Transport for NSW/Sydney Airport Corporation Limited

Sydney Gateway Road Project

Environmental Impact Statement/ Major Development Plan

Chapter 21 Landscape character and visual amenity

2020

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Chapter 21

Landscape character and visual amenity

This chapter provides a summary of the results of the landscape character and visual amenity assessment. It describes the existing landscape and visual environment, identifies potential impacts during construction and operation, and provides measures to mitigate and manage the impacts identified. Further information is provided in Technical Working Paper 13 (Urban Design, Landscape Character and Visual Impacts).

The SEARs relevant to the landscape and visual amenity assessment are listed below. There are no MDP requirements specifically relevant to landscape and visual amenity, however there is a requirement under section 91(1) of the Airports Act to assess the potential environmental impacts associated with a development (section 91(1)(h)), and to specify how those impacts may be dealt with (section 91(1)(j)). Full copies of the SEARs and MDP requirements, and where they are addressed in this document, are provided in Appendices A and B respectively

Reference	Requirement	Where addressed
Key issue SEARs		
4	**Placemaking and urban design**	
4.3	The Proponent must: (a) estimate the number of trees to be cleared by the project (a tree is defined by Australian Standard (AS) 4970 Protection of trees on development sites) that will not be covered by a biodiversity offset strategy;	Section 21.3.3
	(b) for those trees to be cleared, describe how the project will achieve a net increase in tree canopy within or adjacent to the construction footprint.	Section 21.3.3
5	**Visual amenity**	
5.1	The Proponent must assess the visual impact of the project and any ancillary infrastructure on: (a) views and vistas;	Sections 21.3 and 21.4.2
	(b) streetscapes, key sites and buildings (including existing landscape works, green space and tree canopy);	Sections 21.3, 21.4.1 and 21.4.2
	(c) heritage items including Aboriginal places and environmental heritage;	Section 17.4.1
	(d) the local community.	Sections 21.3, 21.4.1 and 21.4.2
5.2	The Proponent must provide visual representations of the project from key receiver locations to illustrate the project and its visual impacts and how the project has responded to the visual impact through urban design and landscape works.	Sections 21.4.2 and 21.6.1

21. Landscape character and visual amenity

21.1 Assessment approach

Cities and environments change over time as new land uses, buildings, infrastructure and services are introduced. Urban design is the discipline of designing landscape, infrastructure and spaces so that cities are shaped and improved as they grow and infrastructure needs expand. A key element of planning and developing the project has been the involvement of urban design professionals to help shape project design to minimise impacts and optimise outcomes for the community.

As the project has the potential to impact the community, surrounding land and road users, there is a formal process to assess the potential for landscape and visual impacts and recommend mitigation and management measures to minimise impacts that cannot be avoided. The urban design and visual impact assessment has been undertaken by accredited urban design specialists experienced in infrastructure development. By commencing the landscape character and visual impact assessment early in the project development process and working closely with project road and civil designers, impacts can be identified early and resolved through appropriate design to optimise project outcomes. This ensures that overall project design is appropriate for its context, optimises community and social outcomes and avoids or minimises adverse impacts as far as reasonable and feasible.

An overview of the approach to the assessment is provided below, including the legislative and policy context and a summary of the assessment methodology.

Further information on the approach to urban design and place making for the project is provided in Chapter 7 (Project description).

21.1.1 Legislative and policy context to the assessment

The assessment has been undertaken in accordance with the SEARs and MDP required (provided in Appendices A to B) and with reference to the following:

- Relevant legislation, including the EP&A Act, the Airports Act and associated regulations
- *Guideline for landscape character and visual impact assessment* (Roads and Maritime, 2018d)
- *Beyond the pavement: urban design policy, procedures and design principles* (Roads and Maritime, 2014)
- *Sydney Airport Master Plan 2039* (SACL, 2019a)
- *Sydney Airport Environment Strategy 2019-2024* (SACL, 2019b).

21.1.2 Methodology

Study area

The study area is defined by landscape character zones (see section 21.2.2). These generally extend to Kogarah Golf Course to the south-west, the Princes Highway to the west, St Peters interchange to the north, Joyce Drive to the east and Sydney Airport to the south.

Key tasks

The assessment involved:

- Reviewing the concept design and relevant literature
- Analysing aerial photographs and topographic maps, and undertaking site visits, to understand the existing landscape and visual context of the study area
- Undertaking a contextual analysis to understand both the constraints and opportunities for the project

- Identifying landscape character zones and their sensitivity to change
- Identifying representative viewpoints and sensitive receptors and their sensitivity to change
- Undertaking a tree survey to identify the number of existing trees with the potential to be affected by the project
- Describing the key visual features of construction and operation
- Assessing the potential landscape character and visual impacts during construction and operation based on the potential sensitivity and the magnitude of impacts
- Determining the potential significance of impacts through a combined assessment of sensitivity and magnitude
- Recommending mitigation and management measures.

Landscape character impact assessment

In the urban context, landscape refers to the overall character and function of a place. It includes all elements within the public realm and the interrelationship between these elements and the people who use it. During the contextual analysis for the assessment, distinct landscape character zones were identified, generally based on the relationship between natural, built and community elements such as land use, vegetation cover, topography, heritage, or scenic value. Nine landscape character zones were identified, and these are shown in Figure 21.2 and described in section 21.2.2.

The potential landscape character impacts were determined based on the sensitivity of the landscape character zone and the magnitude of the impact. Sensitivity refers to how sensitive the existing character of the setting is to the proposed change. Magnitude refers to the physical size and scale of the impact at this location. The combination of sensitivity and magnitude determines the landscape character impact, which is rated from negligible to high as shown in Figure 21.1.

Visual amenity impact assessment

The area from where the project could be visible is referred to as the visual catchment or visual envelope. This is largely defined by the landform of the study area. Viewpoints were selected to illustrate the visual influence of the project both within and outside the project site. These generally represent publicly accessible views and vistas from a range of locations and viewing situations. A total of 26 viewpoints were selected for the assessment, and these are shown in Figure 21.3.

The potential visual impacts were determined based on the sensitivity of the viewpoint and the magnitude of the change. Sensitivity refers to the quality of the view and how it would be affected by the project. Magnitude refers to the physical size and scale of the project and the proximity relative to the viewer. Magnitude also considers overshadowing during the day and lighting at night. The combination of sensitivity and magnitude determines the visual impact, from negligible to high as shown in Figure 21.1.

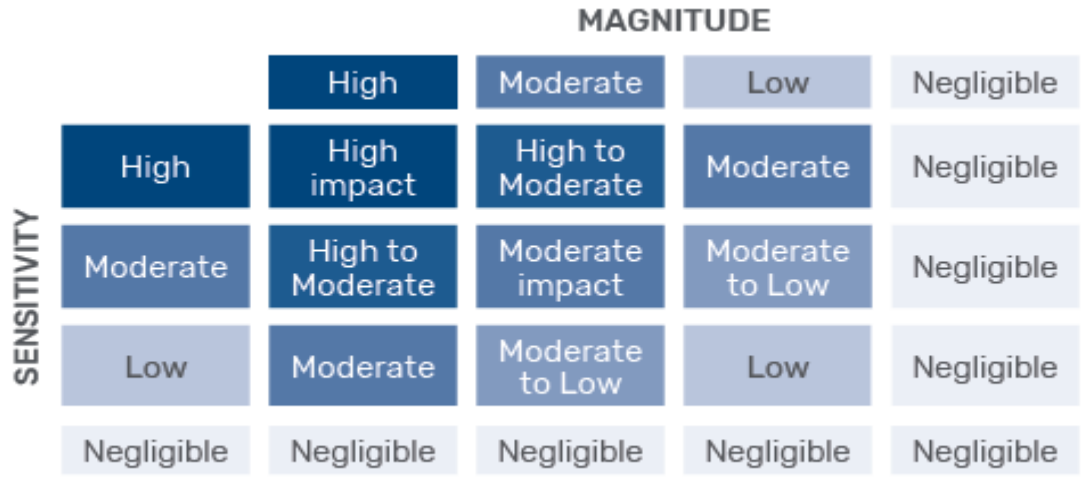


Figure 21.1 Impact significance rating matrix

A series of locations were selected for the production of visual representations. These were prepared to visually represent the views from selected locations with the introduction of the project (ie during operation). These visual representations are provided in section 21.4.

Tree assessment

A tree assessment was undertaken to identify significant trees within the project site. This involved a desktop review of relevant information and visual tree survey. The aim of the assessment was to confirm the following:

- Trees that would be removed or impacted during construction
- Trees that would be retained
- Measures to protect those trees that would be retained
- Trees with high landscape value that may be suitable for transplanting to a new location.

21.1.3 Risks identified

An environmental risk assessment was undertaken as an input to the impact assessment (see Appendix G). This involved identifying potential environmental risks during construction and operation, and rating the potential risks according to likelihood, consequence and overall level of risk, in accordance with *AS/NZS ISO 31000:2009 Risk management – Principles and guidelines*. Visual amenity risks with an overall assessed risk rating of medium or above, identified by the environmental risk assessment, included:

- Temporary visual impacts on sensitive visual receivers in the vicinity of construction work and from areas with views of the project site
- Permanent visual impacts on sensitive visual receivers as a result of the introduction of new road infrastructure visible from a number of viewpoints (including new bridges, other elevated sections of road infrastructure) and permanent noise mitigation measures
- Impacts on the landscape characteristics and visual amenity of Tempe Recreation Reserve once the project is operational
- Visual impacts on the character and appearance of Alexandra Canal as a result of the proposed new bridges, including the provision of any piers within the canal
- Visual impact as a result of the removal of mature trees and vegetation in some areas.

The landscape character and visual amenity assessment included consideration of these potential risks.

21.2 Existing environment

21.2.1 General visual environment

The landscape and visual environment of the study area is characterised by its highly developed urban nature. There are a number of land uses, features and infrastructure influencing the character and visual amenity of the project site. These include existing road and rail infrastructure, Alexandra Canal, commercial and industrial developments, and Sydney Airport and associated infrastructure. There are also public open space and residential areas located to the west of the project site in Tempe, and some residential properties also located to the north in Mascot.

The study area is relatively flat and gently sloping. The original landform has been extensively modified since the beginning of European settlement. As a result, there are very few remaining areas of natural ground. There are minimal areas of existing native vegetation with mostly planted native and exotic vegetation. Mature trees are located in some areas.

The location and setting of the project site is described in Chapter 2 (Location and setting). Further information on existing land uses is provided in Chapter 21 (Land use and property).

21.2.2 Landscape character zones

The landform, vegetation, views, settlement pattern and built structures define the landscape character of the study area. Nine landscape character zones were identified within the study area:

1. Terminal precincts
2. Green space
3. Alexandra Canal
4. Runway precinct
5. Freight and industrial
6. Residential
7. Warehousing and employment
8. Motorway
9. Airport support.

These landscape character zones were identified as having similar spatial or character properties, and similar landscape sensitivity. The landscape character zones are shown on Figure 21.2 and described in Table 21.1. Table 21.1 also includes the sensitivity rating assigned to each zone by the landscape character and visual amenity assessment.

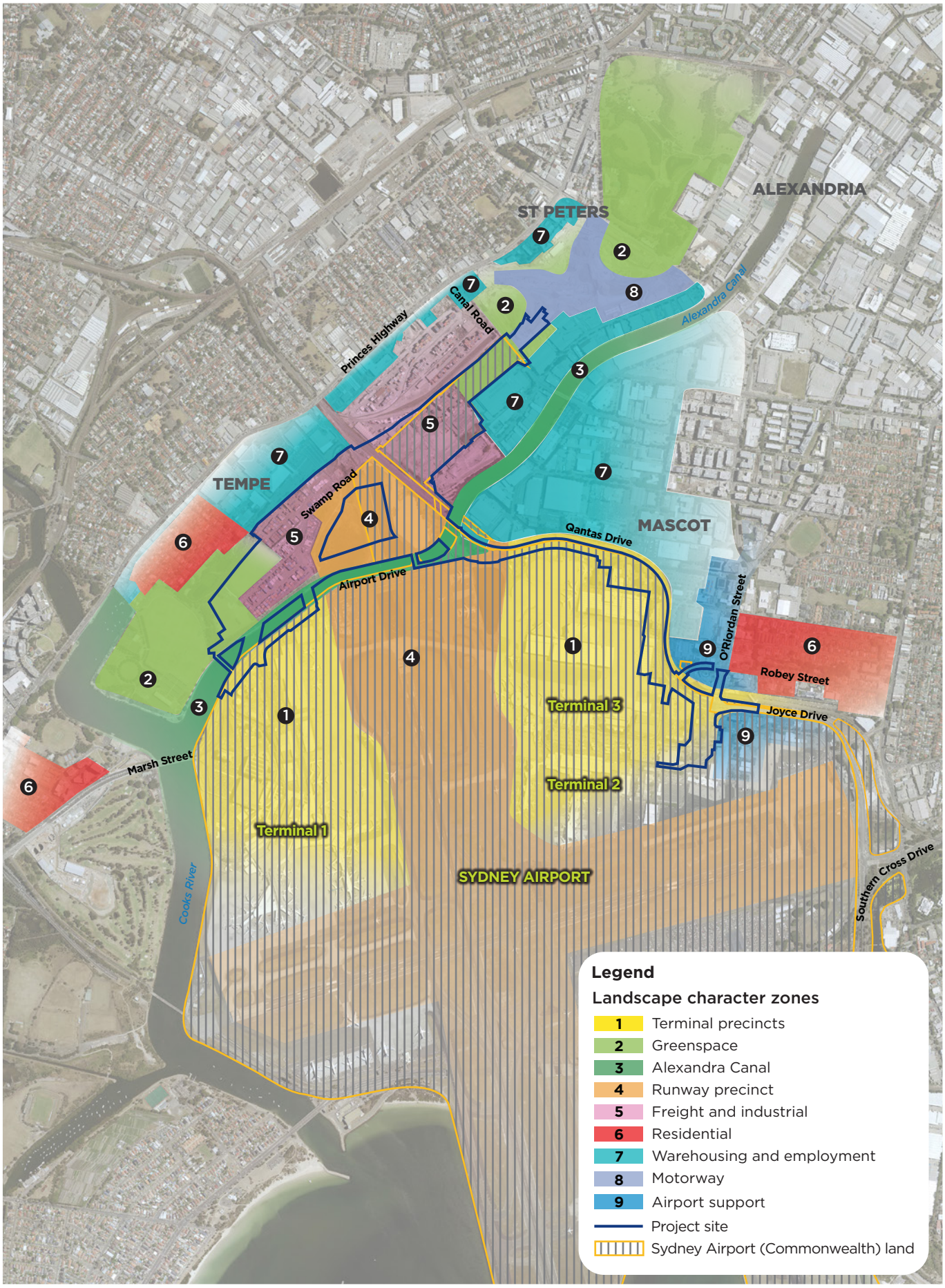


Figure 21.2 **Landscape character zones**

Table 21.1 Landscape character zones and sensitivity ratings

Landscape character zone	Description	Sensitivity
1 (Terminal precincts)	This landscape character zone includes the Terminal 1 and Terminal 2/3 precincts. This consists of the main built up areas of Sydney Airport land. This low-lying landscape would be sensitive to any changes due to its visibility from a large area. The landscape and visual values are derived from the flat open 'big sky' landscape, contrasting built form, aircraft movements and social values. The heritage listed Mascot (Robey Street) underbridge and Mascot (O'Riordan Street) underbridge, and buildings at Sydney Airport with heritage significance, are also located in this zone.	High
2 (Green space)	This zone is characterised by public open space including Tempe Recreation Reserve, the Tempe Lands (including Tempe Wetlands), Sydney Park, Cahill Park and Kogarah Golf Course. The generally flat and open setting allows for expansive views, including of Alexandra Canal. There is a close physical and visual relationship between this zone, zone 3 (Alexandra Canal), and the western part of zone 1 (Terminal precincts). This zone provides important recreation facilities and opportunities for access to open space. Areas of public open space are planned in the vicinity of St Peters interchange. There is also open, undeveloped land adjoining the Goodman St Peters business park and between Airport Drive, Alexandra Canal and the Botany Rail Line.	High
3 (Alexandra Canal)	This zone includes Alexandra Canal. The canal is a listed heritage item with a range of visual, cultural and heritage values. The landscape character attributes of this zone include the canal, scattered mature trees and other vegetation along the banks, vistas along the canal, and the open air space above the canal. The setting contrasts with surrounding precincts with their dense built form, providing visual relief. The heritage listed Mascot (Shea's Creek) Underbridge is also located in this zone.	High
4 (Runway precinct)	This zone includes Sydney Airport's main north–south runway, the Sydney Airport northern lands and the east–west runway. This zone is characterised by the flat and low-lying topography and a general lack of vertical form due to airspace limitations. The wide open sky is a key character element against which aircraft can be observed taking off and landing. Sydney Airport has heritage values that include both the contemporary airport and its stages of history and development. The runways are identified as the most aesthetically distinctive part of the airport as well as the 'big sky' landscape.	Moderate
5 (Freight and industrial)	This zone is characterised by freight and industrial uses. Built elements include Boral Concrete, Cooks River Intermodal Terminal, Tyne Container Services and part of the Botany Rail Line. Much of this zone provides a backdrop to and contrast with zone 4 (Runway precinct), with a rising landform and higher elements, including stacked shipping containers. While the zone has an industrial character, the heritage significance of the Cooks River Intermodal Terminal and the stacked shipping containers are signifiers of important port activities.	Low
6 (Residential)	This zone is located to the west of the project site in Tempe and near Wolli Creek and to the north-east of the project site in Mascot. The residential zone in Tempe consists mainly of detached dwellings on small blocks. The residential character is framed by vegetation (in the Tempe Lands) creating a sense of seclusion. There are also areas of traditional single dwelling houses near the Botany Rail Line and east of O'Riordan Street in Mascot. Wolli Creek is an urban renewal area located south of the Cooks River. It includes numerous medium and high density residential apartment buildings, surrounding waterways and open space.	High
7 (Warehousing and employment)	This is a large zone interfacing the project site in a number of areas. It includes employment areas in Tempe and Mascot, and a range of businesses with links to Sydney Airport. The zone also includes large 'big-box' retail businesses including Ikea. It is located along the Princes Highway with an outlook over lower lying areas, including over zones 1, 3, 4 and 5. This zone also includes mature trees and vegetation along the lot boundaries and street frontages, which define views.	Low

Landscape character zone	Description	Sensitivity
8 (Motorway)	This zone is associated with road infrastructure at St Peters interchange, which is currently under construction as part of the New M5 project.	Low
9 (Airport support)	This zone is a small zone at the eastern end of the project site. The main land uses include commercial and accommodation (hotels, serviced apartments, parking, logistics and retail), which predominantly service Sydney Airport.	Low

21.2.3 Representative viewpoints

Key viewpoints are shown on Figure 21.3. These have been selected as representative locations to assess the potential visual impacts of the project. The locations of the viewpoints are representative of the range of views available within and around the project site. The viewpoints and their assessed sensitivity to change are summarised in Table 21.2.

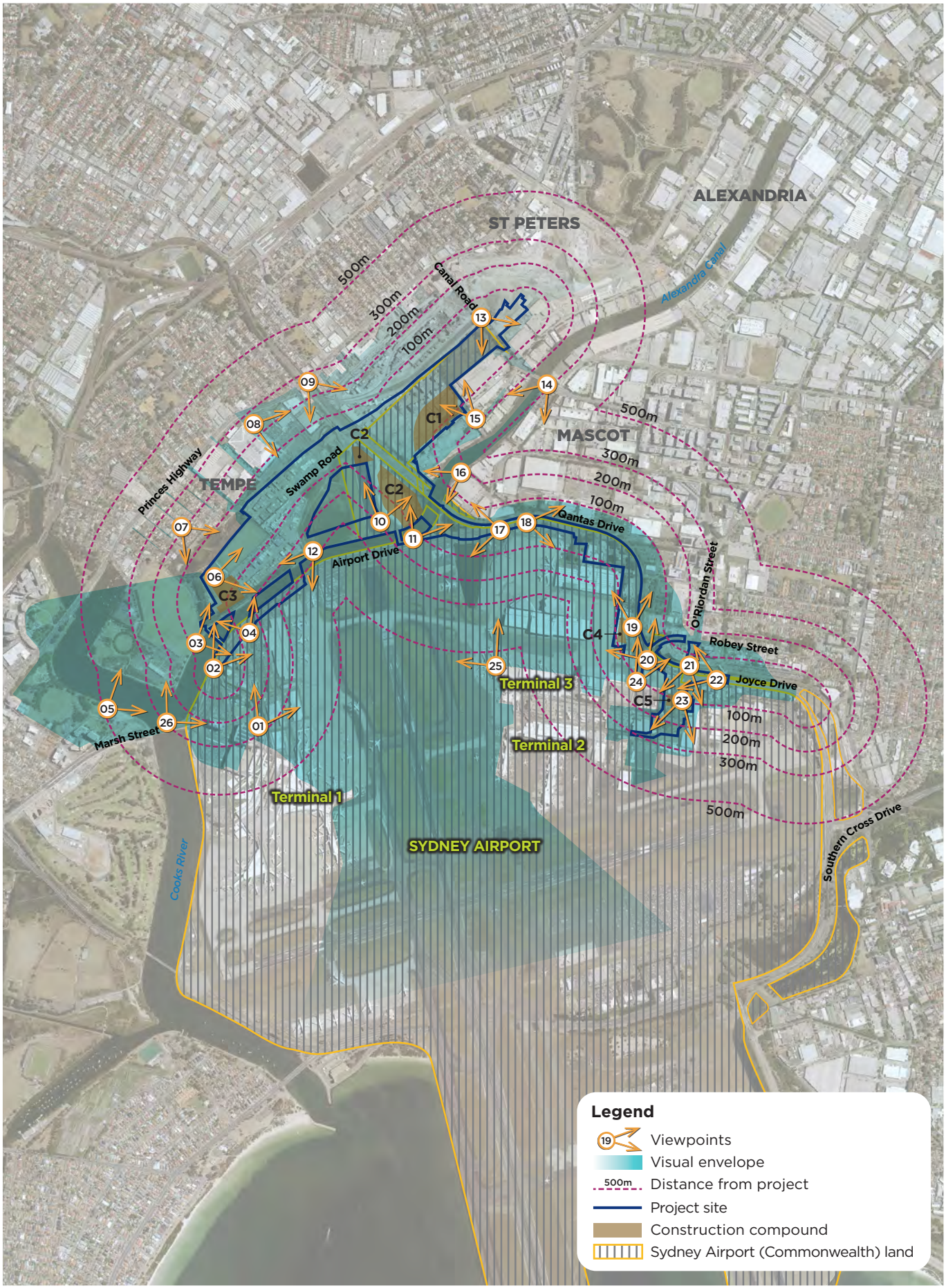


Figure 21.3 **Visual envelope and representative viewpoints**

Table 21.2 Viewpoints and sensitivity rating

Viewpoint (see Figure 21.3)	Location	Description	Sensitivity	Existing view
01	P2 car park at Terminal 1	This view includes open views towards the north–south runway and urban centres in the distance, giving this viewpoint a moderate sensitivity. It also includes vegetation on the banks of Alexandra Canal at Tempe Lands.	Moderate	
02	Alexandra Canal cycleway opposite Tempe Recreation Reserve	The moderate sensitivity of this viewpoint is derived from it water glimpses and from vegetation lining the road corridor and Alexandra Canal. The open nature of the sky above Sydney Airport is also a feature of the viewpoint.	Moderate	
03	Tempe Recreation Reserve	The high sensitivity of this viewpoint is derived from the open space setting with mature vegetation, including along Alexandra Canal and in Tempe Lands. The open nature of the sky above the airport and Alexandra Canal are features.	High	
04	Link Road at the intersection with Airport Drive	The open views across Alexandra Canal to Tempe Lands with its vegetated embankments give this viewpoint a moderate sensitivity. Vegetation along the canal is also sensitive to change. The shipping containers are also a visually prominent feature.	Moderate	

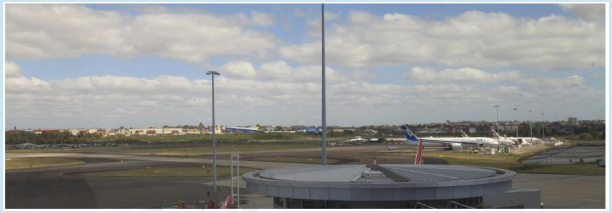
Viewpoint (see Figure 21.3)	Location	Description	Sensitivity	Existing view
05	Rowers on Cooks River restaurant and function centre, Wolli Creek hotels and apartments	The high sensitivity of this viewpoint is derived from the open character of the Cooks River and Alexandra Canal, open space at Tempe Recreation Reserve and the Tempe Lands, and mature vegetation.	High	
06	Tempe Lands car park	Although having low sensitivity, this viewpoint includes an open sky landscape, views towards the Sydney central business district, glimpses of Sydney Airport and vegetation. The shipping containers are also a visually prominent feature.	Low	
07	Wentworth Street, Tempe,Tempe residential streets	Open space and vegetation in Lori Short Reserve and in the Tempe Lands terminate the view and are sensitive to change. This viewpoint has a moderate sensitivity.	Moderate	
08	Ikea store	This open sky landscape, with views of Sydney Airport (including the Jet Base), is moderately sensitive. Vegetation provides visual relief in the densely developed urban setting.	Moderate	

Viewpoint (see Figure 21.3)	Location	Description	Sensitivity	Existing view
09	The Princes Highway bridge over the Botany Rail Line	This viewpoint is of low sensitivity. The sensitive elements include the open vista across the landscape and Terminal 3. This is one of very few open view corridors from the densely built up areas along the Princes Highway. The open sky landscape above Sydney Airport and the vegetation along the Botany Rail Line are also sensitive to change.	Low	
10	North Precinct Road	Much of the view has an industrial character with a low sensitivity to change. The established vegetation and openness of the landscape are important visual elements.	Low	
11	Alexandra Canal cycleway near Shea's Creek underbridge	The high sensitivity of this viewpoint is derived from the canal side open space character, established vegetation along Alexandra Canal, the expanse of sky above the canal, and the strips of green space along the canal.	High	
12	Access track along the western side of Alexandra Canal	Sensitive elements in this view are the large mature trees on both sides of Alexandra Canal, and the open sky and vista along the canal towards Wolli Creek.	High	

Viewpoint (see Figure 21.3)	Location	Description	Sensitivity	Existing view
13	Bus stop on the northern side of Canal Road	The moderate sensitivity of this viewpoint is derived from the large mature trees on both sides of the road corridor.	Moderate	
14	Canal Road bridge over Alexandra Canal	This is one of the key viewpoints of Alexandra Canal giving this viewpoint a high sensitivity. Visually sensitive elements include the waterway, mature trees along the bank, the vista towards Sydney Airport with aircraft visible at the terminals, and the open sky above the canal.	High	
15	Burrows Road South	Established mature trees provide amenity within the industrial estate giving this viewpoint a moderate sensitivity.	Moderate	
16	Alexandra Canal cycleway south of Coward Street	This viewpoint is of high sensitivity as a result of its waterway setting. Other sensitive elements include the mature trees along the canal and the open sky above the canal.	High	

Viewpoint (see Figure 21.3)	Location	Description	Sensitivity	Existing view
17	Qantas and Airport Drive junction	The main sensitive element in the view is the open sky and the long vista towards the Tempe Lands and Wolli Creek providing a moderate sensitivity. The park-like character of the land adjacent to Alexandra Canal provides visual relief through greenery.	Moderate	
18	Qantas Drive, near the Botany Rail maintenance overbridge	The moderate sensitivity of this viewpoint is derived from the mature trees lining the southern side of Qantas Drive and the grass and/or plantings in front of the advertising structures.	Moderate	
19	Qantas Drive between Robey and Ewan streets	Established mature tree cover is the main visually sensitive element, complemented by low level planting in the verges. This green setting for the roadway gives the viewpoint a moderate sensitivity.	Moderate	
20	Seventh Street at the intersection with Qantas Drive	The established tree cover, including a large mature fig tree south of Qantas Drive and a dense stand of mature vegetation on the northern side, contributes to the sensitivity of this viewpoint. The multi-storey building stock in the background is of low visual quality, leading to an overall moderate sensitivity.	Moderate	

Viewpoint (see Figure 21.3)	Location	Description	Sensitivity	Existing view
21	O'Riordan Street at the intersection with Qantas Drive	Much of this view is dominated by the large intersection. The mature vegetation and feature planting on the southern side of the intersection, the vista towards the Terminals 2/3 entrance, and the open sky above Sydney Airport, result in a moderate sensitivity. Nearby businesses would be sensitive to any changes to presentation and visibility.	Moderate	
22	Joyce Drive near Sir Reginald Ansett Drive	The low sensitivity of this viewpoint is derived from the long distance vista through the Sydney Airport Jet Base to the Tempe water tower. The viewpoint also includes a dense stand of mature trees west of O'Riordan Street and established palm trees at the entrance to Terminals 2/3.	Low	
23	Sir Reginald Ansett Drive	The view, which is framed by an advertising gantry, comprises mostly existing road pavement. Established mature trees along the road are sensitive elements as is the open sky above Sydney Airport, leading to a moderate sensitivity. Adjacent businesses would be sensitive to change in relation to visual exposure.	Moderate	
24	Seventh Street	The moderate sensitivity of this viewpoint is derived from the established mature tree cover on the northern side of Qantas Drive terminating the view. The tree cover also helps to screen some of the road furniture.	Moderate	

Viewpoint (see Figure 21.3)	Location	Description	Sensitivity	Existing view
25	Qantas Heritage Collection, Level 1, Terminal 3	Visually sensitive elements include trees along Alexandra Canal, and green space in the northern lands, Tempe Lands and between Sydney Airport's runways. They constitute only a relatively small portion of a busy view. The shipping containers add to the visual clutter, but the open sky character dominates. The view would be moderately sensitive to elements that alter the openness of the sky.	Moderate	
26	Giovanni Brunetti Bridge	The high sensitivity of this view is derived from the open waterway setting with vistas along Alexandra Canal towards the Sydney central business district. The vegetation along the canal, in Tempe Recreation Reserve, and on the embankment of the Tempe Lands, provides a natural frame and would be sensitive to change.	High	

21.2.4 Trees in and adjacent to the project site

Vegetation along the road network holds important visual value and contributes to the character of the area. The trees include large mature trees along Qantas Drive and in the Terminals 2/3 precinct, with stands along Sir Reginald Ansett Drive, Keith Smith Avenue, Ninth Street and Shiers Avenue.

Within the project site, 2,667 trees were identified by the tree assessment. The majority of the trees identified are planted native species. Exotic ornamental species comprised 209 trees. Other trees included native species originally occurring in the area.

Some of the trees and vegetation considered to have landscape value (ie visual screening, landscape features) include:

- Hill's weeping figs growing along the edges of Qantas Drive, which provide screening and general visual amenity
- Planted trees (such as river oaks and eucalypts) along the northern side of Qantas Drive, which provide screening of the Botany Rail Line and soften the appearance of the large billboards and tall buildings in this area
- Broad-leaved paperbark, river oak and tallowwood below the rail embankment adjacent to the Robey Street intersection
- Eucalypts on the western side of Canal Road softening the visual appearance of the road
- Cabbage tree palms near the Sydney Airport entrance to Terminals 2/3
- Groups of trees and shrubs along the southern bank of Alexandra Canal
- Stand of planted trees and shrubs on the northern bank of Alexandra Canal, which provide some screening of shipping containers
- Hedges and trees along the southern side of Qantas Drive.

21.2.5 Landscape character and visual amenity within Sydney Airport (Commonwealth) land

A total of 23 of the 26 viewpoints considered by the assessment are located within Sydney Airport land or have views of Sydney Airport land. Sydney Airport land is located within landscape character zones 1 (Terminal precincts), 2 (Green space), 4 (Alexandra Canal) and 5 (Freight and industrial).

There are 993 planted trees (both native and exotic) located in the project site within Sydney Airport land.

The existing landscape character and visual amenity within Sydney Airport land is described in Table 21.1 and Table 21.2.

21.3 Assessment of construction impacts

21.3.1 Landscape character impacts

The main landscape character impacts during construction would include:

- Spatial and visual impacts as a result of temporary structures and construction activities
- Changes to access and connectivity
- Increased traffic and vehicle movements as a result of the project workforce, haulage and delivery movements.

The assessment concluded that construction would result in a:

- High impact to two landscape character zones (zones 1 and 2)
- Moderate impact to four landscape character zones (zones 3 to 6)
- Low impact to three landscape character zones (zones 7 to 9).

Landscape character zones 1 (Terminal precincts) and 2 (Green space) are the zones considered to have the highest impact due to their high sensitivity and high magnitude of potential impact. The landscape character impacts were derived from an assessment of the potential changes during construction and the scale of these changes, such as the construction footprint, construction activities including site preparation and construction of project elements, ancillary facilities and construction-related traffic movements. All assessed construction changes would result in a moderate or high impact to zones 1 and 2 (ie the zones with the highest overall impact).

The construction footprint extends across all landscape character zones, resulting in temporary restrictions to use and access by the public. This would result in temporary landscape character impacts affecting the ability of the public to access and enjoy certain locations. A large area of the Tempe Lands (within zone 2 (Green space)) would be within the construction footprint, and these areas would not be available for recreation uses during the construction period. The Alexandra Canal cycleway and the pedestrian and cycle bridge over the canal would not be available during construction. There would be a loss of buildings and facilities within zone 1 (Terminal precincts).

Construction activities would be undertaken in all landscape character zones, with the exception of zone 7 (Warehousing and employment). All zones would experience indirect impacts from works within other zones. Construction activities would involve temporary traffic diversions or other traffic management measures to maintain traffic flow and connectivity during construction. The activities would affect access and connectivity in the zones directly affected by construction. Landscape character zone 1 (Terminal precincts) would be the most affected due to the need to maintain traffic flow along Qantas Drive and Airport Drive throughout the construction period. Temporary visual impacts are also expected due to the presence of tall equipment and temporary structures. There may also be works outside standard construction hours with the potential for light spill impacts.

Temporary facilities would be established within some of the landscape character zones. These would include construction compounds, crane pads, work platforms and parking areas. Five sites have been identified that would be fenced off and generally covered in hardstand. The sites are located away from sensitive receivers, such as residential areas, and would temporarily alter the character of zones 1 to 5. In addition to changed land use and access arrangements, there would be changes to the spatial and visual character of the area. The ancillary facilities would also have some impact on the adjoining zones 6, 7 and 9. The construction compounds are shown in Figure 21.2 in relation to the landscape character zones.

Additional vehicle movements would also affect landscape character, with increased traffic and the presence of heavy vehicles and machinery. Construction-related traffic movements would have a temporary impact on all landscape character zones as all zones include or are located next to arterial roads. The most affected zones would be those with haulage and temporary access roads and access points, as well as those with construction compounds. These include zones 1, 2, 4 and 5, with a high magnitude of impact predicted for all except zone 4, which was assessed as having a moderate magnitude of impact.

Construction is temporary and short term in nature. The measures provided in section 21.6 would be implemented to minimise landscape and visual impacts during construction.

21.3.2 Visual impacts

The project would result in temporary visual impacts during construction. These impacts would be experienced by receptors (including residents, pedestrians, cyclists, motorists, airport users and local workers) in the vicinity of work areas and from the identified viewpoints to differing degrees. During construction, visible elements would include work areas, machinery and equipment, fencing, soil stockpiles, waste materials and partially constructed structures.

The potential visual impact would depend on the nature and intensity of construction work. Visual impacts would also be more significant at locations where residential or other sensitive receivers have an unscreened view of the project site.

In relation to impacts on viewpoints, the assessment concluded that there would be the potential for a:

- High impact at viewpoint 11 (Alexandra Canal cycleway near Shea's Creek underbridge)
- High to moderate impacts at 10 viewpoints (2 to 4, 13, 18 to 21, 23 and 24)
- Moderate impacts at six viewpoints (10, 14, 16, 17, 22 and 26)
- A moderate to low impact at five viewpoints (1, 8, 9, 15 and 25)
- A negligible impact at four viewpoints (5, 6, 7 and 12).

The viewpoints and their sensitivity are described in Figure 21.2.

These potential impacts would be temporary and limited to the construction phase. The actual impacts would vary depending on the final construction method and staging, and there would be times when the impacts are lower than predicted.

The use of lighting for works outside standard working hours may result in light spill and associated impacts on neighbouring properties. However, Sydney Airport and the surrounding road network is generally well lit at night, and additional lighting should not result in a significant increase in light spill. In addition, directional lighting would be used to minimise the potential for light spill. Lighting impacts on Sydney Airport operations is discussed in Chapter 11 (Airport operations).

The measures provided in section 21.6 would be implemented to minimise landscape and visual impacts during construction.

The potential for visual impacts on heritage listed items is discussed in section 17.4.1.

21.3.3 Tree removal

It is estimated that about 1,300 trees would need to be removed during construction, including 573 trees within Sydney Airport land. A total of about 1,367 trees could be retained (subject to the measures provided in section 21.6) with 420 of these located within Sydney Airport land. The tree retention numbers assume that the cabbage tree palms would be transplanted within the project site. All other trees were identified as not suitable for transplanting.

A number of trees that would need to be removed contribute to the amenity and character of the local area and/or screen views from sensitive receivers. The removal of the trees would have the potential to reduce some screening between the project site and nearby receivers, impacting visual amenity.

The project site offers limited potential for new tree cover due to space constraints. Other issues associated with planting new trees include the constraints associated with Sydney Airport's prescribed airspace and the need to select appropriate species to minimise the risk of wildlife strike. Saline soils and contaminated land also present environmental constraints.

The project currently provides for a total of 551 replacement trees, representing a net loss of 749 trees across the project site, including a net loss of 276 trees within Sydney Airport land. Trees that would be removed by the project would be replaced to ensure there is a net increase in tree canopy.

Trees that cannot be replaced within the project footprint would be replanted within Sydney Airport land and land subject to the EP&A Act, relative to the number of trees removed. Transport for NSW is also committed to replanting trees that would be removed at the former Tempe landfill.

A tree management strategy would be prepared to identify how a net increase in tree canopy can be achieved (see section 21.6). The final number of trees impacted would be confirmed during detailed design and final construction planning. Impacts on trees would be minimised where practicable.

Sydney Airport Corporation would provide advice in relation to potential locations for replacement trees. Areas within Sydney Airport will be considered first, if available. If adequate space within the airport is not available, area(s) close to the airport will be selected, in consultation with the Airport Environment Officer and the relevant local council, ensuring consideration is given to *National Airports Safeguarding Framework Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports*.

21.3.4 Summary of impacts on Sydney Airport (Commonwealth) land

The assessment concluded that there is the potential for landscape character impacts on Sydney Airport land as a result of construction within zones 1 (Terminal precincts), 2 (Green space), 4 (Alexandra Canal) and 5 (Freight and industrial). In summary:

- Landscape character zone 1 (Terminal precincts) was assessed as having the potential to be highly impacted due to the need to maintain traffic flow along Qantas Drive and Airport Drive throughout the construction period
- Landscape character zone 2 (Green space) was assessed as having the potential to be highly impacted as a result of the impacts on Tempe Lands, where areas would be within the construction footprint, with associated impacts from ancillary facilities and construction-related traffic
- Landscape character zone 4 (Runway precinct) was assessed as having the potential to be moderately impacted due to the moderate sensitivity and magnitude of impact
- Landscape character zone 5 (Freight and industrial) was assessed as having the potential to be moderately impacted due to a low sensitivity and high magnitude of impact
- Zones 1, 2, 4 and 5 are affected by haulage and temporary access roads and access points, as well as construction compounds. A high magnitude of impact was identified for all except zone 4, which was assessed as having a moderate magnitude of impact.

The assessment concluded that construction would result in a high (zones 1 and 2) and moderate (zones 4 and 5) impact to landscape character zones within Sydney Airport land.

The majority of the potential visual impacts on Sydney Airport land would occur as a result of construction along Airport Drive, Qantas Drive and Sir Reginald Ansett Drive.

Potential landscape and visual impacts during construction would be temporary and mitigated by implementing the measures provided in section 21.6.

About 573 trees are proposed to be removed from the project site where it is located on Sydney Airport land, with 297 replacement trees identified. This represents a net loss in trees within Sydney Airport land of 276 trees. The proposed approach to replacing trees is discussed in sections 21.3.3 and 21.6.

21.4 Assessment of operation impacts

21.4.1 Landscape character impacts

The assessment concluded that the significance of permanent landscape character impacts across the nine landscape character zones would range from negligible to high. These potential impacts are summarised in Table 21.3. The assessment rated the potential impacts of the presence of project infrastructure in terms of sensitivity and magnitude to provide an overall level of significance (see section 21.1.2). These ratings are provided in Table 21.3.

The assessment (summarised in Table 21.3) considered the options for the design of proposed emplacement mound(s) at the former Tempe landfill (see section 7.10.2):

- Option one would involve locating one mound between the Terminal 1 connection and one mound north of the freight link road
- Option two would involve locating one mound west of the Terminal 1 connection in the area of existing open space that also encompasses the off-leash dog exercise area. Another mound (also part of option three) is also proposed between the Terminal 1 connection and the freight link road.

The landscape character zones assessed for the mound design options include zones 1 (Terminal precincts), 2 (Green space), 5 (Freight and industrial), 6 (Residential) and 7 (Warehousing and employment). The placement of mounds would lead to different opportunities and layouts for future recreation facilities at Tempe Lands. The options would result in slightly different landscape character and visual impacts. However, due to the extent of the project's landscape character impacts, the preferred mound design would have little bearing on the landscape character impacts of the project overall.

The assessment concluded that there would be a high landscape character impact for three of the nine zones (1, 2 and 3) and a moderate landscape character impact for two of the zones (5 and 6). The remaining zones would experience moderate to low, low and negligible impacts. In summary, the impacts would be:

- Adverse for zones 1 (Terminal precincts), 3 (Alexandra canal), 6 (Residential) and 7 (Warehousing and employment)
- A combination of adverse and beneficial for zones 2 (Green space), 4 (Runway precinct), 5 (Freight and industrial) and 9 (Airport support)
- Neutral for zone 8 (Motorway).

Table 21.3 Permanent landscape character impacts

Landscape character zone	Sensitivity	Magnitude	Key landscape character changes	Landscape character impact
1 (Terminal precincts)	High	High	▪ Large increase in hard surfaces ▪ The Terminals 2/3 access would result in a notable change in character ▪ Removal of trees along Qantas Drive would change the spatial character and visual containment ▪ Removal of existing buildings adjacent to Qantas Drive would alter the built form ▪ This zone would also be affected by changes in adjoining zones (2 and 5) due to the changes in the outlook and potential effects on spatial character ▪ Both mound options would be equally visible from zone 1 and the adopted design would not affect the overall landscape character impact rating due to the high visual impacts in this zone: — Mound option one would have a smaller impact on the spatial character of the area as it would replace the shipping containers in zone 3 (Alexandra Canal) — Mound option two would introduce additional elevation with more effect on spatial character and three dimensional form ▪ A high magnitude of adverse landscape character impacts would result from extensive changes to the existing built fabric, tree cover, land use interface and views	High
2 (Green space)	High	High	▪ Green space would be replaced with road infrastructure in some locations resulting in substantial changes to the character ▪ Removal of trees with high amenity value on the embankments of Tempe Lands and along Canal Road with limited potential for reinstatement ▪ Embankments and retaining walls required for the St Peters interchange connection would be visible from adjoining zones ▪ The emplacement mound options would not substantially alter the spatial character and would create new opportunities for views over the surrounding areas ▪ Option two for the mound design would result in additional large elevation above existing open space in Tempe Lands, creating new landforms and altering the spatial character, outlook and views within this zone and adjoining areas. ▪ The magnitude and landscape character impact ratings are the same for both the option one and option two mound designs	High

Landscape character zone	Sensitivity	Magnitude	Key landscape character changes	Landscape character impact
3 (Alexandra Canal)	High	High	■ The new bridges would result in a high impact on the character of open air space above and along Alexandra Canal ■ Public access along Alexandra Canal would shift from the eastern side to the western side, following the closure of Airport Drive and relocation of the cycleway. ■ Drainage works would impact on the heritage fabric of Alexandra Canal in some locations ■ Limited reinstatement of trees removed alongside the canal resulting in permanent changes to views and vistas	High
4 (Runway precinct)	Moderate	Low	■ New project elements would be consistent with the infrastructure and transport character of the zone ■ Most project elements in this zone would be low-lying, following the existing landforms and located towards the perimeter of the zone ■ The rising landform and built structures in the back drop would reduce the prominence of new elements ■ The Qantas Drive bridge and Qantas Drive upgrade and extension would alter the open landscape character in the north-eastern part of the zone	Moderate to low
5 (Freight and industrial)	Low	High	■ Land use changes (to road infrastructure) would result in a wide range of landscape character changes. ■ Earth embankments and retaining walls would noticeably alter the form of this zone and would be visible from adjoining zones ■ Beneficial new open space would be created in the southern part of the zone, offsetting green space losses in zone 2 (Green space) ■ Structures, such as open concrete drainage channels and the flood mitigation basin, would be visible ■ Both mound options would partially replace the shipping containers as a prominent feature, but would not substantially alter the spatial character in these locations ■ Both mound options would create new opportunities for views over surrounding areas ■ Mound option two also has the potential to provide for active recreation facilities ■ The magnitude and landscape character impact ratings are the same for both option one and option two mound designs	Moderate

Landscape character zone	Sensitivity	Magnitude	Key landscape character changes	Landscape character impact
6 (Residential)	High	Low	▪ The majority of the project would be hidden from this zone in Tempe by sections of zone 2 (Green space) ▪ The Terminal 1 connection, Terminal 1 bridge and freight terminal bridge would alter the outlook from Wolli Creek affecting views for residents on the southern side of the Cooks River ▪ The impact on residents' views in the north-facing apartments on the southern side of the Cooks River would be reduced due to a distance from the project site (about 900 metres) ▪ Residents in the Mascot portion of zone 6 would not be affected by changes in the visual setting due to existing vegetation, buildings and elevated rail embankment ▪ Both mound design options would only be visible from more elevated areas close to the Princes Highway ▪ This zone would be impacted by works in the adjoining zones 2 and 5 (Green space and Freight and industrial) due to the change in outlook as a result of the mounds. The preferred option for the mound design would not affect the landscape character impact rating of this zone.	Moderate
7 (Warehousing and employment)	Low	Low	▪ Direct character impacts are limited ▪ Project elements within zones 1 (Terminal precincts), 2 (Green space) and 5 (Freight and industrial) would be visible from this zone ▪ Works in adjoining zones would alter the outlook from zone 7 with some effect on how zone 7 is perceived ▪ Businesses in the Mascot portion of zone 7 would experience a change in outlook due to tree removal ▪ The mounds would slightly alter the outlook from some areas along the Princes Highway. Both design options would offer a landscape element by replacing the existing shipping containers ▪ The magnitude and landscape character impact ratings are the same for both mound options.	Low
8 (Motorway)	Low	Negligible	▪ Areas within this zone are currently affected by construction of St Peters interchange ▪ The project is consistent with the future land use and character of the zone	Negligible
9 (Airport support)	Low	Moderate	▪ Project elements within surrounding zones would be highly visible from the eastern part of the zone, altering the outlook and affecting how zone 9 is perceived ▪ The visibility and presentation of business located east of Sir Reginald Ansett Drive would be altered by the Terminal 2/3 access in zone 1 (Terminal precincts) ▪ Tree removal would impact the existing visual buffer between zones 1 (Terminal precincts) and 9	Moderate to low

21.4.2 Visual impacts

The extent to which the project would be visible from the identified viewpoints would vary depending on existing topography, vegetation, buildings and land uses, as well as the form of the project when viewed from each viewpoint. The potential permanent visual impacts were assessed in relation to the identified 26 key viewpoints and groups of viewpoints shown on Figure 21.3 and described in Table 21.2.

Visual representations of the project are provided in Figure 21.4 to Figure 21.16 for key viewpoints to illustrate how the project may appear and affect views at these locations. Table 21.4 provides a summary of the results of the assessment of visual impact at each viewpoint. The assessment also considered the two design options for the proposed emplacement mounds at Tempe Lands (see section 21.4.1).

The assessment concluded that the project would have a high visual impact on viewpoint 11 and 12. Viewpoint 11 (Alexandra Canal cycleway near Shea's Creek underbridge) is considered to have a riverside parkland character with a high sensitivity to change. A number of large new structures would impact this view and change the outlook, including the Qantas Drive bridge, the terminal link bridge and the eastbound terminal link. This would result in a high magnitude of visual impact. Viewpoint 12 (access track along the western side of Alexandra Canal) is also considered to have a high sensitivity to change to its waterway setting. The presence of new infrastructure, including the proposed freight terminal bridge and Terminal 1 connection bridge, would result in a high magnitude of visual impact.

There would be high to moderate visual impacts on viewpoints 2 to 4, 13, 18 to 21, 23-24 and 26. As 13 of the assessed views have a high and high to moderate visual impact, the assessment concluded that the project has the potential to notably affect the views and visual qualities from these viewpoints. Other visual impacts were identified as being in the moderate and moderate to low range. There is one identified negligible impact at viewpoint 15. No difference in the visual impacts was identified for the mound design options.

The assessment concluded that 24 viewpoints would be impacted by the project. Over time, the level of impact may reduce at two viewpoints as landscaping becomes established. There would be limited reduction in impacts over time due to little potential for screening, either with landscaping or other measures, the preferred mound design, final landscaping and urban design for Tempe Lands and Sydney Airport's operational constraints.

Mitigation measures are provided in section 21.6.2 to minimise the adverse visual impacts as far as possible. Potential visual impacts on heritage listed items are discussed in section 17.4.1.

Table 21.4 Permanent visual impacts

Viewpoint	Location	Sensitivity	Magnitude	Nature of impact	Visual impact	Reduction over time
01[1]	P2 car park at Sydney Airport Terminal 1	Moderate	Low	Adverse	Moderate to low	No
02	Alexandra Canal cycleway opposite Tempe Recreation Reserve	Moderate	High	Adverse	High to moderate	Yes
03[1]	Tempe Recreation Reserve: Option one mound design	High	Moderate	Adverse	High to moderate	No
	Tempe Recreation Reserve: Option two mound design	High	Moderate	Adverse	High to moderate	No
04[1]	Link Road at the intersection with Airport Drive	Moderate	High	Adverse	High to moderate	No
05[1]	Rowers on Cooks River restaurant and function centre, Wolli Creek hotels and apartments	High	Low	Adverse	Moderate	No
06[1]	Tempe Lands car park	Low	High	Adverse	Moderate	No
07[1]	Wentworth Street, Tempe/Tempe residential streets	Moderate	Low	Adverse	Moderate to low	No
08	Ikea store	Moderate	Low	Adverse	Moderate to low	No
09	The Princes Highway bridge over the Botany Rail Line	Low	Moderate	Adverse	Moderate to low	No
10	North Precinct Road	Low	High	Adverse	Moderate	No
11	Alexandra Canal cycleway near Shea's Creek underbridge	High	High	Adverse	High	No
12	Access track along the western side of Alexandra Canal	High	High	Adverse	High	No
13	Bus stop on the northern side of Canal Road	Moderate	High	Adverse	High to moderate	Yes
14	Canal Road bridge over Alexandra Canal	High	Low	Adverse	Moderate	No
15	Burrows Road South	Moderate	Negligible	Neutral	Negligible	n/a
16	Alexandra Canal cycleway south of Coward Street	High	Low	Adverse	Moderate	No
17	Qantas and Airport Drive junction	Low	Moderate	Adverse	Moderate to low	No
18	Qantas Drive, near the Botany Rail maintenance overbridge	Moderate	High	Adverse	High to moderate	No
19	Qantas Drive between Robey and Ewan Streets	Moderate	High	Adverse	High to moderate	No
20	Seventh Street at the intersection with Qantas Drive	Moderate	High	Adverse	High to moderate	No

Viewpoint	Location	Sensitivity	Magnitude	Nature of impact	Visual impact	Reduction over time
21	O'Riordan Street at the intersection with Qantas Drive	Moderate	High	Adverse	High to moderate	No
22	Joyce Drive near the Sir Reginald Ansett Drive	Low	High	Adverse	Moderate	No
23	Sir Reginald Ansett Drive	Moderate	High	Adverse	High to moderate	No
24	Seventh Street	Moderate	High	Adverse	High to moderate	No
25	Qantas Heritage Collection, Level 1, Terminal 3	Moderate	Low	Neutral	Moderate to low	No
26[1]	Giovanni Brunetti Bridge	High	Moderate	Adverse	High to moderate	No

Notes: 1. Views assessed for mound design options.

Figure 21.4 Visual representation of the project at viewpoint 3 – Tempe Recreation Reserve

Figure 21.5 Visual representation of the project at viewpoint 4 – Link Road at the intersection with Airport Drive

Figure 21.6 Visual representation of the project at viewpoint 6 – Tempe Lands car park

Figure 21.7 Visual representation of the project at viewpoint 10 – North Precinct Road

Figure 21.8 Visual representation of the project at viewpoint 11 – Alexandra Canal cycleway near Shea's Creek underbridge

Figure 21.9 Visual representation of the project at viewpoint 12 – Access track along the western side of Alexandra Canal

Figure 21.10 Visual representation of the project at viewpoint 13 – Bus stop on the northern side of Canal Road

Figure 21.11 Visual representation of the project at viewpoint 14 – Canal Road bridge over Alexandra Canal

Figure 21.12 Visual representation of the project at viewpoint 17 – Qantas and Airport Drive junction

Figure 21.13 Visual representation of the project at viewpoint 19 – Qantas Drive between Robey and Ewan streets

Figure 21.14 Visual representation of the project at viewpoint 21 – O'Riordan Street at the intersection with Qantas Drive

Figure 21.15 Visual representation of the project at viewpoint 23 – Sir Reginald Ansett Drive

Figure 21.16 Visual representation of the project at viewpoint 24 – Seventh Street

21.4.3 Summary of impacts on Sydney Airport (Commonwealth) land

Landscape character impacts

The project is located within four landscape character zones including zones 1 (Terminal precincts), 2 (Green space), 4 (Alexandra Canal) and 5 (Freight and industrial). Zones 1 and 2 would be subject to high impact with zone 4 and 5 subject to moderate to low and moderate impact, respectively.

The impacts would result from the following activities:

- Elevated embankments above the existing landform in zones 1, 4 and 5
- Removal of vegetation, particularly in zone 1 along Qantas Drive
- Introduction of a new built form for zones 1, 4 and 5 impacting the 'big sky' landscape contributing to Sydney Airport's heritage values
- Removal of existing buildings within zone 1
- Drainage measures would potentially be highly visible in zones 2 and 5, altering the existing landscape character
- Land use changes in zones 2 and 5 from open space and freight/container storage areas to arterial road corridors.

These landscape changes would impact the zones within Sydney Airport land, in addition to other zones with views of Sydney Airport land.

Visual impacts

All viewpoints are located on Sydney Airport land with the exception of viewpoints 3, 6 and 7. The visual impact for the 23 viewpoints located on Sydney Airport land is described in section 21.4.2.

The assessment concluded that the project would have a high visual impact on viewpoint 11 and 12. Viewpoint 11 (Alexandra Canal cycleway near Shea's Creek underbridge) has a riverside parkland character with a high sensitivity to change. A number of large new structures would impact this view and change the outlook, including the Qantas Drive bridge, Terminal link bridge and eastbound terminal link. This would result in a high magnitude of visual effect. Viewpoint 12 (access track along the western side of Alexandra Canal) also has a high sensitivity to change to the waterway setting of this view. The presence of large infrastructure including the new freight terminal bridge and Terminal 1 connection bridge would result in a high magnitude of visual effect.

The project would result in long-term impacts on Sydney Airport land. Visual impacts would be the same irrespective of the mound design option chosen for the project (either option one or option two).

Consistency with the Sydney Airport Master Plan

Landscape character and visual impact commitments are not specifically identified in the *Sydney Airport Master Plan 2039* (SACL, 2019a). However, relevant commitments identified in relation to landscape include:

- Develop a strategy for providing planting within or in the vicinity of the airport site to compensate for vegetation removed during on-going development of the airport site.

The project would involve removing vegetation on Sydney Airport land. Consistent with the above commitment, a tree management strategy is proposed (see section 21.6.1)

21.5 Cumulative impacts

There would the potential for cumulative landscape and visual impacts between the project and other recent and proposed developments in the study area, including:

- Botany Rail Duplication
- Upgrade of the Boral Concrete St Peters facility
- Qantas Flight Training Centre relocation
- Airport West Precinct, Airport East Precinct and Airport North Precinct road upgrading project
- New M5
- M4-M5 Link
- Sydney Airport ground access solutions and hotel project (at Terminals 2/3).

21.5.1 Construction

Cumulative impacts would result from concurrent and consecutive construction activities viewed from a number of viewpoints. Based on the locations, duration and scale of ongoing works for major developments, the assessment concluded that the magnitude of cumulative effects on landscape character zones would be:

- High for landscape character zones 1 (Terminal precincts), 5 (Freight and industrial), 7 (Warehousing and employment) and 9 (Airport support)
- Moderate for landscape character zones 2 (Green space) and 4 (Runway precinct)
- Low for landscape character zones 3 (Alexandra Canal), 6 (Residential) and 8 (Motorway).

Of the 26 viewpoints, 16 viewpoints would experience additional visual impact from other major projects with two viewpoints considered to experience high to moderate additional impacts. The majority of the other viewpoints would have negligible or low additional impacts.

An assessment of the cumulative visual impacts (project impact with additional impact) results in a higher level of impact overall. There would be no reduction in visual impact and no change to 17 viewpoints. However, nine viewpoints would experience an increase in visual impact:

- From a high to moderate impact to a high impact at viewpoints 13, 18, 19, 20 and 24
- From a moderate impact to a high to moderate impact at viewpoints 10 and 22
- From moderate to low impact to a moderate impact at viewpoints 9 and 17.

The primary contributor to cumulative visual impacts would be from the Botany Rail Duplication which would occur immediately adjacent to, and in parallel with, the eastern part of project. While this would increase the magnitude of visual effect on some viewpoints during construction, concurrent construction would minimise the period of time during which visual impacts would be experienced.

21.5.2 Operation

New and upgraded infrastructure and structures associated with a number of other projects would be visible from viewpoints assessed as part of this project. The other developments would be visible from 16 of the 26 viewpoints. The magnitude of visual effects from other projects is predominantly negligible to low. This is generally due to the small portion of the view to other projects.

The exception is the Botany Rail Duplication and Qantas Flight Training Centre relocation. The Botany Rail Duplication would result in the removal of stands of vegetation along the rail corridor between King Street, Mascot and O'Riordan Street, Mascot. This vegetation makes a positive contribution to the visual and spatial character of the area. This is shown in viewpoints 19, 20, 22 and 24 (see Table 21.2). The Botany Rail Duplication would also include construction of a retaining wall close to Qantas Drive. The retaining wall would be visible from the same four viewpoints.

The combination of tree removal, retaining wall construction and space constraints that prevent re-establishment of trees along the road-rail interface would lead to cumulative permanent visual impacts. The cumulative impact would also be higher than the visual impacts resulting from the Sydney Gateway road project alone.

21.6 Management of impacts

21.6.1 Approach

Approach to mitigation and management

The assessment identified that the project would result in visual impacts, landscape character changes and the removal of trees. There would also be short-term and temporary visual impacts during construction.

Approach to managing the key potential impacts identified

Design development has included a focus on avoiding and/or minimising the potential for visual impacts during all key phases of the process. This is the primary form of mitigation. Further information on key design considerations, including urban design and place making, the need for an urban design and landscape plan, and how these have been integrated in the design process to date, is provided in sections 7.2.3 and 7.12.

The future design refinement process would be undertaken in accordance with relevant guidelines, including *Beyond the Pavement: Urban design policy, procedures and design principles* (Roads and Maritime, 2014), *Bridge Aesthetics: Design guideline to improve the appearance of bridges in NSW* (Roads and Maritime, 2019a), *Better Placed* (Government Architect NSW, 2017) and the *Noise wall design guideline. Design guideline to approve the appearance of noise walls in NSW* (Roads and Maritime, 2016a). A list of the guidelines that would guide the next stage of the urban design process is provided in section 7.12.4.

A tree management strategy would be prepared to manage the replacement of trees removed as part of the project. The strategy would identify:

- Trees and vegetation that can potentially be retained
- Tree replacement locations (including potential locations outside the project site) to provide a net increase in tree canopy, including locations for the translocation of cabbage tree palms
- Opportunities for rapid-growing replacement trees
- Suitable tree species with consideration of Sydney Airport's wildlife management plan, prescribed airspace and *National Airports Safeguarding Framework Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports*

- Opportunities for high quality streetscapes
- Relevant on-site processes and tree protection measures.

Trees removed would be replaced to ensure there is a net increase in tree canopy. Trees that cannot be replaced within the project footprint would be replanted within Sydney Airport land and land subject to the EP&A Act, relative to the number of trees removed. The final location of replacement trees would be confirmed in consultation with Inner West Council and Sydney Airport Corporation.

Approach to managing other impacts

Implementing other relevant measures in Chapters 19 (Land use and property), 20 (Social and economic impacts) and 22 (Biodiversity) would assist in minimising the potential for landscape character and visual impacts during construction.

Expected effectiveness

Transport for NSW has experience in managing potential urban design, landscape character and visual impacts as a result of road developments of a similar scale and scope to this project.

Urban design outcomes have been incorporated into the concept design and would be further refined during detailed design. The urban design outcomes have been guided by existing Transport for NSW policies and procedures (such as Beyond the Pavement), which commit Transport for NSW to providing excellent outcomes for the people of NSW, governed by overarching urban design principles that include both physical outcomes and performance based principles.

A range of mitigation measures are provided for incorporation into the project. These measures combine with the urban design concept to develop a solution that maximises the protection of the existing visual values and landscape character of the project site and adjoining areas. Mitigation measures may be considered under two categories:

- Primary mitigation measures are embedded in the design of the proposed works through an iterative process between the engineering and urban design teams. This form of mitigation is generally the most effective (see Chapter 7 (Project description))
- Secondary mitigation measures are designed to specifically address the remaining (residual) adverse effects arising from the proposed works.

An urban design and landscape plan would be prepared during detailed design in accordance with the urban design and place making strategy and concept plan. This would include urban design treatments to reduce the potential visual impacts during operation.

Audits and reporting of the effectiveness of environmental management measures is generally carried out to show compliance with management plans and other relevant approvals and would be outlined in detail in the CEMP (see Chapter 27 (Approach to environmental management and mitigation)). Procedures would also be developed for monitoring and maintaining landscaped areas to be implemented during operation to ensure planting becomes established and ensure the effectiveness of these treatments are appropriately implemented and maintained.

21.6.2 List of mitigation measures

Measures that will be implemented to address potential impacts on landscape character and visual amenity are listed in Table 21.5.

Table 21.5 Landscape character and visual amenity mitigation measures

Impact/issue	Ref	Mitigation measure	Timing
General visual impacts	LV1	An urban design and landscape plan will be prepared to provide a consistent approach to project design and landscaping.	Detailed design
	LV2	Further design refinements of structures including bridges and the Terminals 2/3 access viaduct will be undertaken to minimise visual impacts as far as possible.	Detailed design
Managing the loss of trees	LV3	A tree management strategy will be developed including measures to offset the loss of trees and achieve a net increase in tree canopy. The final location of replacement trees will be confirmed in consultation with Inner West Council and Sydney Airport Corporation. The strategy will also include on-site processes and protective measures to ensure trees identified for retention are appropriately protected during construction.	Detailed design
Noise barriers	LV4	Where feasible and reasonable, the proposed noise barrier in the Tempe Lands will be designed to provide new active transport connectivity across the Terminal 1 connection and between the western and eastern portions of open space, and maximise passive surveillance of open space from the road.	Detailed design
	LV5	Noise barriers will be designed to minimise their visual prominence as much as possible.	Detailed design
Minimising light spill	LV6	Lighting for the project will be designed in accordance with AS4282-1997 Control of the obtrusive effects of outdoor lighting. Lighting will be designed to minimise glare and light spill into adjoining areas.	Detailed design
Visual impacts during construction	LV7	The design and maintenance of construction compound hoardings will aim to minimise visual amenity and landscape character impacts.	Construction
	LV8	The selection of materials and colours for hoardings will aim to minimise their visual prominence.	Construction
	LV9	Lighting of work areas, compounds, and work sites will be oriented to minimise glare and light spill impact on adjacent receivers.	Construction
Tree protection during construction	LV10	Trees to be retained will be protected prior to the commencement of construction in accordance with AS4970-2009 Protection of trees on development sites and the project's tree management strategy. Any tree pruning will be undertaken in accordance with the project's tree management strategy, guided by a tree report prepared by a qualified arborist.	Construction
Site rehabilitation	LV11	Following completion of construction, site restoration will be undertaken in accordance with the rehabilitation strategy (measure CS22). Temporary impacts on public open space will be rehabilitated in consultation with the relevant local council and/or landowner.	Construction

21.6.3 Managing residual impacts

Residual impacts are impacts of the project that may remain after implementation of:

- Design measures to avoid and minimise impacts (see sections 6.4 and 6.5)
- Construction planning and management approaches to avoid and minimise impacts (see sections 6.4 and 6.5)
- Specific measures to mitigate and manage identified potential impacts (see section 21.6.2).

It is anticipated the project would result in substantial changes to the landscape and visual character of the surrounding area. Some of the changes would reduce in severity over time as proposed vegetation establishes and matures. However, the project would result in the following long-term residual impacts:

- Alterations to the topography and three dimensional form
- Loss of built form within Sydney Airport land
- Loss of views and vistas along Alexandra Canal and between the canal and adjoining areas
- Land use changes
- Enlarged scale of road infrastructure
- Potential increase in light levels in parts of the project site with the potential for light spill.

Although the overall impact would not substantially reduce over time, the perception of the severity of the impact may reduce as people adjust to the changes. The project is also proposed in the context of land use changes and other projects planned for the area, including the New M5, M4-M5 Link and the Botany Rail Duplication. In the context of this landscape, it is anticipated that the long-term landscape character changes as a result of the project would be consistent with the future character and use of the area. As a result, long-term landscape character and visual impacts as a result of the project are not expected to be significant.