Appendix E – Mitigation Measures Table

Environmental Impact		Residual Impact
Aboriginal Cultural Heritage Impacts to archaeological material	**Unexpected archaeological finds procedure** In the unlikely event that any archaeological material, or suspected archaeological material is uncovered during any works within the subject area it is recommended that all works within the vicinity of the find, immediately stop, and the unexpected archaeological finds procedure is followed. **Consultation with registered Aboriginal parties** Aboriginal community consultation should be maintained in accordance with the Consultation Requirements (Department of Climate Change, Energy, the Environment and Water 2010), contact with Registered Aboriginal Parties should be maintained no less than once every six months. **Changes to the proposal** If changes are made to the proposal that may result in impact to areas not assessed by this ACHAR, further archaeological assessment is required.	**Low**
Excavation Increased geological instability resulting from excavation works	**Detailed Dilapidation Surveys** Detailed dilapidation surveys to be completed on neighbouring structures that fall within the zone of influence (twice the excavation depth when measured from the basement walls). This will inform excavation processes and ongoing safety policies and monitoring. **Vibration Monitoring** A full-time quantitative vibration monitoring will be carried out on the neighbouring houses to the south and the adjoining heritage '*Brigstock'* building to the east throughout demolition. This will include geophones affixed onto the neighbouring buildings and a warning system for vibration exceedances. If higher than expected vibrations are recorded, they will be assessed against the Vibration Emission Design Goals. **Excavation** Prior to commencement of any excavation, reference is to be made to the NSW Government 'Code of Practice, Excavation Work' dated January 2020. **Basement Retention** Prior to the commencement of excavation, proposed vertical cuts in the soil and bedrock profiles are to be supported by cast-insitu retention systems. The proposed vertical cuts should be supported by either contiguous pile walls (in areas which are highly sensitive to lateral movement; for example, southern basement wall and the northern half of the eastern basement wall), or soldier pile walls with shotcrete infill panels elsewhere. **Temporary Rock Anchors** Prior to installation of rock anchors, permission must be sought from the neighbouring property owners, including Willoughby City	**Low**

Environmental Impact		Residual Impact
	Council. **Additional Geotechnical Investigation** To obtain adequate site coverage, at least six additional cored boreholes will be required post-demolition. Two additional groundwater monitoring wells will also need to be installed post-demolition. Following completion of the additional investigation, this report will need to be reviewed and updated as appropriate. **Further Geotechnical Input** The following is a summary of the further geotechnical input which is required and detailed throughout the Preliminary Geotechnical Investigation (**Appendix AA**): • Additional geotechnical investigation post-demolition; • Review and update of this report and seepage analysis following completion of the additional investigation; • FEM analysis of the basement retention system and excavation; • Preparation of a Dewatering Management Plan; • Dilapidation survey reports on all neighbouring structures, or parts thereof, located within the zone of influence of the basement excavation; • Review of the dilapidation survey reports; • Quantitative vibration monitoring on the neighbouring houses to the south (32A Bertram Street & 55 Archer Street) and on the adjoining heritage 'Brigstock' building to the east; • Inspection of perimeter pile wall drilling; • Proof testing and lift-off testing of temporary rock anchors for the basement walls; • Progressive rock face inspections within the Basement 6 excavation at it proceeds; • Groundwater monitoring of seepage volumes; • Internal footing inspections, including proof coring or spoon testing, as appropriate; • Additional advice once the method of resisting the uplift pressures of Basement 6 has been finalised.	
Contamination Exposure of contamination of hazardous materials during construction	**Hazardous Materials Survey** Before commencement of the demolition works, a Hazardous Materials Survey (HMS) should be completed by a suitably qualified consultant, to identify any hazardous materials present within the existing building fabrics of the 'Brigstock' Building. All identified hazardous materials are to be appropriately managed, to maintain worker health and safety during the demolition works and to prevent the spread of potentially hazardous substances onto the site and soil surfaces. Where clearance inspection indicates the presence of hazardous materials remaining on the site, further removal and validation or further clearance inspection works must be undertaken.	**Low**

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Environmental Impact		Residual Impact
	An asbestos clearance inspection and certificate should be completed by a suitably qualified professional (SafeWork NSW Licenced Asbestos Assessor) following the removal of asbestos containing materials, if identified during the HMS. **Targeted Site Investigation** Following the completion of all demolition work as part of the proposed redevelopment, a targeted site investigation (TSI) focusing on the characterisation of the soils will be retained within 34 Albert Avenue should be conducted. The TSI should include nine sampling locations to meet the minimum sampling points (as well as all other requirements) specified by NSW EPA (2022a). One sampling location should be placed within the area of the proposed substation. **Off-site disposal of soils policy** All soils designated for off-site disposal, including any virgin excavated natural material (VENM) must be pre-classified in accordance with the NSW EPA (2014) Waste Classification Guidelines. Any material being imported to the site should be validated as suitable for its intended use, in accordance with NSW EPA (2014). In particular, importing filling / landscaping material must be certified as meeting the VENM classification prior to importation.	
Noise and Vibration Impacts arising from excessive noise levels and/or duration of noise	**Operational noise** <u>Loading dock</u> The use of loading dock to be limited between 7am and 6pm only. <u>Mechanical services</u> Mechanical services are to be mitigated during detailed design and may include: • Positioning mechanical plant away from nearby noise sensitive receivers; • Acoustic attenuators fitted to duct work; • Screening around mechanical plant; • Acoustic insulation within duct work; • Acoustically insulated bends fitted to duct work; and • Reselection of mechanical plant. **Construction noise** • Practices that willreduce noise from the site include: • Increasing the distance between noise sources and sensitive receivers; • Reducing the line-of-sight noise transmission to residences or other sensitive land uses using temporary barriers (stockpiles, shipping containers and demountable offices can be effective barriers); • Constructing barriers that are part of the project design early in the project to introduce the mitigation of site noise; and	**Low-Moderate**

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Environmental Impact		Residual Impact
	• Installing purpose-built noise barriers, acoustic sheds and enclosures Screening Screening of noise is to be taken into account during the planning stages. Water pumps, fans and other plant equipment that operate on a 24-hour basis may be problematic at night and should therefore be effectively screened by either situating them behind a noise barrier or by being positioned in a trench or a hollow in the ground provided this does not generate reverberant noise. Crane (diesel operated) An appropriate silencer on the muffler and acoustic screen around the engine bay are recommended to attenuate the noise from it. Reversing and warning alarms Alternative warning systems should be considered to reduce environmental noise impacts during construction. The alternatives listed on page 31 of the Noise and Vibration Impact Assessment (**Appendix Z**) should be considered for use on the construction site. Noise and Vibration Monitoring Noise and vibration monitoring to be undertaken during construction in the form of regular checks and in response to any noise or vibration complaints. A noise and vibration monitoring program is to be implemented for the construction works in accordance with Table 27 of the Noise and Vibration Impact Assessment (**Appendix Z**). The monitoring program is to be carried out during the likely nosiest periods during each construction phase as agreed with the acoustic engineer and contractor.	
Ground and Water Conditions Increased geological instability resulting from excavation works. Environmental damage from groundwater seepage	**Water Supply Works Approval** A Water Supply Works (WSW) approval will be obtained from the relevant authorities to allow for the drainage and discharge. This aims to facilitate mitigation measures against groundwater seepage inflows into the basement. **Water Treatment System** A specialist contractor design an appropriate water treatment system to facilitate the disposal of groundwater during temporary construction dewatering, should off-site disposal of groundwater to stormwater be required. The use of a 'WETSEP' system or equivalent to hold and treat water prior to discharge could be considered to achieve the water quality standards imposed by the authority (e.g. Council) permitting the discharge of groundwater. **Unexpected Groundwater Condition Response** In the event unexpected conditions are encountered during development work or during dewatering that may pose a contamination risk, all works will stop and an environmental consultant should be engaged to inspect the site and address the issue.	**Low-Moderate**

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Environmental Impact		Residual Impact
Construction Traffic	The recommended construction traffic management measures within the Construction Pedestrian & Traffic Management Plan (**Appendix V**) will be implemented during construction phase.	**Low**
Water Management Impacts on quality of stormwater discharge into drainage system	**Regular Maintenance** On-going maintenance of the stormwater infrastructure system described in this report needs to be undertaken on a regular basis to ensure that the system operates efficiently and as required by the design. The stormwater infrastructure requiring maintenance is as follows: • Stormwater drainage pit and pipe network within the property and to council street pit. • Stormwater quality treatment devices (filters) • Rainwater tank(s) • OSD orifice plate and trash screen • Subsoil drainage in garden beds and raingardens. **Sedimentation and Erosion Control Plan (Construction)** A Soil and Water Management Plan (SWMP) has been prepared in accordance with the NSW Department of Housing Publication titled: Managing Urban Stormwater-Soils and Construction (2004) and the relevant WDCP guidelines for the site. Stormwater discharge and drainage policies included in the SWMP shall be implemented during construction to mitigate any potential impacts, including loss of topsoil, changed salinity or pH levels or decrease in waterway capacity leading to increased flood levels and durations. **Construction Methodology** The following construction methodology is to be followed to minimise the impact of sedimentation due to construction works: • Diversion of “clean” water away from the disturbed areas and discharge via suitable scour protection; • All sediment-laden water will be contained within the basement excavation and treated prior to discharge (if required). • Provision of construction traffic shaker grids and wash-down to prevent vehicles carrying soils beyond the site; • Provision of silt fences to filter and retain sediments at source.	**Low**
Flooding Flooding of site and surrounds	**Flood Emergency Response Plan** Potential inundation of the site in the Probable Maximum Flood (**PMF**) due to local run-on from the catchment to the south of the site and from Archer Street will be managed by implementation of a conditioned site-specific Flood Emergency Response Plan (FERP). The FERP will address emergency management considerations applicable to the occupation of the site for a range of flood events up to the PMF. As a minimum, the FERP will address the following: • Time of onset of flooding from the local catchment and available warning time.	**Low**

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Environmental Impact		Residual Impact
	• Period of isolation in the event of inundation due to the PMF, • Evacuation capability (number of people to be evacuated, time and location of evacuation), • Compatibility with any existing emergency management strategies, • Vulnerability of occupants, clients and visitors (including persons with impaired mobility), • Suitability of flood-free location for sheltering (Level 1 Reception / Wellness space), • Availability of services for the period of isolation, • Structural adequacy and building requirements	
Tree Impact Impacts on trees to be retained	The recommended mitigation measures in the Aboricultural Impact Assessment (**Appendix M**) will be implemented, including: • All stormwater pits must be relocated outside of the tree protection zones (TPZs) of trees to be retained; • The proposed path from Albert Avenue to the heritage building is recommended to be installed above existing ground (such as an elevated boardwalk style) so there are no earthworks within the TPZ and be permeable and is subject to detailed design coordination with the project arborist. • Any works within any of the TPZ fenced zones are to be under the supervision and recommendations and sign off by the project arborist. • TPZ fencing shown on the Arborist Impact Plan (Arb_601) together with TPZ signage is recommended in order to protect street trees and their associated soil zones for trees: T1 to T4, T7-T9, T20-21, T23, T24, T25 and T26. • Site hoarding around the site boundary is proposed. Where tree protection fencing is required along the site boundary (i.e. the eastern and western boundaries), the site hoarding may act as suitable tree protection. This is to be detailed and signed off prior to commencement of works by the project arborist. • In the case of trees T7-T9, additional TPZ fencing around the street verge turfed zones is necessary. • New footpath pavement is proposed within the TPZ's trees T7-T9, T18 and T21. Where new pavement is within the TPZs, it is recommended this pavement be permeable and flexible (to allow tree root development). Detailed design coordination and project arborist supervision of the demolition and installation is required to ensure minimal root zone impacts. • Sedimentation trenching works and reduction of the street verge are proposed on the northern side of T9 and at the edge of the TPZ. Project arborist supervision and sign off with arborist recording/reporting of tree root presence within the trench, as standard procedure and is required. • All pruning works are to be under supervision, direction and sign off by the project arborist and performed by an AQF Level 3 Arborist and to the pruning *Australian Standard 4373-2007 – Pruning of Amenity Trees*. • A pruning specification by the project arborist will be required with a Tree Protection Specification (TPS) report for the Construction Certificate (CC) phase.	**Low**

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	• Additional pruning of trees on adjoining properties will be required for T23, T24 and T25. Pruning of trees on adjoining properties will require separate consents and be signed by the property owner on which the trees are located. These consents are recommended to be obtained prior to any works on the subject site.	
Waste Management	The recommended waste management measures for construction and operation phases within the Waste Management Plan (**Appendix AF**) will be implemented for the development, including: **Construction waste** • The identified construction waste is to be managed in accordance with the methods for reuse, recycling or disposal listed in Table 3. **Operational waste** • The residential waste flow from generation to collection is to be managed through the following steps: 1. Residents are to transfer waste to waste chutes inlets located on each residential level, which will be deposited into their respective bins within the waste storage room on the lower ground floor. The maximum distance between residential dwellings and chutes/bin rooms on each residential level is approximately 30m; 2. Site management is responsible for maintaining bins and the waste storage rooms, ensuring bins are clean and in working order. Site management is also responsible for switching out full bins and monitoring bin fullness; 3. Bins under the waste chutes will be on a 1,100L bin linear track system to reduce the requirement for more frequent bin rotation; 4. Site management is to ensure contracts with Council or a private waste contractor, who also ensure appropriate collection scheduling and access is organised to minimise noise, odour, vermin, and visual amenity impacts to staff, visitors and the public. • The commercial waste flow from generation to collection is to be managed through the following steps: 1. Waste is temporarily stored at its point of generation in an appropriately sized receptacle, clearly marked for type of waste; 2. Site cleaners or tenancy staff are to transfer waste to the waste and recycling storage area for appropriate disposal into the respective bins. Commercial tenants will not have access to residential waste bins; 3. Cleaning staff and site management are responsible for maintaining bins and the waste storage rooms, ensuring bins are clean and in working order. Cleaning staff and building management are also responsible for switching out full bins and monitoring bin fullness; and	**Low**

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	4. Building management is to ensure contracts with Council or a private waste contractor, who also ensure appropriate collection scheduling and access is organised to minimise noise, odour, vermin, and visual amenity impacts to staff, visitors and the public.	
Crime Prevention	The recommended crime prevention strategies included in the CPTED Assessment (**Appendix U**) shall be implemented in the detailed design of the development, including: • Use of adequate lighting • Use of CCTV camera • Incorporation of access control strategies such as a swipe card or similar security measures • Ongoing maintenance of the development and associated landscaping • Preparation of a Plan of Management to ensure maintenance of the development	**Low**
Social Impact Disruption to community and potential amenity impacts associated with operation of development	**Construction Environmental Management Plan** To reduce disruption to community as a result of construction, a Construction Environmental Management Plan will be prepared and include dust, noise and traffic mitigation measures to minimise the potential construction impacts.	**Low**

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