity to include proportion of the proposed dwellings as affordable housing, enhancing the social benefit of improving access to housing.
DO-SI2	Consistently liaising with WPCA to ensure the development is supported by road, social infrastructure, and active and public transport in a timely manner.
DO-SI3	Maintain communication with existing residents and commit to being a 'good neighbour' during construction through implementing a Construction Management Plan and providing a complaints hotline.
DO-SI4	Providing community space within the proposed development to facilitate community building and cohesion.
DO-W	Wind
DO-W1	Strategic landscaping around corners will be retained / included to reduce pedestrian movement near areas susceptible to high winds.
DO-W2	Trees with dense interlocking canopies along the street fronts at the base of the buildings will also act to reduce downwash wind effects and should be retained. These will be evergreen to assist in reducing wind impacts during winters. Alternatively, it is recommended to incorporate awnings along all street fronts to mitigate the impact of the winds redirected by the buildings. Note that the awning design should be continuous with no gaps to reduce the risk of wind reattachment on the ground level.

Ref No.	Mitigation Measures
DO-W3	Any outdoor seating areas should correspond to favourable wind locations. Therefore, locating these away from corners on the ground level is recommended. Inclusion of localised measures such as planting/screening is also recommended.
DO-W4	It is recommended to recess the lobby entrances to Buildings A, B, E, and F by approximately 1.5 m. This adjustment would facilitate a transitional space for individuals exiting controlled indoor environments to acclimatise to outdoor conditions effectively. Alternatively, the integration of localised planters or screening elements can be considered to mitigate impacts.
DO-W5	Full-height screening along one of the open aspects is recommended for all corner balconies and wider terraces where applicable. Alternatively, it is recommended to incorporate 1.4 m high impermeable balustrades or intermittent screens around the perimeter to reduce direct wind exposure and improve the usability of these spaces.
DO-W6	The communal terraces of Buildings B and E will benefit from 2m tall perimeter screening (can be a combination of impermeable screening at base with a 50% porous screen above). Landscaping, particularly around the perimeter, should be retained to buffer the winds further.
DO-W7	The landscape design for Building E Level 03 terrace features dense planting along the western perimeter. This should be maintained to reduce exposure to winter winds.
DO-W8	The landscape design for Building F level 04 terrace incorporates shading structures that are expected to reduce the risk of wind reattachment and should be retained. It is also recommended to include 1.4 m tall perimeter screening or hedge along the southern perimeter of the terrace to further reduce channelling winds.
Construction Management	
CM-CDWM	Construction and Demolition Waste Management
CM-CDWM1	All waste going to landfill will be taken to an appropriate C&D facility for sorting.
CM-CDWM2	Hazardous Waste: During any demolition and material recovery activities, all contractors should be aware of potentially hazardous materials. Hazardous construction materials should be disposed of in accordance with EPA guidelines to protect the environment and personnel. In order to avoid risk to the environment and any breach of legislation all contractors involved in construction and demolition at the site will be responsible for observing the following practices:
CM-CDWM3	Early identification and reporting of hazardous waste is required.
CM-CDWM4	Reporting of any suspicious activities of involved stakeholders (waste generator, transporter, or receiver) to including handling waste unlawfully or illegally dumping waste through the Environment Line on 131 555.
CM-CDWM5	Waste will be transported to a place that can lawfully accept it under Section 143 of the Protection of the Environment Operations Act 1997.
CM-CDWM6	All reasonable precautions and exercise due diligence at all times to prevent/minimise commission of any offence will be undertaken.
CM-CDWM7	Written records will be undertaken of: <ul style="list-style-type: none"> • who transported the waste (company name, ABN, vehicle registration and driver details, date and time of transport, description of waste) • copies of waste dockets/receipts from the waste facility (date and time of delivery, name and address of the facility, its ABN, contact person).
CM-CDWM8	Asbestos: If asbestos is identified during demolition, a detailed asbestos management plan will be prepared and will identify the following:
CM-CDWM9	Identify the location of asbestos and any naturally occurring asbestos.
CM-CDWM10	Include decisions, and reasons for them, about the management of asbestos at the site, for example safe work procedures and control measures.
CM-CDWM11	Outline procedures for incidents and emergencies involving asbestos, including who is responsible for what.

Ref No.	Mitigation Measures
CM-CDWM12	Be maintained with up-to-date information.
CM-CDWM13	Be accessible to any worker who has carried out or intends to carry out work at the workplace and any health and safety representatives who represent workers at the site.
CM-CDWM14	Provide information, consultation and training responsibilities to workers carrying out work involving asbestos.
CM-ESC	Erosion and Sediment Control
CM-ESC1	Sediment management plans shall be prepared for construction of the tanked basement.
CM-ES	Excavation Stability
CM-ES1	Monitoring program during construction with appropriate alarm triggers to be undertaken.
CM-V	Vibration
CM-V1	Monitoring program during construction with appropriate alarm triggers to be undertaken.
CM-HAA	Historical Archaeological Assessment (HAA)
CM-HAA1	<p>Unexpected finds procedure</p> <p>As the archaeological potential of the study area has been assessed as Low, it is recommended that potential archaeological resources be managed through an Unexpected Finds Procedure that is developed for the proposal. An example of an Unexpected Finds Procedure is outlined below:</p> <ul style="list-style-type: none"> • If archaeological remains are identified during any stage of the project, works in the area must cease, the area adequately protected, and a suitably qualified archaeologist notified so as to carry out more detailed investigation and assessment. • If the archaeological assessment determines that the remains are 'relics' in the meaning of the Heritage Act, the department of Climate Change, Energy, the Environment and Water must be notified about the discovery of relics in accordance with Section 146 of the Heritage Act. Further approval/s may be required to allow the works to proceed.
CM-HA2	<p>Heritage induction</p> <p>All staff involved in the proposed works, including design professionals and tradespeople, will receive an archaeological heritage induction prior to the commencement of works. The archaeological heritage induction will cover the potential for the project to encounter significant archaeological remains, and the recommendations and mitigation methods included in the Historical Archaeological Assessment including the procedure to follow in the event that an unexpected archaeological find is encountered. Clear lines of communication will be established for the reporting of any such finds and for procedures to be rapidly implemented.</p>
CM-HAA3	<p>General</p> <ul style="list-style-type: none"> • Any additions or design modifications to the proposal, outside the scope of the assessment of the HAA, will require additional heritage assessment to ensure consistency with the assessment of the HAA. • A copy of the HAA will be provided to the City of Liverpool Council to inform them of the proposal and the potential impacts to the study area located adjacent to the State Environment Planning Policy (Precincts–Western Parkland City) 2021 listed item (no. 13) and the State Heritage Register listed item (no. 00046), Kelvin.
CM-TR	Tree Removal and Protection
CM-TR1	Trees 1-15 will be removed to facilitate the proposed development. Tree removal will be undertaken with the required approvals and consent will be obtained from the relevant consent authority prior to any tree removal taking place. Trees 4 and 5 are exempt trees and do not require approval for removal as they are below the height for protection under the Liverpool Tree Management Policy 2016.
CM-TR2	All tree removal work will be carried out by an experienced Arborist with minimum AQF Level 3 qualifications in accordance with AS4373-2007 - Pruning of Amenity Trees, Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016) and other applicable legislation.

Ref No.	Mitigation Measures
CM-TR3	Tree 16 will be protected and retained located on an neighbouring allotment in accordance with the Tree Location Plan & Tree Protection Specifications, AS497-2009 Protection of trees on development sites and the specific recommendations below:
CM-TR4	A Project Arborist experienced in tree protection on construction sites will be engaged prior to the commencement of any works on site. The Project Arborist shall monitor and report regularly to the Principal Certifying Authority (PCA) and the Applicant on the condition and protection of the retained trees during the works. The Project Arborist will supervise and monitor any excavation, machine trenching or compacted fill placement within the TPZ of retained trees throughout construction.
CM-TR5	Tree Protection Fencing will be installed along the location of the existing boundary fence within the TPZ alignment of Tree 1 as shown on the Tree Location & Protection Plan Specification and in accordance with Section 4.3 of AS4970-2009. Tree protection will not be removed or altered without prior approval of the Project Arborist.
CM-NV	Noise and Vibration
CM-NV1	<p>Quiet work methods and technologies are recommended, including:</p> <ul style="list-style-type: none"> • Materials Handling/ vehicles: <ul style="list-style-type: none"> - Trucks and bobcats to use non-tonal reversing beacon (subject to OH&S requirements) to minimise potential disturbance of neighbours. - Avoid carless dropping of construction material into empty trucks. - Trucks trailers and concrete trucks (if feasible) will turn off their engines during idling to reduce noise impacts (unless truck ignition needs to remain on during concrete pumping).
CM-NV2	<p>In the event of complaints there are a number of noise control strategies available that can be considered such as the below.</p> <p>Where a particular activity or construction appliance is us found to generate excessive noise levels, it may be possible to select an alternative approach or appliance. For example, the use of a hydraulic hammer on certain areas of the site may potentially high levels of noise. Undertaking this activity using bulldozers, ripper or milling machines will result in lower noise levels.</p>
CM-NV3	Acoustic Barriers: Given the position of adjacent development, it is unlikely that noise screens will provide significant acoustic benefit for commercial or residential receivers but will provide noticeable improvement for those on ground level. Barriers can also be placed between the source and the receiver.
CM-NV4	Material handing: The installation of rubber over material handling areas can reduce the sound impacts dur to material being dropped by up to 20dbA.
CM-NV5	Establishment of Site Practices: This involves the formulation of work practices to reduce noise generation. A more detailed management plan for this project in accordance with the construction methodology outlining work procedures and methods for minimising noise.
CM-NV6	<p>In the case that ongoing complaints of excessive noise or vibration levels occur immediate measures shall be undertaken to investigate the complaint, the cause of the exceedances and identify any required change to work practices. If a noise compliant is received, the complaint should be recorded and must include the following:</p> <ul style="list-style-type: none"> • The name and address of the complainant. • The time and date of the complaint. • The nature of the company and the time and date the noise was heard. • The name of the employee who received the complaint. • Actions taken to investigate the complaint and a summary of the results of the investigation. • Required remedial action, if required. • Validation of the remedial action. • Summary of feedback to the complainant. • A permanent register of complaints should be held.

Ref No.	Mitigation Measures
CM-NV7	<p>Site induction:</p> <ul style="list-style-type: none"> • A copy of the Noise Management Plan is to be available to contractors. The location of the Noise Management Plan should be advised in any site induction. • The site induction will detail the site contact and is to be notified in the event of a noise complaint.
CM-A	Access
	Reinforcement of bathroom and toilet walls
CM-A1	Except for walls constructed of solid masonry or concrete, the walls around the shower, bath (if provided) and toilet will be reinforced to provided fixing surface for safe installation of grabrails.
CM-A2	The walls around the toilet will be reinforced by installing: <ul style="list-style-type: none"> i. noggings with a thickness of at least 25mm ii. sheeting with a thickness of at least 12mm
CM-A3	The walls around the bath are to be reinforced by installing: <ul style="list-style-type: none"> i. noggings with a thickness of at least 25mm ii. sheeting with a thickness of at least 12mm
CM-A4	The walls around the hobless shower recess are to be reinforced by installing: <ul style="list-style-type: none"> i. noggings with a thickness of at least 25mm ii. sheeting with a thickness of at least 12mm
CM-BC	Bio-Certification
CM-BC1	Appropriate erosion and sediment control will be erected and maintained at all times during construction in order to avoid the potential of incurring indirect impacts on biodiversity values. As a minimum, such measures should comply with the relevant industry guidelines such as 'the Blue Book' (Landcom 2004).
CM-BC2	Future landscaping plans will incorporate species native to the area.
CM-BC3	Potential impacts relating to stormwater and runoff will be managed during construction and operation phases. The CEMP will guide stormwater management during the construction phase of development.
CM-ESC	Erosion and Sediment Control
	The contractor will be required to inspect the site after every rainfall event and at least weekly, and will:
CM-ESC1	Inspect and assess the effectiveness of the ESCP and identify any inadequacies that may arise during normal work activities or from a revised construction methodology
CM-ESC2	Construct additional erosion and sediment control works as necessary to ensure the desired protection is given to downstream lands and waterways.
CM-ESC3	Ensure that drains operate properly and to affect any repairs.
CM-ESC4	Remove spilled sand or other materials from hazard areas, including lands closer than 5 metres from areas of likely concentrated or high velocity flows especially waterways and paved areas.
CM-ESC5	Remove trapped sediment whenever less than design capacity remains within the structure.
CM-ESC6	Ensure rehabilitated lands have affectively reduced the erosion hazard and to initiate upgrading or repair as appropriate.
CM-ESC7	Maintain erosion and sediment control measures in a fully functioning condition until all construction activity is completed and the Site has been rehabilitated.
CM-ESC8	Remove temporary soil conservation structures as the last activity in the rehabilitation.
CM-ESC9	<p>Inspect the sediment basin during the following periods:</p> <ul style="list-style-type: none"> • During construction to determine whether machinery, falling trees, or construction activity has damaged and components of the sediment basin. If damage has occurred, repair it. • After each runoff event, inspect the erosion damage at flow entry and exit points. If damage has occurred, make the necessary repairs. • At least weekly during the nominated wet season (if any), otherwise at least fortnightly; and • Prior to, and immediately after, periods of 'stop work' or Site shutdown.

Ref No.	Mitigation Measures
CM-ESC10	Clean out accumulated sediment when it reaches the marker board/post and restore the original volume. Place sediment in a disposal area or, if appropriate, mix with dry soil on the Site.
CM-ESC11	Do not dispose of sediment in a manner that will create an erosion or pollution hazard.
CM-ESC12	Check all visible pipe connections for leaks, and repair as necessary.
CM-ESC13	Check all embankments for excessive settlement, slumping of the slopes or piping between the conduit and the embankment, make all necessary repairs.
CM-ESC14	Remove the trash and other debris from the basin and riser; and
CM-ESC15	Submerged inflow pipes must be inspected and de-silted (as required) after each inflow event.
CM-ESC16	Maintenance of the sediment basin should be undertaken in accordance with the guidance outlined in IECA Appendix B (2008). This includes de-silting of the basin if the next storm is likely to cause settled sediment to rise above the nominated marker post within the basin, or if the settled sediment has exceeded 90% of the nominated sediment storage volume.
CM-ESC17	As required by IECA, ongoing review of sediment basin performance will be carried out throughout the construction phase of the development. As noted in IECA Appendix B of the Erosion and Sediment Control Plan, 'sediment basins are not designed to achieve a specific water quality; rather, they are designed to either capture and treat a specific volume of runoff, or to treat discharges up to a specified peak flow'. Considering this, site specific water quality management practices such as those suggested in IECA will need to be implemented by the Contractor responsible for implementation of the ESCP. Demonstration of adaptive management practices and decision-making processes such as that presented in Figure 4 of the Erosion Sediment Control Plan will provide greater certainty that all reasonable and practicable actions are being undertaken to minimise potential impacts associated with release of sediment laden water from the site.