

13 Landscape and visual

This chapter provides a summary of the results of the landscape and visual impact assessment. The full assessment report is provided in **Appendix C2** (Landscape and visual technical report), which is part of **Appendix C** (Place making and urban design).

An Aboriginal Assessment is provided in Annexure A of **Appendix C2**, and an assessment of overshadowing impacts is provided in Annexure B of **Appendix C2**.

Table 13-1 sets out the SEARs relevant to the landscape and visual impacts, alongside the desired performance outcomes of the project, and identifies where the requirements have been addressed in this EIS.

Table 13-1 SEARs – Landscape Character and visual impact assessment

Assessment requirements	Where addressed in this EIS
3. The Proponent must assess the visual and landscape impacts of the proposal, including ancillary infrastructure on:	
(a) views and vistas;	Potential visual and landscape impacts to views and vistas are assessed in section 13.1, section 13.6.2, section 13.7.2 and Appendix C2 (Landscape and visual technical report).
(b) streetscapes, key sites and buildings;	Potential visual and landscape impacts to streetscapes, key sites and buildings are assessed in section 13.2, section 13.6 and section 13.7 Appendix C2 (Landscape and visual technical report).
(c) landscaping, green spaces, wetlands and existing trees and tree canopy, including an assessment of likely magnitude of impacts to trees and need for removal to be undertaken by an arborist, including the provision of measures to minimise and offset impacts;	Potential visual and landscape impacts to landscaping, green spaces, wetlands, existing trees and tree canopy are assessed in section 13.1, section 13.6 and section 13.7 . An Arborist report is also provided in Annexure A of Appendix C2 (Landscape and visual technical report) which further details the magnitude of impact and the provision of mitigation measures.
(d) heritage items including Aboriginal places, environmental heritage; and areas of heritage sensitivity; and	Potential visual and landscape impacts on the setting and views to and from heritage items and conservation areas are considered in section 13.1, section 13.6 and section 13.7 and Appendix C2 (Landscape and visual technical report). Potential impacts to heritage items are assessed in Appendix N (Statement of heritage impact).
(e) the local community.	Potential visual and landscape impacts on the local community are assessed in section 13.1, section 13.6 and section 13.7 and Appendix C2 (Landscape and visual technical report).
4. The Proponent must provide visual representations of the proposal from key receiver locations to illustrate the proposal and its visual impacts.	Visual representations of the proposal from key receptor locations are provided in section 13.6 and section 13.7 and Appendix C2 (Landscape and visual technical report).

13.1 Assessment approach

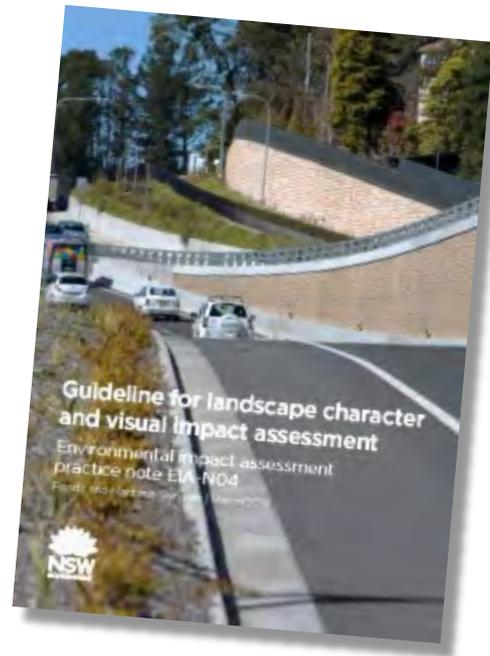
13.1.1 Relevant guidelines and policies

A range of guidance is available for the assessment of landscape and visual impact. In New South Wales the Roads and Maritime Services *Guidance note EIA-N04 Guidelines for Landscape Character and Visual Impact Assessment*¹ is typically referred to. The methodology used for this assessment is consistent with the direction provided in this document.

In addition to this guide, the assessment draws upon the AILA Guidance Note for Landscape and Visual Assessment, prepared by the Australian Institute of Landscape Architects (2018); and the night time visual assessment draws upon guidance offered in the: Institution of Lighting Engineers (UK) and the *Guidance Notes for the reduction of obtrusive light* (2011), and *AS4282 Control of the obtrusive effects of outdoor lighting* (1997).

Reference to the following relevant local environmental plans, development control plans, and planning strategies was also made.

- *Draft Metropolitan Strategy for Sydney to 2031* (Greater Sydney Commission 2017)
- *A Plan for Growing Sydney* (NSW Government 2014)
- *Revised Draft Eastern City District Plan* (Greater Sydney Commission 2017)
- *Bayside West Precincts 2036 Plan – Arncliffe and Banksia* (DP&E 2018)
- *Sydney Regional Environment Plan No 33 – Cooks Cove* (SREP 33)
- *Rockdale Local Environmental Plan 2011* (Bayside Council, 2011)
- *Rockdale Development Control Plan 2011* (Bayside Council, 2011)



13.1.2 Methodology

This section provides a summary of the assessment methodology. Further information is provided in **Appendix C2** (Landscape and visual technical report).

The assessment considered the potential for impacts to the overall landscape character, and visual amenity within the vicinity of the Arncliffe surface works (Northern surface works) and the Rockdale/Kogarah surface works (Southern surface works). Potential impacts on visual amenity were considered during both the day and night. Potential landscape character and visual amenity impacts were assessed prior to the implementation of any form of mitigation. The assessment comprises:

- Identification of the existing environmental conditions
- A review of the relevant policy and planning setting
- Identification of the landscape character zones and key areas that experience views
- An assessment of landscape character impact during construction and operation
- An assessment of the daytime visual impact during construction and operation
- An assessment of night-time visual impact during construction and operation
- Identification of mitigation measures.

¹ Roads and Maritime, 2013. *Guidance note EIA-N04 Guidelines for Landscape Character and Visual Impact Assessment*.

Landscape character assessment

Landscape refers to *'all aspects of a tract of land, including landform, vegetation, buildings, villages, towns, cities and infrastructure.'*

Landscape character is the ... *'combined quality of built, natural and cultural aspects that make up an area and provide its unique sense of place'*.

A range of landscape character zones could be directly or indirectly impacted by the project. To address these impacts, an assessment was carried out by identifying the sensitivity of each landscape character zone and the likely magnitude of change expected as a result of the project, then making an overall assessment of the level of impact.

A Landscape Character Zone is ... *'An area of landscape with similar properties or strongly defined spatial qualities, distinct from areas immediately adjacent'*. Landscape character zones have been identified for each surface works area.

The sensitivity of a landscape character zone is *'its capacity to absorb change.'* The sensitivity of a landscape may reflect the frequency and volume of users in a location, but also reflects other characteristics such as tranquillity, diversity and rarity. The value of landscapes is often described in council and state government master plans and planning guidance documents, reflecting the importance of landscape resources to the local, regional and state-wide community.

Magnitude is the *'measurement of the scale, form and character of a development proposal when compared to the existing condition. In the case of visual assessment this also relates to how far the proposal is from the viewer.'*²

This assessment identifies the magnitude of change expected in each landscape zone as a result of the project. This includes direct impact such as the removal of trees or parkland, as well as indirect impact, such as the change in character and functional change of an area of open space due to changing land use and access. Landscape modification can be adverse or beneficial. **Table 13-2** lists the terminology used to describe the magnitude of change.

The overall levels of potential landscape impacts were determined by assessing the extent of magnitude of change in combination with sensitivity, using the ratings shown in **Figure 13-1**.

Visual impact assessment

Daytime

This visual impact assessment considers visual amenity as experienced by the users of the site and surrounds. It identifies the range of views to the site which may be impacted, including views from residential areas, parks and streets.

To address potential impact on visual amenity, assessments were carried out by identifying the existing visual conditions, views that are representative of these conditions, the sensitivity of the view and the magnitude of change expected as a result of the project, then making an overall assessment of the level of impact.

Viewpoints selected to illustrate the potential visual influence of the site represent publicly accessible viewpoints from a range of locations and viewing situations. Particular attention was paid to views from places where viewers are expected to congregate such as parks, recreation areas, public transport routes and commercial areas, as well as views to and from heritage items.

Visual sensitivity refers to the nature and duration of views. Locations from which a view would potentially be seen for a longer duration, where there are higher numbers of potential viewers and where visual amenity is important to viewers, can be regarded as having a higher visual sensitivity. In addition, views recognised by local, state or federal planning regulations would, by nature of their recognition in these documents, increase the sensitivity level of the view.

The sensitivity of a viewpoint is considered in the broadest context of possible views, from those of national importance through to those considered to have a neighbourhood visual importance (**Table 13-2**).

^{2 2} Roads and Maritime, 2013. *Guidance note EIA-N04 Guidelines for Landscape Character and Visual Impact Assessment*.

Visual modification describes the extent of change resulting from the project and the visual compatibility of these new elements with the surrounding landscape. There are some general principles which determine the level of visual modification which include elements relating to the view itself such as distance, landform, backdrop, enclosure and contrast. There are also characteristics of the project itself, such as scale, form, line and alignment. Visual modification can result in an improvement or reduction in visual amenity.

A high degree of visual modification would result if the development contrasts strongly with the existing landscape. A low degree of visual modification occurs if there is minimal visual contrast and a high level of integration of form, line, shape, pattern, colour or texture between the development and the environment in which it is located.

In some circumstances, there may be a visible change to a view which does not alter the amenity of the view. This would be due to the visual absorption capacity of the surrounding landscape and/or the compatibility of the project with the surrounding visual context. **Table 13-3** lists the terminology used to describe the level of visual modification.

The overall levels of potential impacts to visual amenity were determined by assessing the magnitude of change in combination with sensitivity, using the ratings shown in **Figure 13-1**.

Table 13-2 Sensitivity level definitions – day time

Sensitivity	Landscape Character	Visual Impact
High	Landscape zone protected with national or international legislation and / or Does not have the capacity to absorb change without detracting from its valued characteristics.	Heavily experienced view to a feature or landscape that is iconic to a major portion of a city or region, or an important view from an area of regional open space.
Moderate	Landscape zone that is heavily used and valued by residents of a major portion of a city or a non-metropolitan region and / or Has some capacity to absorb change without detracting from its valued characteristics e.g. Rockdale Bicentennial Park and Scarborough Park.	View of high quality or experienced by concentrations of residents and/or local recreational users e.g. view to heritage-listed Kings Wetlands in Rockdale Bicentennial Park and Patmore Swamp in Scarborough Park.
Low	Landscape zone valued and experienced by residents and/or local recreational users and / or Has a moderate capacity to absorb change without detracting from its valued characteristics e.g. High density residential areas, Kogarah Golf Course and main roads.	High quality view experienced by concentrations of residents and/or local recreational users e.g. views along Eve Street cycleway. Views where visual amenity is important at a neighbourhood scale, such as views along suburban streets, views seen from local roads (e.g. President Avenue), briefly glimpsed views to landscape features, and views from small groups of residences.
Negligible	Landscape zone not greatly valued for its landscape attributes e.g. industrial areas Has a high capacity to absorb change without detracting from its valued characteristics e.g. industrials areas of Kogarah and Sydney Airport.	Views where visual amenity is not particularly valued by the wider community e.g. industrial areas of Kogarah.

Table 13-3 Magnitude level definitions – day time

Magnitude	Landscape Character	Visual Impact
High	A substantial portion of the landscape zone is changed. This may include considerable alteration to the valued attributes of the landscape character zone.	Substantial part of the view is altered. The project contrasts substantially with surrounding landscape.
Moderate	A moderate portion of the landscape zone is changed. This may include noticeable alteration to the valued attributes of the landscape character zone.	Alteration to the view is clearly visible. The project contrasts with surrounding landscape.
Low	A minor portion of the landscape zone is changed. This may include slight alteration to the valued attributes of the landscape character zone.	Either there is a minor portion of the view changed and / or the project component visible is largely mitigated by proposed public realm improvements.
Negligible	Either the landscape zone is unchanged or if it is, it is largely mitigated by proposed character improvements. Does not alter or not noticeably alter the valued attributes of the landscape character zone.	Either the view is unchanged or if it is, the change in the view is generally unlikely to be perceived by viewers. The project does not contrast with the surrounding landscape.

Night-time

The assessment of night-time impact has been carried out with a similar methodology to the daytime assessment. The night-time assessment does however draw upon the guidance of the Institution of Lighting Engineers (UK) and the *Guidance for the reduction of obtrusive light* (2005), as well as *AS4282 Control of the obtrusive effects of outdoor lighting* (1997).

AS4282 identifies three potential effects of lighting, including:

- *“Changes to the amenity of an area due to the intrusion of spill light into otherwise dark areas, both outdoors and indoors, and to the direct view of bright luminaires*
- *A reduction in the ability of transport system users to see essential details of the route ahead, including signaling systems, due to glare from bright luminaires*
- *Changes to night-time viewing conditions due to a general luminous glow, i.e. sky glow, caused by the scattering of light in the atmosphere.”*

A night time sensitivity level has been allocated for the northern and southern surface works areas. The sensitivity of the night time setting reflects the predominant light levels of each area. The night time visual sensitivity levels are described in **Table 13-4**.

Following the sensitivity assessment, magnitude of visual change that would be expected within the study area was then identified. These changes are described, as relevant, in terms of:

- Sky glow – the brightening of the night sky above our towns, cities and countryside.
- Glare – the uncomfortable brightness of a light source when viewed against a dark background
- Light trespass – the spilling of light beyond the boundary of the property or area being lit

Table 13-4 lists the terminology used to describe magnitude of visual change at night.

Assessment of night time visual impact has been made by combining the visual sensitivity and magnitude of change to assign an impact level. **Figure 13-1** shows the night time visual impact level matrix.

Table 13-4 Visual sensitivity levels and magnitude of visual change – night time

	Visual Sensitivity	Magnitude of visual change
High	E1: Intrinsically dark landscapes Very high sensitivity visual settings at night including national parks, state forests etc.	Substantial change to the level of sky glow, glare or light trespass would be expected. The lighting of the project contrasts substantially with surrounding landscape at night.
Moderate	E2: Low district brightness areas Highly sensitive visual settings at night including rural, small village, or relatively dark urban locations.	Alteration to the level of sky glow, glare or light trespass would be clearly visible. The lighting of the project contrasts with surrounding landscape at night.
Low	E3: Medium district brightness areas Moderately sensitive visual settings at night including small town centres or urban locations.	Minor change to the level of sky glow, glare or light trespass. Minimal contrast with the surrounding landscape at night.
Negligible	E4: High district brightness areas Low sensitivity visual settings at night including town/city centres with high levels of night time activity.	Either the level of sky glow, glare and light trespass is unchanged or if it is altered, the change is generally unlikely to be perceived by viewers. The project does not contrast with the surrounding landscape at night.

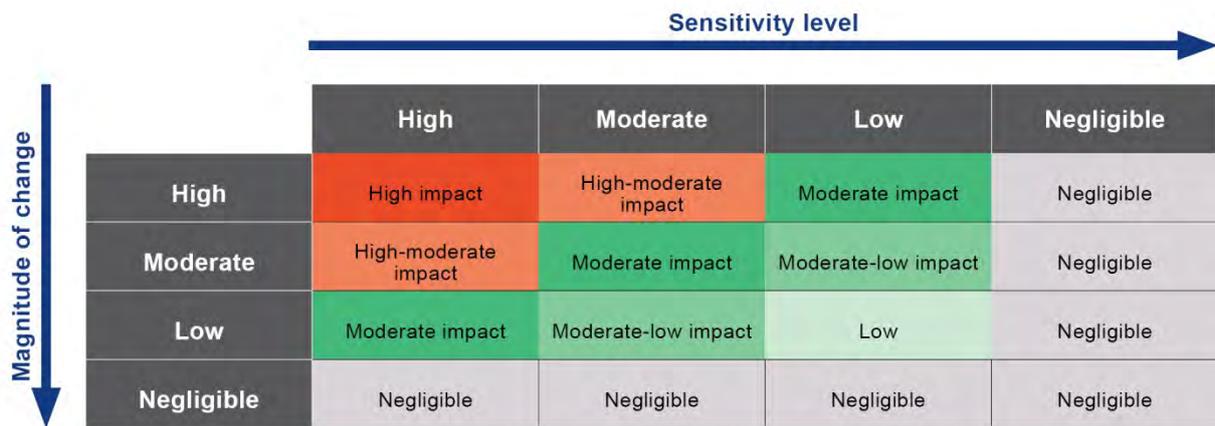


Figure 13-1 Overall level of potential impacts matrix

13.2 Existing environment

Rockdale is a highly urbanised area with large industrial and commercial precincts, bordered by Sydney International Airport and served by major road, rail and bus transport connections. The urban area is relieved by the Rockdale Wetlands and Recreation Corridor, which runs from the Cooks River along Muddy Creek in the north, through Rockdale Bicentennial Park, Patmore Swamp, Scarborough Park ponds and through to Sans Souci in the south.

There are two general areas of surface works - the northern surface works in Arncliffe, and the southern surface works in the vicinity of Presidents Avenue, between Kogarah and Brighton-Le-Sands.

13.2.1 Landscape character

The landscape character areas surrounding the northern and southern surface works were identified and a sensitivity rating determined for each based on the sensitivity ratings outlined in **Table 13-2**. These landscape character areas were primarily determined by land use, which was considered to be the defining landscape character elements of both the surface works areas.

For a detailed description of the heritage features of the project area please see **Chapter 19** (Non-Aboriginal heritage) and **Chapter 20** (Aboriginal cultural heritage). Land uses within and surrounding the project area are described in **Chapter 14** (Property and land use).

Northern Surface Works

There are three primary landscape character zones (LCZs) that have been identified for the northern surface works with some sub character areas. These have largely been drawn from those identified in the New M5 Motorway with the exception of one additional LCZ (LCZ3g New M5 temporary construction ancillary compound).

These landscape character areas are shown in **Figure 13-2** and a brief description of each, including their sensitivity ratings, is provided in the following section (refer **Table 13-5** for a summary of sensitivity ratings). An overview of the night time setting at the northern surface works is also provided.



Figure 13-2 Landscape character zones, northern surface works area (Arncliffe)

LCZ1a: Residential - Low density

- Low density suburban area of Arncliffe located to the north and west of Marsh Street
- Built form generally single and double storey detached dwellings on individual lots with a mixture of architectural styles, ages and materials
- Dissected by several major transport corridors including the M5 East and West Botany Street.
- Topography generally flat with some slight undulation, some elevated easterly views across Arncliffe and to the airport
- The landscape values of this zone are considered to be of low sensitivity as it is a suburban zone, experienced by small numbers of visitors and residents.



Figure 13-3 Character images for LCZ1a: Residential - Low density

LCZ1b: Residential - High density

- High density residential area of Wolli Creek located north of Innesdale Road, Marsh Street, Cahill Park and the Princes Highway
- Built form varied, older remaining detached houses and terraces amidst low, medium and high rise residential apartments and airport transit hotels with large footprints, architectural styles vary with a broad selection of age and materials
- Flat topography, street level views constrained by building line, expansive views across Kogarah Golf Course to the Airport from upper levels of east and southeast facing apartments and hotel rooms along Marsh Street
- The landscape values of this zone are considered to be of low sensitivity as it is a high density residential area. Whilst this area is occupied by high number of residents and visitors, there is an expectation of a built character and highly urban setting.



Figure 13-4 Character images for LCZ1b: Residential - High density

LCZ2c: Recreation Open space

- Flat, low lying tracts of open space at mouth of Muddy Creek, where it joins the Cooks River
- Landing Lights Wetland a key feature, contain some of the last remaining saline wetlands on the Cooks River, Rockdale Market Gardens a key historic and cultural landscape feature
- Southern and Western Suburbs Ocean Outfall Sewer (SWOOS), one of Sydney's oldest main sewers and a state heritage item, is visible on the southern side of Kogarah Golf Course
- Eve Street and Bestic Street shared pathways provide access through this zone and allow views to surrounding open space, providing visual relief from surrounding urban areas, major arterials routes and Sydney Airport.



Figure 13-5 Character images for LCZ2c: Recreation Open space

LCZ2d: Recreation – Waterways

- Includes section of the Cooks River and Muddy Creek between Wolli Creek and Banksia
- Waterways used for active water-based recreation activities including sailing, boating, rowing, kayaking and fishing
- Waterway edges sparsely vegetated, allowing views to and from the water from adjacent open space areas and the airport
- This zone considered to be of low sensitivity as although it is a recreational landscape it is surrounded by a largely modified landscape and would be able to absorb change.



Figure 13-6 Character images for LCZ2d: Recreation – Waterways

LCZ3e: Infrastructure – Transport corridor

- Includes M5 East Motorway and Marsh Street, both major arterial routes
- Noise walls and vegetation provide a visual buffer alongside the M5 East Motorway, screening views to and from the road corridor
- Eclectic streetscape character along Marsh Street with built form varying in age, height, architectural style and materials, street level views are directed along the carriageway
- This zone is considered to be of low sensitivity, as although it includes a busy arterial route and would be experienced by large numbers of people, it has the capacity to absorb change readily.



Figure 13-7 Character images for LCZ3e: Infrastructure – Transport corridor

LCZ3f: Infrastructure – Airport

- Sydney Airport located to the east of the Cooks River.
- Consists of large, flat, open landscape and includes expansive areas of tarmac and turf, scattered low buildings, observation towers, multi-level car parks, hangars and sheds, and aircraft (on the ground, taking off and landing)
- Open character of this zone allows expansive views to and from this aviation-centric landscape
- This landscape is functional rather than appreciated for its aesthetic qualities and is therefore considered to be of negligible sensitivity.

LCZ3g: Infrastructure – New M5 Motorway operations complex

- New M5 Arncliffe temporary construction compound which is currently in use, occupies part of the western side of Kogarah Golf Course
- Compound enclosed by noise walls and large acoustic sheds (visible above the noise walls)
- This landscape would be functional and not particularly appreciated for its landscape qualities. It has considerable visual absorption capacity and is therefore considered to be of negligible sensitivity.



Figure 13-8 Character images for LCZ3g: Infrastructure – New M5 Motorway operations complex

Summary of landscape character area sensitivity

Table 13-5 provides a summary of the sensitivity ratings for each of the Northern Surface Works landscape character areas.

Table 13-5 Landscape character areas and sensitivity - Northern surface works area

Landscape Character Zone	Sensitivity
LCZ1a: Residential - Low density	Low
LCZ1b: Residential - High density	Low
LCZ2c: Recreation- Open space	Moderate
LCZ2d: Recreation – Waterways	Low
LCZ3e: Infrastructure – Transport corridor	Low
LCZ3f: Infrastructure – Airport	Negligible
LCZ3g: Infrastructure – New M5 Motorway operations complex	Negligible

Setting at night

Areas including the M5 East Motorway, Marsh Street and high rise residential areas of Arncliffe and Wolli Creek feature bright street lighting, intersection lighting and brightly lit high density residential development.

Areas of open space and residential areas of Arncliffe feature streetlights and lighting from residential properties.

Southern Surface Works

There are six LCZs that have been identified for the southern surface works. These landscape character areas are shown in **Figure 13-9** and a brief description of each, including their sensitivity ratings, is provided in the following section (refer **Table 13-6**. for a summary of sensitivity ratings). An overview of the night time setting at the southern surface works is also provided.

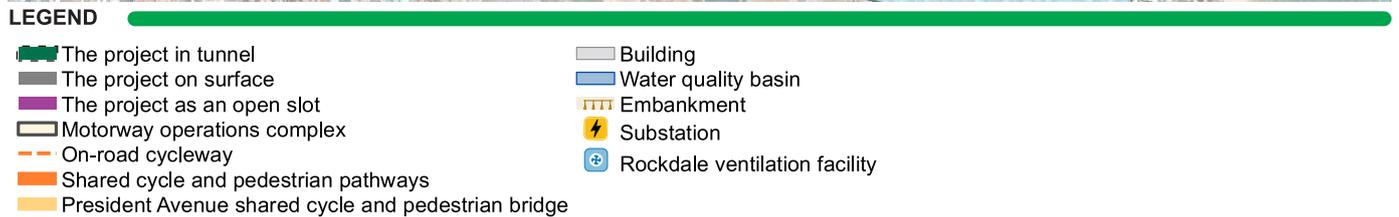
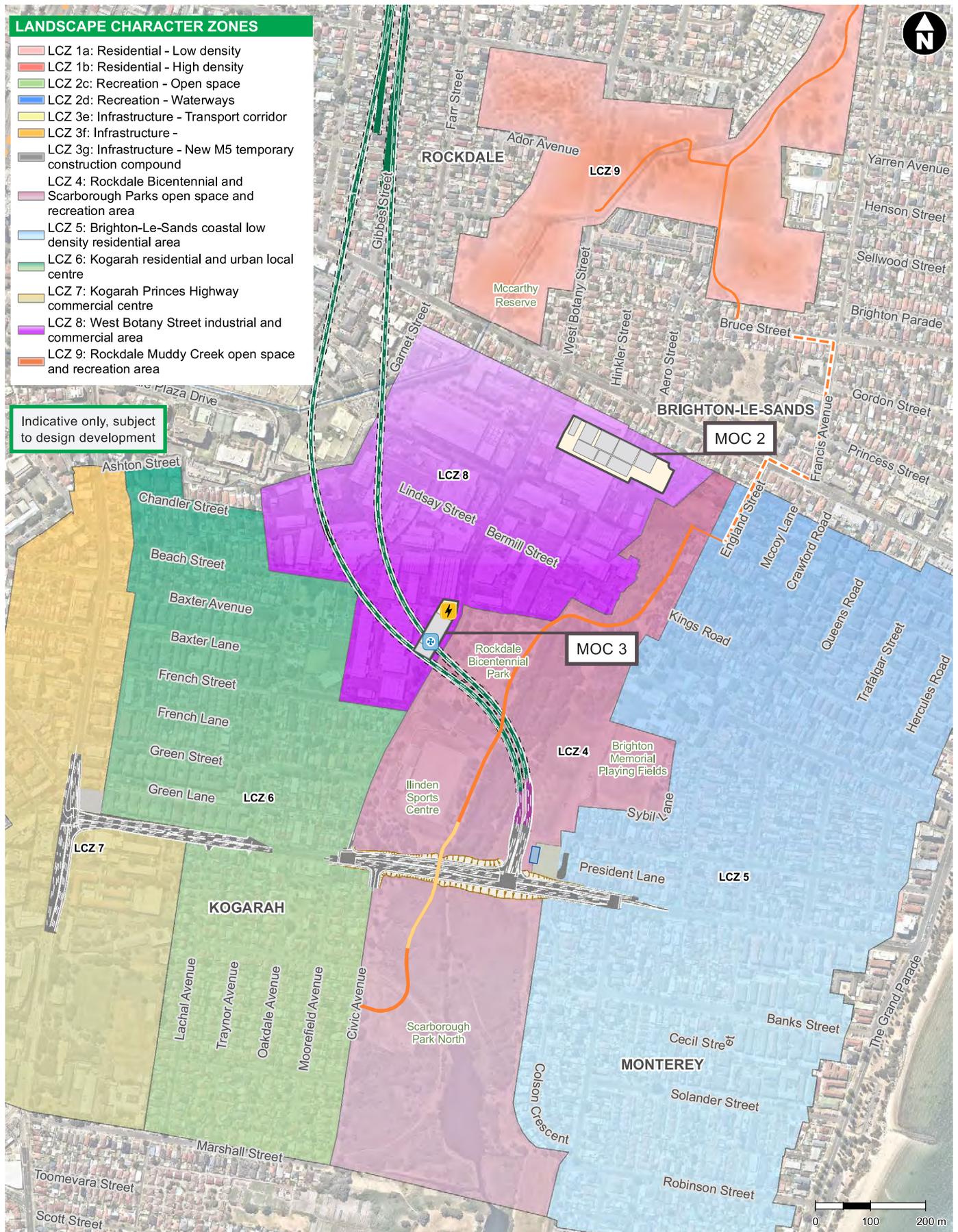


Figure 13-9 Landscape character zones, southern surface works area (President Avenue)

LCZ4: Rockdale Bicentennial and Scarborough Parks

- Land generally low lying and flat, associated with the Rockdale Wetlands which form part of a system of tidal and freshwater swamps
- Wetlands considered to be of '*high visual quality*'
- Dense vegetation encloses views to the wetlands, and east/west inter-visibility between the open spaces is limited, also creates a landscape and visual buffer between industrial and commercial uses to the west and the coastal low density residential areas to the east at Brighton-Le-Sands. There are a number of high retention value trees located in this LCZ (refer to **Figure 13-40**)
- Includes several open spaces and the Brighton-Le-Sands Public School
- East-west pedestrian circulation is provided for between Kings Road and West Botany Street in the north, and a bridge crossing between Rockdale Bicentennial Park and the Memorial Fields
- This zone is considered to be of moderate sensitivity, as it is locally valued for its '*high visual quality*' and includes several community facilities and passive recreation areas, attracting visitors from within and outside the region.



Figure 13-10 Character images for LCZ4: Rockdale Bicentennial and Scarborough Parks

LCZ5: Brighton-Le-Sands coastal residential area

- Low density suburban development, located between the Rockdale Wetlands and Brighton-Le-Sands coastal strip
- Comprises federation bungalows and red brick cottages, set amongst modern infill development, predominant built form of single and double storey houses on individual lots with mature front gardens which unify the zone, streets generally wide, quiet and shaded by street trees
- Brighton-Le-Sands Public School located adjacent to the wetlands in Crawford Street and consists of a Federation style complex of buildings (local heritage item) set within flat low lying grounds containing mature trees
- Topography flat and low lying, street level views are generally enclosed by built form and channelled along the gridded network of streets with glimpses to the ocean in the east
- This is generally a quiet suburban zone, experienced by small numbers of visitors and residents. The landscape values of this zone are therefore to be considered to be of low sensitivity.



Figure 13-11 Character images for LCZ5: Brighton Le-Sands coastal residential area

LCZ6: Kogarah residential and local centre

- Small low density residential precinct, located between the Rockdale Wetlands and the Princes Highway
- Character strongly influenced by concentration of single storey red brick detached bungalows and cottages, wide, quiet tree lined streets, with houses set well back from the road by front gardens is typical
- Topography generally flat and low lying, even though area is slightly elevated from the adjacent Rockdale and Scarborough Wetlands to the east
- Properties located on West Botany Street, particularly Civic Avenue, overlook the wetlands.
- President Avenue traverses this zone in an east/west direction, including a small cluster of retail buildings and a service station
- The landscape values of this zone are considered to be of low sensitivity as it is a predominantly suburban zone, experienced by small numbers of visitors and residents. This landscape would have some absorption capacity along President Avenue.



Figure 13-12 Character images for LCZ6: Kogarah residential and local centre

LCZ7: Princes Highway commercial centre

- Centred on Princes Highway (at the western end of President Avenue), a major north south route between Sydney and Wollongong, five to six lanes wide with narrow footpaths on either side and narrow or zero building setbacks and few street trees
- Built form varies in age, height, architectural style and materials creating an eclectic streetscape character, includes St George Private Hospital, TAFE NSW St. George College, James Cook Boys Technology High School and Moorefield Girls High School
- Pedestrian circulation generally along footpaths beside the Princes Highway, crossings at signalised intersections and an overpass between the hospital and TAFE
- Topography rises and is slightly elevated from the adjacent wetland area at Rockdale Bicentennial and Scarborough Parks (LCZ1)
- Street level views mainly directed north and south along the Princes Highway, some slightly elevated easterly views towards Brighton-Le-Sands from President Avenue intersection, upper levels of east facing apartments and office buildings would have elevated views along President Avenue and to the Rockdale Wetlands and beyond to Botany Bay
- This zone is a busy arterial route, attracting staff, students, patients and visitors from across the region. The zone has the capacity to absorb change due to its diverse built form and the dominating character of the Princes Highway. It is therefore considered to be of low sensitivity.



Figure 13-13 Character images for LCZ7: Kogarah Princes Highway commercial centre

LCZ8: West Botany Street industrial and commercial area

- Commercial and retail precinct focused on West Botany Street, between French and Bay Streets containing a mixture of commercial, retail and light industrial developments
- Built form hugely varied, modern commercial and retail development generally located along the West Botany 'high street' and older brick saw-tooth roof industrial buildings in side streets such as Bermill Street
- Roads and Maritime maintenance depot located in the eastern section of the zone, alongside the Rockdale Wetlands
- Topography generally flat and low lying, with street level views contained by the built form
- This zone is a busy local commercial precinct, attracting concentrations of residents, staff and visitors. Due to the variety and scale of the built form this landscape has the capacity to absorb change readily. Overall, it is considered to be of low sensitivity.



**Figure 13-14 Character images for LCZ8: West Botany Street industrial and commercial area
LCZ9: Rockdale Muddy Creek open space**

- Relatively flat open space and recreational landscapes following Muddy Creek (a concrete channel) between Bestic and Bay Streets
- Includes a number of reserves (with a playground, asphalt netball courts), two bridge crossings over Muddy Creek and paths and footworn tracks throughout the open space
- Mature trees located at Rockdale Park, scattered across the Whiteoak Reserve, in some areas around the perimeter of the sporting reserves, and along creek
- Open space surrounded by predominantly low density residential areas, with the exception of the Sheralee Tourist Caravan Park and the Cairnsfoot Special School
- This zone is considered to be of moderate sensitivity, as it includes many community facilities and active and passive recreation areas, attracting residents and visitors from across the region.



Figure 13-15 Character images for LCZ9: Muddy Creek open space

Summary of landscape character area sensitivity

Table 13-6 provides a summary of the sensitivity ratings for each of the Southern Surface Works landscape character areas.

Table 13-6 Landscape character areas and sensitivity - Southern surface works area

Landscape Character Zone	Sensitivity
LCZ4: Rockdale Bicentennial and Scarborough Parks	Moderate
LCZ5: Brighton-Le-Sands coastal residential area	Low
LCZ6: Kogarah residential and local centre	Low
LCZ7: Princes Highway commercial centre	Low
LCZ8: West Botany Street industrial and commercial area	Low
LCZ9: Muddy Creek open space	Moderate

Setting at night

The Princes Highway, President Avenue and West Botany Street area are brightly lit areas with street lighting, the service station and other commercial properties. This setting is surrounded by lower levels of lighting in the adjacent suburban areas. Areas of open space and surrounding residential areas of Kogarah and Brighton-Le-Sands would have lower lighting levels with streetlights, lights from residential properties and lit sporting fields.

Permanent power supply

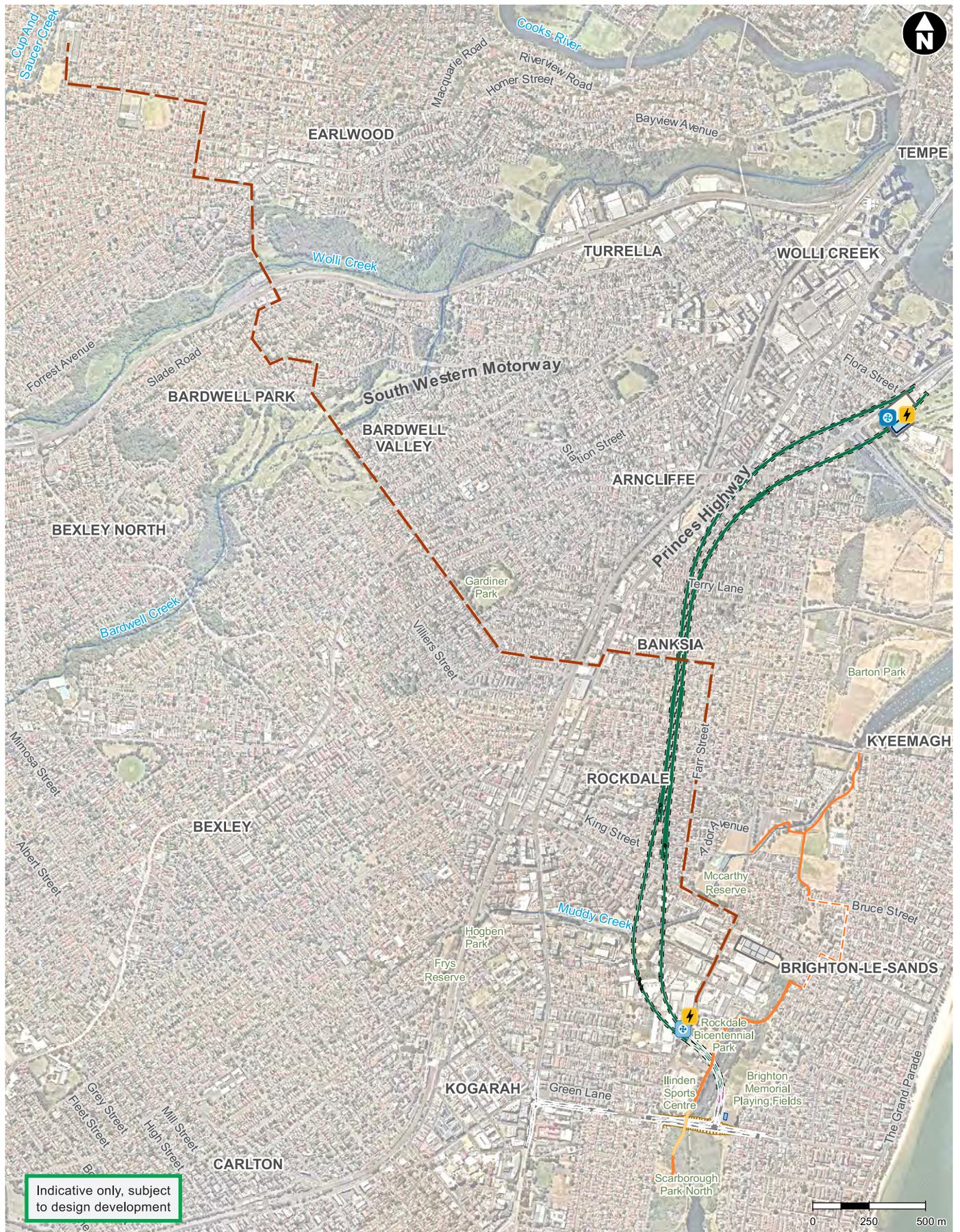
The landscape character impacts of the indicative power supply route have also been assessed. However, due to the small scale of the work, separate LCZs have not been identified.

The proposed permanent power supply corridor (shown in **Figure 13-16**) extends south from the Ausgrid Canterbury sub-transmission substation, along Westfield Street which passes Hughes Park and a wide park-like road reserve. The corridor would be aligned generally east to west along predominantly residential streets of Earlwood, Bardwell Park, Bardwell Valley, Banksia and Rockdale. These residential streets are mostly two lanes wide with low to medium density residential properties and intermittent street trees, creating a leafy suburban character.

The corridor would pass along more densely urban streets to the southwest of the Earlwood village centre. The corridor also crosses the Eastern Suburbs and Illawarra railway line (T4) via an overbridge at Hartill-Law Avenue and passes the Bardwell Park railway station, entering another small commercial centre to the east of the station. It would also cross the Airport and South Line (T8) and the Princes Highway, to the south of Banksia station. These areas have fewer street trees and a more intensely urban and infrastructure character with a greater capacity to absorb the character of construction works and power transmission infrastructure.

On this route, the corridor would pass alongside or through several open spaces including Earlwood Oval, Girrahween Park, Charles Daly Reserve, Bardwell Valley Golf Club, Silver Jubilee Park, Gardiner Park, and McCarthy Reserve. These places include various types of open space including grassed fields, and rolling parkland with trees, and bushland areas.

This corridor is mainly of low landscape sensitivity, with some areas of moderate landscape sensitivity in the areas of open space including Earlwood Oval, Girrahween Park, Charles Daly Reserve, Bardwell Valley Golf Course and Silver Jubilee Park.



LEGEND

- The project in tunnel
- The project on surface
- The project as an open slot
- On-road cycleway
- Shared cycle and pedestrian pathways
- President Avenue shared cycle and pedestrian bridge
- Building
- Embankment
- Water quality basin
- Water treatment facility
- Motorway operations complex
- Substation
- Rockdale ventilation facility
- Arncliffe ventilation facility*
- Permanent power supply line

Figure 13-16 Permanent power supply

13.3 Planning and policy context

The planning and policy setting for the project and its potential landscape and visual impacts is based on the regional and local planning documents discussed below. Please also see **Chapter 4** (Strategic context and project need).

13.3.1 Greater Sydney Regional Plan: A Metropolis of Three Cities (2018)

This plan (Greater Sydney Commission, 2018b) sets a 40-year vision (to 2056) and establishes a 20-year plan to manage growth and change for Greater Sydney.

The region's 'green infrastructure' including 'urban tree canopy, green ground cover, bushland, waterways, parks and open spaces' (p.6) are valued assets in Greater Sydney. A target has been set to 'increase tree canopy cover to 40 per cent, up from the current 23 per cent' (Strategy 30.1, p.164). Strategy 25.1 aims to 'protect environmentally sensitive areas of waterways' (p.151) such as the Rockdale Wetlands. The scenic value of landscape is also valued in the plan, including waterways, urban bushland; urban tree canopy and green ground cover; parks and open spaces, which 'create a sense of identity' (p.159). Strategy 28.2 aims to 'enhance and protect views of scenic and cultural landscapes from the public realm'. The region's 'Green Grid' (p.6) including the network of walking and cycling links are also recognised as important, including President Avenue and the Rockdale Bicentennial and Scarborough Park corridor, which as identified as a Green Grid Opportunities (p.169) to help connect open spaces with communities.

13.3.2 Eastern City District Plan (2018)

The Project would be located within the Eastern City District of Sydney. The *South District Plan* (Greater Sydney Commission, 2018) sets out aspirations and proposals for Greater Sydney's South District. It is a guide for implementing the *Greater Sydney Region Plan* at a District level and is a bridge between regional and local planning

Port Botany and Sydney Airport are identified as trade gateways. Opportunities provided by improved links to Port Botany and Sydney Airport and planning for the F6 Extension will improve motorway access and freight movements from the Eastern Harbour City across Greater Sydney and to Port Kembla/Illawarra, supporting the functions of these gateways. South of President Avenue, a corridor is identified as a 'Road Investigation 0–10 years' (p.7).

In line with the *Great Sydney Regional Plan*, Kogarah is identified as a 'Health and Education Precinct' (p.7) and land to the west and southwest of the airport (Bayside West Precinct) is identified as an 'Urban Renewal Area' (p.7). The Eastern City District's coast and waterways 'shape its landscape and character', including the Rockdale Wetlands corridor, recognised as a 'nationally important wetland' (p.99). The Rockdale Bicentennial and Scarborough Park corridor is also identified as a 'Green Grid Priority Corridor' (p.7), to support walking, cycling and greening the urban environment. New development and investment in infrastructure are identified as key opportunities to improve the quality and access to riparian corridors (p.101). In particular, the plan states that the F6 extension 'should be designed to retain and protect recreational open spaces and the ecological values of the corridor' (p.110).

13.3.3 Cooks Cove Precinct

As outlined in **Chapter 4** (Strategic context and project need), the Cooks Cove Precinct (within which the northern surface works would be located) has been considered for redevelopment for recreational, employment and residential uses since 2004.

Future planning proposal for land within the Cooks Cove Precinct would need to be consistent with the provisions of the *Sydney Regional Environment Plan No 33 – Cooks Cove* (Cooks Cove SREP).

The area where the project would be located within the Cooks Cove precinct is zoned for future infrastructure (special uses), employment (trade and technology) and open space uses. Although action has not yet been taken to give effect to these proposed future uses, the Cooks Cove SREP requires that for any new development: 'The height, form and orientation of buildings are to take into account visual impact from both land and water, as well as solar access, ventilation, wind impact, the amenity and privacy of hotel occupants' (Part 2, s.10b).

The area where the project would be located within the Cooks Cove precinct is restricted to six storeys, except within 120 metres of the Cooks River where the building height limit is five storeys. The Cooks Cove SREP allows for one building within the Trade and Technology Zone to be up to 11 storeys provided it is not closer than 10 metres from the zone boundary.

13.3.4 Rockdale Local Environmental Plan 2011

The Rockdale LEP 2011 (LEP) applies to land on which the southern surface works at President Avenue will be undertaken. Key relevant aims of this plan are to ‘*conserve the environmental heritage of Rockdale*’ (cl1.2.2b), ‘*maintain and improve residential amenity*’ (cl.2.1.2c) and ‘*provide high quality open space*’ (cl1.2.2e).

Land use zones

The reserved F6 Extension surface corridor Stage 1 route is zoned Infrastructure, reflecting the desire for improving access and connectivity between Sydney and the Illawarra, whilst relieving pressure from the Princes Highway and Grand Parade in Brighton-le-Sands. Other land use zones covering and in close proximity to the President Avenue surface works include Public Recreation, Light Industrial, and Low and Medium Density Residential. Relevant clauses include:

- Infrastructure (SP2): ‘*To prevent development that is not compatible with or that may detract from the provision of infrastructure*’
- Public Recreation (RE1): ‘*To protect and enhance the natural environment for recreational purposes*’
- Low and medium density residential (R2/R3): ‘*To ensure that land uses are carried out in a context and setting that minimises any impact on the character and amenity of the area*’.

Heights of Buildings

Adjacent parcels of land to the east, south and west of the Rockdale Wetlands and Recreation Corridor are permitted to reach maximum building heights of 8.5 metres, reflecting the desire to maintain the low density residential character either side of President Avenue. Further north, building heights are permitted to reach 14.5 metres within the light industrial precinct along West Botany Street, backing onto the Rockdale Wetlands. The Public Recreation zoned area is not subject to a building height restriction under the LEP.

Design

Although the LEP does not include specific guidance on road tunnel design, clause 5.6 permits ‘*variations to maximum building height standards for roof features of visual interest*’ such as the proposed road tunnel ventilation system.

Heritage

Heritage items and heritage conservation areas in and around the project include:

- Western Outfall Main Sewer (Rockdale to Homebush) at Marsh Street, Arncliffe; a state listed heritage asset, part of the Southern and Western Suburbs Ocean Outfall Sewer
- Kings Wetland, a locally listed heritage landscape at Kings Road, Brighton- Le-Sands
- Patmore Swamp, a locally listed heritage landscape in the northern part of Scarborough Park: ‘*Aesthetically significant as a landscape of high visual amenity contrasting with surrounding suburbs*’ (NSW OEH 2010)
- School building at Brighton-Le- Sands Public School (1916), a locally listed heritage asset at 35 Crawford Road.

A key objective of the heritage conservation clause is ‘*to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views*’ (s.5.10).

13.3.5 Rockdale Development Control Plan, 2011

Rockdale Development Control Plan (DCP) provides detailed objectives, controls and performance standards for development, which supplement the provisions of the LEP.

The DCP recognises the importance of maintaining and enhancing views to significant landmarks, including the Cooks River area (s.4.1.1). It also specifically requires the views to Botany Bay to be considered in site planning.

The DCP supports the conservation of significant buildings, landscape elements and special places within the LGA that contribute to its heritage significance such as the remnant bushland and wetlands. The DCP requires the following relevant controls for development of and in the vicinity of heritage items:

- *“Any proposed development must conserve the setting of the heritage item and the significant views to and from the heritage item*
- *Development adjacent to a heritage item must be designed to be of a similar scale and proportion so that the item or place of heritage significance is not dominated or overwhelmed (s.4.1.2)”*

Council recognises the aesthetic value of trees in creating a ‘sense of place’ and providing a distinctive character to an area whilst visually softening the built environment and screening undesirable sights. It requires that *“existing significant trees and vegetation are incorporated into proposed landscape treatment”* (s.4.1.7) of new development.

The DCP also promotes quality landscape design solutions that respond to significant existing trees and natural features, relate to the building scale, and provide screening for visually obtrusive land uses or building elements (s.4.3.1).

13.4 Urban design

The Place Making and Urban Design Strategy (AECOM 2018), documents the urban design process, design principles and proposed design treatments for the project. The following section summarises the key features of the design, as identified within the Place Making and Urban Design Strategy, including design principles for the project and the corridor, landscape and vent facility design.

13.4.1 Design objectives

The urban design objectives have been adopted from the *‘WestConnex Urban Design Framework’* and modified to suit the contextual environment of the proposed F6 Extension. To further strengthen this, *‘Beyond the Pavement – Urban design policy, procedures and design principles’* (Roads and Maritime, 2014) underpin the urban design objectives for the F6 project and is integral to the urban design outcome.

To ensure an integrated ‘whole of corridor’ response with the surrounding environment the following urban design objectives have been developed to govern the project outcomes:

- Leading edge environmental responsiveness
- Connectivity, accessibility and legibility
- Place making
- Urban renewal and liveability
- Memorable identity and a safe, enjoyable experience
- A new quality benchmark.

13.4.2 Landscape character and visual mitigation strategy

There are several mitigation measures which have been incorporated into the design in response to the landscape and visual conditions of the site.

Siting and layout:

- The project's tunnel has been located to avoid the Kings Wetland and Ilinden Sports Centre
- The F6 tunnel has been located to maximise the future functionality of the Memorial sports fields and remaining areas of the Rockdale Bicentennial Park
- The President Avenue overpass has been located to maximise connectivity with the broader circulation network and to allow for extension during future stages of the project.

Landform considerations:

- All earthwork formations would be gently rounded out at both top and bottom of slopes, and at the end of each formation, in order to achieve a 'natural' transition into adjacent landforms
- The earthworks to raise President Avenue would have maximum slopes of 1:4 to visually integrate this level change with the surrounding open space.

Structure design and treatment:

- The visual appearance and materiality of the ventilation facility would reflect built form elements of the surrounding urban character
- The design of the shared pedestrian and cycle pathway bridge would be developed through collaboration between the engineer and urban designer from the outset, to ensure a coordinated and visually integrated outcome. The design would present smooth, clean lines with minimum structural depth consistent with their spans, and complement the surrounding built-form and natural environment. Urban design elements including throw screens, lighting and fencing shall all be considered as part of the overall composition and form, with a view to developing a slender, symmetrical, visually uncluttered and well-ordered profile. Signage requirements should be kept to a minimum
- The tunnel portal would be minimal in form and embellishment and would work in unison with the surrounding landscape setting.

Landscape treatments

- Supplementary tree planting and screening would be provided along President Avenue to offset the tree removal and to re-establish a visual screen along the corridor
- The area surrounding the tunnel portal and entry and exit ramps would be planted with a variety of low, mid and canopy vegetation reflective of the adjacent wetlands and recreational open space species
- A section of the existing wetland pond would be rebuilt at completion of the F6 works to restore this landscape
- Key active recreational facilities impacted by the works, in particular the sporting facilities, playground and skate park, would be reinstated to maintain the level of amenity.

An indicative landscape concept master plan for Rockdale Bicentennial Park has been prepared and is shown on **Figure 13-17**). The final layout would be decided in consultation with council, stakeholders and the community.



Figure 13-17 Indicative landscape concept master plan at Rockdale Bicentennial Park

13.5 Visibility of the Project

13.5.1 Northern surface works area (Arncliffe)

Potential visibility of the project

Visual envelope

A Visual Envelope Map (VEM) has been used to illustrate the theoretical area from which the surface works may be visible. This is based on interpretation of aerial photography (refer to **Figure 13-18**).

The potential visibility of the northern surface works site would be influenced by the landform and the surrounding built form. The site would be seen from Marsh Street which bounds the site to the north. To the northwest, areas of low density residential development are located on a landform which rises towards West Botany Street so that views towards the site may be possible. There are also areas of higher density residential development which would have views from upper windows and balconies, across the site. To the northeast and east of the site, there may be views from across the golf course and Cooks River as this landscape is relatively open and the landform is gently undulating. Views to the south may extend across open space to the M5 East Motorway which forms a visual barrier to views extending further south.

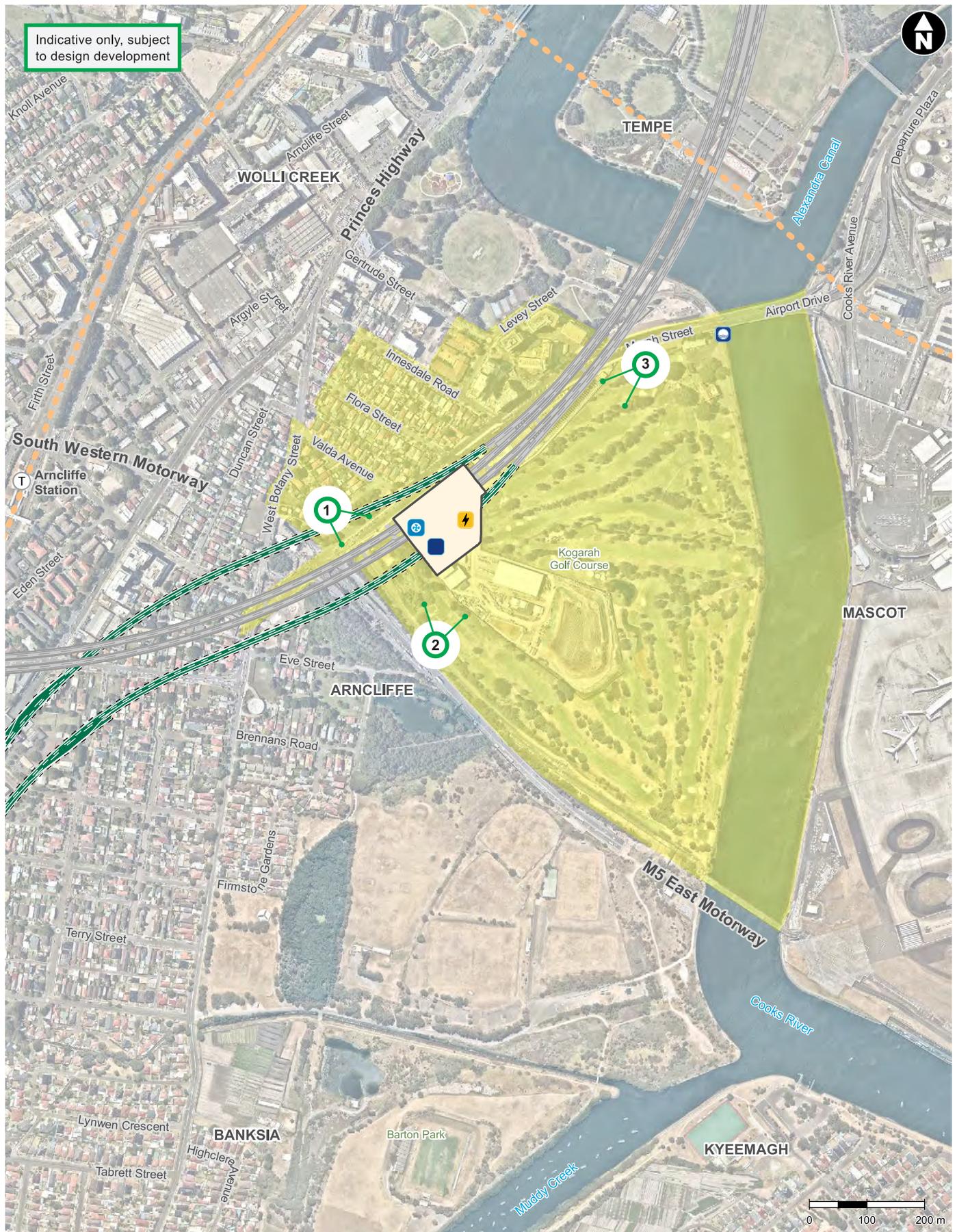
Selection of representative viewpoints

Three viewpoints were selected from within the visual catchment of the project as representative of range of potential views to the project. These views include views from residential areas, public open space and major roads.

The following views have been identified as representative of the views to the Northern surface works area (Arncliffe):

- VP1: View east from near Marsh Street pedestrian underpass
- VP2: View north from Eve Street cycleway
- VP3: View south from Marsh Street

The locations of these viewpoints are shown on **Figure 13-18** and the viewpoints themselves are shown on **Figure 13-19 - Figure 13-21**.



Indicative only, subject to design development

LEGEND

- The project in tunnel
 - Motorway operations complex
 - Substation
 - Water treatment facility
 - Operational discharge location
 - New M5 Tunnel
 - Arncliffe ventilation facility*
 - Viewpoint location
 - Railway line
 - Waterbody
 - Visual Envelope Map
 - Railway station
- * Under construction as part of the New M5 Motorway project



Figure 13-18 Visual envelope and viewpoint locations, northern surface works area (Arncliffe)



Figure 13-19 Viewpoint 1 – View east from near Marsh Street pedestrian underpass



Figure 13-20 Viewpoint 2 – View north from Eve Street cycleway



Figure 13-21 Viewpoint 3 – view south from Marsh Street

13.5.2 Southern surface works area (President Avenue)

Potential visibility of the project

To assess the potential visibility of the southern works area (President Avenue) the project has been considered as three key visual components: the surface works (which refers to the surface roads, Motorway operations complex and street level areas of the ventilation facility), the Rockdale ventilation facility outlet (a structure which would rise above the surrounding built form), and the shared pedestrian and cycle pathway bridge (which would also rise above the park and road corridor).

Visual envelope

Surface Works

The potential visibility of the surface works would be reduced by the dense surrounding built form and vegetation of the study area. A visual envelope map (VEM) has been used to establish the theoretical area from which the surface works may be visible. This is based on interpretation of aerial photography (refer to **Figure 13-22**).

It is expected that views to the President Avenue intersection and tunnel entry and exit ramps would be visible from the adjacent residential areas to the east. Views to the upgraded President Avenue would be seen from Scarborough Park, properties facing Presidents Avenue, and along intersecting streets.

Similarly the Rockdale MOC would be largely enclosed by surrounding built form and vegetation. This built form and vegetation would limit views to adjacent industrial, commercial and residential properties, West Botany and Bay Streets.

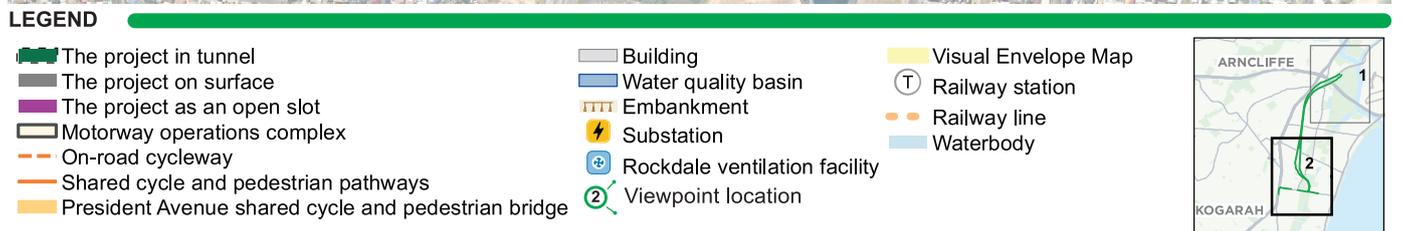
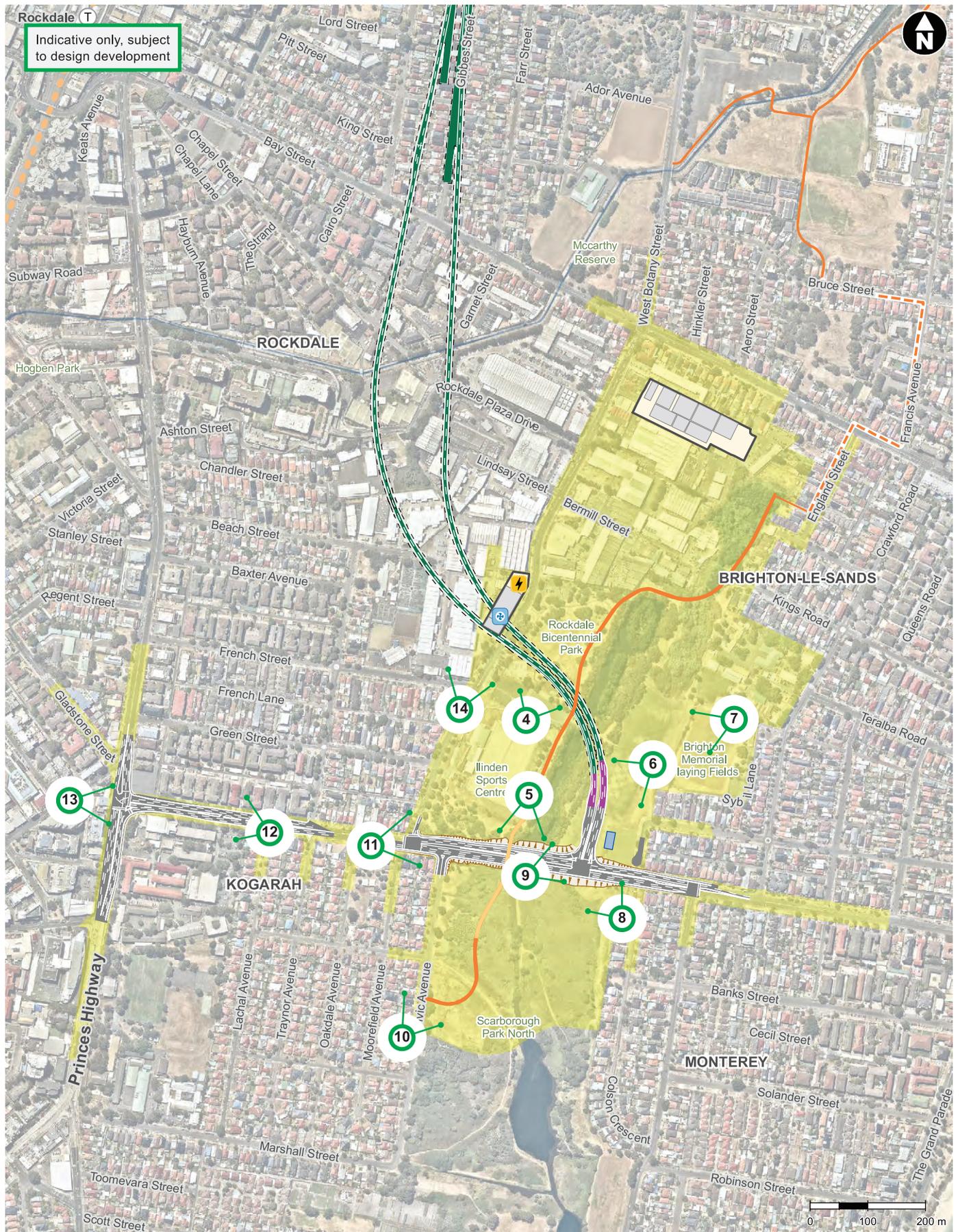
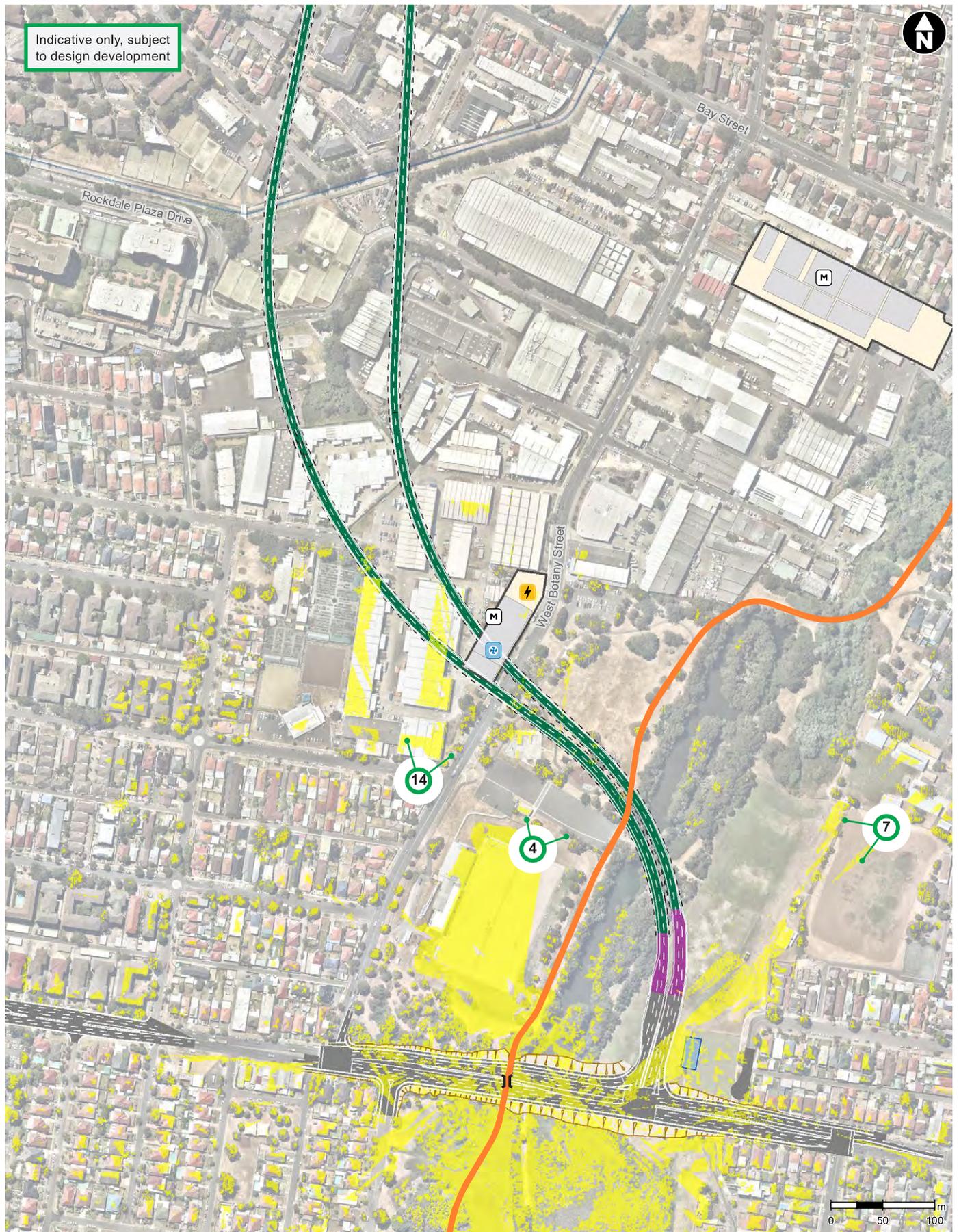


Figure 13-22 Visual envelope and viewpoint locations, southern surface works (President Avenue)

A Visual Envelope Map (VEM) has been used to establish the theoretical area from which the ventilation facility may be visible. This theoretical extent is based on LIDAR data (including built form and vegetation), with an assumed height of the outlet of 35 metres. The analysis uses a 3D model to identify the areas from which views to the site may be possible. This diagram shows the outlet as being visible from the streets and buildings surrounding the ventilation facility site, north and south along West Botany Street and extending east across the Rockdale Bicentennial Park, and beyond the Rockdale Wetlands to the Rockdale Memorial Fields. This theoretical area includes the rooftops of buildings in the surrounding industrial, commercial and residential areas to the very top of the outlet. This VEM formed the basis for field investigations to identify views to the proposed ventilation outlet (refer to **Figure 13-23**).



LEGEND

The project in tunnel	Visible	Substation
The project on surface	Building	Rockdale ventilation facility
The project as an open slot	Embankment	Motorway operations complex
Motorway operations complex	Water quality basin	President Avenue shared cycle and pedestrian bridge
Shared cycle and pedestrian pathways	Viewpoint location	

Figure 13-23 Visual envelope and viewpoint locations, southern surface works (President Avenue) – Rockdale ventilation facility outlet 13-31

Shared pedestrian and cycle pathway bridge over President Avenue

A Visual Envelope Map (VEM) has also been used to establish the theoretical area from which the shared pedestrian and cycle pathway bridge over Presidents Avenue may be visible. This theoretical extent is based on LIDAR data (including built form and vegetation) and an assumed height of the bridge of 5.5 metres above the roadway. The VEM shows the shared pedestrian and cycle pathway bridge as being visible from east and west along Presidents Avenue and extending north into the Ilinden Sports Centre, and south across Scarborough Park North. This VEM formed the basis for field investigations to identify relevant viewpoints for this area (refer to **Figure 13-24**).



LEGEND

The project in tunnel	Visible	Substation
The project on surface	Building	Rockdale ventilation facility
The project as an open slot	Embankment	Motorway operations complex
Motorway operations complex	Water quality basin	President Avenue shared cycle and pedestrian bridge
Shared cycle and pedestrian pathways	Viewpoint location	

Figure 13-24 Visual envelope and viewpoint locations, southern surface works (President Avenue) - shared pedestrian and cycle pathway bridge

Selection of representative viewpoints

Fifteen viewpoints were selected from within the visual catchment of the project as representative of broad range of potential views to the project in the southern surface works area. These views include views to the roadworks, Rockdale ventilation facility and shared pedestrian and cycle pathway. These views include residential areas, schools, public open space, heritage places and local businesses.

The following views have been identified as representative of the views to the southern surface works area (President Avenue):

- Viewpoint 4: View north from the Ilinden Sports Centre
- Viewpoint 5: View south from Rockdale Bicentennial Park
- Viewpoint 6: View south from the Rockdale Memorial Fields
- Viewpoint 7: View south from Brighton-Le-Sands Public School
- Viewpoint 8: View north from Colson Crescent
- Viewpoint 9: View northeast from President Avenue
- Viewpoint 10: View east from Civic Avenue
- Viewpoint 11: View east from President Avenue retail area
- Viewpoint 12: View west along President Avenue at Lachal Avenue
- Viewpoint 13: View east along President Avenue from the Princes Highway
- Viewpoint 14: View south from West Botany Street
- Viewpoint 15: View east from West Botany Street to the Roads and Maritime maintenance depot.

The locations of these viewpoints are shown on **Figure 13-22 - Figure 13-24** and the viewpoints themselves are shown on **Figure 13-25 - Figure 13-36**.



Figure 13-25 Viewpoint 4 – View north from the Ilinden Sports Centre



Figure 13-26 Viewpoint 5 – View south from Rockdale Bicentennial Park



Figure 13-27 Viewpoint 6 – View south from the Rockdale Memorial Fields



Figure 13-28 Viewpoint 7 – View south from Brighton-Le-Sands Public School



Figure 13-29 Viewpoint 8 – View north from Colson Crescent



Figure 13-30 Viewpoint 9 – View northeast from President Avenue



Figure 13-31 Viewpoint 10 – View east from Civic Avenue



Figure 13-32 Viewpoint 11 – View east from President Avenue retail area



Figure 13-33 Viewpoint 12 – View west along President Avenue at Lachal Avenue



Figure 13-34 Viewpoint 13 – View east along President Avenue from the Princes Highway



Figure 13-35 Viewpoint 14 – View north from West Botany Street



Figure 13-36 Viewpoint 15 – View east from West Botany Street to Roads and Maritime depot

13.5.3 Permanent power supply

The permanent power supply would require temporary works within the road reserves and through open spaces. Works would include some lane and footpath closures to accommodate temporary trenching works to install the connection underground. The works would include construction of surface level power lines, attached to existing infrastructure, at the Bardwell Valley Golf Club and Silver Jubilee Parks and to cross the T4 and T8 railway lines. No existing street trees within this corridor would be removed as part of the Project.

13.6 Potential impacts – construction

This section provides an overview of the potential landscape and visual impacts during construction. An overview of the impacts is provided as well as summary of the impact assessment ratings.

13.6.1 Northern surface works

Landscape character impacts

During construction there would be **moderate-low** landscape character impact on the LCZ2c Recreation - Open Space at the northern surface works area (Arncliffe). This is due to the continuation of intensive construction undertaken on an area that would otherwise be returned to open space. There would be no works undertaken in other landscape character zones, and therefore an otherwise **negligible landscape character** impact on surrounding areas.

Table 13-7 summarises the impacts on these LCZs and their locations are shown on **Figure 13-2**.

Table 13-7 Northern surface works - summary of landscape character impacts during construction

Landscape character zone	Sensitivity	Magnitude of change	Impact level
LCZ1a: Residential - Low density	Low	Negligible	Negligible
LCZ1b: Residential - High density	Low	Negligible	Negligible
LCZ 2c: Recreation - Open space	Moderate	Low	Moderate-low
LCZ 2d: Recreation - Waterways	Low	Negligible	Negligible
LCZ 3e: Infrastructure - Transport corridor	Low	Negligible	Negligible
LCZ 3f: Infrastructure - Airport	Negligible	Negligible	Negligible
LCZ 3g: Infrastructure - New M5 Motorway operations complex	Negligible	Negligible	Negligible

Visual impacts

An overview of the viewpoint assessment for the Project is provided following and a summary of the assessment results is provided in **Table 13-8**. The locations of viewpoints are shown on **Figure 13-37**.

Daytime

During construction there would be **moderate visual impact** on views from the Eve Street cycleway (VP2) due to the proximity of the construction works to this moderately sensitive recreational route.

There would be a **low visual impact** from Marsh Street (VP3), where some construction activity would be seen over the Golf Course and adjacent to the New M5 Motorway MOC. This low impact is due to visual absorption capacity of the landscape and limited visibility of the site.

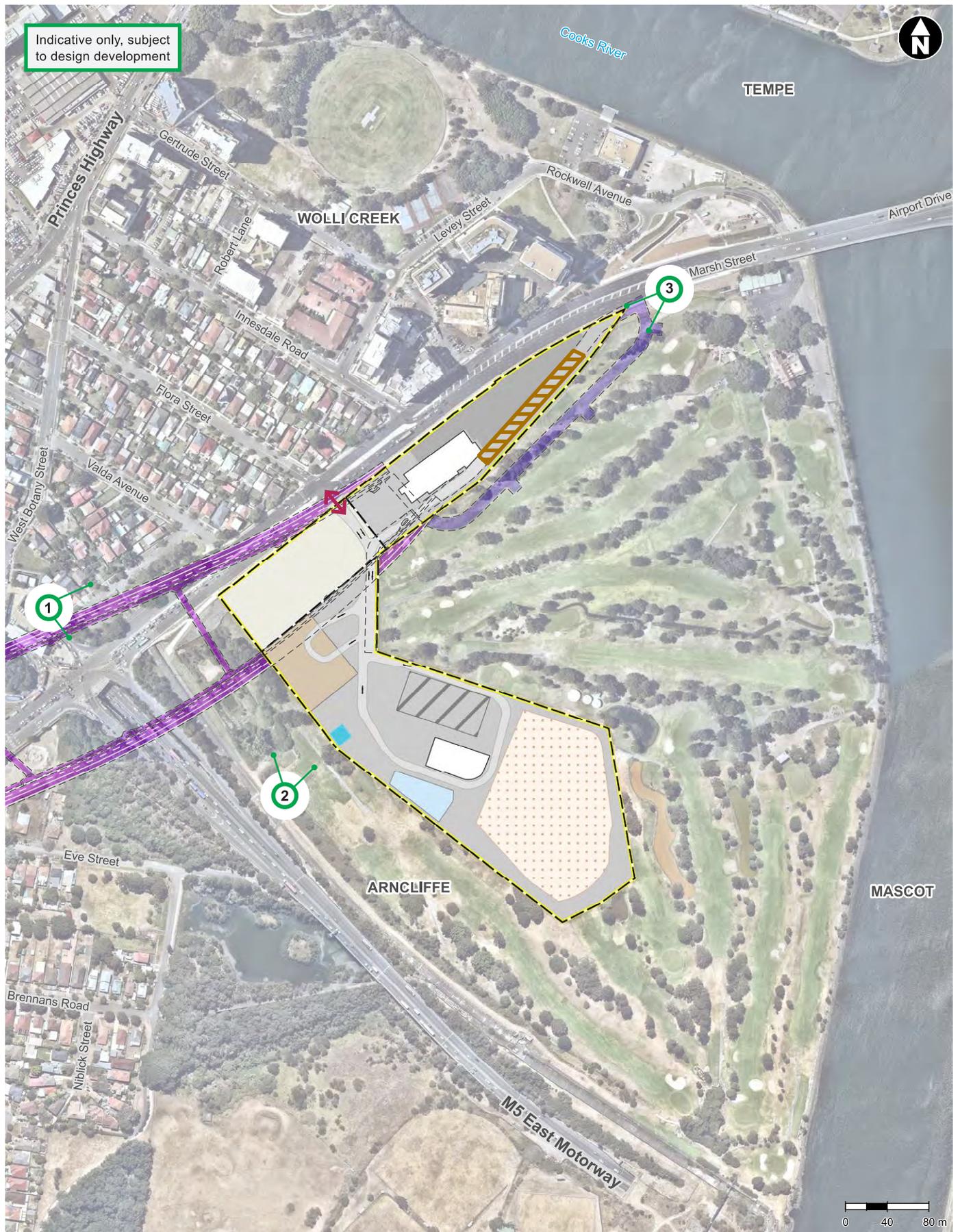
There would be a **negligible visual impact** from near the Marsh Street pedestrian underpass (VP1) as the construction elements would be partially screened, consistent in character and somewhat absorbed into the character of views from this location.

Night time

At night there would be a **negligible visual impact** as much of the works would be contained by an acoustic enclosure and seen within a brightly lit setting.

Table 13-8 Northern surface works - summary of day time and night time visual impacts during construction

Viewpoint	Sensitivity	Magnitude	Impact level
Day time			
VP1: View east from near Marsh Street pedestrian underpass	Low	Negligible	Negligible
VP2: View north from Eve Street cycleway	Moderate	Moderate	Moderate
VP3: View south from Marsh Street	Low	Low	Low
Night time			
VP1: View east from near Marsh Street pedestrian underpass	Low	Negligible	Negligible
VP2: View north from Eve Street cycleway	Low	Negligible	Negligible
VP3: View south from Marsh Street	Low	Negligible	Negligible



LEGEND

- | | | |
|--|----------------|---------------------|
| Construction decline | Building | Vehicle access |
| Construction boundary | Carpark | View point location |
| Underground construction | Spoil site | |
| Construction ancillary facility | Spoil shed | |
| Underground construction - Temporary access tunnel | Access route | |
| | Sediment basin | |

Figure 13-37 Construction layout and viewpoint locations, northern surface works - Arncliffe construction ancillary facility (C1)

13.6.2 Southern surface works

Landscape character impacts

There would be a **high-moderate landscape impact** on the Rockdale Bicentennial and Scarborough Parks landscape (LCZ4) during construction. This is due to several factors including reduced access to open space which includes the playground, skate park and sporting fields; the introduction of construction activity across large areas of park, and the temporary diversion of West Botany Street. Another key factor is the vegetation removal that would occur within the park. **Figure 13-40** provides an overview of the trees that would potentially be removed as part of the project and their associated retention value (determined using a combination of environmental, cultural, physical and social values – refer to **Appendix C2** (Landscape and visual technical report) for further detail).

The construction character introduced to the Princes Highway commercial centre (LCZ7) area would be somewhat absorbed into the highly urban and mixed character of the zone. The works, which would include the removal of mature street trees (refer to **Figure 13-40**) would however result in a **moderate level of impact**.

There would be **low landscape character impacts** on the surrounding landscape character zones. This is because most of the proposed roadworks would occur within the open space character zones (LCZ4 and LCZ9). The construction of both the ventilation facility and Motorway Operations Centre would be located in the West Botany Street industrial and commercial areas (LCZ8) a light industrial landscape character area, which is of low sensitivity.

Table 13-9 summarises the impacts on these Landscape Character Zones and their locations are shown on **Figure 13-9**.

Table 13-9 Southern surface works - summary of landscape character impacts during construction

Landscape character zone	Sensitivity	Magnitude of change	Impact level
LCZ4: Rockdale Bicentennial and Scarborough Parks	Moderate	High	High-moderate
LCZ5: Brighton-Le-Sands coastal residential area	Low	Low	Low
LCZ6: Kogarah residential and local centre	Low	Low	Low
LCZ7: Princes Highway commercial centre	Low	Moderate	Moderate-low
LCZ8: West Botany Street industrial and commercial area	Low	Low	Low
LCZ9: Muddy Creek open space	Moderate	Low	Moderate-low

Visual impacts

An overview of the viewpoint assessment for the Project is provided following and a summary of the assessment results is provided in **Table 13-10**. The viewpoint locations are shown on **Figure 13-22** to **Figure 13-24**.

Daytime

In views from President Avenue to the tunnel portal, entry and exit ramps and the President Avenue intersection there would be a **high-moderate visual impact**. This is due to the removal of mature trees (refer to **Figure 13-40**) and open space, and construction of the tunnel portal, intersection and road upgrades visible in close proximity. In views towards the tunnel portal and intersection, such as the Brighton-Le-Sands Public School and residential areas of Brighton-Le-Sands, proposed vegetation the visual impact to **moderate**. Retained vegetation to the northeast of the Memorial Fields would enclose views to works within Rockdale Bicentennial Park from areas of Brighton-Le-Sands, including the Brighton-Le-Sands Public School.

The major earthworks and roadworks required to upgrade President Avenue, and construction of the shared pedestrian and cycle pathway bridge, would also result in **moderate visual impacts** to views from adjacent residential areas to the east (Colson Crescent) and **moderate-low visual impacts** to views from the west (Civic Avenue).

Construction of the Rockdale ventilation facility and diversion of West Botany Street would result in a **moderate visual impact** due to the scale of the works.

At the Princes Highway and President Avenue intersection the demolition of the service station and roadworks would have a **moderate visual impact**. There would also be elevated views from properties on the Princes Highway where both the Princes Highway intersection works and the Presidents Avenue intersection works would be seen in the a long range view, resulting in an increased impact.

Night time

At night there would be **moderate-low visual impacts** due to the low sensitivity of the setting at night, and enclosure of works within site areas.

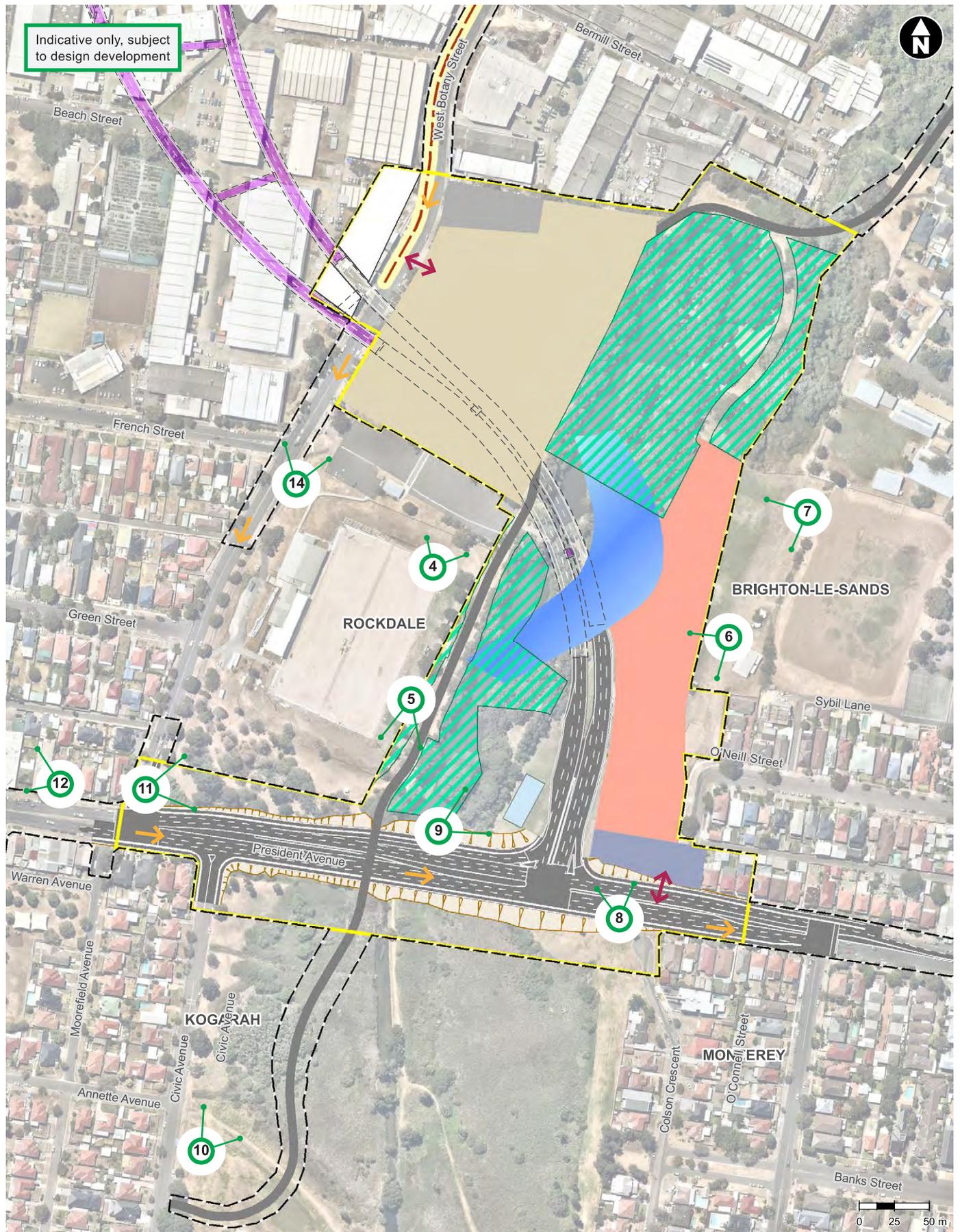
Table 13-10 Southern surface works - day time and night time visual impacts during construction

Viewpoint	Sensitivity	Magnitude of change	Impact level
Daytime			
VP4: View north from the Ilinden Sports Centre	Moderate	High	High-moderate
VP5: View south from Rockdale Bicentennial Park south	Moderate	High	High-moderate
VP6: View south from Rockdale Bicentennial Park Memorial Fields	Moderate	High	High-moderate
VP7: View south from open space at Brighton-Le-Sands Public School	Moderate	Moderate	Moderate
VP8: View north from Colson Crescent	Low	High	Moderate
VP9: View northeast from President Avenue	Moderate	High	High-moderate
VP10: View east from Civic Avenue	Low	Moderate	Moderate-low
VP11: View east from President Avenue retail area	Low	Moderate	Moderate-low
VP12: View west along President Avenue at Lachal Avenue	Low	Moderate	Moderate-low
VP13: View east along President Avenue from the Princes Highway	Low	High	Moderate
VP14: View south from West Botany Street	Low	High	Moderate
VP15: View east from West Botany Street to Roads and Maritime maintenance depot	Low	Low	Low

Viewpoint	Sensitivity	Magnitude of change	Impact level
Night time			
VP4: View north from the Ilinden Sports Centre	Low	Moderate	Moderate-low
VP5: View south from Rockdale Bicentennial Park	Low	High	Moderate
VP6: View south from the Rockdale Memorial Fields	Low	High	Moderate
VP7: View south from Brighton-Le-Sands Public School	Low	Moderate	Moderate-low
VP8: View north from Colson Crescent	Low	Moderate	Moderate-low
VP9: View northeast from President Avenue	Low	Moderate	Moderate-low
VP10: View east from Civic Avenue	Low	Moderate	Moderate-low
VP11: View east from President Avenue retail area	Low	Low	Low
VP12: View west along President Avenue at Lachal Avenue	Low	Moderate	Moderate-low
VP13: View east along President Avenue from the Princes Highway	Low	Moderate	Moderate-low
VP14: View south from West Botany Street	Low	Moderate	Moderate-low
VP15: View east from West Botany Street to Roads and Maritime maintenance depot	Low	Negligible	Negligible



Figure 13-38 Construction layout and viewpoint locations, southern surface works (President Avenue) - Rockdale construction ancillary facility (C2)



LEGEND		
Surface works	Building	Vehicle access
Embankment	Carpark	Vegetation exclusion zone
Construction boundary	Sediment basin	Permanent power supply line
Cut-and-cover structures	Soil treatment area	Permanent power supply construction boundary
Underground construction	Carpark and facilities	View point location
Construction ancillary facility	Waterbody diversion	Through traffic maintained during construction
Underground construction - Temporary access tunnel	Diaphragm wall support site	

Figure 13-39 Construction layout and viewpoint locations, southern surface works - President Avenue construction ancillary facility (C3) 13-45

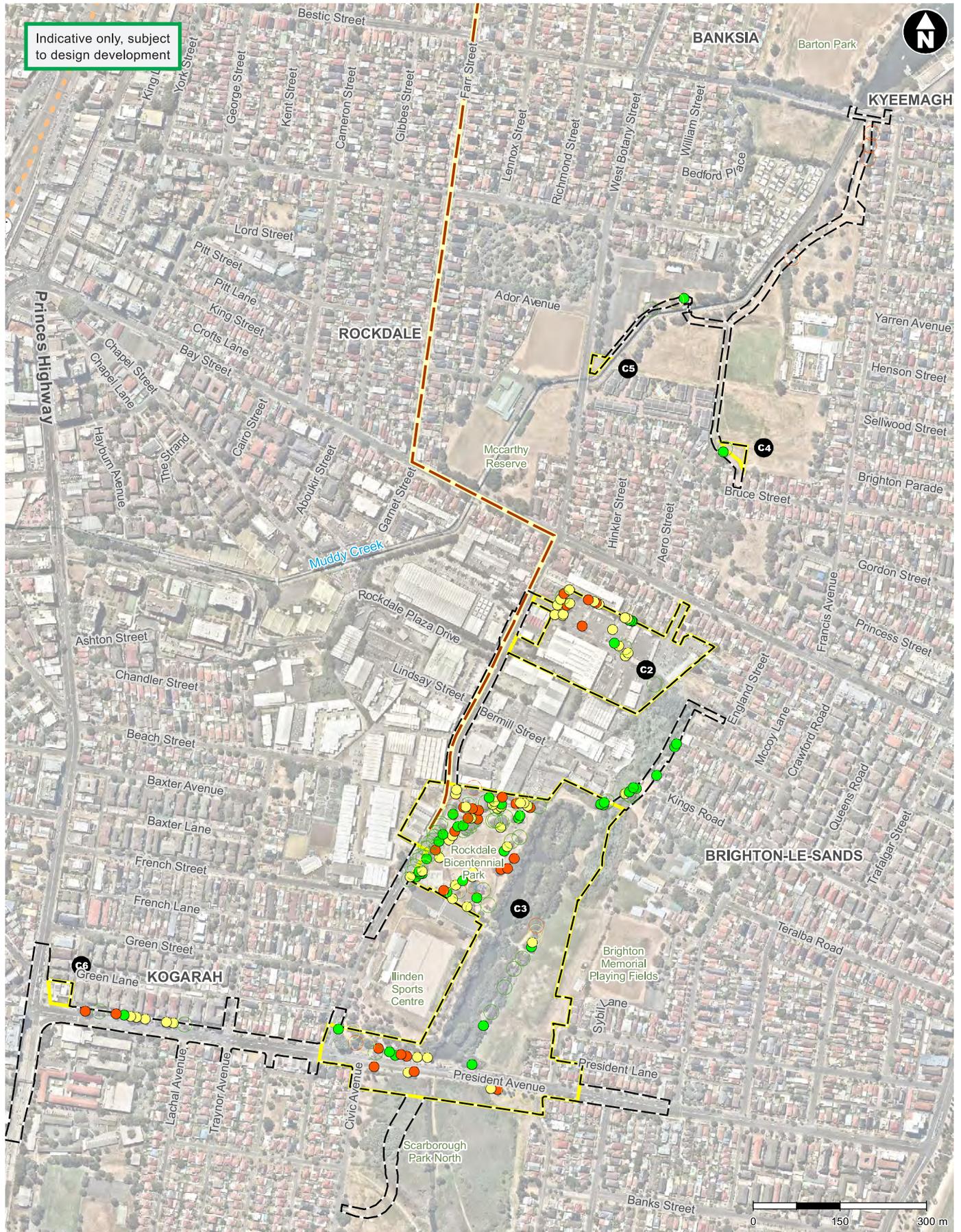


Figure 13-40 Trees that would potentially be removed and their assessed value – southern surface works

13.6.3 Permanent power supply

Due to the works occurring in both local streets, through local centres and open spaces, it is expected that the project would result in a low magnitude of change. As this is a landscape of neighbourhood to local sensitivity, there would be a **moderate to low landscape character impact** during construction. **Table 13-11** provides a summary of the landscape character impact.

Table 13-11 Proposed permanent power supply - summary of landscape character impacts during construction

Landscape character zone	Sensitivity	Magnitude of change	Impact level
Permanent power supply	Low – moderate	Low	Moderate-low

13.6.4 Cumulative impacts

Northern surface works area (Arncliffe)

During construction there would be some cumulative effects between the project and the New M5 Motorway project. Whilst the construction works for the project would be undertaken on a reduced area of the former New M5 Motorway construction site, the duration of works at this location would be extended. The landscape character, day and night time visual impacts should be appreciated in the context of several years of impact already experienced due to the New M5 Motorway construction works.

Southern surface works area (President Avenue)

There would not be any other motorway projects likely to result in a cumulative impact upon landscape character areas identified for the southern surface works area (President Avenue).

13.7 Potential impacts – operation

This section provides an overview of the potential landscape and visual impacts during operation. An overview of the impacts is provided as well as summary of the impact assessment ratings.

13.7.1 Northern surface works

Landscape character impacts

During operation there would be **moderate-low landscape character impact** on the LCZ2c Recreation - Open Space at the northern surface works area (Arncliffe). This is due to the introduction of an additional F6 water treatment facility and substation, extending the New M5 MOC facility, and replacing an additional area of open space. There would be no works undertaken in other landscape character zones, and therefore an otherwise **negligible landscape character impact** on surrounding areas during operation.

Table 13-12 summarises the impacts on these Landscape Character Zones and their locations are shown on **Figure 13-2**.

Table 13-12 Northern surface works - Summary of Landscape Character Impacts during operation

Landscape character zone	Sensitivity	Magnitude of change	Impact level
LCZ1a: Residential - Low density	Low	Negligible	Negligible
LCZ1b: Residential - High density	Low	Negligible	Negligible
LCZ 2c: Recreation - Open space	Moderate	Low	Moderate-low
LCZ 2d: Recreation - Waterways	Low	Negligible	Negligible
LCZ 3e: Infrastructure - Transport corridor	Low	Negligible	Negligible
LCZ 3f: Infrastructure - Airport	Negligible	Negligible	Negligible
LCZ 3g: Infrastructure - New M5 Motorway operations complex	Negligible	Negligible	Negligible

Visual impacts

An overview of the viewpoint assessment for Project is provided following and a summary of the assessment results is provided in **Table 13-13**. The proposed operation layout of the project as well as the location of the viewpoints is shown on **Figure 13-18**.

Daytime

There would be a **moderate-low** visual impact on views from the Eve Street cycleway during operation. This is due to the additional F6 water treatment plant and substation which would expand the New M5 MOC and extend this built character across the view to open space. There would also be a **low visual impact** in views from Marsh Street, where the MOC would appear larger within views across the existing Kogarah Golf Course. In other areas the F6 water treatment facility and substation would be screened by the New M5 MOC and have a **negligible visual impact**.

Night time

At night, as there are no additional lit elements proposed by the project, there would be a **negligible visual impact**.

Table 13-13 Northern surface works - summary of day time and night time visual impacts during operation

Viewpoint	Sensitivity	Modification	Impact level
Day time			
VP1: View east from near Marsh Street pedestrian underpass	Low	Negligible	Negligible
VP2: View north from Eve Street cycleway	Moderate	Low	Moderate-low
VP3: View south from Marsh Street	Low	Low	Low
Night time			
VP1: View east from near Marsh Street pedestrian underpass	Low	Negligible	Negligible
VP2: View north from Eve Street cycleway	Low	Negligible	Negligible
VP3: View south from Marsh Street	Low	Negligible	Negligible

13.7.2 Southern surface works

Landscape character impacts

There would be **low landscape impact** across much of the southern surface works area (President Avenue) due to the compatibility of the ventilation facility, Motorway Operations Centre and the President Avenue and Princes Highway intersection, with the existing landscape character, and the relatively low sensitivity of these landscape character zones.

There would, however, be a **high-moderate landscape impact** experienced in the LCZ4: Rockdale Bicentennial and Scarborough Park area character primarily due to the loss of open space. There would also be modifications to the landform, a reduction in vegetation cover (refer to **Figure 13-40**), and introduction of culverts at the wetland crossing under President Avenue, altering the landscape character in this location.

There would be a **moderate-low landscape character impact** expected at the LCZ9: Muddy Creek open space area. This is due to the upgrades to the fields including lights, pedestrian bridges and car-parking which would increase the developed character of this open space somewhat.

Table 13-14 summarises the impacts identified for the Landscape Character Zones.

Table 13-14 Southern surface works - summary of landscape character Impacts during operation

Landscape Character Zone	Sensitivity	Magnitude of change	Impact level
LCZ4: Rockdale Bicentennial and Scarborough Parks	Moderate	High	High-moderate
LCZ5: Brighton-Le-Sands coastal residential area	Low	Low	Low
LCZ6: Kogarah residential and local centre	Low	Low	Low
LCZ7: Princes Highway commercial centre	Low	Low	Low
LCZ8: West Botany Street industrial and commercial area	Low	Low	Low
LCZ9: Muddy Creek open space	Moderate	Low	Moderate-low

Visual impacts

An overview of the viewpoint assessment for the Project is provided following and a summary of the assessment results is provided in **Table 13-15**. The viewpoint locations are shown on **Figure 13-22 - Figure 13-24**.

Daytime

In views directly to the works at President Avenue, a change from views to open space to a major intersection, entry and exit ramps, and tunnel portal would have a **high-moderate visual impact**. Whereas, from middle distance locations, such as the Brighton Le-Sands Public School and residential areas of Brighton-Le-Sands, the location of this intersection and tunnel portal within the parkland allows for vegetation within the parkland to be provided to screen the infrastructure (refer to **Figure 13-41** and **Figure 13-42**). **Moderate-low visual impacts** would be experienced from these locations.



Figure 13-41 Existing condition – View west from Brighton-Le-Sands Public School



Figure 13-42 Artist's impression – View west from Brighton-Le-Sands Public School during operation

Note: The Rockdale ventilation facility would be screened by existing and new vegetation

The location of the Rockdale ventilation facility within a setting of light industrial built form would allow the impact to be reduced. There would be a **low visual impact** in views of the Rockdale ventilation facility from West Botany Street and adjacent areas due to the compatibility of this structure with the surrounding industrial and commercial setting (refer to **Figure 13-43** and **Figure 13-44**).



Figure 13-43 Existing condition – View north along West Botany Street



Figure 13-44 Artist's impression – View north along West Botany Street during operation

The shared pedestrian and cycle pathway bridge over President Avenue would have a **low visual impact** on views from the surrounding open space and adjacent roads. Vegetation within the park would mature over time to visually integrate the viaduct structure, and screen views towards the bridge over time (refer to **Figure 13-45** and **Figure 13-46**).



Figure 13-45 Existing condition – View west along President Avenue



Figure 13-46 Artist's impression – View west along President Avenue during operation

Night time

At night the new President Avenue intersection, entry and exit ramps and tunnel portal would be brightly lit. President Avenue would also have upgraded lighting. This would contrast with the surrounding dark setting of the park, and result in a **moderate-low visual impact**. Lighting at the President Avenue intersection with the Princes Highway, at the Rockdale ventilation facility, and Motorway Operations Complex would result in **low** and **negligible visual impact** due to the consistency of the lighting levels with the existing setting.

Table 13-15 Southern surface works - summary of day time and night time visual impacts during operation

Viewpoint	Sensitivity	Magnitude of change	Impact level
Daytime			
VP4: View north from the Ilinden Sports Centre	Moderate	Low	Moderate-low
VP5: View south from Rockdale Bicentennial Park south	Moderate	Moderate	Moderate
VP6: View south from Rockdale Bicentennial Park memorial fields	Moderate	Low	Moderate-low
VP7: View south from open space at Brighton-Le-Sands Public School	Moderate	Low	Moderate-low
VP8: View north from Colson Crescent	Low	Moderate	Moderate-low
VP9: View northeast from Presidents Avenue	Moderate	High	High-moderate
VP10: View east from Civic Avenue	Low	Low	Low
VP11: View east from President Avenue retail area	Low	Low	Low
VP12: View west along President Avenue at Lachal Avenue	Low	Low	Low
VP13: View east along President Avenue from the Princes Highway	Low	Low	Low
VP14: View south from West Botany Street	Low	Low	Low
VP15: View east from West Botany Street to Roads and Maritime maintenance depot	Low	Low	Low
Night time			
Night views at the President Avenue, President Avenue intersection and tunnel exit and entry ramps	Low	Moderate	Moderate-low
Night views of the shared pedestrian and cycle pathway	Low	Low	Low
Night views at the Princes Highway intersection	Low	Low	Low
Night views at the Rockdale ventilation facility	Low	Negligible	Negligible

Overshadowing

The Rockdale Motorway Operations Complexes (MOC2 and MOC3) have the potential to result in overshadowing impacts on neighbouring properties. An overshadowing assessment of the permanent buildings and structures associated with MOC2 and MOC3 was undertaken. The outcomes of the assessment and shadow diagrams are presented in Annexure B of **Appendix C2** (Landscape and visual technical report).

At MOC2, the key receptors include the adjacent industrial buildings and workplaces. The sensitivity of these receptors is considered to be low. No overshadowing impacts of adjacent buildings would occur at MOC2 during summer (December) and the spring/autumn equinox (March/September). There would be very minor overshadowing impacts during winter solstice (June) at MOC2 (refer to **Figure 13-47** and **Figure 13-48**).

At MOC3, the key receptors are industrial buildings and a footpath along West Botany Street to the south-east, which is located along a busy street and in an industrial setting. The sensitivity of these receptors is considered to be low. Rockdale Bicentennial Park is located to the east of MOC3 and is a well-used recreational facility, therefore sensitivity would be high. The results of the overshadowing assessment for MOC3 were as follows:

- Winter solstice (June) – overall impacts considered to be low
 - 9:00am (refer to **Figure 13-49**): The ventilation facility causes overshadowing across the southern glazed end of the building face of the industrial premises. Overshadowing of windows by the ventilation facility is considered to be moderate during this period. By about 10.30am, the industrial premises would be out of shadow. The sensitivity of these premises is considered to be low.
 - 12:00pm: Overshadowing of the footpath would occur along West Botany Street. The sensitivity of this footpath is low.
 - 3:00pm (refer to **Figure 13-50**): Moderate overshadowing would occur within Rockdale Bicentennial Park, although some of the affected area experiences shadowing from existing tree plantings. The vent shaft overshadows part of the open space in the park area, however the shadow is relatively narrow.
- Spring/Autumn equinox (March/September) – overall impacts considered to be negligible
 - 9:00am: No significant overshadowing impacts
 - 12:00pm: No significant overshadowing impacts
 - 3:00pm: The footpath and northbound lane of West Botany Street are overshadowed and the ventilation facility overshadows a small portion of the verge on the opposite side of West Botany Street. The sensitivity of these receptors is low.
- Summer solstice (December) – overall impacts considered to be negligible
 - 9:00am: No significant overshadowing impacts
 - 12:00pm: No significant overshadowing impacts
 - 3:00pm: The footpath is overshadowed by MOC3. The sensitivity of this footpath is considered low.

Overall, the impact of overshadowing from MOC2 and MOC3 is considered to be negligible.

Overshadowing impacts of the ventilation facility at MOC1 has not been assessed, as it has already been assessed as part of the New M5 Motorway project. The project would only involve mechanical and electrical fitout of the ventilation facility for the project.

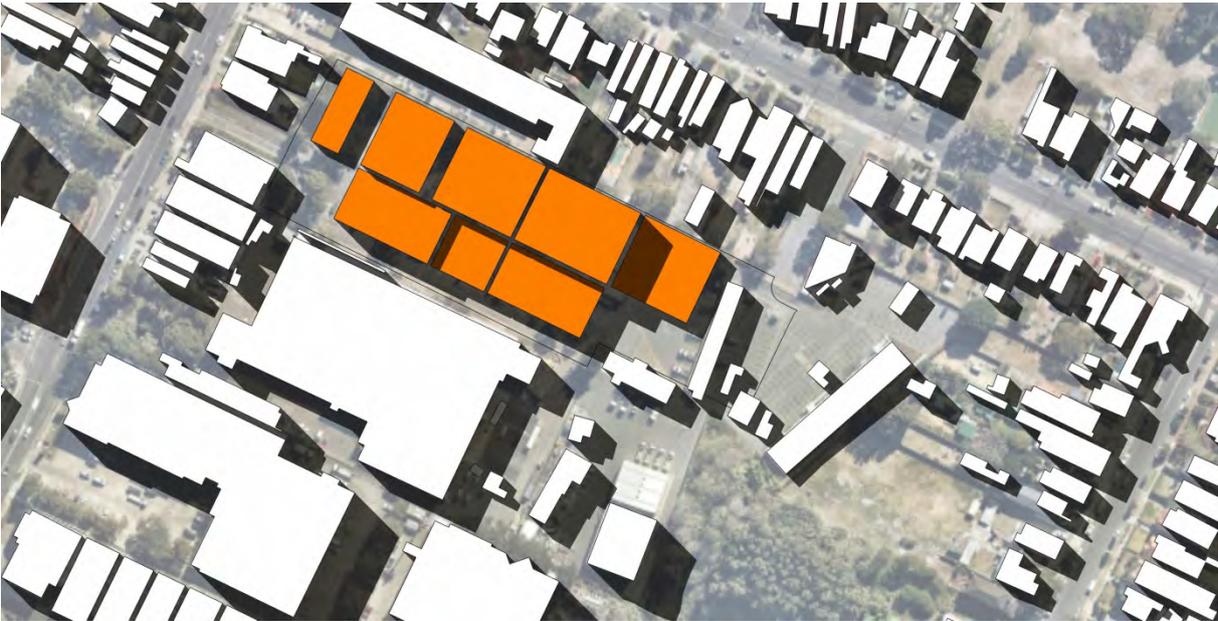


Figure 13-47 Overshadowing diagram – MOC2 – June 21 at 9:00am (winter solace)

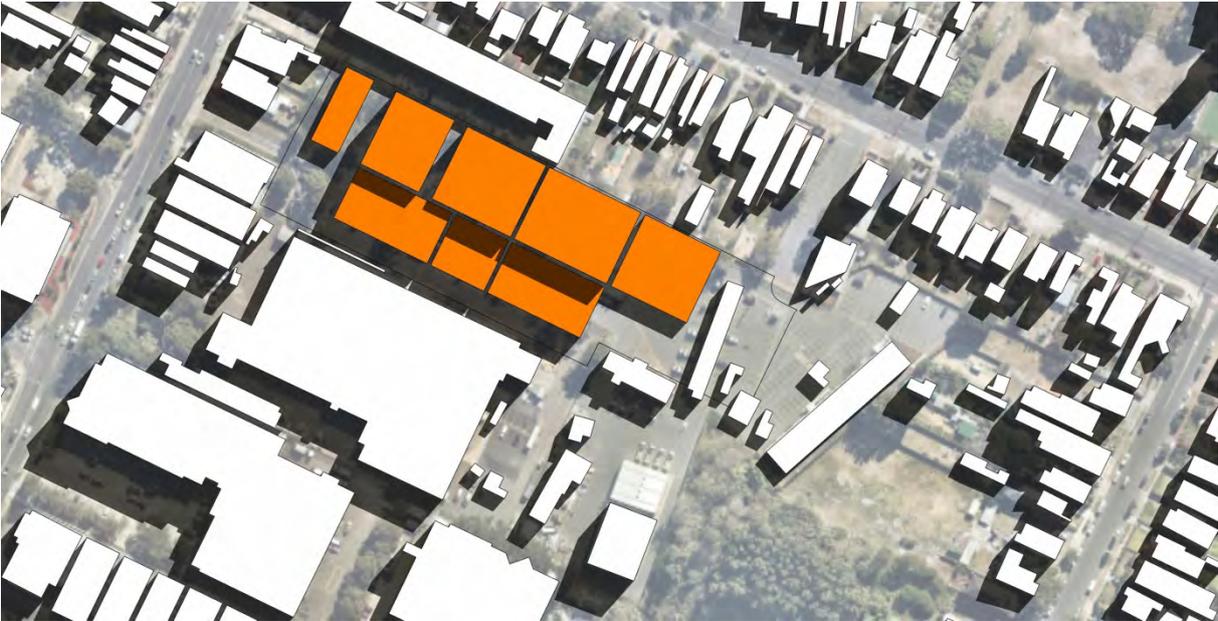


Figure 13-48 Overshadowing diagram – MOC2 – June 21 at 3:00pm (winter solace)



Figure 13-49 Overshadowing diagram – MOC3 – June 21 at 9:00am (winter solace)



Figure 13-50 Overshadowing diagram – MOC3 – June 21 at 3:00pm (winter solace)

13.7.3 Permanent power supply

There would be no permanent aboveground project elements along this route during operation. This would result in no perceived reduction in the quality of this landscape, which is of local sensitivity, resulting in a **negligible landscape character impact**.

Table 13-16 Permanent power supply - summary of landscape character impacts during construction

Landscape character zone	Sensitivity	Magnitude of change	Impact level
Permanent power supply	Low – moderate	Negligible	Negligible

13.7.4 Cumulative impacts

Northern surface works area (Arncliffe)

During operations there would be no cumulative effects between the project and the New M5 project. There would be no additional visible elements required for the project and therefore a negligible landscape character, daytime and night time visual impact has been identified for the project.

Southern surface works area (President Avenue)

There would not be any other motorway projects visible from the visual catchment of the southern surface works area (President Avenue) during the day or night.

13.8 Management of impacts

Environmental management measures that would be undertaken to mitigate landscape and visual impacts during construction and operation are provided in **Table 13-17**.

An overview of the tree strategy for the Project (which is related to environmental mitigation measures LVIA2 and LVIA5 in **Table 13-17**) is provided below.

Tree Strategy

Where removal of trees is unavoidable, trees would be replaced in accordance with the tree management strategy for the project, which would be prepared in consultation with relevant stakeholders (including Bayside Council). The strategy would be used to guide the management of trees, including those within riparian areas that need to be removed and to consider options for their replacement. The strategy would address:

- The need to minimise tree removal
- Protection of trees being retained
- Replacement of trees

The strategy would provide for the following:

- Consideration of all options to minimise the need for tree removal and to retain as many trees as possible
- Preparation of comprehensive tree reports (by a qualified arborist) for trees requiring protection, pruning, or removal, to guide the approach to managing trees
- Measures to minimise damage to, and ensure the health and stability of, trees to be retained, in accordance with AS4970-2009 Protection of trees on development sites
- Replacement of trees where removal cannot be avoided, in accordance with the following general principles:
 - net increase in the number of replacement trees
 - provision of replacement trees to achieve similar outcomes as those removed where possible, such as screening, amenity, etc.
 - replacement trees are to have a minimum pot size of 75 litres, except where the plantings are consistent with the pot sizes specified in a relevant authority's plans for vegetation management, or as agreed by the relevant authority(s) (such as Bayside Council)

- trees to be planted within 500 metres of the project area wherever practicable, or in another location determined in consultation with the relevant council
- Consideration of plant species that would benefit Grey-headed Flying-fox foraging
- Targets to be achieved such as established vegetation cover and water quality parameters.

A management of operation impacts mitigation measures is:

- Semi-mature trees (assume minimum container size of 100 litres) should be provided where short term screening is required, such as in areas between the President Avenue intersection and tunnel entry, and exit ramps and adjacent residential areas of Brighton-Le-Sands.

Table 13-17 Environmental management measures – landscape and visual impact assessment

Impact	Reference	Environmental management measures	Timing
Impacts to views from the construction of surface infrastructure for the project including construction ancillary facilities, particularly within the vicinity of President Avenue intersection	LVIA1	An Urban Design and Landscape Plan will be prepared. The plan will detail built and landscape features to be implemented prior to operation of the project. The plan is to be developed in consultation with local council.	Prior to construction
	LVIA2	Where reasonable and feasible, existing trees will be retained and protected within construction areas.	Construction
	LVIA3	Construction and operational lighting will be oriented to minimise glare and light spill impacts on adjacent receptors.	Construction Operation
	LVIA4	The design and maintenance of construction compound hoardings will aim to minimise visual impacts and landscape character impact, including the prompt removal of graffiti.	Construction

Impact	Reference	Environmental management measures	Timing
	LVIA5	<p>Where trees are removed due to facilitate construction of the project, replacement trees would be selected and planted in accordance with the tree management strategy developed for the project. The strategy would provide for the following:</p> <ul style="list-style-type: none"> • Consideration of all options to minimise the need for tree removal and to retain as many trees as possible • Preparation of comprehensive tree reports (by a qualified arborist) for trees requiring protection, pruning, or removal, to guide the approach to managing trees • Measures to minimise damage to, and ensure the health and stability of, trees to be retained, in accordance with AS4970-2009 Protection of trees on development sites • Replacement of trees where removal cannot be avoided, in accordance with the following general principles: <ul style="list-style-type: none"> – net increase in the number of replacement trees – provision of replacement trees to achieve similar outcomes as those removed where possible, such as screening, amenity, etc. – replacement trees are to have a minimum pot size of 75 litres, except where the plantings are consistent with the pot sizes specified in a relevant authority's plans for vegetation management, or as agreed by the relevant authority(s) (such as Bayside Council) – trees to be planted within 500 metres of the project area wherever practicable, or in another location determined in consultation with the relevant council • Consideration of plant species that would benefit Grey-headed Flying-fox foraging • Targets to be achieved such as established vegetation cover and water quality parameters. 	Construction

13.9 Environmental risk analysis

An environmental risk analysis was undertaken for the landscape and visual impact assessment and is provided in **Table 13-18** below.

A level of assessment was undertaken commensurate with the potential degree of impact the project may have on visual amenity. This included an assessment of whether the identified impacts could be avoided or minimised (for example, through design amendments). Where impacts could not be avoided, environmental management measures have been recommended to manage impacts to acceptable levels.

The residual risk is the risk of the environmental impact after the proposed mitigation measures have been implemented. The methodology used for the environmental risk analysis is outlined in **Appendix O** (Methodologies).

Table 13-18 Environmental risk analysis – Landscape and visual

Summary of impact	Construction/ operation	Management and mitigation measures	Likelihood	Consequence	Residual risk
Impacts to visual amenity from the construction of surface infrastructure for the project including construction ancillary facilities, particularly within the vicinity of President Avenue intersection	Construction	LVIA1	Likely	Minor	Low
Impacts to visual amenity and landscape character at and around Rockdale Bicentennial Park (e.g. due to vegetation removal)	Operation	LVIA1, LVIA2	Likely	Moderate	Medium
Impacts to visual amenity and landscape character as a result of the installation of surface infrastructure associated with the project including the southbound ventilation outlet, substation, groundwater treatment facility and surface road infrastructure.	Operation	LVIA2	Likely	Minor	Low