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Green Square to Ashmore Connector Road
City of Sydney Council
15-Apr-2021

Review of Environmental Factors

Green Square to Ashmore Connector Road

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Client: City of Sydney Council

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Introduction

This Review of Environmental Factors (REF) has been prepared by AECOM Australia Pty Ltd (AECOM) on behalf of the City of Sydney (the City) to assess a proposed transport corridor connecting Botany Road and Geddes Avenue to Bowden Street, Alexandria (the Site), known as the Green Square to Ashmore Connector Road (GS2AC) (the Proposal).

The City is the proponent for the proposed road and is also the "determining authority" for the Proposal under Part 5. Division 5.1 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act).

This assessment finds that the Proposal would not result in any significant impacts upon the environment, subject to the relevant mitigation measures being applied, and as such may be approved. Details of the environmental assessment is provided in the following sections.

Background

The GS2AC has long been considered as a transport solution to improve access to the Green Square Town Centre (GSTC) for pedestrians, cyclists, buses and vehicles.

The road was originally investigated in the *Green Square Structural Masterplan 1997* (City of Sydney, (CoS), 1997) and throughout the 2000's, where a preliminary route alignment was suggested. In 2008, the *Green Square Transport Management and Accessibility Plan* (CoS, 2008) further identified the proposed road to improve road access to GSTC. The GS2AC is currently identified in the *Sydney Development Control Plan 2012* (Sydney DCP) (CoS, 2012).

In 2017, the City prepared a Review of Environmental Factors for the then concept design of the proposed road: *Green Square to Ashmore Connector Road between Botany Road and Bowden Street, Alexandria REF* (CoS, 2017) (hereafter referred to as the 2017 REF). Following exhibition and consideration of issues raised in submissions, the 2017 REF was self-determined by the City under Division 5.1 of the EP&A Act in December 2018.

In April 2019, the concept design for GS2AC was taken to the City of Sydney Design Advisory Panel (DAP) for review. The DAP made several design recommendations, requiring amendments to the concept design presented in the 2017 REF.

A consistency assessment, *Green Square to Ashmore Precinct Connector Road (GS2AC) – REF Planning Pathway* (AECOM, 2020) identified that the design objectives of the revised concept plan primarily caters for active and public transport modes, and is not consistent with the approved 2017 REF (which allowed for all modes), requiring a new REF. It is noted that whilst the design objectives of GS2AC have evolved since the 2017 REF approval, the overall physical corridor as approved in the 2017 REF remains largely unchanged.

This REF assesses the revised concept plan to meet the City's obligations under Part 5, Division 5.1 of the EP&A Act.

The Proposal

The GS2AC (current revised concept plan) comprises a 380m road that runs from Botany Road to Bowden Street via O'Riordan Street and Bourke Road, with two (2) new signalised intersections and upgrade works to the existing Botany Road / Geddes Avenue signalised intersection. The road features a single traffic lane in each direction to be dedicated as a public transport corridor (bus lanes) with local traffic access to adjacent properties. The road also features an on-road two-way cyclepath which connects to the existing east-west cyclepaths on Bowden Street and Geddes Avenue and provides interchange with the existing north-south cyclepath on Bourke Road. Local vehicle access would be allowed for properties along the GS2AC which are to be developed in the future.

The Proposal is expected to open in 2022. The renewal of adjoining lands for affordable housing and employment based land uses would be completed within or near this time and the Proposal would support these future land uses.

Need for the Proposal

The GS2AC is a long identified transport initiative to improve the east-west connection between the Ashmore Precinct and GSTC. *Sustainable Sydney 2030* (CoS, 2017) reinforces the strategic need to improve connectivity and access to the GSTC through improved access with safe and accessible roads and public transport routes. The Proposal is in accordance with *Sustainable Sydney 2030*, in which the City is aiming to shift towards sustainable modes of transport such as walking and cycling and a preference for public transport rather than private vehicle use.

Consultation

The City has maintained a high level of community and stakeholder consultation throughout the GS2AC road development. The public exhibition of this REF report would provide a further opportunity for the community and stakeholders to learn about the Proposal and provide feedback, including the Proposal's increased focus on public transport modes.

Environmental Impacts

Environmental and social impacts for the GS2AC have been assessed and key issues are summarised below.

Traffic and transport

The majority of the Proposal would be confined to acquired industrial/ commercial land which would be converted into a road corridor. Construction works that interface with existing public roads would be limited to the intersection tie-ins with Botany Road/ Geddes Avenue, O'Riordan Street and Bowden Street/ Bourke Road. Overall construction works would not be expected to significantly impact on traffic movements and intersection operation on these existing roads, subject to appropriate construction traffic control measures being employed.

Installation of the two new signalised intersections (Bourke Road/ GS2AC and O'Riordan Street/GS2AC) and modification to the existing signalised intersection at Botany Road/ Geddes Avenue would require works to be completed within the road reserve and would likely require the closure of two trafficable lanes at any one time. To minimise impacts to traffic and the likelihood of disruption, intersection works should be carried out as night works outside of peak traffic periods.

Existing pedestrian footpaths on Bourke Road, Botany Road and O'Riordan Street would form part of the construction footprint, therefore pedestrians would need to be diverted to temporary pedestrian paths whilst the upgrades are undertaken. Traffic controls would be put in place to provide for safe alternate pedestrian access.

It is not anticipated that access to surrounding properties would be significantly impacted during the construction period. Where properties are affected, alternate access points with minor adjustments would be made available in consultation with affected properties to ensure access is maintained for the duration of the construction period.

Once works are completed the GS2AC would have a positive impact on connectivity for the town centre, allowing safer and easier pedestrian, cycleway and public transport routes to the GSTC. While private vehicles would be actively discouraged local vehicle access for properties (both current and future) along the GS2AC would be permitted once the road is in operation.

Noise and vibration

During construction, noise levels would be likely to exceed construction noise goals for the majority of receivers along the construction route. Impacts would be greatest for residential receivers when construction takes place towards the eastern end of the works. Reasonable and feasible noise mitigation would be applied to minimise potential construction noise impacts.

A Construction Noise and Vibration Management Plan (CNVMP) would be developed as part of the Construction Environmental Management Plan (CEMP) to manage potential construction noise and vibration impacts to sensitive receivers.

The risk of structural damage from vibration intensive works during construction is generally assessed as being low, given setback distances. However, this would be confirmed during detailed design, and site-specific measures incorporated into the CNVMP to ensure appropriate setbacks are maintained.

Operational road traffic noise impacts were assessed, and reasonable and feasible noise mitigation measures considered for the Proposal.

The operational traffic noise assessment identified three sensitive receivers (apartment buildings) to be eligible for noise mitigation based on predicted operational traffic noise.

Noise mitigation in the form of quieter road surfaces, noise barriers, and architectural treatments has been considered. The use of quieter noise pavements along the GS2AC would not provide suitable noise reduction as the exceedances are occurring as a result of redistributed traffic on adjacent roads. Noise barriers were not considered appropriate due to the requirement to maintain road access to residents, in addition to the height of the apartment buildings.

Architectural treatment is recommended at all three receivers that were found eligible for the consideration of noise mitigation, however it is noted that these receivers are all under construction and therefore would be designed to contemporary standards, taking into account road traffic noise amenity in the area.

Socioeconomic

The City aims to achieve sustainable renewal of residual lands located in the eastern section (Geddes Avenue/ Botany Road to O'Riordan Street) of the Proposal to provide two (2) mixed use affordable housing developments. This would include a 200 unit affordable housing development to the north of the proposed roadway and a 100 unit affordable housing development to the south. This aligns with *Sustainable Sydney 2030* and its objective to achieve more affordable housing options within the Local Government Area.

The Proposal would assist the City in achieving these objectives by providing key transport infrastructure that would cater for greater public transport connectivity and accessibility to support planned affordable housing development. The roadway would allow for safer and more accessible pedestrian and cycle routes to key transport locations and service areas. The focus on public transport/ cycle and pedestrian modes is expected to provide for increased urban activation and amenity along the route, and overall beneficial social outcomes for future residents along the roadway. Urban design and landscaping would be implemented to enhance the amenity and safety in design aspects of the streetscape.

Contamination

The Proposal is situated on land that was previously used for industrial and commercial use and there is potential for contaminants to be present within the underlying soils. Excavation has the potential to expose contaminants within the soil. If not appropriately managed, this may present a health risk concern to construction workers and the community. The exposure of contaminants could also pose an environmental risk if they were to enter nearby waterways via construction runoff into the surrounding stormwater network. Potential contamination impacts may also arise from the use of fuels, lubricants and chemicals for construction plant and equipment in the case of accidents or spills.

A Contaminated Land Management Plan would be prepared as part of the CEMP incorporating management and mitigation measures outlined in the Remedial Action Plan (PB, 2016) and Acid Sulfate Soil Management Plan (PB, 2016) which cover the Proposal Area.

Overall, the impact resulting from contamination within the Proposal Area is considered to be low and would not preclude the Proposal and land use change as proposed.

Hydrology

The hydraulic impact of constructing the Proposal was assessed as part of the 2017 REF utilising the available hydraulic model from the *Green Square Catchment Floodplain Risk Management Plan* (CoS, 2013). The current design would maintain the same road levels and storm water infrastructure capacity that were modelled in the 2017 REF.

The hydraulic assessment shows that there would be no significant adverse impact resulting from the Proposal on surrounding hydrology.

Biodiversity

Potential biodiversity impacts resulting from the Proposal were assessed through a review of publicly available information Proposal and a walk through of the Proposal area by an ecologist. The assessment identified that vegetation in the area is generally comprised of environmental weeds common to urban areas of Sydney. The main impacts of the GS2AC would be the direct clearing of scattered native vegetation. This would result in very minor, localised impacts on existing native vegetation, with negligible impacts to fauna. The removal of individual trees and replacement with native landscape planting would result in a minor net benefit for vegetation in this location.

Fifteen (15) street trees would be required to be removed. This would be offset by 33 new trees which are to be planted as part of the landscaping works for the Proposal.

Habitat impacts associated with the works would be localised and temporary. There would be no significant impact on habitat for known threatened species. Overall, the Proposal is not considered likely to result in a significant impact upon biodiversity values, including threatened species and ecological communities.

Conclusion

GS2AC is essential to support the GSTC providing improved local access and connectivity, and significant benefits by enabling a safe and efficient public transport, cycle and pedestrian link. The Proposal is consistent with relevant State and local environmental planning policies and strategies, as well as *Sustainable Sydney 2030*.

This REF has assessed key environmental impacts associated with the GS2AC and finds that, subject to the implementation of recommended mitigation measures, the construction and operation of the Proposal would not result in significant impacts. The Proposal may therefore be approved by the City, as the determining authority.

Abbreviations

Abbreviation	Meaning
ASS	Acid Sulfate Soils
ASSMP	Acid sulfate soil management plan
ATC	Automatic traffic counts
BC Act	*Biodiversity Conservation Act 2016*
CEMP	Construction Environmental Management Plan
The City/Council	The City of Sydney Council
CLM Act	*Contaminated Land Management Act 1997*
CNVMP	Construction Noise Vibration Management Plan
CO	Carbon Monoxide
CoS	City of Sydney
dB(A)	A-weighted decibels
DAP	Design Advisory Panel
DCP	Development Control Plan
DPIE	Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
ESD	Ecologically Sustainable Development
EPA	Environment Protection Authority
EP&A Act	*NSW Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPI	Environmental Planning Instrument
EPBC Act	*Environment Protection Biodiversity and Conservation Act 1999*
ESS	NSW Department of Environment Energy and Science
GS2AC	Green Square to Ashmore Connector Road
GSTC	Green Square Town Centre
ICNG	Interim Construction Noise Guideline
Km	Kilometres
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
m	Metres
mbgl	Metres below ground level
NCG	Noise Criteria Guidelines
NEPM	National Environment Protection Measures
NMG	Noise Management Guidelines
MNES	Matters of National Environmental Significance

Abbreviation	Meaning
NPI	National Pollutant Inventory
NPW Act	*National Parks and Wildlife Act 1974*
OEH	Office of Environment and Heritage
PASS	Potential Acid Sulfate Soils
Pb	Lead
PM	Particulate matter
PMF	Probable Maximum Flood
POEO Act	*Protection of the Environment Operations Act 1997*
REF	Review of Environmental Factors
RMS	Roads & Maritime Services
RNP	Road Noise Policy
SDS	Safety Data Sheet
SEPP	State Environmental Planning Policy
SES	State Emergency Services
SHR	State Heritage Register
SO_2	Sulphur Dioxide
TCP	Traffic Control Plans
TfNSW	Transport for New South Wales
TMAP	Transport Management Accessibility Plan
TMC	Turning movement count
TMP	Traffic management plan
TPZs	Tree protection zones
WARR Act	*Waste Avoidance and Resource Recovery Act 2001*
WMP	Waste Management Plan
WSUD	Water Sensitive Urban Design

1.0 Introduction

This Review of Environmental Factors (REF) has been prepared by AECOM Australia Pty Ltd (AECOM) on behalf of the City of Sydney (the City) to assess a proposed transport corridor connecting Botany Road and Geddes Avenue to Bowden Street, Alexandria (the Site), known as the Green Square to Ashmore Connector Road (GS2AC) (the Proposal).

The City is the proponent for GS2AC and is also the "determining authority" for the Proposal under Part 5, Division 5.1 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act).

1.1 Overview of the Proposal

1.1.1 Background

The GS2AC has long been considered as a transport solution to improve access to the Green Square Town Centre (GSTC) for pedestrians, cyclists, buses and vehicles.

The road was originally investigated in the *Green Square Structural Masterplan 1997* (City of Sydney, (CoS), 1997) and throughout the 2000's, where a preliminary route alignment was suggested. In 2008, the *Green Square Transport Management and Accessibility Plan* (TMAP, CoS, 2008) further identified the Proposal to improve road access to GSTC. The Proposal is currently identified in the *Sydney Development Control Plan 2012* (Sydney DCP) (CoS, 2012).

In 2017, the City prepared a Review of Environmental Factors for the then concept design of the road: *Green Square to Ashmore Connector Road between Botany Road and Bowden Street, Alexandria REF* (CoS, 2017) (hereafter referred to as the 2017 REF). Following exhibition and consideration of issues raised in submissions, the 2017 REF was self-determined by the City under Division 5.1 of the EP&A Act in December 2018.

In April 2019, the concept design for GS2AC was taken to the City of Sydney Design Advisory Panel (DAP) for review. The DAP made several design recommendations, requiring amendments to the concept design presented in the 2017 REF.

A consistency assessment, *Green Square to Ashmore Precinct Connector Road (GS2AC) – REF Planning Pathway* (AECOM, 2020) identified that the design objectives of the revised concept plan primarily caters for active and public transport modes, and is not consistent with the approved 2017 REF (which allowed for all modes), requiring a new REF. It is noted that whilst the design objectives of GS2AC have evolved since the 2017 REF approval, the overall physical corridor as approved in the 2017 REF remains largely unchanged.

1.1.2 Key features of the New Proposal

The GS2AC comprises a 380m road from Botany Road to Bowden Street via O'Riordan Street and Bourke Road with two (2) new signalised intersections and upgrade works to the existing Botany Road / Geddes Avenue signalised intersection. The Geddes Avenue/ Botany Road to O'Riordan Street section of the GS2AC corridor is generally referred to as the eastern section and the O'Riordan Street to Bourke Road/ Bowden Street is referred to as the western section.

Key features of the Proposal include:

- Single lane traffic in each direction with a public transport corridor (bus lanes)
- On-road two-way cyclepath along the GS2AC road to connect the existing east-west cyclepaths on Bowden Street and Geddes Avenue and interchange with the existing north-south cyclepath on Bourke Road
- Provision for emergency vehicle access along the corridor
- Amendment to the southern boundary of the Site, on the Western block, with the footprint extending into Ausgrid owned property to allow for a landscape buffer along the boundary of the Proposal. Adjustment to adjoining property fence as required
- Adjustment to property boundary and access arrangements for the A2B Australia-owned property

- Removal of trees affected by the proposed road
- Relocation of utilities and services as required
- Property access and service driveways for sites including 15 O'Riordan Street (Ausgrid), 330 – 338 Botany Road (affordable housing provider), 338 Botany Road (community housing provider) and 9-13 O'Riordan Street (A2B Australia)
- Other ancillary works as required to deliver the road.

Key road infrastructure relating to the Proposal include:

- Service infrastructure (stormwater, connection of the Green Square Stormwater Trunk Drain, and lighting)
- Provision for electrical, water, telecommunications and gas infrastructure and other utilities required to deliver the Proposal
- Establishment of recycled water main to cater for the proposed affordable housing developments adjacent to the road corridor
- Landscaping and tree planting as well as street furniture
- Signage.

This design has been determined in consultation with Transport for NSW (TfNSW) to accommodate future provision of bus routes in this location. A bus route is yet to be formalised (pending decision by TfNSW) and in the interim a staged approach is proposed comprising:

- Stage 1: Closure of the eastern ends of each block to ensure roadways only used for local access (closure would entail a continuous raised footpath treatment and kerb lines along O'Riordan Street and Botany Road, prior to any operating bus route along the corridor)
- Stage 2: Opening of eastern ends and implementation of a bus lane (but allowing only local access within each block) once the bus route has been formalised.

The relevant stages are shown on the concept design drawings in Appendix A.

1.2 Location of the Proposal

The Proposal is located in the City of Sydney Local Government Area (LGA) and within the Green Square Precinct, spanning the suburbs of Alexandria and Zetland. The Proposal runs east to west, bounded by Bourke Road and Botany Road as shown in **Figure 1**.

Green Square is a strategic urban renewal and employment area located between Sydney CBD and Sydney Airport and is served by the Airport & South railway line.

Figure 1 Local area

1.2.1 Proposal Area

The Proposal Area includes all areas where works would be undertaken and the locations of all ancillary facilities, including temporary construction material laydown areas.

The Proposal Area is shown in **Figure 2.**

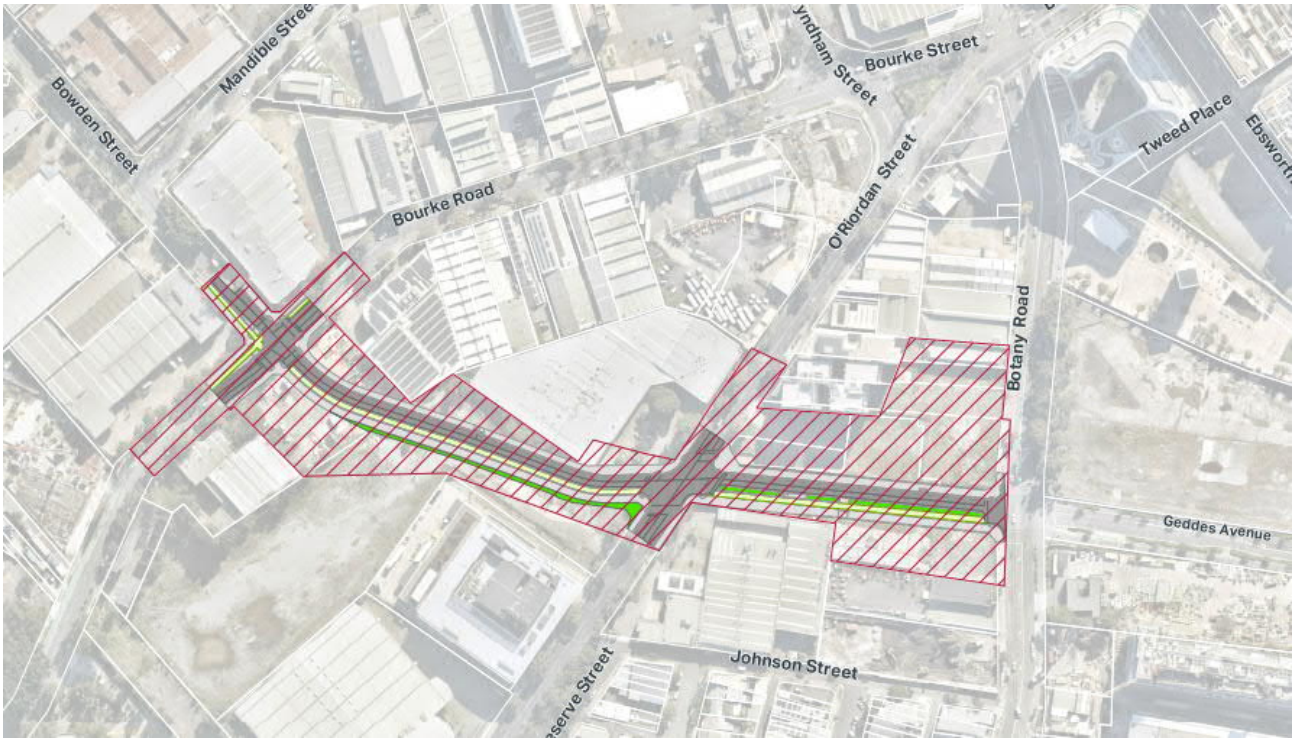

Figure 2 Proposal Area

1.2.2 Land ownership

Figure 3 presents the land ownership parcels along the proposed road and **Table 1-1** provides ownership details.

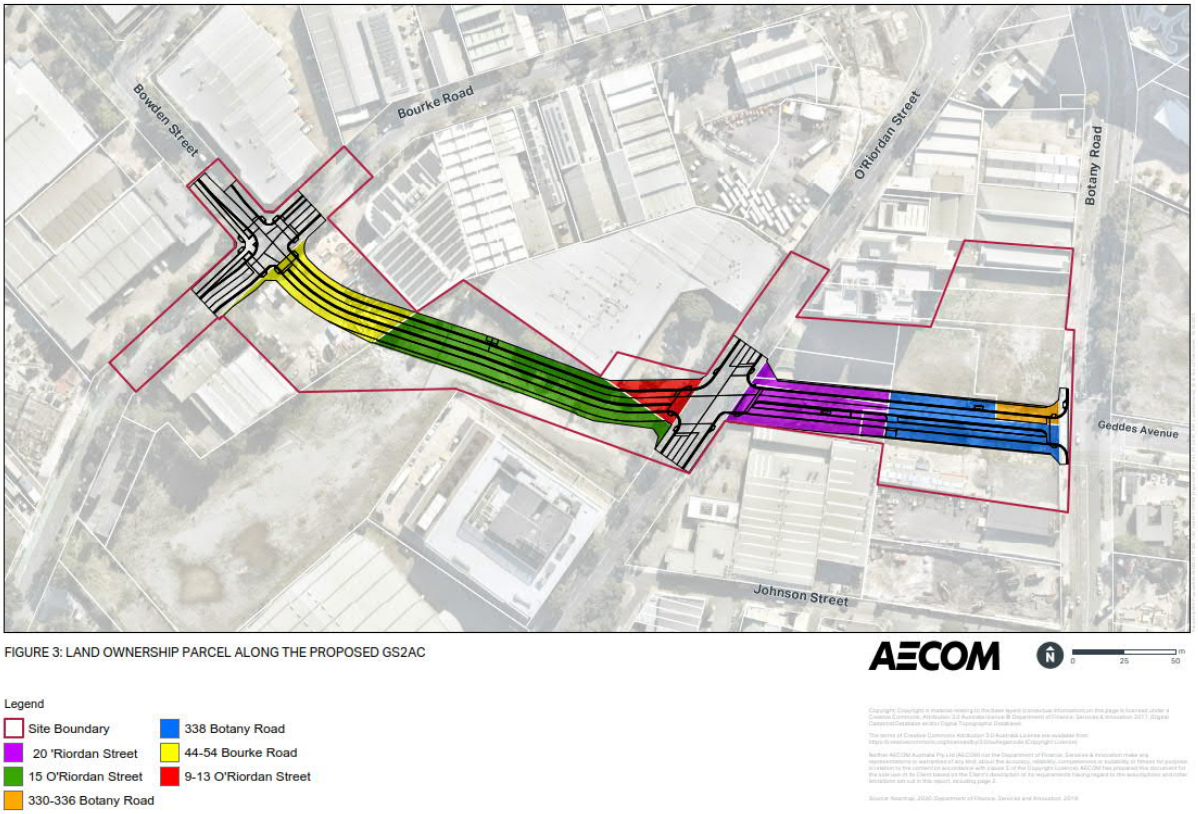

Figure 3 Land ownership parcels along the proposed GS2AC

Table 1 Land ownership

Land ownership			
Lot	**Key**	**Total area within lot (m^2)**	**Current Ownership**
DP 317055 lot 37		1474.9	CoS
DP 818246 lot 7		2386.7	Ausgrid
SP 34626		521.0	A2B Australia
DP 214410		1689.5	CoS
DP 569709 lot 101		1752.8	CoS
DP 739598 lot 1		271.5	CoS

1.3 Existing infrastructure and land uses

The Proposal Area is located within an urbanised environment, known as the southern employment Lands. The southern employment lands are identified in *the Employment Lands Strategy 2014-2019* (CoS, 2014).

The Proposal Area is subject to planning controls in the *Sydney Local Environmental Control Plan 2012* (Sydney LEP 2012) and the Sydney DCP. GSTC is subject to planning controls in the *Sydney Local Environmental Control Plan (Green Square Town Centre) 2013*.

Land uses to the south east and south west of the Site include industrial and warehouse sites. The traditional land use of the area is evolving with modern offices, warehouses and some residential housing replacing the old industrial nature of the area.

Green Square railway station is located approximately 100 m north of the Proposal boundary.

Sensitive receivers (land uses which are sensitive to potential noise, air and visual impacts) within the GSTC precinct in proximity to the Proposal include:

- Residential land uses – the closest being properties along Queen Street located approximately 100 m south of the Proposal boundary and Bridgehill Development, located on Paul Street / Geddes Avenue
- Areas for active recreation
- Places of worship – Zetland Mosque located approximately 300 m north east of the Proposal boundary
- Medical centre – Green Square Health located approximately 500 m north east of the Proposal boundary
- Hotel apartments - Veriu Suites located adjacent to the development.

The applicable land zoning for this area is specified by the Sydney LEP. The Proposal Area is primarily located within an area zoned as 'B7 – Business Park'. Part of the Proposal would also be undertaken on land zoned as SP2 Infrastructure (Road).

Nearby land zones are comprised of the following:

- B6 – Enterprise Corridor
- R1 – General Residential
- B4 – Mixed Use
- RE1 – Public Recreation.

Key existing infrastructure within the Proposal Area includes:

- Underground and overhead electricity, stormwater, sewerage and telecommunications infrastructure.
- Street lighting.

The location of the Proposal and its corresponding and surrounding land use zones is illustrated in **Figure 4**. GSTC is a deferred matter in Sydney LEP 2012 and land zonings in this area are subject to Sydney LEP(Green Square Town Centre) 2013.

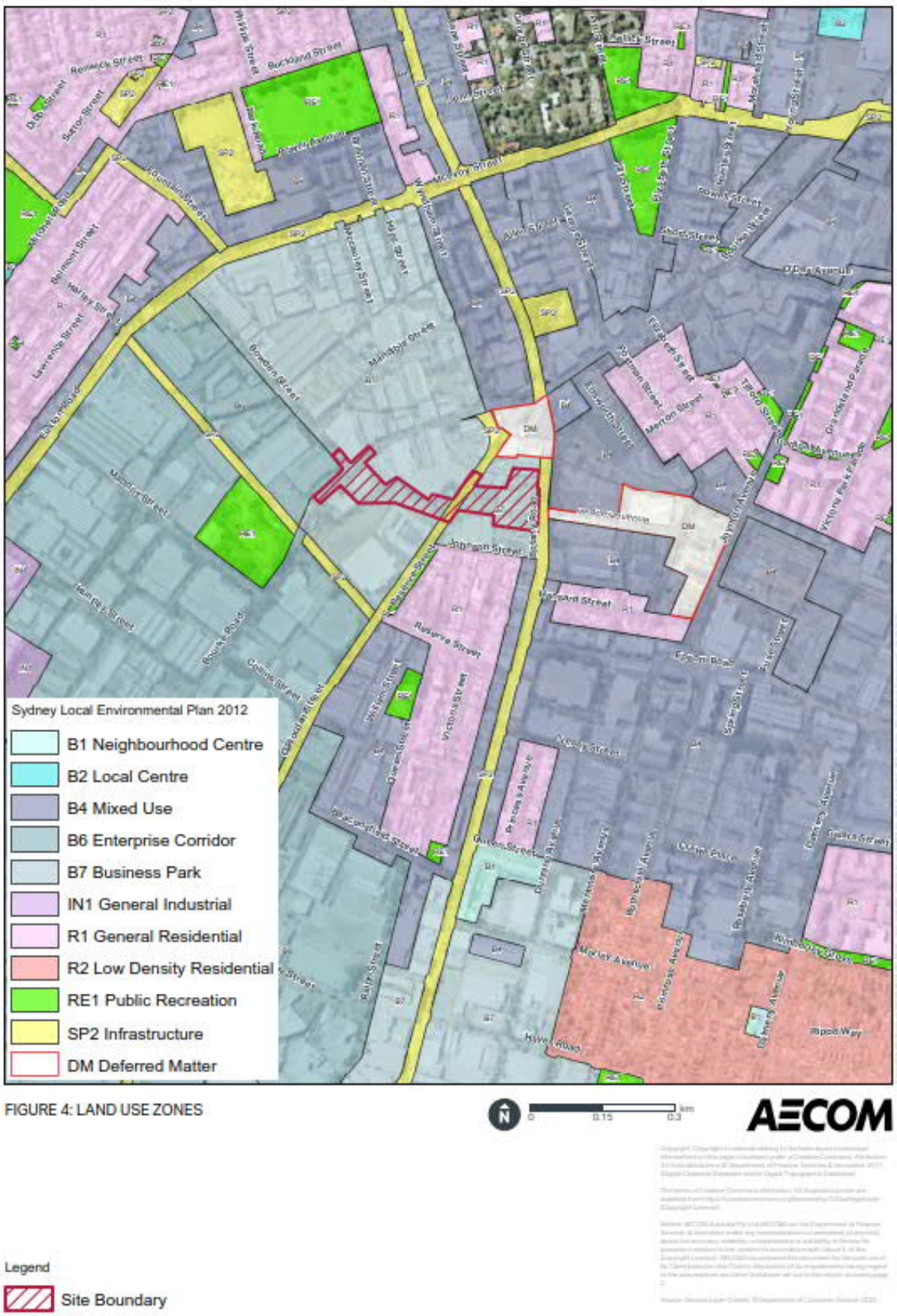

FIGURE 4: LAND USE ZONES

Figure 4 Land use zones

1.4 Purpose of this Review of Environmental Factors

This REF has been prepared by AECOM on behalf of the City of Sydney. The purpose of this REF is to:

- Describe the Proposal
- Document, examine and consider to the fullest extent possible the likely impacts of the Proposal on the environment
- Detail mitigation measures to be implemented
- Determine whether an Environmental Impact Statement or Species Impact Statement is required in relation to the Proposal
- Determine whether the Proposal can proceed.

For the purposes of these works, the City of Sydney is both the proponent and the determining authority for this REF under Part 5, Division 5.1 of the EP&A Act.

The Proposal and associated environmental impacts have been described in the context of clause 228 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), the *Biodiversity Conservation Act 2016(BC Act)*, the *Roads Act 1993* (Roads Act), other relevant NSW legislation and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In doing so the REF helps to fulfil the requirements of Section 5.5 of the EP&A Act, for the City to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

The findings of the REF would be considered when assessing:

- whether the Proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Public Spaces under Division 5.2 of the EP&A Act
- the significance of any impact on threatened species as defined by the BC Act 2016 and/or Fisheries Management Act 1994(FM Act) and therefore the requirement for a Species Impact Statement
- the potential for the Proposal to significantly impact a matter of national environmental significance or Commonwealth land and the need to make a referral to the Australian Government Department of Agriculture, Water and the Environment for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

2.0 Need and options considered

Section 2.0 discusses the need and objectives of the Proposal. This section also provides a summary of the options that have been considered during development of the Proposal and why the preferred option has been chosen.

2.1 Strategic justification

2.1.1 Overview

The GS2AC is a long identified transport initiative to improve connection to GSTC. A *Green Square Town Centre Parking and Traffic Study* conducted in 2012 highlighted the need for better connection to Green Square from the Inner West, inclusive of the Ashmore Precinct.

Sustainable Sydney 2030 was a reinforcing factor in the strategic need to provide connectivity and access to the town centre through access roads and public transport routes. In accordance with *Sustainable Sydney 2030*, the City is aiming to shift towards sustainable modes of transport such as walking and cycling and the preference for public transport rather than private vehicle use.

2.2 Relevant policies and strategies

2.2.1 Sustainable Sydney 2030

Sustainable Sydney 2030 proposes a Liveable Green Network to provide safe, quality, continuous routes for pedestrians and cyclists. The updated Proposal provides dedicated cycle lanes and pedestrian facilities which would connect to broader networks including existing cycle paths on Bowden Street and Bourke Road and new cycle paths being constructed along the southern edge of Geddes Avenue in the GSTC. The Proposal design to prevent through traffic and prioritise public transport, cycle paths and pedestrian facilities, provides for high amenity and safe travel experience for pedestrian and cycle users.

2.2.2 Sydney Metropolitan Strategy

A Plan for Growing Sydney (The Sydney Metropolitan Strategy) was released in 2015 as the NSW Government's 20-year plan for the Sydney Metropolitan Area. It provides direction for Sydney's productivity, environmental management and liveability; and for the location of housing, employment, infrastructure and open space. The Plan establishes a vision for Sydney as a strong global city, and great place to live. The vision is supported by key goals and principles aimed at encouraging improvements in transport infrastructure, housing, resilience and sustainability while maintaining a strong and competitive economy.

The Plan segregates Sydney into six (6) subregions with Green Square forming part of the Central Subregion. Green Square is nominated as a "Strategic Centre" containing mixed uses, densities and diversity that is of metropolitan significance. This includes commercial, civic and cultural centres, government services and higher density housing.

The Proposal is consistent with The Plan through the provision of a new transport corridor linking to a Strategic Centre. This would enhance the area's connectedness, providing increased amenity for residents, workers and visitors through the provision of high-quality public domain that acts as a gateway to the GSTC, incorporating modern design elements and landscape treatment. The priority on public transport, cycle path and pedestrian facilities would in particular support sustainability and liveability outcomes for residents, visitors and workers in the area, by providing high quality, viable and safe public transport, cycle and pedestrian options connecting to wider networks.

2.2.3 Our Greater Sydney 2056 - A Metropolis of Three Cities

In October 2017, the Greater Sydney Commission published *Our Greater Sydney 2056 – A Metropolis of Three Cities*, which supports the vision for a metropolis of three cities to balance growth and deliver its benefits more equally and equitably to residents across Greater Sydney.

The Proposal is consistent with the broader metropolitan vision for Greater Sydney by ensuring that it would support local access for an increasing number of residents moving in the area and by ensuring

Green Square contributes to the economic function of the Eastern Economic Corridor, which runs from Macquarie Park to Sydney Airport, by improving connectivity.

2.2.4 Our Greater Sydney 2056 - Eastern City District Plan

The Eastern City District Plan sets out planning priorities and actions for improving the quality of life for residents of the Eastern City District, of which Green Square is a strategic centre. Planning priorities include:

Planning Priority E1 – Planning for a city supported by infrastructure

Planning Priority E5 – Providing housing supply, choice and affordability with access to jobs, services and public transport,

The Proposal is consistent with the aims of the Eastern City District Plan by providing safe, accessible public transport, cycle and pedestrian infrastructure, which supports housing, employment and public transport objectives in the Plan.

2.3 Proposal objectives

The Proposal objectives for the delivery of the GS2AC are provided below:

- Provide a local access road that improves access to the GSTC primarily for pedestrians, cyclists and public transport users. There would be limited access to private vehicles
- Provide a road with a high quality public domain that acts as a gateway to the Town Centre which incorporates modern design elements and landscape treatment
- Achieve the integration of the proposed road with the existing and future road and transport network
- Provide an opportunity for conveyance of stormwater through the proposed site via the Green Square Stormwater Drain from Link Road Rosebery to the Alexandra Canal
- Achieve the integration and timely provision of future servicing infrastructure within the road corridor and provide an opportunity to expand the Town Centre water recycling network into the East Alexandria precinct
- Provide a road which complies with relevant Australian, TfNSW and Council road access and safety standards
- Provide an opportunity to achieve the sustainable reuse of lands for affordable housing and other employment generating uses
- Provide a road of minimal engineering, environmental and planning impact
- Ensure timely and accurate communication and notification with key stakeholders and local residents during planning and construction
- Minimise environmental impacts during the construction stage
- Minimise potential disruption to existing road users and adjoining property owners during the construction stage.

2.4 Alternatives considered

2.4.1 Option 1 – Harley Street Extension

The City investigated an alternative option for an east-west road connection between Botany Road and Bourke Road. The Harley Street extension was identified by the City from Botany Road south of the Town Centre, to Harley Street between Mitchell Road and Euston Road. This option was abandoned prior to the development of the TMAP (2008) as the proposed route does not directly link with the Town Centre and is 200m south of the proposed Botany Road/Geddes Avenue access. This access also has the potential to create further traffic conflicts on Botany Road.

The Harley Street option was reviewed at an early stage and no further investigation has been undertaken by the City.

2.4.2 Option 2 - The 2017 REF Preferred Option

The 2017 REF preferred route alignment provided a more appropriate solution to addressing existing and future transport and access constraints affecting the development of the Town Centre and the broader Green Square area, by linking up with Geddes Avenue. The 2017 REF preferred route also connected with three (3) main roads in the Green Square area (Botany Road, O'Riordan Street, Bourke Road), allowing an easier path of travel for buses, cyclists and pedestrians wishing to gain access to GSTC and Green Square railway station. Essentially the 2017 REF design proposed an alternative path of travel via the congested intersection at Bourke Road/Wyndham Street/Botany Road/ and Bourke Road.

The option also allowed for the accommodation of the Green Square Stormwater Drain, which is a significant stormwater infrastructure asset owned by Sydney Water and the City to address existing flooding constraints in Green Square area, and provided easement opportunity to expand the water recycling network in the GSTC.

This option also provided the potential for urban renewal of vacant industrial land to be used for affordable housing and long term employment uses, without a significant loss of commercially viable land.

This option had the general support of TfNSW and key landowners, subject to further negotiations regarding the proposed design, and was also more favourable due to the presence of existing City owned land.

2.4.3 Option 3 – The New Preferred Option (Updated Concept Design)

In April 2019, the 2017 REF preferred option was presented to the City of Sydney Design Advisory Panel (DAP). The DAP made several design recommendations, requiring amendments to the concept design. Following the recommendations of the DAP, the new preferred option was designed.

The new preferred option follows the same route as Option 2 and provides the same benefits in terms of connection with main roads, providing a public road corridor for water infrastructure and potential for urban renewal.

The main difference between Option 2 and Option 3 is that the Proposal would no longer be open to private vehicles, with the exception of providing access to properties located along the road. Option 3 focuses on providing connection to the GSTC by means of public and active transport. A single lane of traffic in each direction would allow for a public transport corridor. A new bus route is yet to be formalised, however the Proposal design has been determined in consultation with TfNSW to make provision for a bus route in the future to accommodate future demand from urban renewal and expansion in the precinct. The reduction in space allocation to traffic also means that cyclepaths, footpaths and planting have all been increased.

From a public and active transport point of view, Option 3 provides superior outcomes to Option 2 whilst maintaining the general corridor benefits of the 2017 REF design. In prioritising public and active transport modes, the current preferred concept design aligns with the sustainability and liveability objectives of the *Sydney Metropolitan Strategy, Sustainable Sydney 2030, Our Greater Sydney 2056* and the *Eastern City District Plan*.

2.4.4 Option 4 – Sydney Development Control Plan 2012 Route Alignment

Sydney DCP 2012 presents a slightly modified alignment to the current preferred concept design option as presented in this REF. The main difference is a straighter section of road from O'Riordan Street to Bourke Road

This provides an alignment that is consistent with TfNSW requirements for straight angle approaches to signalised intersections and allows for improved sightlines for users of the proposed road providing a continual uninterrupted visual link towards the east and west along the route

Design investigation of this option occurred but was not considered further due to additional land impacts within the A2B Australia Site. Under the preferred option, only a small triangular portion of the

land (approximately 521m^2) would need to be purchased which represents 6% of the total land area (approximately 8,849m^2).

Since the DCP has a straighter road alignment, a greater land area (1,750m^2 or 20% of the total land) within the A2B Australia Site would need to be acquired with a subsequent broader impact area.

Another constraint of Option 4 is that it requires a small amount of City owned land at 34-42 Bourke Road as compared to the preferred option which does not use this property.

In summary, Option 4 has a broader impact area without adding significant improvement to road function. It should be noted that Option 3 still provides adequate site distance in accordance with road design requirements for local access vehicles and public transport using the road.

2.4.5 Option 5 – "Do Nothing" option

The "Do Nothing" option would not provide a viable solution which addresses the need for a connector road and achieves *Sustainable Sydney 2030* objectives.

The "Do Nothing" option would result in further constraints to accessibility in this part of the Green Square area and would undermine the vision contained in the *Sydney Metropolitan Strategy, Sustainable Sydney 2030, Our Greater Sydney 2056* and the *Eastern City District Plan*. Further, it would prevent access from east to west to the Green Square area which exists in an area with predominantly north-south roads. The preferred alignment would significantly improve accessibility to this part of the LGA and support the function of the GSTC.

2.5 Proposal benefits

The benefits of the Proposal include:

- Provision of an important transport corridor for public and active transport uses, with proposed bus stops in both directions and opportunity to move existing bus routes to the Proposal, or even create new routes to help service GSTC, accommodating future expansion
- Establishment of high pedestrian priority including a wide footpath zone, street furniture zone, continuous tree canopy to reduce heat island effect, bus stops and kerb extensions. These inclusions help facilitate the movement of people within the area
- A bidirectional cycle path to provide a much needed connection between existing cycle paths on Bowden Street and Bourke Road and new cycle paths being constructed along the southern edge of Geddes Avenue in GSTC, with linkages to the broader network
- Provision of an easement corridor to expand the water recycling network from GSTC towards future development sites adjacent to the proposed GS2AC and further west towards Ashmore Precinct
- A Proposal with a strong east-west spine formed through GSTC along Geddes Avenue to the west and ultimately onto Bowden Street
- Safe and efficient public and active transport linkages to support new affordable housing and ground floor commercial and retail premises to be developed on residual land and adjacent the Proposal, with the potential to generate increased community interaction and vibrancy for the urban core
- Proposed signalised intersections at Botany Road, O'Riordan Street and Bourke Road, to enhance pedestrian and cyclist safety and accessibility in this part of the Green Square area, where east-west permeability is currently limited, and which would also improve access to the Green Square railway station and GSTC.

3.0 Proposal description

Section 3.0 describes the Proposal and summarises key design parameters, construction method and associated infrastructure and activities. The description of the Proposal is based on the concept design and is subject to detailed design.

3.1 The Proposal

As described in **Section 1.1.1**, the primary feature of the Proposal involves the construction and operation of new roadway, running east to west from Botany Road to Bowden Street via O'Riordan Street and Bourke Road. The Proposal includes two (2) signalised intersections and upgrade works to the existing Botany Road / Geddes Avenue intersection. The roadway is focused on providing public and active forms of transport.

Details of the works being undertaken in those sections are outlined in the following section.

3.1.1 Scope of works

The following works would be undertaken:

- Construction of new road for approximately 380m from the Botany Road/Geddes Avenue intersection to the Bourke Road/Bowden Street intersection to be designed in accordance with Australian and City standards
- Incorporation of a western arm to the signalised intersection at Botany Road – Geddes Avenue
- New signalised intersection at O'Riordan Street to include the eastern and western approaches of the proposed road
- New signalised intersection at Bourke Road / Bowden Street to include an eastern approach from the proposed road. This intersection would provide interchange between the north-south cyclepath on Bourke Road and the east-west cyclepath on Bowden Street
- On-road two-way cyclepath located on the southern side of the proposed road to connect the existing east-west cyclepaths on Bowden Street and Geddes Avenue
- Batters, mounds and retaining walls to provide the structural support to the road and required interfaces to adjacent properties
- Stormwater connections to the Green Square Stormwater Drain
- Street lighting of all roads to meet required statutory requirements with increased illumination at proposed pedestrian crossing facilities
- Road signage and directional signage
- Provision for electrical, water, telecommunications and gas infrastructure and other utilities required for the Proposal
- Provision of a recycled water main to service proposed affordable housing developments located between Botany Road and O'Riordan Street and potentially future development in the Ashmore Precinct
- Landscaping and tree planting as well as street furniture
- Removal of trees affected by the proposed road
- Excavation and export of contaminated material
- Installation of a marker layer and capping layer above contaminated material remaining onsite
- Amendment to the southern boundary of the Site, on the Western block, with the footprint extending into Ausgrid owned property (compared to the 2017 REF design) to allow for a landscape buffer along the boundary of the proposed road. Adjustment to adjoining property fence as required
- Adjustment to property boundary and access arrangements for the A2B Australia-owned property

- Relocation of services as required
- Provision of a service driveway to allow the servicing and maintenance of existing telecommunications tower on site at 15 O'Riordan Street (Ausgrid)
- Construction of future service driveways to adjoining development within the road corridor
- Property access and service driveways for sites including 15 O'Riordan Street (Ausgrid) 330 – 338 Botany Road (Preferred affordable housing provider) and 338 Botany Road (Preferred community housing provider) and 9-13 O'Riordan Street (A2B Australia).

3.2 Design standards

The Proposal has been designed having regard to the following:

- *Austroads Guide to Road Design* (Austroads, 2009)
- *Austroads Guide to Road Safety* (Part 6: Road Safety Audit) (Austroads 2002)
- Relevant Australian Standards.

3.3 Staging

In early 2015 the City determined that the Proposal would be delivered in a single stage. It was originally anticipated that construction would commence in early 2019 and be delivered by the end of 2020. It is now anticipated that the construction of the Proposal would commence in 2021 and be delivered by the end of 2022.

This timing has the support of TfNSW (formerly RMS) and would allow the City to redevelop the residue lands at 330, 332, 334-336 and 338 Botany Road for affordable housing and ground floor commercial uses to achieve activation, once the Proposal has been completed.

If a bus route is not formalised (pending decision by TfNSW), there is potential for the Proposal to be delivered in two stages:

- Stage 1: Closure of the eastern ends of each block to ensure roadways only used for local access (closure would entail a continuous raised footpath treatment and kerb lines along O'Riordan Street and Botany Road, prior to any operating bus route along the corridor)
- Stage 2: Opening of eastern ends and provision of a bus lane (but allowing only local access within each block) once the bus route has been formalised.

3.4 Construction

3.4.1 Construction duration

Construction is expected to occur over a period of approximately 18 months for Stage 1, and a further six (6) months for Stage 2.

3.4.2 Construction activities

The following activities are indicative of the works that would be carried out:

- Install environmental controls and implement traffic management measures
- Survey, set-out and identify services
- Remediation activities and bulk earthworks. This includes sorting, stockpiling, loading and transporting material
- Install retaining walls, excavate, cut and fill to design levels
- Install pipe drainage and utilities works (including adjustments to existing services and utilities as required)
- Import pavement sub-base material and compact

- Install kerbs, footpath slabs, lighting and traffic signals installation
- Install asphalt wearing course and footpath pavements
- Complete landscaping (including tree planting), install street furniture, signage and commission traffic signals
- Demobilise, clean site and remove traffic management and environmental controls.

3.4.3 Construction hours

Standard construction hours would include:

- Monday to Friday: 7:30am to 5:30pm
- Saturdays: 7:30am to 3:30pm
- Sundays or public holidays: No work permitted (except with prior CoS approval).

Night work, during intersection works on existing arterial roads would be required to minimise traffic impacts. Plant and equipment

Plant and equipment required to undertake the works would likely consist of a combination of:

- Tracked excavators (10 tonnes, 15 tonnes and 30 tonnes)
- Tipper trucks
- Tree trimmers and mulchers
- Compaction equipment such as drum, vibrating rollers and plate compactors
- Air compressors
- Pumping equipment
- Crushing / screening plant
- Smaller tools and equipment such as concrete and paver cutting equipment, jack hammers and miscellaneous handheld tools.

3.4.4 Ancillary facilities

3.4.4.1 Construction compounds and laydown areas

Construction compounds and laydown areas would be located within the Proposal area and identified by the construction contractor in the CEMP. These areas would be used for:

- Storage of plant and materials
- Worker amenity areas – site offices, kitchen, toilets
- Limited construction vehicle parking.

3.4.4.2 Public utility adjustment

The Proposal would require adjustment of the following public utilities:

- Sydney Water water mains
- Sydney Water sewer mains (generally limited to manhole adjustments)
- Ausgrid electrical infrastructure (aerial and underground assets)
- Jemena gas infrastructure
- Various Communications infrastructure (including Optus, Telstra, Pipe Networks, NextGen, Verizon, AAPT/Powertel and Vocus).

Consultation with the utility companies is ongoing and Dial- Before-You-Dig measures would confirm utility locations. Protective measures would be identified to avoid damage during construction and utility relocation works.

A more comprehensive list of utilities is presented in **Table 2** below

Table 2 Existing services impacted by the proposed GS2AC

Authority	Location	Description
Ausgrid	Botany Road, O'Riordan Street, Bourke Road	Existing aerial and underground assets present.
Sydney Water (water)	Botany Road, O'Riordan Street, Bourke Road	Existing water mains in Botany Road in western footpath and roadway. Existing main in O'Riordan Street located in eastern footpath Existing main in Bourke Road located in western footpath.
Sydney Water (sewer)	Botany Road, O'Riordan Street, Bourke Road	Existing main in Botany Road located in roadway. Existing trunk main in O'Riordan Street located in roadway. Existing main in Bourke Road located in roadway. Existing sewer mains expected to be maintained without change.
Telstra	Botany Road, O'Riordan Street, Bourke Road	Existing Telstra infrastructure is located in Botany Road, comprising major duct bank within the western footpath. Existing infrastructure also located in O'Riordan Street and Bourke Road footpaths, as well as lead-in infrastructure servicing existing lots impacting zone of works in multiple locations.
Optus	Botany Road	Existing major Optus infrastructure located in eastern footpath.
Pipe Networks	Botany Road	Existing Pipe Networks infrastructure is located in the main Telstra duct bank in Botany Road western footpath.
NextGen	Botany Road	Existing NextGen infrastructure is located in the main Telstra duct bank in Botany Road western footpath.
AAPT/Powertel	Bourke Road, Bowden Street	Existing infrastructure located in the north-eastern footpath at the Bowden Street/Bourke Road intersection.
Verizon	Bourke Road, Bowden Street	Existing infrastructure located in the north-eastern footpath at the Bowden Street/Bourke Road intersection.
Vocus	Bourke Road, Bowden Street	Existing infrastructure located in the north-eastern footpath at the Bowden Street/Bourke Road intersection.
Jemena	Botany Road, O'Riordan Street, Bourke Road	Jemena natural gas mains located in Botany Road eastern and western footpaths, O'Riordan Street eastern footpath, and Bourke Road eastern and western footpaths.

3.4.5 Property acquisition

The partial or full acquisition of the following properties would be required to facilitate delivery of the Proposal:

- A2B Australia site at 9-13 O'Riordan Street, Alexandria (partial acquisition)

  - The road would pass through the south-eastern portion of the site. The City proposes to acquire a portion of the A2B Australia property (520 m^2). The land is owned by a strata association, A2B Australia

- Ausgrid site at 15 O'Riordan Street, Alexandria (partial acquisition)
  - The road would pass through the northern part of the site. The City proposed to acquire a portion of the Ausgrid owned property.
    - A section of road (2385 m^2)
    - A triangular section within the northwest corner of site (880 m^2).

Acquisition negotiations between the City and these two landowners are underway.

All other lands required for delivery of the Proposal have now been acquired by the City and no further property acquisitions are required.

4.0 Statutory and planning framework

Section 4.0 provides a summary of the statutory considerations relating to the Proposal including a consideration of Commonwealth legislation, NSW legislation, environmental planning instruments and NSW Government policies/strategies.

4.1 Commonwealth legislation

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

The (Commonwealth) EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places and other matters and activities – defined in the EPBC Act as 'Matters of National Environmental Significance' (MNES). The EPBC Act requires the assessment of whether the Proposal is likely to significantly impact on MNES or Commonwealth land. These matters are considered in full in **Appendix B**.

Based on the assessment shown in **Appendix B**, the Proposal would not significantly affect any MNES or Commonwealth land. Therefore, a referral to the Commonwealth Minister for the Environment is not required.

4.1.2 Other Commonwealth legislation

Table 3 provides a list of other relevant Commonwealth legislation applicable to the Proposal.

Table 3 Other Commonwealth legislation applicable to the Proposal

Applicable legislation	Considerations
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	There is an obligation on a person who discovers anything which he or she has reasonable grounds to suspect are Aboriginal remains to report that discovery to the Minister, giving particulars of the remains and their location. Given the built up and already disturbed nature of the site, the potential for uncovering in-situ Aboriginal heritage on site is considered to be low Mitigation measures are proposed in **Section 6.5** to ensure that unexpected finds of items of Aboriginal heritage, or Aboriginal remains (should they be uncovered) are dealt with appropriately and in accordance with the applicable legislation. Due diligence searches for existing Aboriginal heritage have been carried out and no Aboriginal heritage items have been identified within or adjacent to the Proposal Area.
Native Title Act 1983	This Act aims to provide for the recognition and protection of Native Title, how Native Title land is used and establishes a mechanism for determining claims to Native Title. There are no pending or approved Native Title claims over the Proposal Area.

4.2 NSW legislation and regulations

4.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act establishes the system of environmental planning and assessment in NSW. This Proposal is subject to the environmental impact assessment and planning approval requirements of Division 5.1 of the EP&A Act. This division specifies the environment impact assessment requirements for activities undertaken by public authorities such as City of Sydney, which are permissible without development consent.

In accordance with Section 5.5 of the EP&A Act, the City, as the proponent and determining authority, must examine and consider to the fullest extent possible all matters affecting or likely to affect the environment by reason of the Proposal. This REF has been prepared to fulfil the City's obligations under Division 5.1 of the EP&A Act.

Where a public authority forms the opinion that a Proposal is likely to have a significant impact on the environment, the preparation of an Environmental Impact Statement is required and approval is to be sought from the Minister for Planning and Public Spaces under Part 5, Division 5.2 of the EP&A Act.

Clause 228 of the EP&A Regulation defines the factors which must be considered when determining if an activity assessed under Division 5.1 of the EP&A Act has a significant impact on the environment. **Section 6.0** of this REF provides an environmental impact assessment of the Proposal in accordance with clause 228. **Appendix C** specifically responds to the factors for consideration under clause 228

4.2.2 Other NSW legislation and regulations

Table 4 provides a list of other relevant legislation applicable to the Proposal.

Table 4 Other NSW legislation applicable to the Proposal

Applicable legislation	Considerations
Biodiversity Conservation Act 2016 (BC Act)	The BC Act establishes a framework for assessing and protecting environmental and biodiversity interests. The purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. **Section 6.9.3** of this REF outlines that potential impacts to biodiversity resulting from the Proposal would not be significant.
Biosecurity Act 2015	Section 22 of this Act requires that any person who deals with a biosecurity matter has a duty to ensure that in so far as is reasonably practicable, the potential biosecurity risk is prevented, eliminated or minimised. No declared noxious weeds have been identified to occur within the LGA. Though unlikely, appropriate management methods would be implemented during construction if declared noxious weeds are identified in the Proposal Area.
Contaminated Land Management Act 1997 **(CLM Act)**	Section 60 of the CLM Act imposes a duty on landowners to notify NSW Environment, Energy and Science, and potentially investigate and remediate land if contamination is above EPA guideline levels. Chemical testing and visual characterisation in accordance with the NSW EPA *Waste Classification Guidelines* (EPA, 2014) would be undertaken to confirm the composition and nature of excavated material that is suspected of being contaminated. Where spoil is classified as unsuitable for reuse, it would be transported to an appropriately licensed offsite facility. **Section 6.7** of this REF outlines potential impacts and mitigation measures.
Heritage Act 1977 **(Heritage Act)**	The Proposal would not result in the destruction or damage of any known historical objects. There are no recorded historical objects at or near the Proposal Area. The mitigation measures proposed in **Section 6.4** would prevent potential impacts on any identified non-Indigenous heritage item.
National Parks and Wildlife Act 1974 **(NPW Act)**	Sections 86, 87 and 90 of the NPW Act require consent from the Department of Planning, Industry and Environment for the destruction or damage of Aboriginal objects. The Proposal would not result in the destruction or damage of any known Aboriginal objects. There are no recorded Aboriginal objects at or near the Proposal Area. The mitigation measures proposed in **Section 6.5** would prevent potential effects on any identified Aboriginal heritage item.

Applicable legislation	Considerations
***Protection of the Environment Operations Act 1997* (POEO Act)**	The Proposal does not involve a 'scheduled' activity under Schedule 1 of the POEO Act. However, in accordance with Part 5.7 of the POEO Act, the City would notify the EPA of any pollution incidents that occur onsite. This would be managed in the CEMP to be prepared and implemented by the construction contractor
***Roads Act 1993* (Roads Act)**	The Proposal would require works on Botany Road (classified), O'Riordan Street (classified), Bowden Street (unclassified), Bourke Road and Geddes Avenue (unclassified). Section 138 of the Roads Act requires consent from the relevant road authority for the carrying out of works in, on or over a public road. However, Clause 5(1) in Schedule 2 of the Roads Act states that public authorities do not require consent for works on unclassified (Council) roads other than a Crown road to exercise the public authority's functions over that road. On this basis, consent from TfNSW by way of a Road Occupancy Licence or other form of licence is required for works occurring on Botany Road and O'Riordan Street. The City has maintained extensive consultation with TfNSW (formerly Roads and Maritime Services (RMS)) during the Proposal, particularly with the drafting of the concept design and preparation of the Traffic and Transport Impact Assessment Report. TfNSW approval is requirement under Section 138 of the Roads Act to connect the proposed GS2AC to classified roads and work in a classified road.
Sydney Water Act 1994 (NSW)	The City needs to obtain an approval under Section 146 of the Sydney Water Act to connect the proposed stormwater network to the Green Square Trunk Drain, which is a Sydney Water asset. Approval would be obtained prior to the commencement of construction.
Threatened Species Conservation Act 1995 (NSW)	The ecology impacts of the Proposal have been assessed and it is considered that the GS2AC road corridor does not contain suitable habitat for any listed threatened species or community. An approval under this Act is therefore not required.
***Waste Avoidance and Resource Recovery Act 2001* (WARR Act)**	The City would carry out the Proposal having regard to the requirements of the WARR Act. A site-specific Construction Waste Management Plan would be prepared as part of the CEMP.
Water Management Act 2000 / 2010 (NSW)	No works are expected to intercept groundwater, therefore there are no approvals required under the Water Management Act.

4.3 Key State environmental planning policies

4.3.1 State Environmental Planning Policy (Infrastructure) 2007

The *State Environmental Planning Policy (Infrastructure)* 2007 (Infrastructure SEPP) is the key environmental planning instrument (EPI) which determines the permissibility of an infrastructure Proposal and its assessment pathway under the EP&A Act.

Under Clause 94 (1) of the Infrastructure SEPP *development for the purpose of a road or road infrastructure facilities may be carried out by or on behalf of a public authority without consent on any land* (with the exemption of land subject to the *National Parks and Wildlife Act 1974*, which does not apply to the Proposal area). Under clause 94 (2) of the Infrastructure SEPP, *road infrastructure facilities* include *construction works including*

(i) temporary buildings or facilities for the management of construction, if they are in or adjacent to a road corridor, and

(ii) creation of embankments, and

(iii) extraction of extractive materials and stockpiling of those materials, if—

(A) the extraction and stockpiling are ancillary to road construction, or

(B) the materials are used solely for road construction and the extraction and stockpiling take place in or adjacent to a road corridor, and

(iv) temporary crushing or concrete batching plants, if they are used solely for road construction and are on or adjacent to a road corridor, and

(v) temporary roads that are used solely during road construction,

Based on the provisions of Clause 94 (1) and (2) of the Infrastructure SEPP, the GS2AC Proposal (including temporary construction facilities adjacent to the road corridor) is classified as permissible without consent on all subject land, as the Proposal meets the definition of *development for the purpose of a road or road infrastructure facilities that will be carried out by or on behalf of a public authority*, being the City.

The Proposal is therefore subject to assessment under Part 5 of the EP&A Act, as development permissible without consent. As the Infrastructure SEPP prevails over local environmental plan zoning provisions, the permissibility of the Proposal is established via the provisions of the Infrastructure SEPP.

Part 2 of the Infrastructure SEPP contains provisions for public authorities to consult with local councils, State Emergency Services (SES) and public authorities other than councils prior to the commencement of certain types of development. **Section 5** of this REF discusses the consultation undertaken under the requirements of the Infrastructure SEPP and is also summarised below.

Clause 15AA of the Infrastructure SEPP requires consultation with the SES if the Proposal is situated within lands at risk of flooding. As Green Square is the subject of a flood study (Green Square & West Kensington Flood Study, 2011), the SES was notified per the requirements of the Infrastructure SEPP and provided 21 days in which to provide comment on the Proposal. No comments have been received from SES at the date of this REF.

Clause 16 of the Infrastructure SEPP requires the consultation with relevant government agencies (which are not local councils) in relation to certain specified development. As the Proposal is not specified development identified within Clause 16, further consultation with the identified government agencies is not required.

It is noted that the Infrastructure SEPP prevails over all other EPIs except where State Environmental Planning Policy (State Significant Precincts) 2005 *or State Environmental Planning Policy (Coastal Management) 2018 applies*. These SEPPs do not apply to the Proposal area or proposed activity and therefore do not require further consideration as part of this REF.

4.3.2 State Environmental Planning Policy 55 – Remediation of Land

State Environmental Planning Policy 55 – Remediation of Land (SEPP 55) provides a State-wide approach to the remediation of contaminated land for the purpose of minimising the risk of harm to the health of humans and the environment.

Clause 7 of SEPP 55 requires a consent authority to not consent to the carrying out of any development on land unless it has considered whether the land is contaminated, and if the land is contaminated, the level of remediation needed to allow the proposed development to be carried out. Furthermore, a consent authority must be satisfied that the land would be remediated before the land is used for that purpose. The risks of contamination within the Proposal Area have been assessed within the REF consistent with this requirements and mitigation and control measures to manage impacts have been identified in **Section 6.7**)

4.4 Local environmental planning instrument

4.4.1 Sydney Local Environmental Plan 2012

The Proposal is located in the Sydney LGA and is subject to The *Sydney Local Environmental Plan 2012* (Sydney LEP). **Table 5** summarises the relevant aspects of the Sydney LEP applicable to the Proposal. **Figure 4** shows the relevant section of the zoning map from the Sydney LEP, with the location of the Proposal shown. As noted above, the permissibility of the Proposal is established through the provisions of the ISEPP which prevails over LEP zonings.

Table 5 Relevant provisions of the Sydney LEP

Provision description	Relevance to the Proposal
Clause 2.3 Zone objectives and land use tables	The majority of works to be undertaken for the Proposal would be carried out on land zoned as B7 – Business park. Part of the Proposal would also be undertaken on land zoned as SP2 Infrastructure (Road). The Proposal is consistent with the objectives of the B7 and SP2 zoned land on which it is located. The Proposal would not affect the land use objectives of surrounding land zones.
Clause 2. 6 Subdivision – consent requirements	Clause 2.6 requires development consent prior to the subdivision of land. The Proposal involves subdivision of the affected lands to create the road and adjoining residue lots. The subdivision of the eastern lots was completed in 2018. A development application for the subdivision of the lots in the western section is being prepared by the City The subdivision applications are assessed under Part 4 of the EP&A Act.
Clause 2. 7 Demolition requires development consent	No demolition works are proposed, and the Proposal would support proposed urban development on adjoining lands and development of the GSTC Precinct through the provision of essential transport services.
Clause 5. 2 Classification and reclassification of public land	Clause 5.2 requires the classification or reclassification of public land. Prior to the road being opened, the City proposes to classify the land as a “road” under the Roads Act 1993.
Clause 5. 10 Heritage conservation	Clause 5.10 of the Sydney LEP aims to conserve the environmental heritage of Sydney, conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, setting and views, conserve archaeological sites, and conserve Aboriginal objects and Aboriginal places of heritage significance. The Proposal does not impact any listed heritage items under the Sydney LEP. The RMS Section 170 register includes a listed heritage item (Alignment Mark) identified to be located at Botany Road Alexandria, which upon inspection was not found within the study area of the Botany Road connection. Two other alignment pins located at 527 Botany Road and also 330-332 Botany Road Alexandria were identified during a site visit in February 2015. Neither alignment pin is listed under RMS Section 170 nor would be impacted by the Proposal. Other state heritage items are located a significant distance (over 100m) outside the Proposal Area. Non-Aboriginal heritage is addressed in further detail in **Section 6.4** of the REF.
Clause 5. 12 Infrastructure development and use of existing buildings of the Crown	Clause 5.12 of the Sydney LEP 2012 does not restrict or prohibit the carrying out of any development, by or on behalf of a public authority, which is permitted to be carried out with or without development consent.

Provision description	Relevance to the Proposal
	The Proposal would be undertaken by a public authority (the City) and is permitted without development consent under the provisions of the Infrastructure SEPP.
Clause 7. 14 Acid Sulfate Soils	Clause 7.14 aims to ensure development does not disturb, expose or drain acid sulfate soils and cause environmental damage. In 2014, the City commissioned Parsons Brinckerhoff to prepare a Geotechnical Investigation Report for the proposed road, which provided an assessment of acid sulfate soils (ASS). This is further discussed in **Section 6.7** of the REF including proposed mitigation measures to manage ASS risk during construction.
Clause 7. 15 Flood planning	Cause 7.15 aims to minimise the flood risk to life and property associated with the use of the land and to avoid significant adverse impacts on flood behaviours and the environment. A hydraulic assessment has been completed in support of the Proposal (refer to **Section 6.10** which concluded that the Proposal would result in a minor increase in depth in flooding but with no significant impact to lands within the area). Further assessment of flooding issues would occur during detailed design and prior to construction to further address flooding within the Proposal Area.
Clause 7. 19 Demolition must not result in long term adverse visual impact	Clause 7.19 ensures that the development consent must not be granted to development involving the demolition of a building unless there is a site specific development control plan in place. No demolition works are proposed.

4.5 Ecologically sustainable development

The City is committed to ensuring that its projects are implemented in a manner that is consistent with the principles of ecologically sustainable development (ESD). The principles of ESD are generally defined under the provisions of clause 7(4) of Schedule 2 to the EP&A Regulation as:

- The precautionary principle – If there are threats of serious or irreversible damage, a lack of full scientific uncertainty should not be used as a reason for postponing measures to prevent environmental degradation
- Intergenerational equity – the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations
- Conservation of biological diversity and ecological integrity – the diversity of genes, species, populations and their communities, as well as the ecosystems and habitats they belong to, should be maintained or improved to ensure their survival
- Improved valuation, pricing and incentive mechanisms – environmental factors should be included in the valuation of assets and services.

The principles of ESD have been adopted by the City throughout the development and assessment of the Proposal and the overall implementation of its *Sustainable Sydney 2030* policy.

Table 6 discusses how the Proposal is consistent with the ESD principles.

Table 6 ESD Principles

ESD Principle	Consistency with the proposed road
The precautionary principle	The Proposal is an important part of the City's strategy to improve transport access to the GSTC. This REF has been subject to conservative and robust assessment consistent with applicable assessment standards and with consideration to reasonable and feasible mitigation measure to avoid,

ESD Principle	Consistency with the proposed road
	minimise and mitigate impacts. **Section 6.0** includes an assessment of the impact of the Proposal on a range of environmental factors, including greenhouse gas emissions and climate change. **Section 6.13.3** lists mitigation measures to ensure ESD principles are incorporated during the construction phase of the Proposal.
Intergenerational equity	The Proposal design has been specifically updated to prioritise public and active transport over vehicle access to promote sustainable travel outcomes for future land use development and future generations in the area. In particular connection with surrounding cycle and pedestrian networks and increased connectivity to the Green Square railway station would provide significant benefits to the local community. The Proposal would support the sustainable renewal of adjacent residual lands by providing essential transport facilities, improved connectivity and providing for more activated urban space and increased amenity. The Proposal would play a key role in transforming the East Alexandria precinct into a mixed employment and affordable housing area with good quality access and public domain.
Conservation of biological diversity and ecological integrity	The area has limited ecological value due to the area being previously significantly modified. Proposed local planting of trees and shrubs would enhance local biodiversity.
Improved valuation, pricing and incentive mechanisms	The Proposal is a sustainable initiative increasing public and active transport to the Town Centre. Tree planting and Water Sensitive Urban Design (WSUD) measures would increase the sustainable outcomes of the Proposal. Consistent with the aims of improving social and environmental values, urban design and landscaping measures would be implemented to enhance amenity and public domain and increase liveability outcomes.

5.0 Consultation

Section 5.0 discusses the consultation undertaken to date for the Proposal and the consultation proposed for the future. This section discusses the consultation strategy adopted for the Proposal and the results of consultation with the community, relevant government agencies and stakeholders.

5.1 Consultation strategy

The consultation strategy for the Proposal was developed to encourage stakeholder and community involvement and foster interaction between stakeholders, the community and the Proposal team. The consultation strategy that was developed, having regard to the requirements of the planning process ensures that stakeholders and the community are informed of the Proposal and have the opportunity to provide input.

The objectives of the consultation strategy are to:

- Provide accurate and timely information about the Proposal and REF process to relevant stakeholders
- Raise awareness of the various components of the Proposal and the specialist environmental investigations
- Ensure that the directly affected community is aware of the REF and consulted where appropriate
- Provide opportunities for stakeholders and the community to express their view about the Proposal
- Understand and access valuable local knowledge from the community and stakeholders
- Record the details and input from community engagement activities
- Build positive relations with identified community stakeholders
- Ensure a comprehensive and transparent approach.

5.2 Stakeholder consultation during the design phase

As part of the scoping design development for the Proposal, the City undertook consultation activities to develop and discuss design options and identify a preferred option. The Proposal passes through private land and extensive consultation has been undertaken with relevant landowners to discuss potential impacts.

Key consultations outcomes are as follows:

- A2B Australia - 9-13 O'Riordan Street, Alexandria (partial acquisition)
  - Proposal aims to maintain existing building and minimise impacts to operation
- Ausgrid - 15 O'Riordan Street, Alexandria (partial acquisition)
  - Proposal aims to maximise interconnectivity between the eastern and western portions of the site and maintain access to the telecommunications tower at the site's northern corner.

5.3 Community consultation

CoS ran a community consultation process on the 2017 REF between 21 November 2017 and 2 February 2018, as part of the 2017 REF, to seek community and stakeholder feedback on the Proposal, which was considered in the further development of the early concept design.

The following engagement activities were undertaken:

- Inclusion on Green Square Town Centre map (amended August 2017)
- Map update on Green Square website

- Mentioned in broader information sessions in Green Square (e.g. Have Your Say Day, May 2016 and Green Square Info Day, October 2016)
- Green Square print newsletter (April 2017 edition).

A response to submissions report, *Green Square to Ashmore Connector Road Response to Submissions Report)* (CoS,2018), was developed in response to community submissions made during the public display of the 2017 REF.

Key themes raised during consultation included:

- Traffic issues including traffic delays, additional intersections and the impact on surrounding streets
- Proposed landscaping
- Location of bus stops
- Concerns regarding the accuracy of traffic modelling
- Concerns regarding site access points and potential impacts on A2B Australia.

These concerns were taken into account during detailed design of the Proposal and in ongoing consultation. Issues raised during the 2017 REF consultation process are considered to be relevant to the current design, as the corridor location and footprint remains largely unchanged.

Ongoing communication regarding the project has been via the following channels:

- Green Square construction update newsletter distributed to 8,800 bi-monthly since 2018
- Green Square community construction liaison group meetings, held every 2-3 months since 2018
- Webpage updates
- Inclusion in broader information sessions and opening events in Green Square from 2018 to the present.

5.4 Consultation requirements under the Infrastructure SEPP

Part 2, Division 1 of the Infrastructure SEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Clauses 13-16 of the Infrastructure SEPP require that public authorities undertake consultation with councils and other agencies in relation to specified development.

Table 7 provides details of consultation requirements under the Infrastructure SEPP for the Proposal.

Table 7 Infrastructure SEPP consultation requirements

Clause	Clause particulars	Relevance to the Proposal
Clause 15AA Consultation with State Emergency Service – development with impacts on flood liable land	Where the Proposal occurs on flood liable land written notice must be given (together with a scope of works) to the State Emergency Service (SES). Any response to the notice received from the SES within 21 days after the notice is given must be taken into consideration.	Green Square is the subject of a flood study (Green Square & West Kensington Flood Study, 2011). As such, the Proposal area is considered to be flood liable land and consultation with SES is required. SES has been notified as per the requirements of the Infrastructure SEPP. No comments have been received

5.5 Public display

The 2020 REF would adopt a display strategy utilising a range of consultation mechanisms, in-line with the City and NSW Health's current Covid-19 safe practices, including:

- Public display of the REF for a four (4) week period
- Notification of the Proposal to adjoining residents and businesses
- Placement of the REF on Council's Sydney Your Say and Green Square websites
- Interactive mapping tool as part of digital engagement platform
- On-site signage
- Online stakeholder briefings
- Inclusion in the Sydney Your Say eNewsletter.

The REF would also be provided to TfNSW and Sydney Water for comment during the REF display period.

5.6 Ongoing consultation

At the conclusion of the public display period for this REF, the City would acknowledge receipt of feedback from each respondent. The issues raised by the respondents would be considered by the City before determining whether to proceed with the Proposal.

The City held discussions with TfNSW and Sydney Water throughout the preparation of the 2017 REF and the City is continuing discussions with TfNSW to formalise a new bus route.

Should the City determine to proceed with the Proposal, a Determination Report would be made available on TfNSW's website and would summarise the key impacts identified in this REF, demonstrate how the City considered issues raised during the public display period, and include a summary of mitigation measures proposed to minimise the impacts of the Proposal.

Should the City determine to proceed with the Proposal, the Proposal team would keep the community and other key stakeholders informed of the process, identify any further issues as they arise, and develop additional mitigation measures to minimise the impacts of the Proposal. The interaction with the community would be undertaken in accordance with a Community Liaison Management Plan to be developed prior to the commencement of construction.

6.0 Environmental Impact Assessment

Section 6.0 of this REF provides a detailed description of the likely environmental impacts associated with the construction and operation of the Proposal. For each likely impact, the existing environment is characterized and then an assessment is undertaken as to how the Proposal would affect the existing environment.

This environmental impact assessment has been undertaken in accordance with clause 228 of the EP&A Regulation. A checklist of clause 228 factors and how they have been specifically addressed in this REF is included in **Appendix C**

6.1 Traffic and transport

This section assesses and describes the impacts of the Proposal on traffic, transport and pedestrian and cyclist access within and surrounding the Proposal Area. A new traffic and transport assessment was undertaken to assess any changes to the traffic impact assessment conducted in 2017 as part of the 2017 REF.

This section of the report references the *Green Square to Ashmore Connector Road Traffic and Transport Impact Assessment* (the Traffic and Transport Impact Assessment) (AECOM, 2020) presented in **Appendix D.**

6.1.1 Existing environment

There are four (4) existing roads affected by the proposed road which include Botany Road, O'Riordan Street, Bourke Road and Bowden Street which are discussed below in **Table 8** (City of Sydney, CoS, 2017).

Table 8 Existing traffic environment

Existing Road	Context and Function
Botany Road	Botany Road is a TfNSW managed classified road and national freight corridor and forms part of an arterial route linking Sydney CBD with the Sydney Airport and Port Botany terminals. It is a designated B- Double truck route providing four (4) lanes of undivided carriageways with two traffic lanes in each direction to accommodate high volumes of traffic during the peak periods. The corridor has been identified as a key transport corridor with plans to develop a Botany Road transit corridor noted in the City's *Sustainable Sydney 2030*. During peak periods, clearway restrictions are effective for the peak directional flow along Botany Road. In the vicinity of the study area Botany Road is signposted at 50 kilometres (km) per hour. In the immediate vicinity of the proposed GS2AC, Botany Road has "No Stopping" restrictions on the kerbside lane in both directions. A bus stop is located on the western side of the road. Botany Road intersects with Geddes Avenue and there are two access driveways to 336 and 338 Botany Road. The road contains a footpath on either side with electricity light poles and wires. The City has recently upgraded Botany Road telegraph poles.
O'Riordan Street	O'Riordan Street is a TfNSW managed classified road that provides a similar level of functionality to Botany Road as an arterial connection and B- Double truck route between central and eastern Sydney to Sydney Airport and Port Botany. In the vicinity of the study area O'Riordan Street is signposted at 60 km per hour. O'Riordan Street is characterised by two lanes in both directions of travel. During AM and PM peak periods, clearway restrictions are in place with limited kerbside parking being effective outside of the peak periods. The corridor has limited function as a bus corridor. At the point where the proposed GS2AC is proposed to cross O'Riordan Street, there are three (3) driveways on the western side (two at 9-13 O'Riordan Street and one at 15 O'Riordan Street). On the eastern side there is one access driveway to 20O'Riordan Street and one access to 22 O'Riordan Street. Established trees also line each side of the carriageway.

Existing Road	Context and Function
Bourke Road	Bourke Road is a local road owned and managed by the City and performs the role of a collector road. Bourke Road aligns parallel to O'Riordan Street and provides access to commercial and industrial properties along the corridor as well as adjacent roads. Between O'Riordan Street and Gardeners Road, traffic is accommodated on a single traffic lane in each direction with a segregated bicycle lane along the western side of the road and kerbside parking along the eastern side of the corridor. Bourke Road has a sign posted speed of 50 km per hour. There are also street tree plantings along most sections of the road. Electricity light poles and wires also dominate the streetscape along Bourke Road.
Bowden Street	Bowden Street is a local east- west road providing connection between the higher order roads of Bourke Road and McEvoy Street. It provides two (2) directional lanes with parking allowed only on the northern side. The sign-posted speed limit is 50 km per hour. The road also has a separated on-road cycleway on the western side. There are street tree plantings along most sections of the road with a footpath either side.
Geddes Avenue	Geddes Avenue is a local east-west road providing connection between the higher order roads of Botany Road and Portman Street. It provides two directional lanes with parking not permitted on either side. The sign-posted speed limit is 50 km/h. The road also has a separated on-road cycleway. There are street tree plantings along most sections of the road with a footpath either side.

A comprehensive suite of automatic traffic counts (ATC) and intersection turning movement count surveys (TMC) were completed in November 2018 to understand and analyse existing traffic volumes and patterns within the study area. The results of this study are discussed in Section 3.5 of the Traffic and Transport Impact Assessment (refer to **Appendix D**).

6.1.1.1 Active transport

Walking

Local demand for walking has been observed to be relatively low, which is reflective of the local land uses, and reflected in the available infrastructure. The main local generator of walking trips is the Green Square Station, and most roads in the local catchment have footpaths on either side which provides a reasonable element of pedestrian safety. However, the pedestrian environment suffers due to poor public domain and a lack of alternative route choice to key nodes due to the predominance of busy north-south oriented roads.

There is also a lack of safe pedestrian crossings at the key north-south roads in the area, especially for O'Riordan Street which has a 750 metre gap between existing pedestrian crossings near the Green Square Train Station and Collins Street. The same applies to Bourke Road, which has an 800 metre gap between existing pedestrian crossings at the Green Square railway station and Collins Street. Under each scenario, pedestrians are either forced to walk an additional 500 metres or more to cross safely at a signalised pedestrian crossing or cross each road against oncoming traffic, which comes with great personal risk. The distance between crossings is less acute along Botany Road, where there is a pedestrian crossing at Epsom Road. This is located approximately in the middle between the crossing near the Green Square Train Station and at Collins Street. There is an additional intersection at Geddes Avenue. This is located approximately in the middle between the crossing near the Green Square Train Station and Epsom Road

With the exception of the O'Riordan Street / Collins Street, Botany Road / Geddes Avenue, Botany Road / Epsom Road intersections, pedestrian crossings are not provided at any intersections south of the existing pedestrian crossings near the Green Square railway station.

Cycling

Green Square is connected to Sydney's cycle network with a dedicated on-road separated cycleway which runs along Bourke Road and Bowden Street. These cycleways mainly provide linkages to the CBD in the north and Mascot and the airport to the south. The cycleway is also linked to bicycle

friendly roads to the west. Linkages to the M1 and Kensington to the east are also provided from Green Square by a mixture of bicycle friendly roads and dedicated cycling lanes. **Figure 5** shows the cycle network near the GSTC.

However, similar to the pedestrian environment there is a lack of safe crossings across key roads, poor route choices to key nodes, and a lack of safe and efficient east-west cycle links. This commonly results in cyclists using existing footpaths on Botany Road and O'Riordan Street, with impacts on pedestrian safety.

Figure 5 Current cycle network near Green Square

6.1.1.2 Public transport

Train

Green Square Station is located at the intersection of Botany Road / O'Riordan Street / Bourke Road. The station is on the T2 Airport Line for services between Town Hall and Macarthur. In peak periods, trains run every 3 to 9 minutes depending on the direction of travel. Interchange from bus is available, bike facilities and a taxi rank are close by, however no kiss and ride or commuter parking are provided.

As noted in the *NSW Long Term Transport Master Plan, 2012, Transport for NSW, 2012* (LTTMP), the T2 line was approaching seating capacity between Green Square and Central stations when the document was published in 2012. This is reinforced by 2016 AM line loading data (see **Figure 6**) which shows that all services operating during the AM peak period are over seating capacity (100% loading) at Green Square Station whilst some are in excess of seating plus nominal standing capacity (135% loading).

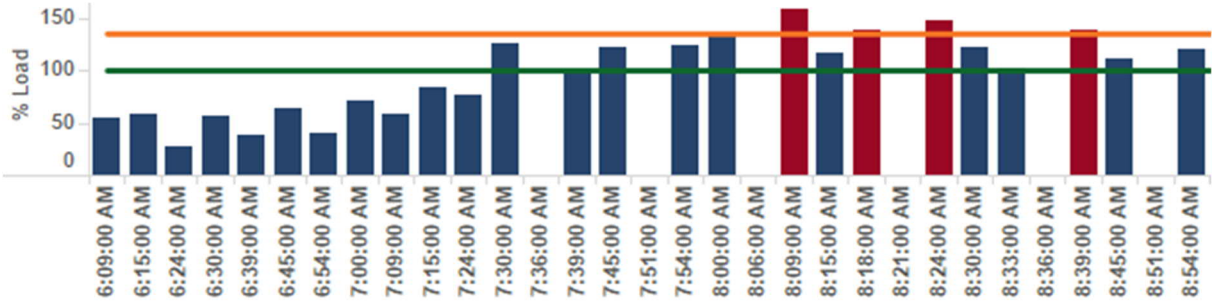

Figure 6 T2 Airport Line 2016 AM peak line loading at Green Square Station

Source: Transport for NSW, 2016

Bus

Green Square is well served by district and local buses with Routes 309, 309x, 310x, and 370 running along Botany Road. To the east of Botany Road, Routes 301, 343 and 348 also run along Joynton Avenue (see **Figure 7**). The majority of these bus routes provide access towards the CBD as well as to the south to Botany, Mascot and Eastlakes; and also, Kensington to the east. They also provide some degree of cross-regional (east-west) public transport functionality as well as rail interchange opportunities - such as at Green Square Station which has bus stops immediately adjacent at Botany Road.

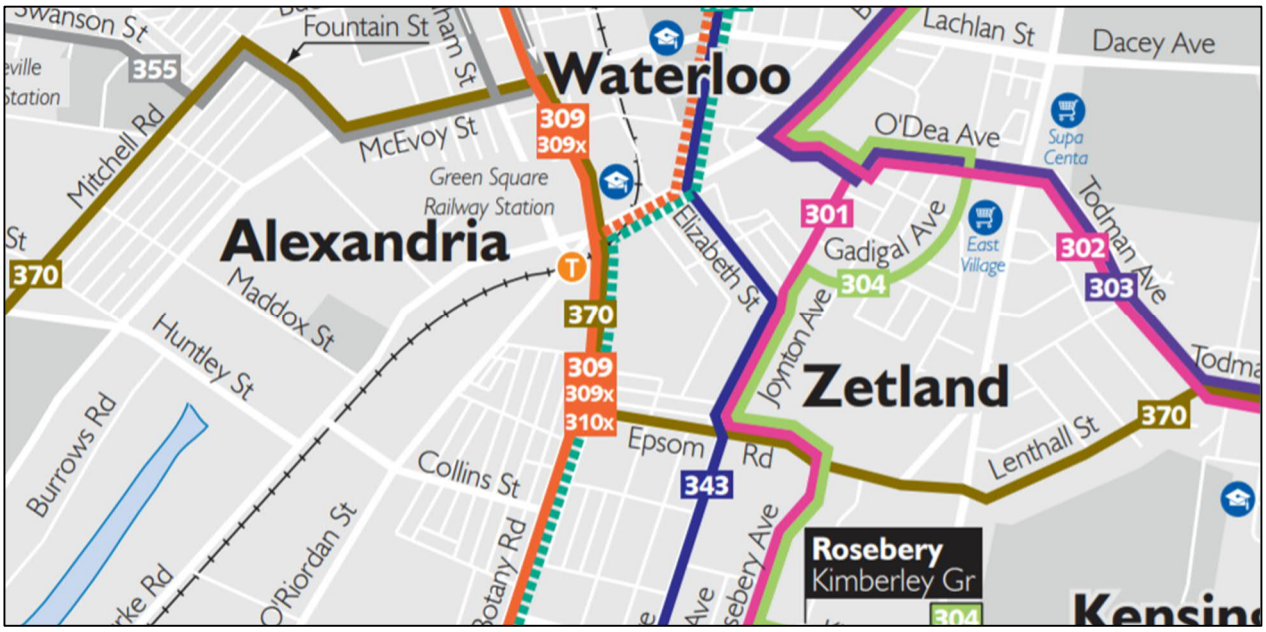

Figure 7 Bus network near Green Square

Source: Sydney Buses, 2020

6.1.2 Potential impacts

6.1.2.1 Construction

Construction Worker Parking

It is anticipated that there would be a limited quantity of parking provided within the Proposal area for accommodation of construction worker's vehicles. It is assumed that the parking location for construction vehicles would be varied during the works to keep the parking clear of active worksites, e.g. excavation, remediation and roadwork sites, truck access routes, etc.

Given the Proposal area's proximity to high frequency public transport services, all workers are to be encouraged to use public transport to access the site, with appropriate tool/ equipment drop-off

arrangements made. This would be incorporated into the site induction program. Workers would be directed not to use on-street parking within the vicinity of the site. The Principal Contractor(s) is to take appropriate action if informed of this activity occurring. Subject to these measures, there would be no material impact on existing on-street parking, which would remain available for existing users.

Access arrangements

Access to the Proposal area would be directly from Bourke Street, O'Riordan Street and Botany Road. It is anticipated that the following conditions would be placed on these accesses:

GS2AC West (Bourke Road to O'Riordan Street)

- Bourke Road: All movements
- O'Riordan Street: Left-in/ Left-out

GS2AC East (O'Riordan Street to Botany Road)

- O'Riordan Street: Left-in/ Left-out
- Botany Road: Left-in/ left or right out (signalised)

The signalised intersection of Geddes Avenue / Botany Road is currently operational. Due to traffic volumes on Botany Road and potential safety issues associated with priority control turn arrangements, it is proposed that this intersection is utilised to provide safe and controlled access from the road network to the eastern section of Proposal area.

Construction traffic volumes

Traffic generated by the construction works would include construction worker light vehicles (including utility vans), as well as heavy vehicles for periodic delivery and removal of materials, including plant and equipment. Vehicle types and sizes would vary depending on the required use, but would include medium and large rigid vehicles and articulated vehicles for import of bulk materials or minor spoil removal, as well as concrete trucks.

The level of construction vehicle activity would be confirmed as part of construction planning, however, the volumes are expected to be up to 60 vehicles per day (120 one-way trips).

A summary of the anticipated traffic generation per stage of works is presented in **Table 9**.

Table 9 Construction traffic generation

Name	Duration (weeks)	Start	Finish	Vehicle Trips (Duration)	Vehicle Trips (per day)
GS2AC East	54	01/07/21	22/12/22		
Remediation and Excavation and in-ground services	16	17/11/21	07/03/22	750	9
Retaining wall/batters	12	24/03/22	17/06/22	450	7
Sub-grade laying	8	18/06/22	16/08/22	600	14
Kerb and gutter	8	17/08/22	12/10/22	400	9
Footpaths	6	15/10/22	22/11/22	700	21
Pavement Lanes Surfacing	4	26/11/22	22/12/22	600	28
GS2AC West	54	01/07/21	22/12/22		
Remediation and Excavation	16	17/11/21	07/03/22	700	8
Retaining wall/batters	12	24/03/22	17/06/22	450	7
Sub-grade laying	8	18/06/22	16/08/22	600	14

Name	Duration (weeks)	Start	Finish	Vehicle Trips (Duration)	Vehicle Trips (per day)
Kerb and gutter	8	17/08/22	12/10/22	400	9
Footpaths	6	15/10/22	22/11/22	700	21
Pavement Lanes Surfacing	4	26/11/22	22/12/22	600	28

Given the number of daily construction vehicles, overall the construction works would not be expected to significantly impact intersection operation or the Botany Road, O'Riordan Street and the arterial network more broadly. Construction vehicle activity would occur outside typical weekday AM and PM peak hours.

Any works on weekends would not present significant traffic related impacts, with no known specific restrictions limiting access and/ or the work hours as specified.

All works within the site and associated vehicle movements would be restricted to the permitted working hours of the site, including night works.

6.1.2.2 Haulage routes

The origin and destination of truck movements is subject to construction planning. Generally, construction vehicles would have origins and destinations from a wide variety of locations throughout Sydney. However, all construction vehicles are to be restricted to the state and regional road network, where possible. No construction vehicles are to use Geddes Avenue, Wyndham Street, Johnson Street or Maddox Street to access the site. In addition, construction traffic must not access the site via Elizabeth Street, Hansards Street and Joynton Avenue.

As such, likely construction vehicle routes have been developed with the aim to provide the shortest distances to/from the arterial road network, whilst minimising the impact of construction traffic on streets in the vicinity of the site. Alternative routes would not be used without specific prior approval from the appropriate stakeholders.

In general, construction vehicle routes via Bourke Street would not be supported. Vehicles routes should generally be via Lachlan Street, McEvoy Street, Botany Road and Epsom Road.

It is noted that during the early bulk earthworks and materials phases some of the exported material may be used at the Green Square Aquatic Centre Development. Vehicles accessing this site would do so via Collins Street/ Botany Road, Epsom Road and Johnston Avenue.

6.1.2.3 Signalised intersection works

The installation of two new signalised intersections (Bourke Road/ GS2AC and O'Riordan Street/GS2AC) and modification to the signalised intersection at Botany Road/ Geddes Avenue would require works to be completed within the existing public road reserve. Works would include pavement cutting, fitting and connection of loop detectors, asphalting and linemarking. These works would likely require the closure of two trafficable lanes at any one time. The closure of two lanes would allow the remaining two open lanes to facilitate traffic in both directions. It is anticipated that these works would be carried out as night works to minimise the impact on these roads.

6.1.2.4 Active transport

Existing pedestrian footpaths on Bourke Road, Botany Road and O'Riordan Street form part of the construction of GS2AC and pedestrians would also need to be diverted to temporary pedestrian paths whilst the upgrades are undertaken.

During the closure, it is expected that pedestrians would use the temporary pedestrian footpaths which would be provided at all street interfaces to maintain pedestrian connectivity. Further to this, the appointed contractor would ensure that appropriate wayfinding/detour signage is installed so pedestrians are informed of the temporary closures and are directed to a safe, alternate crossing point during construction hours. Truck drivers should be alerted to the need to give way to pedestrians crossing the footpath at site access locations.

Approval from the City and TfNSW would be obtained for Temporary Works on the public way and Road Opening Permits prior to work being undertaken on site. These applications would include associated Traffic Control Plans (TCPs). TCPs would ensure that existing pedestrian access routes are maintained at all times.

Cyclists are permitted to travel in a traffic lane on Botany Road and O'Riordan Street. The separated cycleway on Burke Road would be maintained. Temporary diversion or closure for short periods of time may be required during the works, at which time a suitable alternative route would be provided.

Traffic controllers would monitor and supervise the safe movements for trucks, pedestrian and cyclists past worksites, provide priority for emergency services or monitor access to the driveways opposite.

6.1.2.5 Public transport

It is not anticipated that bus services in the vicinity of the Proposal area would be impacted during construction of the Proposal. Minor impacts, resulting in reduced speeds, may occur during off peak times as a result of road works requiring traffic control, however it is anticipated that buses would continue to use Botany Road at all times. In the scenario where bus movements would be impacted by construction works, the State Transit Authority would require notification.

6.1.2.6 Property access

Minimising the impact of construction works on, and maintaining the amenity of, businesses in and around the GS2AC is a top priority for the City. Throughout the construction period, vehicle access would be maintained at all times to properties within the vicinity of the works.

Affected property access locations adjacent to the Proposal include:

- A2B Australia, 9-13 O'Riordan Street
- Ausgrid site, 15 O'Riordan Street

Both properties have alternate access points which with minor adjustments, would be able to service both inbound and outbound movements. If required, staged construction within the affected area is a possibility. It is understood that the City would consult with the affected properties to come to an agreement regarding maintaining access to both businesses. As such, property access would be maintained at all times, and any potential impacts would be short-term in duration.

6.1.2.7 Operation

Walking

The Proposal provides an opportunity to significantly enhance pedestrian safety and accessibility by providing two (2) new signalised pedestrian crossings at O'Riordan Street and Bourke Road, as well as the connection with the approved crossing at Botany Road. These crossings would allow pedestrians to cross each road safely and would assist in improving east-west connectivity to GSTC. **Figure 8** provides an indication of the distance and time saved by using the proposed pedestrian route. The green route (existing scenario) has an indicative walk time of 10 minutes and the blue route (the Proposal) has an indicative walk time of 5 minutes.

Figure 8 East-west pedestrian route with and without the proposed road

Source: City of Sydney, modified by AECOM, 2017

Cycling

Similar to the improvements in pedestrian accessibility, the Proposal would enhance east-west connectivity through the area. The proposed cycleway would encourage cycling by providing a separated two-way cycleway on the road. The infrastructure would also include bicycle crossings across the intersections with dedicated lights.

This route would be well linked to the surrounding local and strategic cycling network. The proposed cycleway is connected with the existing separated cycleways on Bourke Road and Bowden Street to the west and to the cycleway on Geddes Avenue to the east. As shown, the GS2AC cycleway would provide a strategic east-west link between two separate dedicated cycleways.

The Bourke Road cycleway is a popular route for those travelling between Sydney CBD and Mascot. The route along Bowden Street leads towards the Ashmore Precinct as well as to Newtown and the Inner West. Meanwhile, the cycleways on the eastern side connects to the M1 Motorway and Kensington. The GS2AC cycleway would be vital in creating a safe route for cyclists and linking the Green Square Town Centre with the broader cycle network.

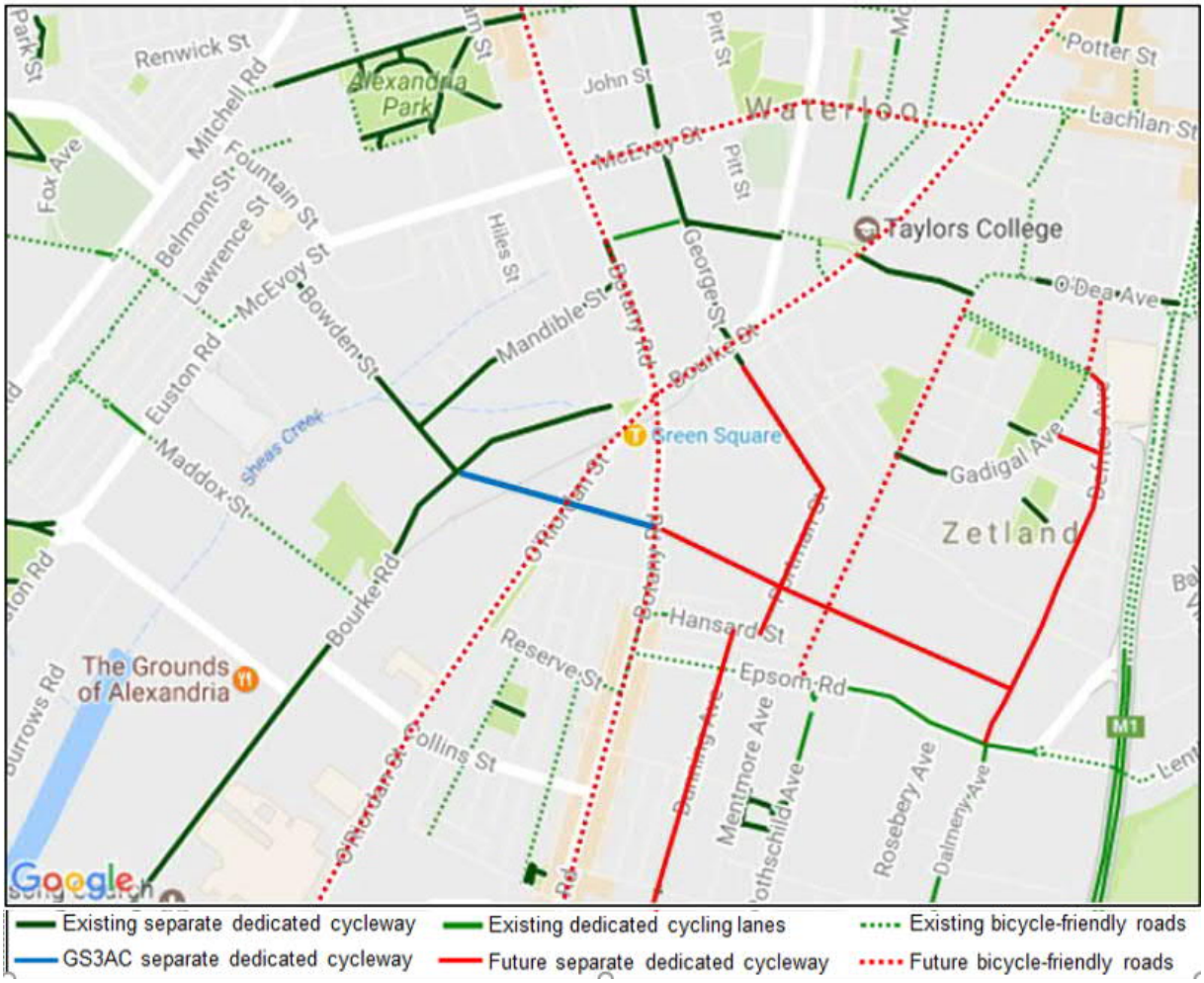

Figure 9 Existing and planned cycle network near Green Square

Source: Sydney Cycleways, modified by AECOM

Train

The Proposal would have no direct impact on the train services provided at the Green Square Station and instead would assist in facilitating improved access to the station from the interfacing surface transport network.

Bus

Bus routes are under consideration by TfNSW during Stage 2 of the Proposal. It is proposed that two existing bus routes operating within the study area would be diverted to serve the GS2AC corridor. This may result in a slightly longer route for these services, however, the provision of bus lanes along GS2AC during Stage 2 is expected to improve reliability and efficiency of routes operating to and from GSTC.

6.1.2.8 Road network

As the GS2AC corridor is proposed to include only bus lanes in both directions and allows only local traffic access, the impacts on the road network in the vicinity of GS2AC is expected to be minimal. The operational impacts on the road network during the opening year (2022) and future year (2032) have been assessed using SIDRA INTERSECTION.

The SIDRA model for opening year (2022) has been built to assess operational performance of the intersections in the vicinity of GS2AC corridor.

The operational performance of scenarios both with and without The Proposal (Stage 1) (**Table 10** are summarised below:

- The conversion of Bourke Road/Bowden St intersection from a priority-controlled intersection to signalised results in increased delays and queue lengths during 2022 with the opening of GS2AC. However, the intersection is forecast to operate at LOS C during both AM and PM peaks with additional spare capacity during both AM and PM peaks with GS2AC.
- The intersection of O'Riordan Street / GS2AC is forecast to operate at LOS A during both AM and PM peaks during 2022 with GS2AC.
- During the opening year, the intersection of Botany Road / Geddes Avenue / GS2AC is forecast to maintain LOS A with the opening of its connection with GS2AC during the AM and the PM peak. Minor increases in delays and queue lengths are forecast but is not expected to result in any significant impact.
- As the east end of GS2AC is closed to vehicular traffic at the intersection of Botany Road / Geddes Avenue / GS2AC during the opening year (2022), no additional traffic is forecast to use the intersection of Botany Road / Epsom Rd. Therefore, no changes to level of service is expected at this intersection during both AM and PM peaks.

Table 10 Opening year 2022 - Road Network Performance

Intersection	Peak Hour	Volume (veh/hr)	Level of Service	Degree of Saturation	Average Delay (sec/veh)	95% back of queue (m)
Bourke Road / Bowden Street / GS2AC						
Without GS2AC	AM	1,331	C	0.82	34.5	43
	PM	1,170	B	0.44	18.9	14
With GS2AC	AM	1,511	C	0.76	34.8	152
	PM	1,320	C	0.61	28.9	127
O'Riordan Street / GS2AC						
Without GS2AC	AM	1,856	N/A*			
	PM	2,096	N/A*			
With GS2AC	AM	1,983	A	0.42	10.6	85
	PM	2,220	A	0.54	13.3	124
Botany Road / Geddes Avenue / GS2AC						
Without GS2AC	AM	2,245	A	0.45	7.7	130
	PM	2,200	A	0.53	8.8	139
With GS2AC	AM	2,353	A	0.57	10.8	159
	PM	2,307	A	0.73	12.3	138
Botany Road / Epsom Rd						
Without GS2AC	AM	2,722	D	1.29	51.3	280
	PM	2,666	F	1.27	86.1	498
With GS2AC	AM	2,722	D	1.22	51.2	266
	PM	2,666	F	1.25	84.3	488

* It is a mid-block free flow section in the without GS2AC scenario

6.1.3 Future year 2032 network performance

Operational performance of the four intersections in the study area was also assessed during a future year (2032). A growth factor of 1.1% has been adopted to obtain future traffic, except future bus volumes and traffic flow along GS2AC.

The operational performance of scenarios both with and without GS2AC (Stage 2) (**Table 11**) are summarised below:

- The intersection of Bowden Street / Bourke Road / GS2AC intersection is forecast to operate at LOS C during both AM and PM peak hours with GS2AC.
- The intersection of O'Riordan Street / GS2AC is forecast to operate at LOS A during both AM and PM peaks during 2032 with GS2AC.
- The intersection of Botany Road / Geddes Avenue / GS2AC intersection is forecast to operate at LOS B during 2032 with GS2AC.
- During both without and with GS2AC scenarios, the intersection of Botany Road / Epsom Road is forecast to operate at LOS F during AM and PM. This is due to the high background traffic volumes forecast to use this intersection during 2032. The addition of a small number of vehicles due to GS2AC is not forecast to result in a significant increase in delays or queue lengths at this intersection.

Table 11 Future year 2032 - Road Network Performance

Intersection	Peak Hour	Volume (veh/hr)	Level of Service	Degree of Saturation	Average Delay (sec/veh)	95% back of queue (m)
Bourke Road / Bowden Street / GS2AC						
Without GS2AC	AM	1,484	F	1.11	155.3	187
	PM	1,305	B	0.59	25.5	20
With GS2AC	AM	1,709	C	0.79	41.7	205
	PM	1,493	C	0.85	36.8	178
O'Riordan Street / GS2AC						
Without GS2AC	AM	2,071	N/A*			
	PM	2,338	N/A*			
With GS2AC	AM	2,233	A	0.43	9.1	93
	PM	2,489	A	0.46	8.7	104
Botany Road / Geddes Avenue / GS2AC						
Without GS2AC	AM	2,502	A	0.78	13.5	97
	PM	2,452	A	0.62	9.8	173
With GS2AC	AM	2,651	B	0.79	17.4	167
	PM	2,608	B	0.76	14.6	174
Botany Road / Epsom Rd						
Without GS2AC	AM	3,035	F	1.44	80.4	329
	PM	2,972	F	1.56	150.4	660
With GS2AC	AM	3,038	F	1.24	80.8	378
	PM	2,984	F	1.58	150.6	648

* It is a mid-block free flow section in the without GS2AC scenario

Based on modelling results the traffic impact assessment indicates that the Proposal would not significantly impact on assessed intersection performance at road opening or in the future operations scenario, compared to its predicted operation without the Proposal.

6.1.4 Mitigation measures

The following mitigation measures are based on the 2017 REF and the *Green Square to Ashmore Connector Road Traffic and Transport Impact Assessment* (AECOM, 2020) (**Appendix D**). These mitigation measures would enable potential impacts from construction and operational traffic to be minimised.

- Prior to the commencement of construction, a detailed Construction Traffic Management Plan (CTMP) would be prepared by the Principal Contractor. The CTMP would include the guidelines, general requirements and procedures to be used when activities or areas of work have a potential to impact on existing traffic arrangements. The approval of the CTMP is to be sought by the appropriate authorities. The Principal Contractor would implement, update and maintain the CTMP throughout the construction period and until completion.
- The CTMP, at a minimum, would address the following:
  - consultation with the consent Authorities and relevant approvals
  - the likely construction vehicle numbers and frequency
  - approach and departure routes
  - anticipated special out of hours or escorted deliveries
  - parking access arrangements during construction
  - construction work zone locations
  - site entry and exit points
  - proposed traffic control signage
  - proposed traffic management at critical locations
  - provision of acceptable pedestrian management measures.
- The Principal Contractor would communicate with surrounding businesses and residents throughout the works and inform them of any upcoming works impacting them within a reasonable timeframe. Construction vehicles would be restricted to the state and regional road network, where possible. No construction vehicles should use Geddes Avenue, Wyndham Street, Johnson Street Maddox Street, Elizabeth Street, Hansards Street or Joynton Avenue to access the site.
- Due to the high frequency public transport services, workers would be encouraged to use public transport to access the site, with appropriate tool/ equipment drop-off arrangements made, to minimise impacts on existing on-street parking.
- Vehicles operating to, from and within the site should do so in a manner which does not create unreasonable or unnecessary noise or vibration.
- No tracked vehicles would be permitted to travel on paved roads.
- Public roads and access points should not be obstructed by any materials, vehicles, refuse skips or similar, without obtaining the necessary approvals.

6.2 Noise and vibration

The noise and vibration assessment carried out for this REF, the *Green Square to Ashmore Connector Road Noise and Vibration Assessment* (AECOM, 2020) is in **Appendix E.1**.

The *Noise and Vibration Assessment* (Renzo Tonin & Associates, 2017) (**Appendix E.2**), conducted as part of the 2017 REF has been used to assess construction impacts as the proposed construction

works required were considered to be generally unchanged and representative of likely impacts from the Proposal and the broad construction methodology would be the same.

6.2.1 Existing environment

The acoustic environment around the Proposal area is urban and is dominated by road traffic noise from the existing road network, including Botany Road, Bourke Road, Epsom Road, and O'Riordan Street. Other key noise sources include aircraft movements from Sydney Airport and industrial noise from nearby commercial/industrial premises.

Noise sensitive receivers were identified using aerial photography and virtual ground-truthing, in conjunction with cadastral information to determine the classification of any residential, commercial, industrial, educational and recreational buildings, as well as other uses (such as unoccupied sheds). Sensitive receivers in this area are predominantly one and two storey residential properties with some multi-storey apartment buildings.

The nearest residential affected receivers are located approximately 100 m south of the Proposal area.

The nearest non-residential affected receivers to construction and operational noise associated with the proposed GS2AC are presented in **Table 12** and graphically in **Figure 10**.

Table 12 Nearest receivers

Receiver	Receiver Type
Alexandria Specialist Day Hospital	Hospital
Yudi Gunyi School	Education
Zetland Mosque	Place of Worship
Alexandria Basketball Stadium	Active Recreation
Beaconsfield Park	Active Recreation

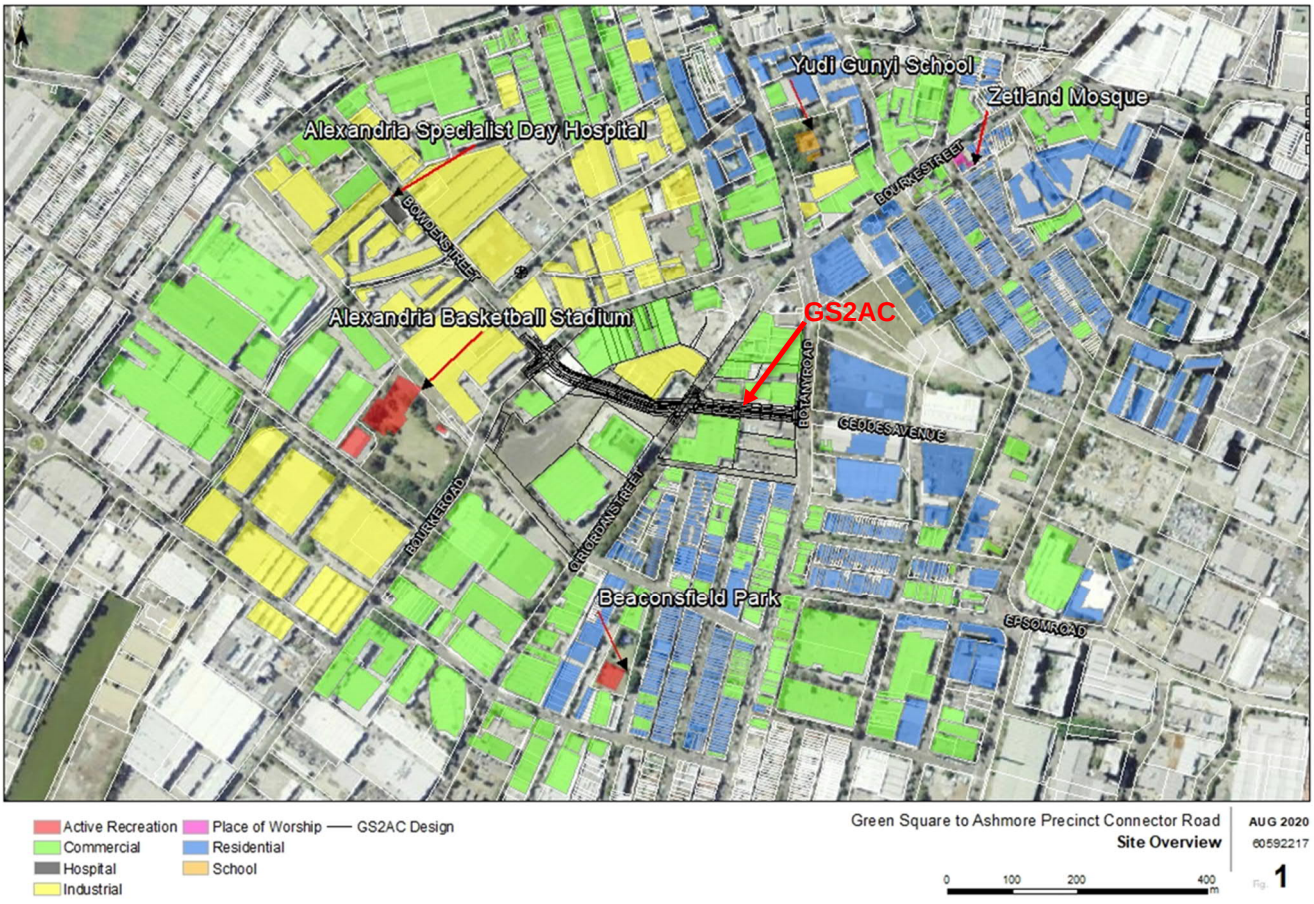

Figure 10 GS2AC location and surrounding sensitive receivers

6.2.2 Noise management levels

The *Interim Construction Noise Guidelines, DECC 2009* (ICNG) provides guidelines for assessing noise generated during the construction phase of developments.

Table 13, reproduced from the ICNG, set out the noise management levels which are primarily based on the Rating Background Level (and procedures for residential receivers).

Table 13 Noise management levels at residential receivers

Time of day	Management level LAeq (15 min)	How to apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10dB(A)	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured LAeq (15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details

Time of day	Management level LAeq (15 min)	How to apply
	Highly noise affected 75dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5dB(A)	A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5dB(A) above the noise affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see section 7.2.2 of the ICNG.

Construction noise management levels can be determined using the ICNG. **Table 14** sets out the noise management levels for various noise-sensitive land use developments, including commercial premises.

Table 14 Noise management levels at other noise sensitive land uses

Land use	Where objective applies	Management level LAeq (15 min)
Classrooms at schools and other educational institutions	Internal noise level	45 dB(A)
Hospital wards and operating theatres	Internal noise level	45 dB(A)
Places of worship	Internal noise level	45 dB(A)
Active recreation areas	External noise level	65 dB(A)
Passive recreation areas	External noise level	60 dB(A)
Community centres	Depends on the intended use of the centre.	Refer to the 'maximum' internal levels in AS2107 for specific uses
Commercial premises	External noise level	70 dB(A)

Land use	Where objective applies	Management level LAeq (15 min)
Industrial premises	External noise level	70 dB(A)

While initial screening of potential impacts at commercial and industrial premises has been carried out in accordance with the ICNG criteria, where noise impacts are revealed, consideration is given to the internal noise amenity, based on prevailing internal noise levels and the building envelope construction.

6.2.3 Potential impacts

6.2.3.1 Construction

This section is based on the Noise and Vibration Assessment report prepared by Renzo Tonin & Associates, September 2017 (**Appendix E.2**).

It is anticipated that works would be undertaken during normal working hours including:

- Monday to Friday: 7:00 am to 6. 00 pm
- Saturday: 8:00 am to 1.00 pm
- Sunday and public holidays: no work unless approved by the principal contractor.

In addition, limited night works may be required for works carried out at road intersections.

Figure 11 shows the work zones and nearest receiver locations for the Proposal area.

Figure 11 Work zones and nearest receiver locations for the Proposal area.

6.2.3.2 Construction - Noise

Noise levels predicted at the nearest receiver locations are summarised in **Table 15**. Refer to the construction noise assessment in **Appendix E.2** for more detailed discussion.

Table 15 Predicted noise levels at nearest affected receivers

Receiver location	Work zone	Predicted LAeq dB(A)		'Noise affected' targets	Comments
		Excavation	Construction		
R1 - Victoria Street and Queen Street, Alexandria	1	56	56	56	Work in all zones predicted to comply with highly affected target of 75dB(A). Zones 2, 3 and 4 predicted to exceed noise affected target.
	2	59	59		
	3	62	62		
	4	74	74		
R2 - 16 O'Riordan Street, Alexandria	1	68	66	65	Work in Zones 3 and 4 predicted to exceed the highly affected target of 75 dB(A). All work zones exceed noise affected target
	2	73	69		
	3	78	72		
	4	78	74		
C1 9 - 13 O'Riordan Street	1	79	80	70	Work in Zones 1, 2 and 3 predicted to exceed the highly affected target of 75 dB(A). All work zones exceed noise affected target
	2	96	96		
	3	79	79		
	4	73	73		
C2 - 17 O'Riordan Street	1	78	79	70	Work in Zones 1, 2 and 3 predicted to exceed the highly affected target of 75 dB(A). All work zones exceed noise affected target
	2	81	81		
	3	74	75		
	4	70	71		
C3 – 18 O'Riordan Street	1	69	69	70	Work in Zones 3 and 4 predicted to exceed the highly affected target of 75 dB(A). Zones 2,3 and 4 exceed noise affected target
	2	74	75		
	3	79	80		
	4	79	79		
C4 – 22 O'Riordan Street	1	70	70	70	Work in Zones 3 and 4 predicted to exceed the highly affected target of 75 dB(A). Zones 2,3 and 4 exceed noise affected target
	2	75	76		
	3	96	96		
	4	83	83		
C5 – 34-42 Bourke Road	1	90	90	70	Work in Zones 1 and 2 predicted to exceed the highly affected target of 75 dB(A). Zones 1 and 2 exceed noise affected target
	2	79	80		
	3	70	70		
	4	67	69		
C6 – 19-21 Bourke Road	1	80	81	70	Work in Zone 1 predicted to exceed the highly affected target of 75 dB(A). Zones 1 and 2 exceed noise affected target
	2	72	72		
	3	66	67		
	4	64	65		

Receiver location	Work zone	Predicted LAeq dB(A)		'Noise affected' targets	Comments
		Excavation	Construction		
C7 – 23-37 Bourke Road	1	79	79	70	Work in Zone 1 predicted to exceed the highly affected target of 75 dB(A). Zones 1 and 2 exceed noise affected target
	2	70	71		
	3	66	66		
	4	64	64		
C8 – 56-60 Bourke Road	1	83	83	70	Work in Zone 1 predicted to exceed the highly affected target of 75 dB(A). Zones 1 and 2 exceed noise affected target
	2	74	74		
	3	67	68		
	4	65	66		

Construction noise is likely to exceed the construction noise goals for the majority of receivers along the construction route. Impacts would be greatest for residential receivers when construction is taking place towards the eastern end of the works. All reasonable and feasible noise mitigation should be applied during the construction phase. Reasonable and feasible noise mitigation measures are outlined in **Section 6.2.4** below.

Night works would be minimised as far as possible and be subject to a night works protocol as part of the CNVMP that assesses noise impacts of intersection works and proposes site specific notification and mitigation measures to minimise night work noise impacts to residents. This assessment would include consideration of sleep disturbance criteria.

Construction traffic noise would have negligible impacts on existing road traffic noise, given existing high road traffic volumes.

6.2.3.3 Construction - Vibration

The vibration generated from excavation and construction works would vary depending on the level and type of activity carried out at each site during each activity. Potential vibration generated to receivers is dependent on separation distances, the intervening soil and rock strata, dominant frequencies of vibration and the receiver structure.

The risk of structural damage during construction is generally assessed as being low, although this should be confirmed when specific machinery and equipment to be used have been finalised. There is a low risk of adverse comment from the nearest receivers for tactile vibration as it is unlikely that working distances would be encroached. Vibration management measures would be incorporated into the CEMP.

Table 16 provides the recommended vibration minimum working distances.

Table 16 Vibration minimum working distances

Plant item	Rating/description	Minimum working distance, m	
		Cosmetic damage[1]	Human response[2]
Bobcat	Travelling	1 (nominal)	Avoid contact with structure
Jackhammer	Handheld	1 (nominal)	Avoid contact with structure
Large Hydraulic Hammer	1600 kg	5	73
Excavator	<=30 tonne (travelling/digging)	5	15
Truck Movements	Travelling loaded	5	10
Vibratory Rollers	20t	10	100

1 Based on DIN4150.3 Group 1 Buildings

2 For residential receivers, for reference only. Management measures given for structural damage for construction works.

6.2.3.4 Operation

This section is based on the Road Traffic Noise Assessment report prepared by AECOM, July 2020 (**Appendix E.1**)

The assessment of road traffic noise has been completed in accordance with *the NSW Road Noise Policy* (RNP) (CECCW, 2011a), the *Noise Criteria Guidelines* (NCG) (RMS, 2015a) and the *Noise Management Guidelines* (NMG) (RMS, 2015b). The NCG and the NMG provide details of the practical application of the criteria presented in the RNP.

To assess the potential impact of the Proposal on noise sensitive receivers, the future road traffic noise levels have been modelled for the 'No Build' (without Proposal), and 'Build' (with Proposal) scenarios for the year of opening (2022) and design year (2032).

The Proposal is expected to redistribute bus traffic throughout the local area. This redistribution has the potential to increase traffic on some non-project roads as a result of the Proposal. The NCG considers any project to be a traffic generating development if it is predicted to increase noise levels by greater than 2.0 dB(A) on any other road. Therefore, road noise contribution from non-project roads was also considered. The non-project roads considered are Bourke Road, Bowden Street, O'Riordan Street, Botany Road, Geddes Avenue, and Epsom Road.

Predicted traffic flows from Year of Opening' (2022) and 'Design Year' (2032) traffic flows presented in **Appendix D**.

Noise levels have been predicted for each assessment scenario across the extent of the Proposal. Section 4.2 of **Appendix E.1** presents a summary of all sensitive receivers where road traffic noise levels exceed the applicable noise criteria. Recommended noise mitigation measures for sensitive receivers are considered further in Section 5.0 of **Appendix E.1**.

Noise levels have been predicted at sensitive receiver locations throughout the Proposal area for both the daytime and night-time scenarios for the 'Year of Opening' of 2022 and the 'Design Year' of 2032.

Exceedances of the applicable noise criteria have been identified for the year 2032, including future land uses. These exceedances are due to existing relatively high noise levels throughout the Proposal area and the noise impacts of redistributed bus traffic along Geddes Avenue from the Proposal, in addition to the close proximity of receivers to Geddes Avenue. Noise levels at a total of three receivers (apartment buildings) are eligible for the consideration of noise mitigation measures.

6.2.4 Mitigation measures

6.2.4.1 Construction

The following at-source control and management measures, based on the Noise and Vibration Assessment report prepared by Renzo Tonin & Associates, September 2017 (**Appendix E.2**), should be considered for the management of noise from excavation and construction works to reduce potential noise impacts.

At-source noise control and management measures should be considered for management of noise from excavation and construction works to minimise potential noise. Noise reductions of between 3 and 8dB(A) for individual plant items could be expected where localised noise barriers are practical. In other areas, the management measures should focus on minimising unnecessary noise generation from the site and the extent and duration of peak noise levels.

A site specific Construction Noise and Vibration Management Plan (CNVMP) would be prepared as part of the CEMP which would include noise modelling of construction activities after the exact selection of equipment to be used on-site becomes available.

Construction noise minimisation measures would include:

- Where possible, localised barriers to be used for stationary equipment
- Selection of the quietest and least vibration emitting construction methods where feasible and reasonable
- Avoid unnecessary noise and limit simultaneous use of noisy equipment
- Equipment not in use for an extended period should be turned off, e.g. heavy vehicles should switch engines off whilst being unloaded
- Alternative reverse alarms, such as ‘quackers’ should be installed, where feasible and reasonable
- Inform community ahead of construction activity and potential impacts
- Build good relations with nearby building occupants by keeping them informed and responding to any complaints that may be received
- Where practical, stage works so that intrusive works are carried out during least noise sensitive periods.

All employees, contractors and subcontractors would receive a site induction. The environmental component may be covered in toolboxes and must include:

- all relevant Proposal specific and standard noise and vibration mitigation measures
- relevant licence and approval conditions
- permissible hours of work
- any limitations on high noise and vibration generating activities
- location of nearest sensitive receivers
- environmental incident procedures.

A complaints management procedure would be established to deal with noise complaints that may arise from construction activities. Each complaint would need to be investigated and appropriate noise amelioration measures put in place to mitigate future occurrences, where the noise in question is in excess of allowable limits.

A monitoring schedule would be developed and implemented during high noise and vibration generating activities where required. Noise and vibration monitoring would be carried out for any identified sensitive works, where monitoring could be used to proactively identify noisy works that may be otherwise managed and mitigated.

Night works would be minimised as far as possible and be subject to a night works protocol as part of the CNVMP that assesses noise impacts of intersection works and proposes site specific notification and mitigation measures to minimise night work impacts to residents.

Site specific buffer distances would be determined where vibration significant plant items, in particular large rock hammers/breakers and vibratory rollers, operate within Cosmetic Damage minimum working distances. Where this occurs, minimum buffer distances to affected receivers should be determined by site measurements prior to the commencement of the regular use of the vibration significant plant on site. The site-specific minimum working distance should be maintained in order to comply with relevant vibration limits.

Dilapidation surveys would be carried out prior to the commencement of construction at properties that do not comply with the nominated indicative buffer distances.

6.2.4.2 Operation

The following operational noise mitigation measures are based on the Road Traffic Noise Assessment report prepared by AECOM, July 2020 (Refer to **Appendix E.1**).

Appropriate noise mitigation has been recommended to minimise impacts on the community from the Proposal. Noise mitigation in the form of quieter road surfaces, noise barriers, and architectural treatments has been considered. The use of quieter noise pavements would not provide suitable noise reduction as the exceedances are occurring as a result of redistributed traffic on adjacent roads, not GS2AC. Noise barriers were not considered appropriate due to the requirement to maintain road access to residents, in addition to the height of apartment buildings which would be noise impacted.

Architectural treatment is recommended at all three sensitive receivers (apartment buildings) that were found eligible for the consideration of noise mitigation, however it was noted that these receivers are all under construction and therefore would have been designed recently, taking into account the existing road traffic noise levels.

It is likely that buses in operation in 2032 would be quieter than those assumed in the road traffic noise modelling. This is due to the increased use of electric buses in the City in line with the NSW Government's commitment to zero net emissions by 2050. This reduction in bus noise would likely offset the predicted increase in noise levels due to increased numbers. However, it is recommended that a detailed review of these properties and their facades is undertaken during the detailed design phase to confirm whether noise mitigation is ultimately required.

6.3 Landscape and visual

This section is based on the *Green Square to Ashmore Connector Design Report* (AECOM, November 2017). It also assesses the impacts associated with tree removal (Refer to **Appendix G.2**).

6.3.1 Existing environment

The Proposal is located within an urbanised environment, known as the Southern Employment Lands, which is a collection of industrial and warehouse sites to the south east and south west of the Green Square Town Centre. The traditional land use of the area is evolving, replacing old industrial factories with modern offices, warehouses and some residential housing.

The Proposal directly impacts seven (7) properties mostly owned by the City which primarily consists of vacant sites with little or no landscaping. There are no heritage items affected and the closest heritage conservation areas / items are located approximately 80 m away in Hansard Street and Beaconsfield. There is no dominant building type with a variety of building styles and constructions and some modern office buildings.

6.3.1.1 Land use development and road pattern

The land use and development pattern are predominantly characterised by lots of varying sizes with most having an east-west orientation and frontage to main roads in the area. Most lots are rectangular or square shape with the exception of the Ausgrid and the A2B Australia sites.

The road pattern is dominated by three (3) major north-south roads including Botany Road O'Riordan Street and Bourke Road, all of which intersect to the north of Green Square railway station. These roads are aesthetically similar, lined with low rise industrial office buildings, street tree planning,

overhead power wires and footpaths. Botany Road and O'Riordan Street are the higher order roads, which carry a significant volume of traffic compared to Bourke Road which is a local collector road. Botany Road is also the main public transport corridor with a number of bus stops along the route; O'Riordan Street is a key City-Airport corridor and Bourke Road is a local service corridor and location for the City's main cycle route.

Other roads in the area include Bowden Street, which is a local industrial road that connects Bourke Road to McEvoy Street / Euston road; and Johnson Street which functions as a mini bypass and buffer between residential areas located further south in Beaconsfield. Bowden Street and Johnson Street are the only roads that have an east-west orientation.

6.3.1.2 Landscape character

This area of Alexandria was historically a low lying area and prone to flooding as the soils are primarily derived sandy loam, as is the case with much of the Sydney Basin. There is a gradual landfall from east to west which is particularly noticeable between 338 Botany Road and 20 O'Riordan Street and also between the Ausgrid Site (15 O'Riordan Street) and the City property (44-54 Bourke Road).

The proposed road is dominated by two (2) landscape character zones. The initial landscape zone is a semi-business park character (17 O'Riordan Street and 22 O'Riordan Street) the other is dominated by vacant lots with exposed concrete, lacking vegetation (Botany Road, 20 O'Riordan Street, 44-54 Bourke Road).

The area itself has been heavily modified and contains few natural elements, other than some trees lining main roads and in Perry Park. The area has few noticeable landmarks, causing poor orientation throughout the suburb as many main north-south roads appear similar. Main points of orientation are the Green Square railway station and the Infinity by Crown Groups apartments in Green Square Town Centre.

6.3.1.3 Existing vegetation

The Proposal area and surrounds are generally devoid of significant vegetation, other than trees in Perry Park and Beaconsfield Park. There is also a predominance of street trees along Bourke Road and O'Riordan Street, a minor landscaped area in the A2B Australia car park and a small amount of vegetation at the periphery of the vacant lots. Vegetation in the area is generally comprised of environmental weeds common to urban areas of Sydney.

The visual amenity impacts of tree removal has been considered in this section. Refer to **Section 6.9** of this report and **Appendix G.2** for an assessment of potential ecological impacts of the impacted trees.

6.3.2 Potential impacts

6.3.2.1 Landscape impacts

The Proposal would result in the replacement of existing mostly vacant industrial properties with a road corridor. Whilst this would result in a change to the existing land use character, the proposed road would incorporate urban design and landscape treatments to provide a high-quality public domain that acts as a gateway to GSTC. The road corridor would provide for more activated public domain that provides clear public accessibility, east-west connectivity and directionality to the GSTC and rail station precinct. The priority towards public and active transport modes would also give the road corridor a distinct character centred on sustainable transport modes.

The proposed road would increase the permeability of the precinct and support the sustainable renewal of adjacent residual lands by providing transport services, increased connectivity and the activation of public domain to service future land use.

6.3.2.2 Visual impacts

The road would be primarily hidden from view, therefore the broader visual impact would be at the proposed intersections, which has views of the proposed road corridor (e.g. Bowden Street looking east and Geddes Avenue looking west).

The Proposal directly impacts on 14 existing mature street trees (6 regarded as having a low rating and eight (8) having a moderate rating). These street trees provide a natural appearance to the

streetscape. This natural appearance would be impacted as road infrastructure (signalised intersections) are installed. There would be the loss of the existing trees at these locations and placement of road facilities and infrastructure. There is also potential for increased, broader visual effects with the removal of street trees, as existing older style industrial buildings of little architectural merit are exposed along O'Riordan Street closer to Green Square railway station.

Urban design measures and landscaping would be implemented to enhance the public domain and amenity of the new road corridor. As such, subject to design measures, the proposed road is considered unlikely to result in significant impacts to the aesthetics of the area and new landscaping would in time replace the removed street trees.

Figure 12 View towards proposed GS2AC from Bowden Street

The inclusion of a retaining wall, on the southern boundary, would not pose any significant visual impact to road users or community members. The retaining wall would be a tiered approach, minimising visual impact to footpath users. The maximum height of the retaining wall is 3.1 m (refer **Figure 13**).

The development of the proposed road would enhance the overall visual appeal of the precinct through the renewal of vacant industrial sides.

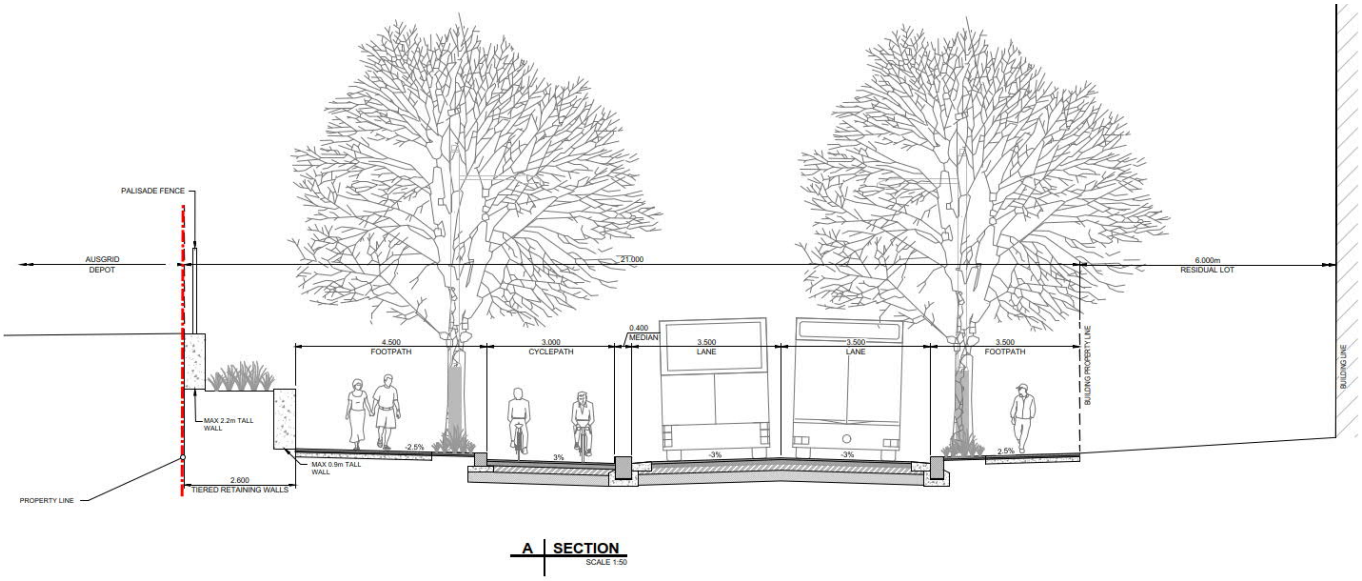

Figure 13 Retaining wall on southern portion of proposed GS2AC

6.3.3 Mitigation measures

The following mitigation measures would be implemented to ensure minimal impact on the landscape and visual appearance of the Proposal.

- Construction work sites would be enclosed by hoarding around the perimeter during construction and maintained in a tidy manner
- An Urban Design and Landscaping Plan would be implemented to enhance the streetscape and public domain values of the Proposal as part of detailed design.

6.4 Non-Indigenous heritage

This section assesses and describes the impacts of the Proposal on non-Indigenous heritage within and surrounding the Proposal Area. This assessment is based on a desktop analysis of the relevant heritage registers.

6.4.1 Existing environment

A search of the following heritage registers was undertaken in 23 July 2020 to identify any potential non-Indigenous heritage items located within the Proposal Area. This included a search of the following databases:

- Australian Heritage Places Inventory
- Commonwealth EPBC Heritage List
- World Heritage List
- NSW State Heritage Register (SHR)
- Section 170 Heritage and Conservation Registers
- City of Sydney LEP 2012

A number of non-Indigenous local and State heritage items are present within a 500m radius of the Proposal. No heritage items are directly impacted by the proposed road. Heritage items located within a 500m radius are presented in **Table 17**.

Table 17 Heritage items near the Proposal

Item	Heritage listing	Distance from Proposed GS2AC Road (m)
Waterloo Public School Group	Register of the National Estate (non-statutory)	360
Yiu Ming Temple	State Heritage Register	475
Survey Mark, Botany Road, Alexandria	RMS Section 170 Heritage and Conservation Register	320
Hansard Street Heritage Conservation Area	Sydney LEP 2012	135
Zetland Estate Heritage Conservation Area	Sydney LEP 2012	285
North Alexandria Industrial Heritage Conservation Area	Sydney LEP 2012	290
William Street Industrial Heritage Conservation Area	Sydney LEP 2012	495
Hillview Estate Heritage Conservation Area	Sydney LEP 2012	80
"Elsie Terrace" including interiors	Sydney LEP 2012	355
Semi-detached houses including interiors	Sydney LEP 2012	145
Warehouse including interior	Sydney LEP 2012	390
Horse trough	Sydney LEP 2012	445
Waterloo Public School group buildings including interiors, landscaping and retaining wall	Sydney LEP 2012	360
Mentmore House	Sydney LEP 2012	405
Former Electricity Substation No. 152 including interiors	Sydney LEP 2012	465
Terrace group including interiors	Sydney LEP 2012	265
Cottage including interiors	Sydney LEP 2012	145
Terrace group including interiors	Sydney LEP 2012	270
Cottage including interior	Sydney LEP 2012	195
Western part of former Alexandria Spinning Mills including interiors	Sydney LEP 2012	495
"Paradise Garage" warehouse including interior	Sydney LEP 2012	460
Rosebery Hotel including interior	Sydney LEP 2012	260
Electricity Substation No.75 including interiors	Sydney LEP 2012	400
Part of former William Brooks factory including interiors	Sydney LEP 2012	460
Former Joseph Lucas office, stairs and showroom including interiors and building setback	Sydney LEP 2012	390
Eastern part of former Alexandria Spinning Mills including internal structure	Sydney LEP 2012	425
Yiu Ming Temple including building, interior and front court	Sydney LEP 2012	470
Former Standard Telephones and Cables industrial building including interiors	Sydney LEP 2012	340

Item	Heritage listing	Distance from Proposed GS2AC Road (m)
Former fire station including interior	Sydney LEP 2012	440
Cottage including interior	Sydney LEP 2012	405
Former Zetland Tram Terminus (874 Elizabeth Street)	Sydney LEP 2012	465
Industrial building "Eclipse House" including interior	Sydney LEP 2012	315
Industrial building "Frank G Spurway" including interior	Sydney LEP 2012	490
Semi-detached cottages including interiors	Sydney LEP 2012	460
Electrical substation including interior	Sydney LEP 2012	335
Green Square Hotel including interior	Sydney LEP 2012	395
Terrace house "Alencon" including interior	Sydney LEP 2012	430
Terrace house including interior	Sydney LEP 2012	170
"Ada Terrace" including interiors	Sydney LEP 2012	285
Cottage including interior	Sydney LEP 2012	465

6.4.2 Potential impacts

6.4.2.1 Construction

The Proposal is unlikely to impact on identified heritage items, which are located over 100m from the site boundary, or on the curtilage of heritage conservation areas located at least 80 m from the site boundary. An RMS Section 170 register includes a listed heritage item (Alignment Mark) at Botany Road Alexandria, which was not found within the study area of the Botany Road connection upon site inspection. Two other alignment pins located at 527 Botany Road and 330-332 Botany Road Alexandria (West Side) were identified during a site visit in February 2015. Neither alignment pin is listed under RMS Section 170 nor would be impacted by the proposed GS2AC.

The identified heritage items are considered to be of sufficient set back distance to be unlikely to be affected by construction vibration within the corridor. However, vibration intensive activities would be carefully planned for as part of the CNVMP including minimum set back distances, dilapidation surveys and vibration monitoring (as required).

6.4.2.2 Operation

During operation, impacts to non-Aboriginal heritage items would be largely experienced as changes to landscape character and visual amenity, however given the Proposal's distance to the closest heritage items and conservation areas, this impact is considered to be negligible.

6.4.3 Mitigation measures

The following mitigation measure would be in place to ensure minimal impact to any non-indigenous heritage items identified within the Proposal area:

- In the event that any unanticipated archaeological deposits are identified within the Proposal Area during construction, all works within the vicinity of the find would cease immediately and the Site Construction Manager would be notified. The Construction Contractor would immediately notify the City of Sydney Proposal Manager and the City of Sydney environmental officer so they can assist in co-ordinating the next steps which are likely to involve consultation with an archaeologist and DPIE. Where required, further archaeological work and/or consents would be obtained for any unanticipated archaeological deposits prior to works recommencing at the location.

6.5 Indigenous heritage

This section assesses and describes the impacts of the Proposal on Indigenous heritage within and surrounding the Proposal Area. A desktop assessment was undertaken to determine whether the Proposal has the potential to affect Aboriginal cultural heritage (including indigenous sites, objects and places as defined under the NPW Act) and if further assessment or investigation is required.

6.5.1 Existing environment

The Proposal Area is located within the City of Sydney LGA and Metropolitan Local Aboriginal Land Council (LALC). The Metropolitan LALC covers a large proportion of the Sydney Basin from the Georges River in the south to Yengo National Park in the north. The Gadigal people were the original inhabitants of the land now encompassed by the City of Sydney LGA.

A search of the Aboriginal Heritage Information Management System (AHIMS) was conducted on 23 July 2020. The AHIMS searches did not identify any Aboriginal heritage items within or adjacent to the Proposal Area. The closest registered site (AHIMS midden site 45-6-2597) is located approximately 1.4 km north of the works. However, listing details suggest the coordinate is inaccurate and this site is actually located 3 km north adjacent to Wynyard Station

The Proposal Area does not contain any landscape features that indicate the presence of Indigenous heritage objects and the cultural heritage potential of the Proposal Area and surrounds appears to be significantly reduced due to past disturbance.

6.5.2 Potential impacts

6.5.2.1 Construction

Direct or indirect impacts to items of Indigenous cultural heritage are unlikely as a result of the Proposal, as:

- No Aboriginal sites have been previously identified within the Proposal Area
- The Proposal Area has previously undergone extensive landscape modification and a high level of disturbance from urban development.

The Proposal Area has been previously disturbed as a result of previous construction of developments, services and footpaths. These previous developments have resulted in removal or disturbance to the upper layers of the natural soil profile which is where indigenous heritage items are likely to have been found. There is clear evidence that the Proposal Area has also been subject to past disturbance with the introduction of fill materials, levelling, installation of utilities and services (both subsurface and above ground) and roadside landscaping. Therefore, there is a low likelihood that the Proposal would affect any previously unidentified culturally sensitive items within the Proposal Area.

If potential Aboriginal objects are encountered during construction for the Proposal, the Unexpected Finds Procedure would be implemented.

6.5.2.2 Operation

Once operational, the Proposal would not impact Indigenous heritage

6.5.3 Mitigation measures

The following mitigation measure would be in place to ensure minimal impact to any non-indigenous heritage items identified within the Proposal area:

- If unforeseen Indigenous objects are uncovered during construction, all works within the vicinity of the find would cease immediately and the Site Construction Manager would be notified immediately. The Construction Contractor would immediately notify the City of Sydney Proposal Manager and City of Sydney environmental officer so they can assist in co-ordinating next steps which are likely to involve consultation with an Aboriginal heritage consultant, the DPIE and the metropolitan LALC.

6.6 Socio economic

6.6.1 Existing environment

The area surrounding the Proposal is similar to many other inner Sydney industrial areas. The area comprises older warehouses mixed with modern industry, offices, warehouses and residential uses. The Southern Employment Lands, which includes the East Alexandria Precinct has limited residential zoning. The nearest regions of continuous housing are in Beaconsfield and a small section of O'Riordan Street, towards the south of the Proposal.

The area is well connected to the City, the airport and Port Botany through the existing rail line and Green Square Station and several regional and local bus routes. Travel from the east to west can be challenging due to the lack of connectivity between in Inner West and the Eastern Suburbs.

Given the industrial nature of the East Alexandria precinct, there is a general lack of community facilities and open spaces. The two (2) nearest parks in the area are Perry Park and Beaconsfield Park. The Drying Green, bound by Geddes Avenue and Zetland Avenue, is expected to be completed in 2021 which would provide a new open space for members of the East Alexandria and Green Square community.

6.6.2 Potential economic impacts

The Proposal would result in the direct loss of one (1) hectare of employment zoned land in the Southern Employment Lands, one of the main centres of employment within the LGA.

The area is representative of less than 1% of the total employment generating lands within the Southern Employment Lands (230 hectares).

As Properties 330-332, 334-336 and 338 Botany Road, 20 O'Riordan Street and the Ausgrid site are currently vacant, the Proposal would not impact the viability of land uses.

The Proposal would however impact A2B Australia at 9-13 O'Riordan Street as 521 m^2 of the property in the south-eastern segment of the site would be acquired. The area to be acquired is currently used as a carpark, accessway and entrance to a maintenance depot. There would be no impact to existing buildings.

The City would continue to work with A2B Australia to ensure minimal impact and disruption is caused to its business and employee amenity during the construction of the proposed road and with respect to acquisition requirements.

6.6.3 Potential social impacts

The City aims to achieve sustainable renewal of residual lands located to the east to provide two (2) mixed use affordable housing developments. This would include a 200 unit affordable housing development to the north of the proposed roadway and a 100 unit affordable housing development to the south. This aligns with the *Sustainable Sydney 2030* and its objective to achieve more affordable housing options within the LGA.

The Proposal would provide a safer and more accessible pedestrian and cycle routes to key transport locations and service areas. This increased urban activity is likely to increase the safety of the area. The one (1) operating business identified to be impacted with respect to partial property acquisition would be consulted throughout the design and construction phase to ensure, the Proposal is managed with minimal impact to the business operations. Access to the businesses would be maintained at all times and construction measures would be employed to minimise amenity impacts to business employees during construction. Overall, the road is unlikely to cause significant negative social impact to surrounding land use.

The Proposal is unlikely to cause negative social impact to nearby residential properties in Queen Street, Johnson Street and in the southeast in Hansard Street. No existing community centres, or key public domains or open spaces would be impacted in the East Alexandria Precinct.

6.6.4 Mitigation measures

The following mitigation measures would be in place to minimise amenity impacts to surrounding land uses, including the one affected business, with a particular focus on keeping the community informed including:

- The community should be informed of construction progress, activities and potential impacts
- Regular updates would be provided to local businesses and residents to provide information regarding key progress milestones through flyers, website announcements or letterbox drops
- Consultation with businesses affected by partial acquisitions would continue, including discussions on how to minimise impacts to business operations.

6.7 Contamination, landform, geology and soils

6.7.1 Existing environment

6.7.1.1 Landform, geology and soils

Review of the 1:100 000 geological map of Sydney (Map 9130, 1:100 000 Department of Mineral Resources [DMR] 1983) indicates the Site is underlain by quaternary 'Botany Sand Bed sediments' and is comprised of unconsolidated to semi-consolidated permeable sands. The sands are medium to fine grained quartz marine sands with minor shell fragments and podzols. The sand is underlain at depth by the Mesozoic Ashfield Shale of the Wianamatta Group comprising black and dark grey shale and laminate.

The elevation of the Proposal Area at this location is relatively flat, with slight variations, 15.1m to 8.2m AHD (Australian Height Datum).

6.7.1.2 Acid sulfate soils

Acid sulfate soil (ASS) risk maps have been obtained from the Sydney LEP 2012. Based on the ASS map, the Proposal Area is located on land mapped as containing Class 3 and 5 ASS, presented in **Figure 14.**

6.7.1.3 Contamination

A search of the NSW EPA Contaminated Land Register on 23 July 2020 identified the following sites within or near to the Proposal Area as contaminated lands:

- 10-20 Botany Road (A residential apartment, former service station)
- 20 O'Riordan Street (Vacant lands, former service station)
- 122 - 138 Joynton Avenue (Ausgrid site, former industrial site).

These sites are presented in **Figure 14.**

The Proposal Area has not been declared as significantly contaminated and is not regulated under the CLM Act.

Given the urbanised nature of the Proposal Area, there is potential for contaminants to be present within the underlying soils. Construction and ongoing maintenance of the existing roads would likely have involved the introduction of fill and potential spills of fuel, oil and other chemicals.

The *Remediation Action Plan for East West Relief Route* (the RAP) (PB, 2016) (**Appendix F.1**) for the Proposal concluded the following contamination was present within the Proposal area:

- Shallow lead impacted soils along the length of the proposed road and in adjacent sites to a depth of approximately 3 metres below ground level (mbgl)
- Asbestos contaminated fill materials across the Ausgrid site, depth 2.2 mbgl
- Residual hydrocarbon impacts at 20 O'Riordan Street, depth 3 mbgl

Groundwater at 20 O'Riordan St has been identified as being impacted by hydrocarbons. Limited studies have been undertaken across the site. To avoid encountering groundwater; the maximum cut depth would be approximately 2.5 mbgl at the eastern portion of the Ausgrid site.

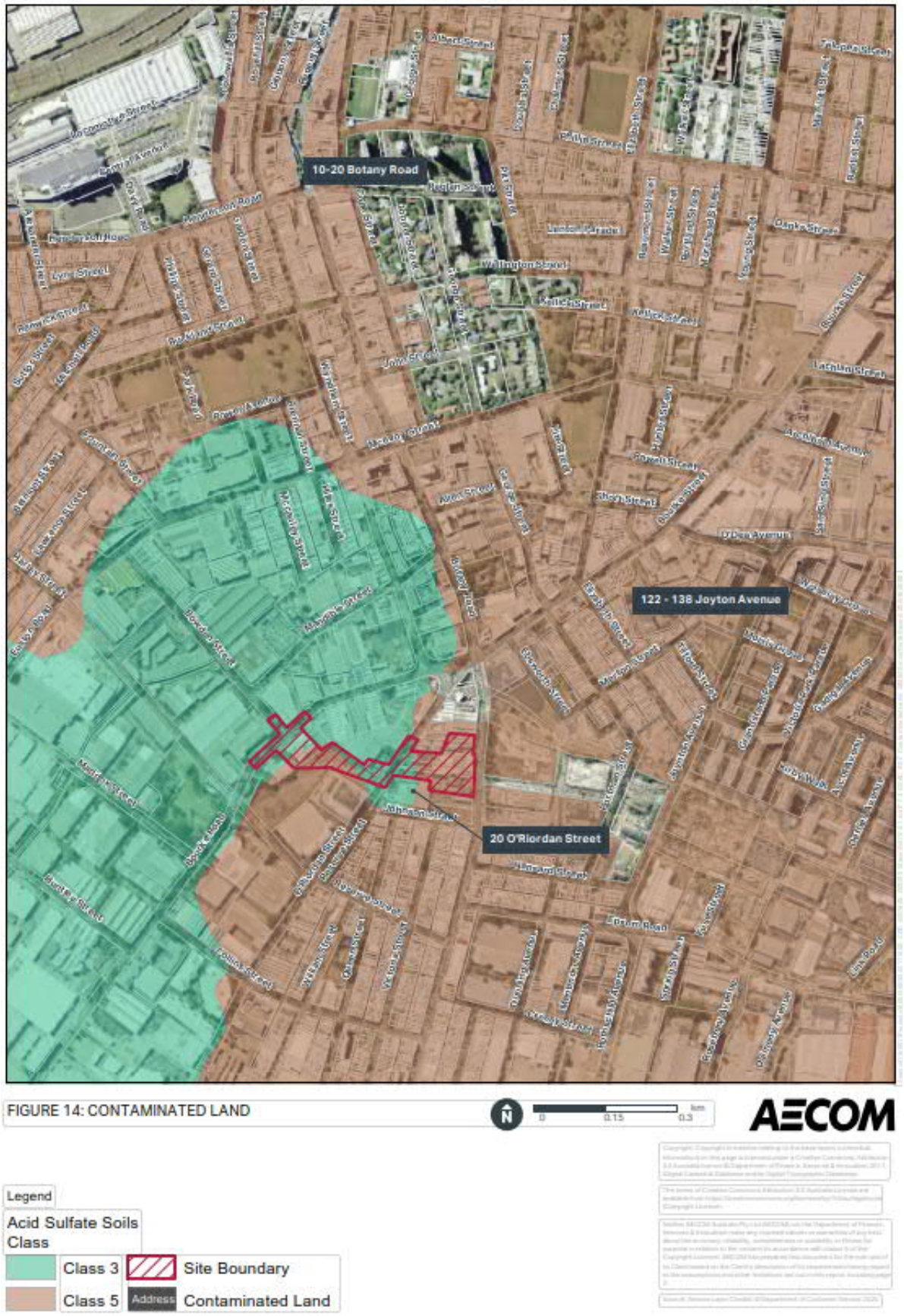

Figure 14 Contaminated lands

6.7.2 Potential impacts

6.7.2.1 Construction

Soil disturbance, erosion and sedimentation

The Proposal would involve excavation and other earthworks associated with the proposed road. If not adequately managed, these works could result in the following risks:

- Erosion of exposed soil and stockpiled materials
- Dust generation from excavation and vehicle movements over exposed soil
- Increase in sediment loads entering the stormwater system and/or local runoff.

The risk of the above impacts occurring is increased during high wind, rainfall events and for work situated on or adjacent to downward sloping surfaces. These risks have implications upon other environmental values including biodiversity, water quality and air quality. Where sediment loads in local waterways are increased as a result of erosion of materials, it would alter the existing water quality conditions, which may result in negative impacts upon aquatic flora and fauna.

Stockpiles that are inadequately covered or not watered-down may result in increased dust in the local area during high wind events. Increased dust in the area surrounding the works may have nuisance impacts upon surrounding receivers.

With no mitigation measures in place, and in inclement weather conditions involving rain and/or high-velocity wind, these impacts are considered to have a temporary, moderate negative impact. However, through the implementation of the mitigation measures listed in **Section 6.7.3**, despite weather conditions, the risks associated with soil disturbance, erosion and sedimentation at the Proposal Area is considered to be low.

Acid sulfate soils

Based on historic land use, the known depth of fill material and geology across the Proposal area and the likely depth of construction, it is considered unlikely that natural marine sediments would be excavated during construction of the Proposal. Management of Potential Acid Sulfate Soils (PASS)/Actual Acid Sulfate Soils (AASS) is therefore not required.

However, in the unlikely event they are encountered, PASS/ASS materials would be managed in accordance with the *East West Relief Road Acid Sulfate Soils Management Plan* (the ASSMP) (PB, 2016) (**Appendix F.2**) developed for the proposed road corridor and Part 4 of the NSW EPA waste classification guidelines. The ASSMP outlines the mitigation measures to be undertaken to ensure minimal disturbance to ASS. Should PASS/AASS be encountered during onsite excavations, the following strategies may be adopted:

- burial of excavated PASS materials below the water table where possible
- neutralisation of PASS materials where re-use on site above the water table is required
- disposal of excess PASS material to an appropriate off-site facility where it cannot be reused on-site.

Groundwater

According to the RAP, groundwater in the vicinity of the decommissioned Mobil service station (20 O'Riordan Street) has been identified as being impacted by hydrocarbons. However, the maximum depth of excavation would be approximately 2.5 m on the eastern portion of the Ausgrid property, where groundwater depths are between 3.5 mbgl and 5.5 mbgl. Groundwater is therefore unlikely to be encountered during construction of the Proposal.

Contamination

Excavation also has the potential to expose contaminants within the soil underlying the existing road surface during intersection works which, if not appropriately managed, could present a health risk

concern to construction workers and the community. The exposure of contaminants could also pose an environmental risk if they were to enter nearby waterways via stormwater infrastructure.

Potential contamination impacts may also arise from the use of fuels, lubricants and chemicals for construction plant and equipment for the Proposal. Fuels, lubricants and chemicals have the potential to be spilled during construction and transfer offsite to adjacent properties or may contaminate the stormwater system.

Overall, the impact resulting from contamination within the Proposal Area is considered to be low and the risk of impacts from contamination (if any) on human health and the receiving environment from construction activities would be reduced and managed through the mitigation measures identified in the RAP.

6.7.3 Operation

Following the completion of construction and remediation works at the Ausgrid property, the current Site Management Plan would need to be revised given the changed conditions, in accordance with the RAP.

The Proposal would not be expected to result in ongoing operational impacts once construction works are completed.

6.7.4 Mitigation measures

The following additional mitigation measures would be in place to minimise impacts on the geology and soils of the Proposal area and those resulting from the excavation of contaminated land.

6.7.4.1 Pre construction

- A Contaminated Land Management Plan would be developed as part of the CEMP, in accordance with the RAP and in accordance with any relevant approvals
- Prior to commencement of works, a site-specific Erosion and Sediment Control Plan (ESCP) would be prepared in accordance with the 'Blue Book' *Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004) and updated throughout construction so it remains relevant to the activities. The ESCP measures would be implemented prior to commencement of works and maintained throughout construction

6.7.4.2 Construction

Excavation

- Segregation of materials would be ensured during excavation to avoid contamination
- All spoil and waste must be classified in accordance with the *Waste Classification Guidelines Part 1: Classifying waste* (EPA, 2014) prior to disposal. Any spoil containing potential ASS must be disposed of in accordance with the ASSMP (*Parsons Brinckerhoff, 2014* in addition to *Part 4: Classifying waste* (EPA, 2014)
- Any PASS/AASS material encountered during construction would be managed in accordance with the ASSMP.

Contaminated groundwater

In the unlikely event that groundwater is encountered during construction, the following mitigation measures would be put in place to minimise the risk of potential exposure:

- Dewatering of exposed groundwater. Water should be stored in retention basins or fully contained tanks on-site. An environmental scientist would collect a sample and analyse it to assess the contamination. If the water exceeds criteria is would be exported offsite and disposed of at an appropriate waste facility. Should the water have concentrations below criteria it may be re-used onsite for dust suppressions or other uses.

Stockpiling

Stockpile management procedures would be established as part of the CEMP, and in accordance with the RAP.

- Stockpiles would be located to mitigate environmental impacts while facilitating material handling requirements
- Contaminated stockpiles would only be stockpiled in non-remediated areas of the site or at locations where no risk is posed, e.g. hardstand areas. Contaminated stockpiles would be covered and wet down
- Asbestos contaminated soil would be managed in accordance with SafeWork NSW and management measures in the RAP. This would include, but would not be limited to, air monitoring, appropriate signage and the establishment of exclusion zones
- Material excavated for the construction of the Proposal, that is proposed to be retained on-site and capped, would be sampled for contaminants. The rate of sampling is to meet the stockpile sampling requirements of the NEPM (2013).

Erosion

- Erosion and sediment controls would be installed prior to commencement of excavation works in accordance with the ESCP and would remain onsite for the duration of construction or until the area has stabilised. Controls would be inspected regularly and maintained
- Work areas are to be stabilised progressively during the works.

Reinstatement

- Reinstatement should be undertaken in accordance with the RAP
- All imported fill, regardless if Virgin Excavated Natural Material (VENM) or Excavated Natural Material (ENM), should be accompanied by the relevant documentation and included within the validation report. The source site should be inspected and the material samples at a rate of one (1) per 100 m3, with a minimum of 10 samples taken per product. Imported fill samples would be submitted for analysis of TRH, BTEX, PAHs, PCBs, metals and pesticides. Results should background levels for metals and unable to be detected for other contaminants.

Contaminated soils

- Contaminated soils would be sampled prior to offsite disposal. Sampling methodology would be in accordance with the National Environment Protection Measures (NEMP) (2013)
- Soil validation is to be undertaken in accordance with the RAP. Following the remediation works, a final report is to be prepared in accordance with the Guidelines for Consultants Reporting on Contaminated Sites. The validation report is to detail the extent and nature of the remediation works, characterisation and disposal of contaminated soils, reinstatement and capping of asbestos contaminated soils, the validation of clean imported fill and topsoils and is to discuss the overall status of the site.

Material tracking

Materials should be tracked from cradle to grave with accurate information about the location and quantity of material. The disposal location should be determined by the remediation contractor. For any trucks leaving site the landfill docket number is to be recorded and provided in the validation report in accordance with the RAP.

Remedial contingencies

It is anticipated that the proposed remedial technologies should be affective in dealing with the present contamination. Contingency strategies may be required in the event of certain scenarios. Potential contingency strategies are presented in **Table 18.**

Table 18 Remediation contingency strategies

Scenarios	Remedial contingencies/actions required
Highly contaminated soils not identified during previous investigation are encountered	If encountered, works are to cease until an environmental consultant can further assess impacted soils/materials and risks

Scenarios	Remedial contingencies/actions required
	associated. Remedial plans are to be amended as necessary and approved by the City Project Manager and site auditor
Asbestos wastes are encountered in areas outside of the Ausgrid site	If asbestos is encountered subsurface, an asbestos management plan would be prepared and provided to the City and site auditor for approval. Works would be suspended, and asbestos removed by a suitably qualified contractor in accordance with SafeWork NSW.
Changes in proposed future land uses at the site	A revised RAP would be issued.

Unexpected finds protocol

Contaminated material may be identified during the excavation works which was not identified in previous investigations. Soil underneath building slabs or other site coverings should be inspected. All unexpected finds are to be documented in the validation report.

Contamination may be evident through:

- Odour
- Seepage of liquids from soil or rock
- Unusual metal objects
- Presence of oil
- Discolouration or staining of soil or rock
- Sheens on groundwater
- Presence of underground storage tanks
- Potential asbestos containing material
- Unusual colour of soil or groundwater
- Presence of waste or rubbish.

If previously unidentified contamination is discovered, the following procedure would be implemented:

- Excavation would cease immediately within the vicinity
- The Principal Contractor would be informed as soon as practicable following the event
- A suitably experienced environmental consultant would assess the unexpected find and sampling would be conducted as advised to determine an appropriate course of action
- Contingency measures identified in the RAP would apply
- Laboratory results would be assessed to determine the waste classification of material
- Excavation would not recommence until the extent of the contamination is assessed and necessary controls implemented
- Dependent on the waste classification, material would be exported and transported to an appropriate waste facility or re-used on site.

Site management plan

Following the completion of construction and remediation works at the Ausgrid property, the current Site Management Plan would need to be revised given the changed conditions, in accordance with the RAP.

6.8 Air quality

6.8.1 Existing environment

The air quality of Sydney is comparable with other Australian cities and is relatively good compared to other urban regions overseas. Concentrations of air pollutants including carbon monoxide (CO), nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and lead (Pb) are low and stable, and consistently meet the national air quality standards. However, ozone (O_3) and particulate matter (PM_{10} and $PM_{2.5}$) levels can exceed the national standard from time to time across Sydney (Office of Environment and Heritage, 2018).

A search of the National Pollutant Inventory (NPI) database was undertaken on 27 July 2020. Searches were conducted within one kilometre of the Proposal Area. The database search identified two facilities whose emissions meet the NPI reporting requirements.

- Drycleaners at 35 Epsom Road, Rosebery, NSW, 2018
- Automotive manufacture at 52 O'Riordan St, Alexandria, NSW, 2015.

Potentially affected receivers within the vicinity of the Proposal Area include local residents, businesses, construction workers and community centres surrounding the site.

6.8.2 Potential impacts

6.8.2.1 Construction

Temporary air quality impacts that have the potential to occur during construction include minor increases in dust and emissions of carbon monoxide, sulphur dioxide, particulate matter, nitrous oxides, volatile organic compounds and other substances associated with excavation and the combustion of diesel fuel and petrol from construction plant and equipment.

Anticipated sources of dust and dust-generating activities include:

- Excavation and removal of existing road surfaces
- Stockpiling activities
- Loading and transfer of material from trucks
- Other general construction activities.

The air quality impact associated with the above activities would be localised and generally contained within the construction area. These impacts would be small scale, involving small numbers of machinery, vehicles and equipment. They would also be intermittent and temporary, being restricted to construction hours. Appropriate measures would be established to manage dust emissions from construction and demolition works. These include ensuring stockpiles are covered, stockpiles are watered during windy days and construction machinery is turned off when not in use. On this basis the overall significance of air quality impacts associated with the construction of the Proposal is expected to be minor.

6.8.2.2 Operation

Potential impacts associated with operation include exhaust emissions from vehicles and buses. The Proposal would mainly prioritise public transport and active transport.

The City proposes to plant up to 33 trees along the proposed road to compensate for loss of street trees within the corridor. The landscaping would potentially have the added benefit of assisting to mitigate impact to local air quality through carbon dioxide absorption. The trees would also help trap airborne particles, dust and toxins associated with diesel fuel exhaust.

6.8.3 Mitigation measures

The following mitigation measures would be in place to ensure minimal impact on the air quality as a result of the Proposal during construction:

- A Construction Dust Suppression Management Plan (CDSMP) would be developed to minimise the movement of airborne dust.

To minimise the generation of dust from construction activities, the following measures would be implemented:

- Covering of stockpiles when not in use
- Watering of stockpiles and exposed soil during windy days (where winds exceed greater than 20 km/hour)
- Covering loads on trucks transporting material to and from the construction site
- Ensuring tailgates are fixed to minimise mud and dirt being tracked onto sealed road surface.

6.9 Biodiversity

This biodiversity assessment has been prepared based on a review of previous ecology assessments undertaken for the Proposal area (as documented in the 2017 REF), updated database searches and a site walk through undertaken on 24 July 2020 by AECOM ecologist as documented in *Green Square Connector Road Biodiversity Inspection* (the Biodiversity Inspection) (AECOM, 2020) (refer Appendix **G.1**).

The results of the site inspection, and a high-level assessment of ecology impacts are presented below.

6.9.1 Existing environment

The Proposal area has been significantly modified by previous and current urban development. This is identified in the Green Square Stormwater Drain REF (Sydney Water, 2014), which states:

> *Before European settlement, the Botany Basin consisted of estuarine and freshwater wetlands, woodlands and the now endangered Eastern Suburbs Banksia Scrub vegetation community. We have lost most of the pre-1788 environmental landscape in Green Square and the wider region after a century and a half of industrial development, drainage and infilling of swamps. The project area is in the most urbanised LGA of Australia.*

The location of native and exotic vegetation is shown in **Figure 15**.

A search of the NSW Bionet Atlas and the Commonwealth Protected Matters Search Tool, as part of the Biodiversity Inspection indicated the potential for 121 threatened and migratory species to be present within a 5 km radius of the Proposal. This includes highly mobile species such as Grey-headed Flying-fox and Powerful Owl, as well as less mobile species such as Wallum Froglet and Green and Golden Bell Frog(refer **Figure 16**). Threatened plants in this radius include *Acacia pubescens*, *Pimelea spicata*, *Syzgium paniculatum* and *Persoonia hirsuta*. A likelihood of occurrence assessment was undertaken for all threatened species identified by desktop searches. This assessment considered the likelihood any threatened species to utilise the site to be low.

No recognised vegetation communities were identified as being present within the site. The nearest mapped community in The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH, 2016) VIS ID 4489 was ‘Urban exotic/native’, located 50 metres south on O’Riordan Street and over the Botany Road/Geddes Avenue intersection.

The nearest mapped native plant community was Coastal Sand Apple-Bloodwood Forest (PCT 1775), located within the NSW Golf Club around 2 km from the Proposal.

Figure 15 Vegetation mapping

Figure 16 Threatened species records

6.9.2 Biodiversity inspection

AECOM conducted an ecological inspection on the morning of 24 July 2020. The site is generally flat and is separated into two almost completely flat sections in a terrace fashion. A summary of the inspection is provided below, and a further detailed review of the inspection is available in **Appendix G.1**.

Vegetation within the Proposal area is generally very limited. Much of the vegetation present appears to be common urban native and exotic species, with some seemingly planted (refer **Figure 15**).

Street trees along the interface of the Proposal area with Bourke Road consist of two large *Melaleuca quinquenervia* and one *Eucalyptus sideroxylon*. Two planted areas of *Lomandra longifolia* are present between the traffic lanes and the bike lane of Bourke Road on the intersection with Bowden Street.

Vegetation within the first section (historically facing Bourke Road) is largely comprised of planted and regenerated native species. Native species present include:

- Tuckeroo (*Cupaniopsis anacardioides*)
- *Acacia implexa*
- *Casuarina glauca*
- *Melaleuca quinquenervia*.

Exotic vegetation in this area included:

- African olive (*Olea europaea subsp. cuspidata*)
- Lantana (*Lantana camara*)
- Crofton weed (*Ageratina adenophora*)
- Rhodes grass (*Chloris gayana*)
- Pink Diosma (*Coleonema pulchellum*)
- Pampas grass (*Cortaderia selloana*)
- Fountain grass (*Pennisetum* sp.)
- Cobbler's pegs (*Bidens pilosa*)
- Purple top (*Verbena bonariensis*).

Vegetation within the second section (to the west of O'Riordan Street) is comprised of the same species with the exception of several Chinese elm (*Ulmus parviflora*) growing alongside the A2B Australia building. The front car park of the A2B Australia property would be impacted by the Proposal. This area includes a number of Scrub cherry (*Syzigium australe*) employed as a hedge and a cultivated Grevillea 'Honey gem'. Street trees along O'Riordan Street include several large Broad-leaved paperbark (*Melaleuca quinquenervia*) and several smaller Narrow-leaved ironbark (*Eucalyptus crebra*). Both of these are commonly planted street trees throughout the Sydney region, and neither are threatened species.

The only fauna species observed around the site was Noisy miner (*Manorina melanocephala*). No evidence of other occupation in the form of scats or tracks was observed, though the site would be reasonably expected to accommodate a selection of native and exotic species. This is likely to include common native and exotic urban-adapted species such as European fox, Rabbit, domestic and feral cats, as well as Brushtail and ringtail possums.

The site lacks any substantial habitat value in the form of typical aspects such as permanent water, coarse woody debris, leaf litter, tree hollows or fallen logs.

6.9.3 Potential impacts

Street Trees

An arboricultural assessment was undertaken as part of the 2017 REF (Earthscape Horticultural Services, March 2015) (Refer **Appendix G.2**) which identified the tree removal likely to be required as

part of the Proposal at Bourke Road / Bowden Street and O'Riordan Street. The conclusions of this report are still considered relevant to this REF, as the corridor for the Proposal remains largely unchanged. The location of affected trees with respect to the proposed road are shown in **Appendix G.2.**

The Proposal is likely to require the removal of six (6) trees that have been assessed as having low retention value. These include one (1) Black Poplar, one (1) Narrow-leaved Ironbark, two (2) Broadleaved Paperbark and two (2) Golden Robinia. None of these trees were assigned significant amenity value and their removal was considered warranted.

The Proposal would also require the removal of eight (8) trees of moderate retention value. These include one (1) Mugga Ironbark, one (1) Balsam Poplar and six (6) Broadleaved Paperbark. These trees were considered to be in good health and condition and making a fair contribution to the amenity of the site and surrounding properties.

The Proposal would also necessitate the removal of one (1) tree of high retention value, a Broadleaved Paperbark. This tree was identified to be in good health and condition and making a positive contribution to the amenity of the streetscape. Given the limitations of the road alignment and design, there are no feasible alternatives that can be recommended that would permit the retention of this tree.

In order to compensate for the loss of amenity resulting from the removal of these trees, the arboricultural assessment recommended replacement planting elsewhere within the road reserve. Landscaping measures are proposed as part of the current design to provide for amenity outcomes.

Proposed kerb and gutter and stormwater works are located within the Tree Protection Zones (TPZs) of a further four (4) trees of moderate value (two (2) Narrow-leaved Ironbark, one (1) Broad-leaved Paperbark and one (1) Balsam Poplar) and two (2) trees of low retention value (one (1) London Plane and one (1) Narrow-leaved Ironbark). These works have the potential to result in an adverse impact on these trees. However, implementation of suitable tree protection measures prior to and during construction was considered likely to avoid any adverse impact.

Landscape planting for the Proposal would include 33 new trees, to offset removal of the 15 existing street trees.

Vegetation

Based on the ecological investigations undertaken in both 2017 and 2020, the Proposal area has been assessed as having a low habitat value due to a lack of intact native vegetation.

The construction of the Proposal would require localised vegetation clearance, which is not considered significant. This is based on the nature of the existing vegetation, being heavily modified from its original state.

Vegetation along the alignment is generally characterised by planted or naturally generated exotic species, and environmental weeds. None of the vegetation is considered to be remnant due to extensive historic clearing in this highly urbanised landscape. Vegetation in this area is also subject to ongoing management to a small degree to maintain the site in an orderly condition.

The loss of vegetation in this area for the purposes of construction would not affect any threatened species or ecological community. On this basis, and proposed landscaping plan for the road reserve which would involve planting with native species, the impact of vegetation removal for the purposes of construction in this location is considered to be negligible.

Fauna habitat

As outlined above, the Proposal Area has been subject to extensive historic clearing. As such, the existing habitat value of the site is significantly reduced from the original assemblage that would have occupied the area prior to European settlement (likely to be a marsh-like community). The Proposal Area is largely bare ground, with areas of weeds and semi-mature regenerated or planted native species. This environment generally favours only highly urban-adapted native and exotic fauna.

The Proposal Area also has little in the way of trees likely to provide foraging resources for Grey-headed Flying-fox – an urban adapted threatened species. The one exception is the Tuckeroo located at the rear of the property formerly facing Bourke Road. This tree would be cleared to facilitate

construction of the road. The loss of this tree is unlikely to result in a significant impact upon any viable local population of this species given the abundance of similar fruiting or flowering vegetation within landscaped areas of Sydney generally.

The Proposal would result in localised changes to drainage, including the formalisation of some drainage into the road's stormwater network. Given the lack of nearby waterbodies or marsh areas, the impact of these changes is considered to be negligible.

Operation of machinery including chainsaws during construction has the potential to directly disturb native fauna through noise impacts. Whilst these impacts are inevitable and largely unable to be mitigated, they would be temporary and are therefore not considered to be significant.

The loss of this vegetation in this area would remove a small degree of understory habitat. This vegetation is likely to be utilised by small insectivorous birds for foraging, with most medium to large ground-dwelling native mammals not likely to be present in this urbanised environment. Habitat for arboreal mammals would not be substantially affected by construction and operation on the basis that the Proposal would affect only a small number of semi-mature native trees providing canopy cover.

Given the absence of constructed masonry buildings and surfaces, or large trees with hollows or flaking bark, it is unlikely that the Proposal would affect any threatened microbat species.

The operation of the proposed road would result in a minor increase in the potential for vehicle strike. However, given the generally low speeds of roads in this area, with regular traffic-light controlled intersections, and the general absence of ground-dwelling native fauna, this risk is considered to be low.

Whilst no threatened species were recorded during the site inspection there remains the potential that this area may be used on occasion by one or more of the above mobile fauna species for shelter or foraging. Such usage is not expected to be extensive nor to the degree that threatened species are likely to solely rely on vegetation subject to removal as part of the Proposal.

Overall, the Proposal is not expected to result in any significant impacts upon threatened fauna or their habitat.

6.9.4 Mitigation measures

The following mitigation measures would be in place to ensure minimal impact on the biodiversity within the Proposal Area.

- Disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal. Trees/vegetation nominated to be removed would be clearly demarcated onsite prior to construction, to avoid unnecessary vegetation removal
- Trees to be retained would be protected through temporary protection measures discussed below:
    - tree protection would be undertaken in line with *AS 4970-2009 Protection of Trees on Development Sites* and would include exclusion fencing of tree protection zones (TPZs);
    - in the event of any tree to be retained becoming damaged during construction, the Construction Contractor would immediately notify the City Project Manager and the City of Sydney environmental officer to coordinate the response which may include contacting an arborist to inspect and provide advice on remedial action, where possible
- For construction works within the TPZ of trees to be retained and where incursions greater than 10% are unavoidable, a qualified arborist would be appointed to conduct exploratory excavation using non-destructive methods to evaluate the extent of the root system affected and determine whether or not the tree can remain viable
- Should the detailed design or onsite works determine the need to remove or trim any additional trees, which have not been identified in the REF, the Construction Contractor would complete a City of Sydney Tree Removal Application Form and submit it to the City for approval
- Parking of vehicles and storage of plant and materials would be avoided within TPZs, for trees to be retained, once pavement has been removed

- Site sediment and debris control measures would be put in place prior to any excavation or construction activity
- Environmental and high threat weeds would be cleared from the broader site as far as possible as part of construction. If vegetation containing weeds is chipped on site, it would be kept separate from native species and should be disposed of separately at a licenced waste management facility
- Removal of woody environmental weeds would include adequate poisoning of the plant to reduce the chance of regrowth. This would include measures such application of glyphosate to the exposed trunk immediately after cutting
- Soils within the site would be stabilised upon completion of the proposed works. This would include measures such as the spread of clean, native-derived vegetation chippings/mulch and/or the application of geofabrics
- The site would be monitored at least once within three to six months of the completion of works to remove any emergent weeds
- Landscaping the new road and surrounds would be undertaken with local native species as far as practical and would involve planting at least 33 new trees
- Any planted vegetation would be monitored at least once within three to six months of the completion of works with any planted stock that has died off being replaced. Another inspection would be undertaken between nine to twelve months after construction to remove weeds and replace any planted stock that has died off.

6.10 Hydrology and water quality

This section of the REF is based on the *Green Square to Ashmore Connector Hydraulic Impact Assessment* (the Hydraulic Assessment) (AECOM in association with HydroStorm Consulting, 2017), which is provided in **Appendix H**.

The Hydraulic Assessment prepared to present the results of hydraulic modelling undertaken to assess the impact of the Proposal on existing flood behaviour. The modelling outcomes are considered to remain relevant for the current design, as the current design has not materially changed with respect to hydraulic parameters.

6.10.1 Existing environment

The Proposal is situated approximately 200 m north east of the Alexandra Canal, in a flood plain area covered by the *Green Square Catchment Floodplain Risk Management Plan* (CoS, 2013) that was approved by SES in 2017. The area is prone to high depth flooding events including the 20 year and 100 year flood event.

The proposed road's intersection with O'Riordan Street is located at a sag point along O'Riordan which floods to a depth of approximately 1m in a 100 year flood event.

The Proposal area is generally flood prone and any proposed development would need to address the risk of flooding. Additionally, proposed development should not have an adverse impact on the surrounding environment.

6.10.2 Potential impacts

Hydraulic modelling and design

Modelling was undertaken for the existing and developed (with the Proposal) conditions for the 20 year and 100 year average recurrent interval (ARI) events together with the Probable Maximum Flood (PMF). A two hour duration was adopted for the 20 year and the 100 year flood events and 45 minutes for the PMF. These durations are generally considered to be critical for the Alexandra Canal Catchment.

The modelling results for the base case and for the Proposal were processed and the difference in flood levels for the two conditions were mapped. Although the results showed an improvement at the O'Riordan Street intersection with GS2AC, a material adverse impact was created in the area near the

Bourke Road intersection with GS2AC. This was due to additional flows travelling west down the proposed road from the O'Riordan Street sag.

A number of road level design options were considered to remove this impact, including raising the crest of the proposed road west of O'Riordan Street intersection and provision of drainage in the proposed road sag west of O'Riordan Street. A secondary consideration was to reduce the existing high flood hazard at the O'Riordan Street sag. Following a number of design iterations of the GS2AC terrain, the current design which achieves a suitable flood outcome, a confirmed through modelling was reached.

Impact on Flooding

The 100 year results for the Proposal show that the flood levels at O'Riordan Street would drop by 0.35 m as compared to the existing conditions. At a few locations, a slight increase in flood levels would occur, due to the blockage of local overland flow or runoff from the developed lots to the surrounding areas. This could be mitigated by providing appropriate internal drainage in the future lot developments and/or improving local street drainage.

The impact of 20 year event is also minor and similar to the 100 year event and could be managed by the provision of local drainage and other appropriate risk management measures.

Figure 17 shows the 100 year flood depth and **Figure 18** shows the PMF flood depth for the Proposal.

Flood Hazard

The Proposal results in significant reduction in flood depths for a 100 year event at O'Riordan Street. However, a material increase in flood depth occurs near the Bowden Street intersection. Although this depth does not result in high hazard, it is desirable that this depth be further reduced by raising the road levels at the detailed design stage.

Figure 19 shows the 100 year ARI provisional flood hazard for existing conditions and **Figure 20** shows the hazard with the Proposal.

The Proposal has a small area of high flood hazard near the intersection with O'Riordan Street. This high hazard is primarily caused by the local high velocities due to the proposed design at that location. A more detailed analysis was undertaken to determine the timing of the peak depth and velocity at the high hazard location. The analysis shows that the provisional hazard remains low during the course of the event due to staggered peaks for the flood depth and velocity.

The Proposal becomes a major overland flow path in a PMF event, carrying runoff to O'Riordan Street and further west to Bowden Street. This is an important consideration in future planning for critical infrastructure and evacuation planning of the flood prone areas within the catchment.

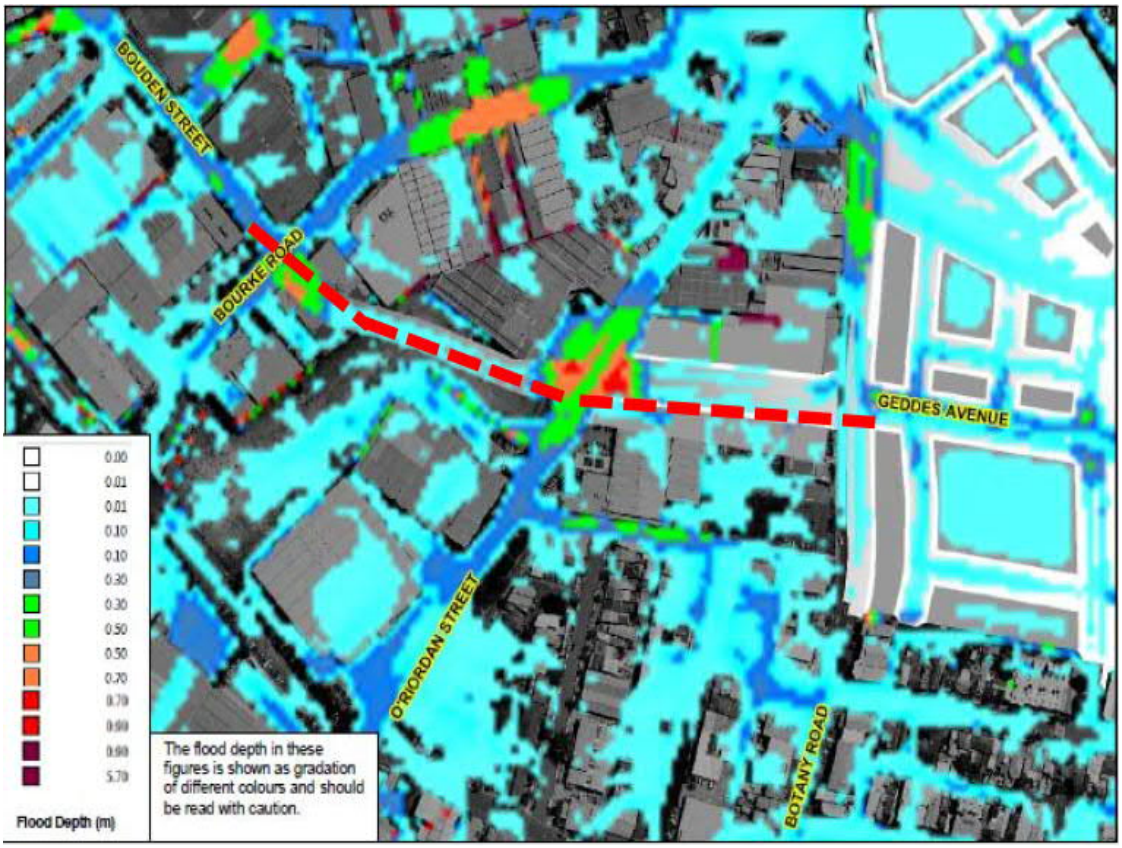

Figure 17 100 year flood depth

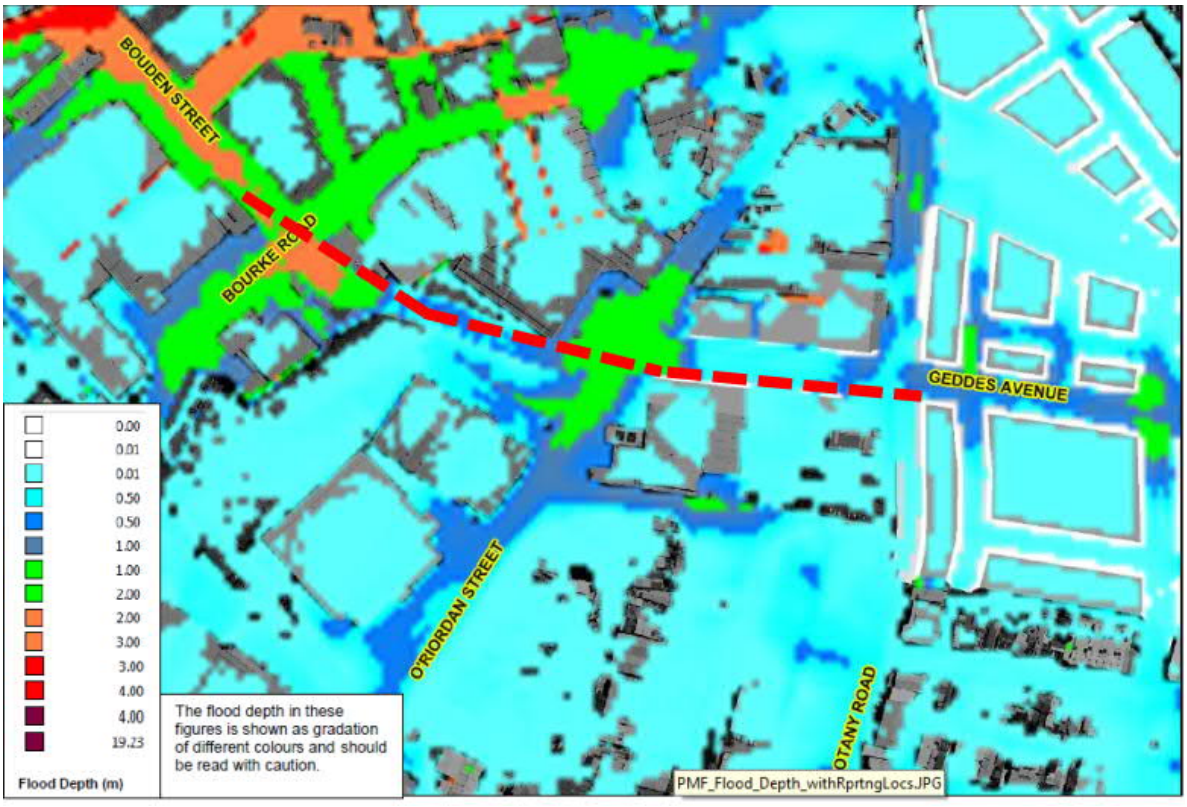

Figure 18 PMF flood depth

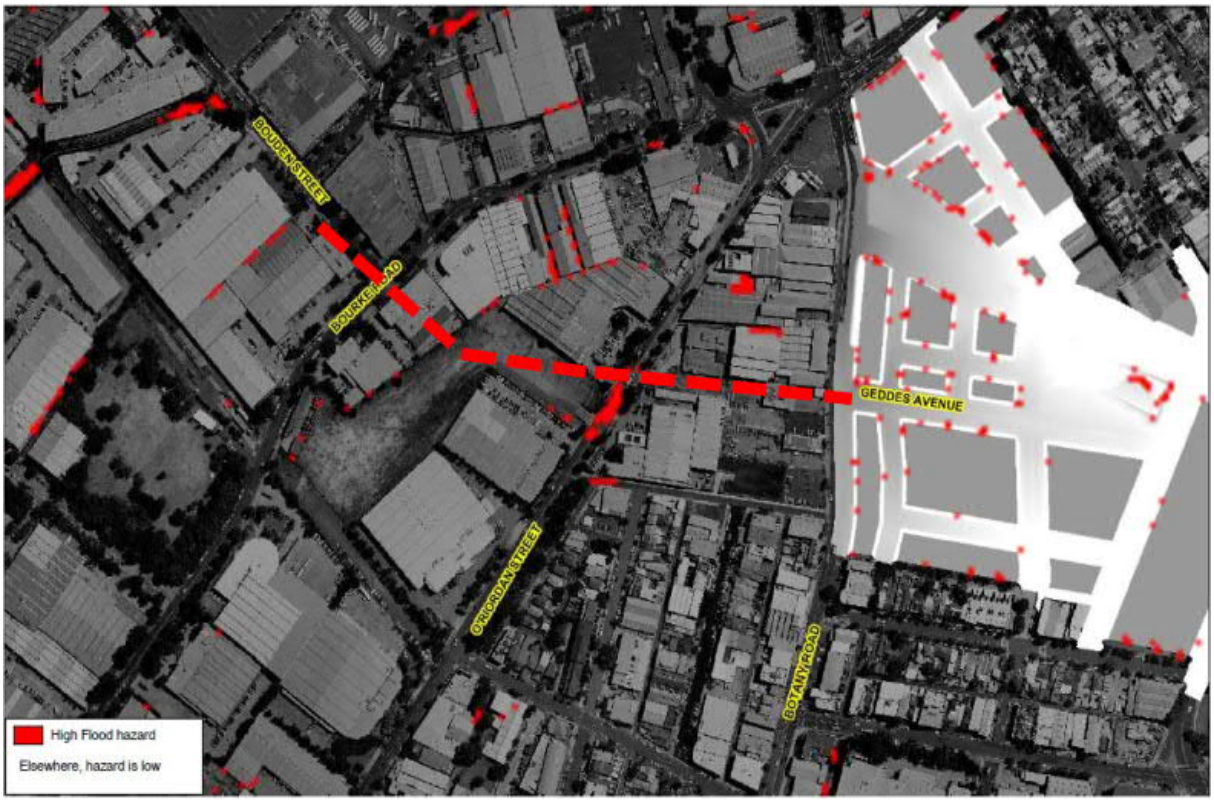

Figure 19 100 year provisional high flood hazard - existing conditions

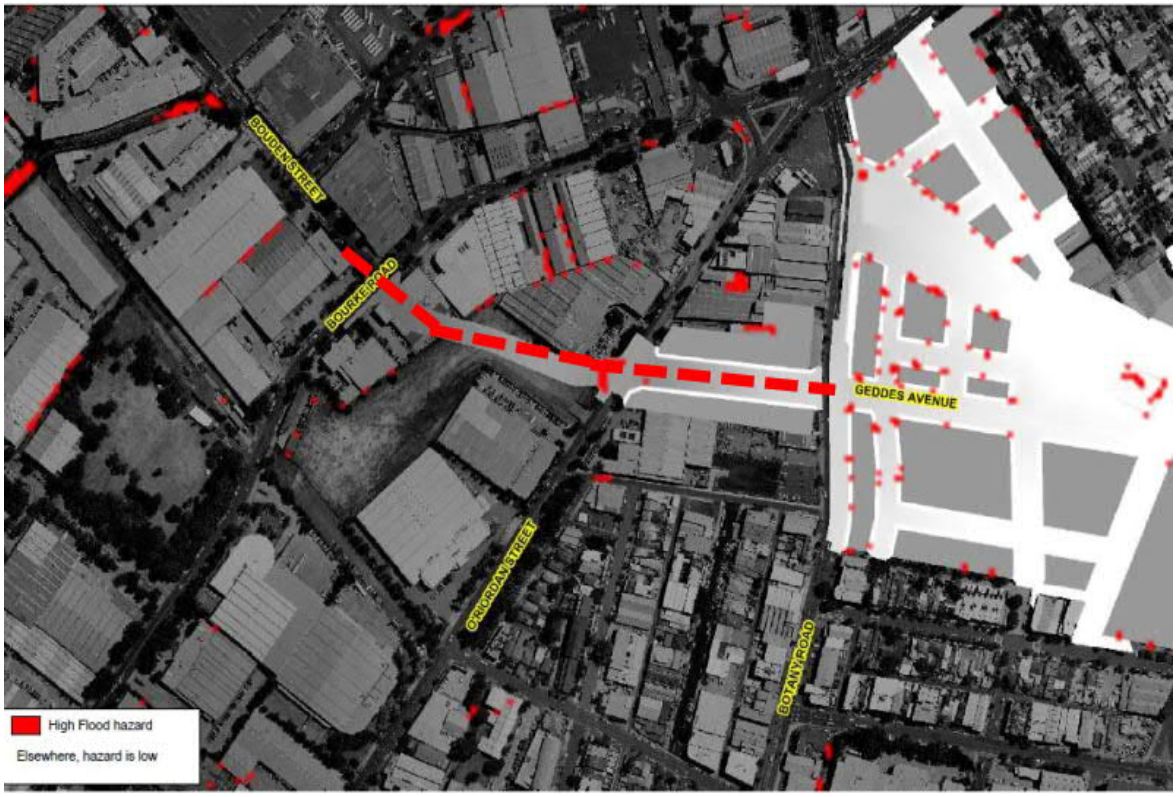

Figure 20 100 year provisional high flood hazard

Water Sensitive Urban Design

The water management strategy for the Proposal has been developed to manage existing flooding issues and achieve best-practice WSUD ensuring that the urban water cycle, stormwater, groundwater, wastewater and water supply, are integrated into the design.

The Proposal has adopted WSUD infrastructure generally consistent with that provided in Geddes Avenue comprising:

- Use of vegetation that is low maintenance and drought tolerant
- A passively irrigated median garden bed along the southern side of road – set down 50mm, broken kerb to capture road catchment
- Additional passively irrigated raingardens, garden beds or link trenches along the northern footpath as required to meet the reduction targets.

6.10.3 Mitigation measures

Prior to construction CoS would to undertake further hydrological modelling to minimise the risk of flooding along the proposed road. This modelling would consider the following options:

- Raising road levels at the Bowden Street intersection
- Connecting street drainage to the Sydney Water Trunk with a maximum discharge of 2.3 m^3/s from the street to the trunk drain
- Local drainage upgrades near areas of impact
- Overland flow path through the roadway.

In addition to conducting further hydrological modelling, the following mitigation measures would be in place to further minimise the impact from flooding.

- A flood emergency response plan would be prepared, as part of the CEMP, identifying a flood-free area for the evacuation of personnel and potentially construction equipment
- Subgrade improvement would be undertaken for the extent of the proposed road prior to construction. This would comprise impact rolling or subgrade removal and replacement to 1.5 m below the finished surface level. This would act as a bridge over the poor quality material below. The preferred approach would be confirmed after additional geotechnical testing along the roadway. To mitigate the risks of sinkholes and the impacts to adjacent buildings, care would be taken to protect structural footings prior to construction and monitor throughout.

Surface water management

The following mitigation measures would be implemented to maintain the water quality within the site:

- Open excavations would be minimised in size and bunded with sandbags or hay bales
- Stockpiles would be removed from site as soon as practicable, once classified
- Stockpiles would be suitably covered and bunded to prevent run off of contaminated water or soil into the surrounding environment or drains
- Control measures would prevent surface water runoff and reduce erosion would include:
    - Temporary bunding or diversion drains
    - HDPE sheeting to be laid under stockpiles
    - Silt fences/hay bales to surround stockpiles
    - Protection of existing drains with silt fencing/hay bales
    - Regular inspection and maintenance of controls.

Subsurface seepage and accumulated excavation water

Pooled water would be sampled and analysed for appropriate contaminants. Analytical results would dictate the management or disposal of the accumulated water.

Sediment

Drains, gutters, roads and access ways would be maintained to the satisfaction of the City. Where required, gutters and roadways would be swept at regular intervals to ensure they remain clean. Control measures, as for surface water would be implemented and maintained.

Spills and Emergency Management

The following mitigation measures are recommended to minimise the potential impacts from spills:

- All fuels, chemicals and hazardous liquids would be stored within an impervious bunded area in accordance with Australian Standards and EPA Guidelines at a minimum of 40 m away from poorly drained areas
- Hydrocarbons and chemicals such as fuels, lubricants and oils would be stored on-site in dedicated facilities such as secure sheds, containers, storage tanks and proprietary hazardous substance cupboards, and in accordance with the applicable Safety Data Sheet (SDS). All potentially hazardous substances onsite should have an appropriate SDS kept with the site management plan
- Spill kits appropriate to products used on site would be readily available
- Spills of fuel, oil, chemicals or the like would be cleaned immediately, and the site environmental manager would be notified of the location of the incident, extent of the incident and type of material spilled
- Should refuelling be required onsite it would be done in appropriate areas e.g. hardstand areas. Drip trays would be used.

6.11 Climate change

6.11.1 Climate change

The dynamic nature of our climate system indicates a need to focus attention on how to adapt to the changes in climate and understand the limitation of adaptation. The effects of climate on the Sydney Metropolitan region can be assessed in terms of weather changes, storm and rainfall intensities, flooding and increased risk of fire.

Sydney may be affected in future by an increase in maximum and minimum temperatures across all seasons, more days of extreme heat and heatwaves, changes in seasonal rainfall patterns and increased intensity of extreme rainfall events and increased drought conditions.

Climate change could lead to an increase in average temperatures as well as additional extreme heat days over 40°C and increased heatwaves (three consecutive days over 40°C). Impacts associated with extreme heat include compromising the structural integrity of road and access path surfaces, causing heat stress in users of the cycleway and heat stress to landscaped vegetation. Measures such as the provision of landscaping to increase shade would help reduce impacts from extreme heat.

Climate change is also expected to lead to an increase in average rainfall, increase in extreme rainfall and increased average recurrence interval for hail events. Impacts associated with changes to rainfall include localised flooding and surface flow, damage to aboveground structures where hail and/or damaging winds occur with the rainfall event and damage to vegetation due to overwatering and/or impact damage. Adequate drainage over the road network would help reduce impacts from extreme rainfall.

The Proposal Area can also be subject to what is known as the “heat island effect”. This occurs in metropolitan areas which have a significantly warmer climate than the surrounding rural area. The heat island effect is primarily due to human activities such as urban development replacing vegetation with hardstand areas. Concrete and asphalt are the main contributors to the heat island effect.

6.11.2 Greenhouse gas emissions

An increase in greenhouse gas emissions, primarily carbon dioxide, would be expected during construction of the Proposal from exhaust emissions from construction machinery and vehicles transporting materials and personnel.

During operation, however the design would encourage active transport and use of public transport and reduce reliance on cars.

6.11.3 Potential impacts and mitigation measures

Climate change

Whilst there is no material increase in hardstand area with the Proposal, there is potential for a minor contribution to the impacts of climate change due to a potential increase from exhaust emissions from construction machinery and vehicles transporting materials and personnel.

The planting of 33 trees would provide for cooling during summer, which should minimise the impacts associated with the heat island affect in the local area.

Greenhouse gas emissions

Due to the small scale of the Proposal and the short term temporary nature of the individual construction works, it is considered that greenhouse gas emissions resulting from the construction of the Proposal would be minimal. Furthermore, greenhouse gas emissions generated during construction would be kept to a minimum through the implementation of the standard mitigation measures. It is anticipated that, once operational, the Proposal may result in an increase in use of active and public modes of transport. This modal shift in transport usage could result in a reduction in fuel consumption by private vehicles and therefore a corresponding relative reduction in associated greenhouse gas emissions in the local area.

6.12 Waste

6.12.1 Potential impacts

There is a potential for waste generation as a result of the construction of the Proposal arising mostly from excavation works. There would also be general waste arising from construction. There is a current excess cut generated from the Proposal which would need to be managed. This may be sustainably managed in open spaces in the western portion of the Proposal Area, through the use of landscaped mounds.

The City is committed to recycling and reusing 80 percent of waste generated during construction and this remains a priority with this Proposal.

6.12.2 Mitigation measures

The following mitigation measures are recommended to minimise the potential impacts on waste management:

A Waste Management Plan (WMP) would be prepared and implemented in accordance with the City of Sydney's waste management targets.

- Hierarchy of waste management should be implemented via:
  - Avoiding unnecessary resource consumption
  - The reuse and reprocessing of materials where possible
  - Recycling and energy recycling
  - Waste disposal as a last resort.
- Subcontractors would monitor and report on all waste generated during construction
- Subcontractors would adhere to the City of Sydney's target of recycling or reusing 80% (by mass) of all waste generated during construction

- Waste disposed of offsite should be classified correctly and taken to a waste facility and managed in accordance with the *Waste Classification Guidelines* (DECC, April 2008)
- Work areas would be kept free of rubbish, with appropriate receptacles provided for waste management and recycling.

6.13 Cumulative impacts

The delivery of the Proposal has the potential to result in cumulative impacts. This would primarily occur during the construction stage of the Proposal, due to coinciding development projects in the area. Collectively, the Proposal and nearby developments could result in increased cumulative impacts on the local community related to traffic, noise and air quality impacts during construction and operation.

6.13.1 Coinciding projects

It is understood that several construction projects may occur in GSTC concurrently with the Proposal. Additional developments are proposed adjacent the road. These include the following:

- 200 affordable housing units to the north (330-338 Botany Road)
- 100 affordable house units to the south (338 Botany Road)
- Markham – 21,000m^2 commercial development (22 O'Riordan Street)
- Ausgrid (Alpha Distribution Ministerial Holding Corporation) – proposed demolition of all remaining buildings and structures on the site and construction of an administration building, service vehicle facility and shop/storage facility (70 Bourke Road, 15 O'Riordan Street, 56-60 Bourke Road).

6.13.2 Assessment

Potential temporary construction cumulative impacts include:

- Construction fatigue for residents, visitors and workers in the area due to the number of developments being constructed at the same time
- Cumulative increases in construction vehicle traffic on public roads causing congestion and delays
- Cumulative noise and vibration impacts associated with multiple construction projects, particularly if works are likely to occur at night.

6.13.3 Mitigation measures

The following mitigation measures are recommended to minimise the potential cumulative impacts:

- Consultation would be carried out with TfNSW to obtain information about project timeframes and impacts. Appropriate safeguards and management measures would be identified to minimise cumulative impacts of construction should any of the projects be constructed at the same time as the Proposal
- The traffic management plan including Road Occupancy Licenses would be prepared in consultation with the Transport Management Centre (TMC) taking into consideration the traffic cumulative impact of projects within the area
- CoS would work with developers of adjacent sites and other relevant construction activities as part of a construction liaison group similar to what is presently being undertaken in the GSTC. This group would coordinate construction of each project to minimise associated impacts on the local area, especially to existing businesses adjoining the Proposal
- The CEMP would be revised to consider potential cumulative impacts from surrounding development activities as they become known. This would include a process to review and update mitigation measures as new works begin or if complaints are received.

7.0 Environmental management

This section describes how the Proposal would be managed through environmental management plans and specific safeguards, to reduce the potential environmental impacts throughout detailed design, construction and operation.

Mitigation measures have been developed to be consistent with the Clause 228 Guidelines.

7.1 Design environmental management

The following plans would be prepared as part of the detailed design:

- Urban Design and Landscaping Plan.

7.2 Construction environmental management plan

A Construction Environmental Management Plan (CEMP) would be prepared in accordance with the requirements of Council's Environmental Management System for the construction phase of the Proposal. The CEMP provides a mechanism through which all potential environmental impacts relevant to the Proposal would be controlled and outlines a framework of procedures and controls for managing environmental impacts during construction.

The following sub plans would also be prepared as part of the CEMP:

- Construction Traffic Management Plan
- Construction Noise and Vibration Management Plan
- Contaminated Land Management Plan
- Erosion and Sedimentation Control Plan
- Dust Suppression Management Plan
- Flood Emergency Response Plan
- Waste Management Plan.

7.3 Operational environmental management

The following plans would be prepared as part of the operational environmental requirements for the Proposal:

- Updated Site Management Plan Safeguards and mitigation measures

Environmental safeguards and mitigation measures proposed for the Proposal are outlined in the **Table 19** below. These safeguards would minimise the potential adverse engineering, environmental and planning impacts of the Proposal described in **Section 6.0**.

Table 19 Environmental safeguards and mitigation measures

No.	Impact	Environmental safeguards	Timing
TRA1	Construction Traffic Management Plan	Prior to the commencement of construction, a detailed Construction Traffic Management Plan (CTMP) would be prepared by the Principal Contractor. The CTMP would include the guidelines, general requirements and procedures to be used when activities or areas of work have a potential to impact on existing traffic arrangements. The approval of the CTMP is to be sought by the appropriate authorities. The Principal Contractor would implement, update and	Pre-construction

No.	Impact	Environmental safeguards	Timing
		maintain the CTMP throughout the construction period and until completion.	
TRA2	Construction Traffic Management Plan	The CTMP would address: • consultation with the consent authorities and relevant approvals • the likely construction vehicle numbers and frequency • approach and departure routes • anticipated special out of hours or escorted deliveries • parking access arrangements during construction • construction work zone locations • site entry and exit points • proposed traffic control signage • proposed traffic management at critical locations • provision of acceptable pedestrian management measures	Pre-construction
TRA3	Consultation	The Principal Contractor would communicate with surrounding businesses and residents throughout the works and inform them of any upcoming works impacting them within a reasonable timeframe.	Construction
TRA4	Construction traffic movements	Construction vehicles would be restricted to the State and Regional Road network, where possible. No construction vehicles should use Geddes Avenue, Wyndham Street, Johnson Street, Maddox Street, Elizabeth Street, Hansards Street or Joynton Avenue to access the site.	Construction
TRA5	Construction worker parking	Due to the high frequency public transport services, workers would be encouraged to use public transport to access the site, with appropriate tool/ equipment drop-off arrangements made, to minimise impacts on street parking.	Construction
TRA6	Vehicle operation	Vehicles operating to, from and within the site should do so in a manner which does not create unreasonable or unnecessary noise or vibration.	Construction
TRA7	Public roads	No tracked vehicles would be permitted to travel on paved roads.	Construction
TRA8	Obstruction of public roads and access points	Public roads and access points should not be obstructed by any materials, vehicles, refuse skips or similar without obtaining the necessary approvals	Construction
NOI1	Management of noise	At-source noise control and management measures would be considered for management of noise from excavation and construction works to minimise potential noise. Noise reductions of between 3 and 8dB(A) for individual plant items could be expected where localised noise barriers are practical. In other areas, the management measures should focus on minimising	Construction

No.	Impact	Environmental safeguards	Timing
		unnecessary noise generation from the site and the extent and duration of peak noise levels.	
NOI2	Construction Noise and Vibration Management Plan	A site specific Construction Noise and Vibration Management Plan (CNVMP) would be prepared as part of the CEMP which would include noise modelling of construction activities after the exact selection of equipment to be used on-site becomes available.	Pre-Construction
NOI3	Noise minimisation	Construction noise minimisation measures would include: • Where possible, localised barriers to be used for stationary equipment • Selection of the quietest and least vibration emitting construction methods where feasible and reasonable • Avoid unnecessary noise and limit simultaneous use of noisy equipment • Equipment not in use for an extended period should be turned off, e.g. heavy vehicles should switch engines off whilst being unloaded • Alternative reverse alarms, such as 'quackers' should be installed, where feasible and reasonable • Inform community ahead of construction activity and potential impacts • Build good relations with nearby building occupants by keeping them informed and responding to any complaints that may be received • Where practical, stage works so that intrusive works are carried out at least noise sensitive periods.	Construction
NOI4	Site induction	All employees, contractors and subcontractors would receive a site induction. The environmental component may be covered in toolboxes and must include: • all relevant project specific and standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise and vibration generating activities • location of nearest sensitive receivers • environmental incident procedures.	Construction
NOI5	Complaints	A complaints management procedure would be established to deal with noise complaints that may arise from construction activities. Each complaint would need to be investigated and appropriate noise amelioration measures put in place to mitigate future occurrences, where the noise in question is in excess of allowable limits.	Construction

No.	Impact	Environmental safeguards	Timing
NOI6	Monitoring	A monitoring schedule would be developed and implemented during high noise and vibration generating activities where required. Noise and vibration monitoring is to be carried out for any identified sensitive works, where monitoring could be used to proactively identify noisy works that may be otherwise managed and mitigated.	Construction
NOI7	Normal working hours	Works would be undertaken during normal working hours including: • Monday to Friday: 7:00 am to 6. 00 pm • Saturday: 8:00 am to 1.00 pm • Sunday and public holidays: no work unless approved by the Principal Contractor.	Construction
NOI8	Night works protocol	Night works would be minimised as far as possible and be subject to a night works protocol as part of the CNVMP that assesses noise impacts of intersection works and proposes site specific notification and mitigation measures to minimise night work impacts to residents	Construction
NOI9	Sensitive receivers	Architectural treatment would be investigated at the three sensitive receivers that were found eligible for the consideration of noise mitigation to determine if mitigation is required.	Post Construction
VIB1	Damage to site and adjacent buildings	Site specific buffer distances would be determined where vibration significant plant items, in particular large rock hammers/breakers and vibratory rollers, operate within Cosmetic Damage minimum working distances. Where this occurs, minimum buffer distances to affected receivers should be determined by site measurements prior to the commencement of the regular use of the vibration significant plant on site. The site-specific minimum working distance should be maintained in order to comply with relevant vibration limits.	Construction
VIB2	Dilapidation surveys	Dilapidation surveys would be carried out prior to the commencement of construction at properties that do not comply with the nominated indicative buffer distances.	Pre-Construction
LAN1	Work sites	Construction worksites would be enclosed by hoarding around the perimeter during construction and maintained in a tidy manner	Construction
LAN2	Urban Design and Landscaping Plan	An Urban Design and Landscaping Plan would be implemented to enhance the streetscape and public domain values of the Proposal as part of detailed design	Detailed Design
HER1	Unanticipated archaeological deposits	In the event that any unanticipated archaeological deposits are identified within the Proposal Area during construction all works within the vicinity of the find would cease immediately and the Site Construction Manager notified. The Construction Contractor would immediately notify the City of Sydney Proposal Manager and the City of Sydney environmental office so they can assist in co-ordinating the next steps which are likely to	Construction

No.	Impact	Environmental safeguards	Timing
		involve consultation with an archaeologist and DPIE. Where required, further archaeological work and/or consents would be obtained for any unanticipated archaeological deposits prior to works recommencing at the location.	
IND1	Unanticipated Indigenous objects	If unforeseen Indigenous objects are uncovered during construction all works within the vicinity of the find would cease immediately and the Site Construction Manager notified immediately. The Construction Contractor would immediately notify the City of Sydney Proposal Manager and City of Sydney environmental officer so they can assist in co-ordinating next steps which are likely to involve consultation with an Aboriginal heritage consultant, the DPIE and the metropolitan Local Aboriginal Land Council.	Construction
SE1	Community information	The community would be informed of construction progress, activities and potential impacts	Pre-Construction and Construction
SE2	Liaison with local business and residents	Regular updates would be provided to local businesses and residents to provide information regarding key progress milestones through flyers, website announcements or letterbox drops	Pre-construction and Construction
SE3	Consultation with affected businesses	Consultation with businesses affected by partial acquisitions would continue, including discussions on how to minimise impacts to business operations.	Pre-Construction and Construction
CLGS1	Contaminated Land Management Plan	A Contaminated Land Management Plan would be developed as part of the CEMP, in accordance with the RAP and in accordance with any relevant approvals.	Pre-Construction
CLGS2	Erosion and Sediment Control Plan	Prior to commencement of works, a site-specific Erosion and Sediment Control Plan (ESCP) would be prepared in accordance with the 'Blue Book' *Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004) and updated throughout construction so it remains relevant to the activities. The ESCP measures would be implemented prior to commencement of works and maintained throughout construction	Pre-construction
CLGS3	Segregation of materials	Segregation of materials would be ensured during excavation to avoid contamination	Construction
CLGS4	Classifying waste and spoil	All spoil and waste would be classified in accordance with the *Waste Classification Guidelines Part 1: Classifying waste* (EPA, 2014) prior to disposal. Any spoil containing potential ASS would be disposed of in accordance with the ASSMP (*Parsons Brinckerhoff, 2014* in addition to *Part 4: Classifying waste* (EPA, 2014).	Construction
CLGS5	Management of PASS/ AASS	Any PASS/AASS material encountered during construction would be managed in accordance with the ASSMP	Construction

No.	Impact	Environmental safeguards	Timing
CLGS6	Dewatering of exposed groundwater	Water should be stored in retention basins or fully contained tanks on-site. An environmental scientist would collect a sample and analyse to assess the contamination. If the water exceeds criteria is would be exported offsite and disposed of at an appropriate waste facility. Should the water have concentrations below criteria it may be re-used onsite for dust suppressions or other uses	Construction
CLGS7	Stockpile management	Stockpile management procedures would be established as part of the CEMP, and in accordance with the RAP	Pre-Construction
CLGS8	Stockpile management	Stockpiles would be located to mitigate environmental impacts while facilitating material handling requirements	Construction
CLGS9	Contaminated stockpiles	Contaminated stockpiles would only be stockpiled in non-remediated areas of the site or at locations where no risk is posed, e.g. hardstand areas. Contaminated stockpiles would to be covered and wet down	Construction
CLGS10	Management of asbestos-contaminated soil	Asbestos contaminated soil would be managed in accordance with SafeWork NSW. This would include, but is not limited to, air monitoring, appropriate signage and the establishment of exclusion zones	Construction
CLGS11	Characterisation sampling	Material excavated for the construction of the Proposal, that is proposed to be retained on-site and capped, would be sampled for contaminants. The rate of sampling is to meet the stockpile sampling requirements of the NEPM (2013).	Construction
CLGS12	Erosion and sediment controls	Erosion and sediment controls would be installed prior to commencement of excavation works in accordance with the ESCP and would remain onsite for the duration of construction or until the area has stabilised. Controls would be inspected regularly and maintained	Construction
CLGS13	Stabilise work areas	Work areas would be stabilised progressively during the works	Construction
CLGS14	Reinstatement of contaminated soil	Reinstatement should be undertaken in accordance with the RAP and appropriate asbestos controls to be in place during the reinstatement works.	Construction
CLGS15	Imported fill material sampling	All imported fill, regardless if Virgin Excavated Natural Material (VENM) or Excavated Natural Material (ENM), should be accompanied by the relevant documentation and included within the validation report. The source site should be inspected and the material samples at a rate of one (1) per 100 m^3, with a minimum of 10 samples taken per product. Imported fill samples would be submitted for analysis of TRH, BTEX, PAHs, PCBs, metals and pesticides. Results should background levels for metals and unable to be detected for other contaminants.	Construction

No.	Impact	Environmental safeguards	Timing
CLGS16	Exported soils	Contaminated soils would be sampled prior to offsite disposal. Sampling methodology would be in accordance with the National Environment Protection Measures (NEMP) (2013)	Construction
CLGS17	Validation reporting	Soil validation is to be undertaken in accordance with the RAP. Following the remediation works, a final report is to be prepared in accordance with the Guidelines for Consultants Reporting on Contaminated Sites. The validation report is to detail the extent and nature of the remediation works, characterisation and disposal of contaminated soils, reinstatement and capping of asbestos contaminated soils, the validation of clean imported fill and topsoils and is to discuss the overall status of the site.	Construction
CLGS18	Material tracking	Materials would be tracked from cradle to grave with accurate information about the location and quantity of material. The disposal location would be determined by the remediation contractor. For any trucks leaving site the landfill docket number is to be recorded and provided in the validation report, together with any other information required in accordance with the RAP	Construction
CLGS19	Unexpected Finds Protocol	Works would cease until the extent of the contamination is assessed, and necessary controls implemented. Procedures for handling asbestos containing materials, including engagement of a suitably qualitied contractor, record keeping, site personnel awareness and waste disposal to be undertaken in accordance with SafeWork NSW requirements	Construction
CLG20	Site management plan update	Following the completion of construction and remediation works at the Ausgrid property, the current Site Management Plan would need to be revised given the changed conditions, in accordance with the RAP	Post-Construction
AQ1	Dust Suppression Management Plan	A Construction Dust Suppression Management Plan (CDSMP) would be developed to minimise the movement of airborne dust	Pre-construction
AQ2	Minimise dust generation	To minimise the generation of dust from construction activities, the following measures would be implemented: • Stockpiles to be covered when not in use • Watering of stockpiles and exposed soil during windy days (where winds exceed greater than 20 km/hour) • Cover loads on trucks transporting material to and from the construction site • Ensure tailgates are fixed to minimise mud and dirt being tracked onto sealed road surface	Construction
BIO1	Disturbance of vegetation	Disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal. Trees/vegetation nominated to be	Construction

No.	Impact	Environmental safeguards	Timing
		removed would be clearly demarcated on site prior to construction, to avoid unnecessary vegetation removal.	
BIO2	Protection of trees to be retained	Trees to be retained would be protected through temporary protection measures discussed below: • tree protection would be undertaken in line with AS 4970-2009 Protection of Trees on Development Sites and would include exclusion fencing of tree protection zones (TPZs) • in the event of any tree to be retained becoming damaged during construction, the Construction Contractor would immediately notify the City of Sydney Project Manager and the City of Sydney environmental officer to coordinate the response which may include contacting an arborist to inspect and provide advice on remedial action, where possible	Pre-Construction and Construction
BIO3	Construction works within the TPZ	For construction works within the TPZ of trees to be retained and where incursions greater than 10% are unavoidable, a qualified arborist would be appointed to conduct exploratory excavation using non-destructive methods to evaluate the extent of the root system affected and determine whether or not the tree can remain viable	Construction
BIO4	Removal of additional trees	Should the detailed design or onsite works determine the need to remove or trim any additional trees, which have not been identified in the REF, the Construction Contractor would be required to complete a City of Sydney Tree Removal Application Form and submit it to the City for approval	Pre-Construction
BIO5	Parking and storage within the TPZ	Parking of vehicles and storage of plant and materials would be avoided within TPZs, for trees to be retained, once pavement has been removed and soil exposed	Construction
BIO6	Sediment and debris control	Site sediment and debris control measures would be put in place prior to any excavation or construction activity	Construction
BIO7	Management of weeds	Environmental and high threat weeds would be cleared from the broader site as far as possible as part of construction. If vegetation containing weeds is chipped on site, it would be kept separate from native species and would be disposed of separately at a licenced waste management facility.	Construction
BIO8	Poisoning of weeds	Removal of woody environmental weeds would include adequate poisoning of the plant to reduce the chance of regrowth. This would include measures such as application of glyphosate to the exposed trunk immediately after cutting.	Construction
BIO9	Stabilisation of soils	Soils within the site would be stabilised upon completion of the proposed works. This would	Construction

No.	Impact	Environmental safeguards	Timing
		include measures such as the spread of clean, native-derived vegetation chippings/mulch and/or the application of geofabrics	
BIO10	Monitoring for weeds	The site would be monitored at least once within three to six months of the completion of works to remove any emergent weeds	Post-Construction
BIO11	Landscaping	Landscaping the new road and surrounds would be undertaken with local native species as far as practical and would involve planting at least 33 new trees	Detailed Design
BIO12	Monitoring of planted vegetation	Any planted vegetation would be monitored at least once within three to six months of the completion of works with any planted stock that has died off being replaced. Another inspection would be undertaken between nine to twelve months after construction to remove weeds and replace any planted stock that has died off.	Post-construction
HWQ1	Further hydrological modelling	Prior to construction CoS would to undertake further hydrological modelling to minimise the risk of flooding along the proposed road. This modelling would consider the following options: • Raising road levels at the Bowden Street intersection • Connecting street drainage to the Sydney Water Trunk with a maximum discharge of 2.3 m^3/s from the street to the trunk drain • Local drainage upgrades near areas of impact • Overland flow path through the roadway.	Detailed Design
HWQ2	Flood Emergency Response Plan	A flood emergency response plan would be prepared, as part of the CEMP, identifying a flood-free area for the evacuation of personnel and potentially construction equipment	Pre-Construction
HWQ3	Subgrade improvement	Subgrade improvement would be undertaken for the extent of the proposed road prior to construction. This would comprise impact rolling or subgrade removal and replacement to 1.5 m below the finished surface level. This would act as a bridge over the poor quality material below. The preferred approach would be confirmed after additional geotechnical testing along the roadway. To mitigate the risks of sinkholes and the impacts to adjacent buildings, care would be taken to protect structural footings prior to construction and monitor throughout.	Construction
HWQ4	Disturbed surfaces	Open excavations would be minimised in size and bunded with sandbags or hay bales	Construction
HWQ5	Stockpile management	Stockpiles would be removed from site as soon as practicable, once classified	Construction
HWQ6	Stockpile management	Stockpiles would be suitably covered and bunded to prevent run off of contaminated water or soil into the surrounding environment or drains	Construction

No.	Impact	Environmental safeguards	Timing
HWQ7	Erosion and sediment controls	Control measures to prevent surface water runoff and reduce erosion would include: • Temporary bunding or diversion drains • HDPE sheeting to be laid under stockpiles • Silt fences/hay bales to surround stockpiles • Protection of existing drains with silt fencing/hay bales • Regular inspection and maintenance of controls	Construction
HWQ8	Sampling of accumulated water	Pooled water would be sampled and analysed for appropriate contaminants. Analytical results would dictate the management or disposal of the accumulated water	Pre-construction
HWQ9	Management of spills	The following mitigation measures would be considered to minimise the potential impacts from spills: • All fuels, chemicals and hazardous liquids would be stored within an impervious bunded area in accordance with Australian Standards and EPA Guidelines at a minimum of 40 m away from flooded or poorly drained areas • Hydrocarbons and chemicals such as fuels, lubricants and oils would be stored on-site in dedicated facilities such as secure sheds, containers, storage tanks and proprietary hazardous substance cupboards, and in accordance with the applicable Safety Data Sheet (SDS). All potentially hazardous substances onsite should have an appropriate SDS kept with the site management plan • Spill kits appropriate to products used on site would be readily available • Spills of fuel, oil, chemicals or the like would be cleaned immediately, and the site environmental manager would be notified of the location of the incident, extent of the incident and type of material spilled • Should refuelling be required onsite it would be done in appropriate areas e.g. hardstand areas. Drip trays would be used.	Construction
W1	Waste Management Plan	A Waste Management Plan (WMP) would be prepared and implemented in accordance with the City of Sydney's waste management targets, including: • Hierarchy of waste management should be implemented via: o Avoiding unnecessary resource consumption o The reuse and reprocessing of materials where possible o Recycling and energy recycling o Waste disposal as a last resort. • Subcontractors would monitor and report on all waste generated during construction	Pre-construction

No.	Impact	Environmental safeguards	Timing
		• Subcontractors would adhere to the City of Sydney's target of recycling or reusing 80% (by mass) of wall waste generated during construction • Waste disposed of offsite should be classified correctly and taken to a waste facility and managed with the *Waste Classification Guidelines* (DECC, April 2008) • Work areas would be kept free of rubbish, with appropriate receptacles provided for waste management and recycling.	
CU1	Consultation with TfNSW	Consultation would be carried out with TfNSW to obtain information about project timeframes and impacts. Appropriate safeguards and management measures would be identified to minimise cumulative impacts of construction should any of the projects be constructed at the same time as the Proposal	Pre-Construction
CU2	Consultation with TMC	The Traffic Management Plan, including Road Occupancy Licenses, would be prepared in consultation with the Transport Management Centre (TMC) taking into consideration the traffic cumulative impact of projects on the Sydney road network	Pre-Construction
CU3	Consultation with developers	CoS would work with developers of adjacent sites and other relevant construction activities as part of a construction liaison group similar to that presently being undertaken in the GSTC. This group would coordinate construction of each project to minimise associated impacts on the local area, especially to existing businesses adjoining the Proposal.	Pre-Construction
CU4	CEMP review	The CEMP would be revised to consider potential cumulative impacts from surrounding development activities as they become known. This would include a process to review and update mitigation measures as new works begin or if complaints are received.	Pre-Construction

7.4 Licensing and approvals

The licenses and approvals listed below are required for the delivery of the Proposal:

- Approval from Sydney Water to connect the stormwater network to the Green Square Stormwater Drain under Section 48 of the Sydney Water Act 1994
- Approval from the City of Sydney Local Pedestrian, Cycling and Traffic Calming Committee is required for proposed traffic works
- Approval under the Local Government Act 1993 to classify the land for the GS2ACas road once it opens
- Approval under Section 116 and 138 of the Roads Act 1993 to connect the proposed Green Square to Ashmore Connector to a classified road

- Authorisation under Section 138 of the Roads Act 1993 to undertake works within a classified road (Roads & Maritime Services) including the preparation of a traffic control signal plan for the following intersections at:
  - Botany Road / the proposed Connector Road
  - O'Riordan Street / the proposed Connector Road
  - Bourke Road / the proposed Connector Road (remaining connection).
- Approval for night works from the City's Construction Regulation Unit (CRU) under a road opening permit and Road Occupancy Licences (ROL)
- Should ASS/PASS be identified onsite and require excavation and offsite disposal, the receiving landfill must be appropriately licenced by NSW EPA for disposal of PASS.

8.0 Conclusion and certification

8.1 Conclusion

This REF has been prepared to assess the environmental impacts of the proposed GS2AC. The Proposal is a long awaited local access road providing access to the GSTC.

The Proposal would generate benefits including:

- Improved journey time reliability for cyclists
- Improved integration with public transport
- Improved equity and accessibility outcomes
- Potential for wider economic benefits beyond the transport sector
- Improved access to the GSTC
- Reduced car reliance
- Reduced energy dependence.

The Proposal provides further opportunity to achieve sustainable renewal with the Proposal supporting development of the adjoining residual lands for mixed affordable house and employment generating uses.

This REF has been prepared in accordance with Division 5.1 of *the NSW Environmental Planning and Assessment Act 1979* and has assessed those matters listed in Clause 228 of the *NSW Environmental Planning and Assessment Regulation 2000*. The format of the report and level of environmental impact assessment also complies with the *City of Sydney Part 5 Environmental Impact Assessment Procedures* manual.

The Proposal complies with relevant State and local planning strategy and policy's including the City's strategic plan, *Sustainable Sydney 2030.*

The assessment has confirmed that the Proposal would not result in any significant impact on any declared critical habitat, threatened species, populations or ecological communities or their habitats. A Species Impact Statement is therefore not required. The assessment determined that the Proposal would improve local access and would integrate with the existing transport network.

The City would continue to work with affected landowners to minimise impacts during construction and operation and would also obtain the necessary permits and approvals by working together with stakeholders including TfNSW.

The public display of this REF would provide an opportunity for the community, businesses and landowners to comment on the Proposal's benefits.

The REF has assessed key environmental and planning issues including traffic and transport, noise and vibration, contamination, biodiversity, hydrology and socio-economic impacts. Mitigation measures would also be implemented to minimise environmental impacts during the construction stage, which includes the preparation of a CEMP.

The recommended mitigation measures would ensure that the Proposal does not result in any significant adverse effect on the environment. In this regard, an Environmental Impact Statement is not required.

8.2 Certification

This review of environmental factors provides a true and fair review of the Proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the Proposal.

Catherine Brady

Technical Director

AECOM

Date: 19 November 2020

9.0 References

The following references have been used as part of the preparation of this REF for the Green Square to Ashmore Connector road:

- Green Square to Ashmore Precinct Connector Road (GS2AC) – REF Planning Pathway (AECOM, 2020)
- Green Square to Ashmore Precinct Connector Road – Response to Submissions Report (City of Sydney, November 2018)
- Review of Environmental Factors for the Green Square to Ashmore Connector Road between Botany Road and Bowden Street, Alexandria (City of Sydney, 2017)
- East West Relief Route Remedial Action Plan, (Parsons Brinckerhoff, January 2016)
- Review of Environmental Factors for the Green Square Stormwater Drain (Sydney Water Corporation, July 2014)
- Air quality trends in Sydney (Office of Environment and Heritage, 2014)
- East West Relief Road – Acid Sulfate Soil Management Plan, (Parsons Brinckerhoff, May 2014)
- Sydney Local Environmental Plan 2012 (Green Square Town Centre) 2013 (City of Sydney, 2012)
- Sydney Local Environmental Plan 2012 (City of Sydney, 2012)
- Sydney Development Control Plan 2012 (City of Sydney, 2012)
- Green Square Town Centre Town Centre Development Control Plan (City of Sydney, 2012)
- City of Sydney Street Tree Master Plan 2011

  NSW Department of Environment and Climate Change (DECC) in Managing Urban Stormwater: Environmental Targets (Consultation Draft, 2007)