Australian Government

NSW GOVERNMENT

sydney METRO

Sydney Metro –
Western Sydney Airport

Technical Paper 9
Landscape and visual

iris

Sydney Metro - Western Sydney Airport

Technical paper 9: Landscape and visual impact assessment

NSW Government | Sydney Metro, October 2020

Contents

ABBREVIATIONS & GLOSSARY

Abbreviations

ABBREVIATIONS

Term	Definition
DCP	Development Control Plan
DPIE	Department of Planning, Infrastructure and Environment
LCU	Landscape Character Unit
LEP	Local Environmental Plan
LSPS	Local Strategic Planning Strategy
LGA	Local Government Area
SEPP	State environmental planning policy

GLOSSARY

Term	Definition
Accessibility	A public transport customer's ability to reach their destination unhindered and as independently as possible. Includes compliance with relevant disability standards.
Amenity	*'The pleasantness of a place as conveyed by desirable attributes including visual, noise, odour etc.'* (Australian Institute of Landscape Architects QLD 2018*)*
Ancillary infrastructure	Includes the services facilities and traction substations.
Construction site	An area of land within the construction footprint. It may include site offices, amenities, workshops, material and plant storage areas, laydown areas, concrete batching plant, precast segment factory and storage etc. Construction sites include St Marys, Claremont Meadows services facility, Orchard Hills, stabling and maintenance facility, Off-airport corridor construction, Luddenham Road, Airport Business Park, Airport Terminal, Viaduct segment casting facility, Tunnel section casting facility, On-Airport corridor construction, Bringelly services facility, Aerotropolis core.
Construction footprint	The total extent of land required for the construction of the project, including ancillary facilities and services and land temporarily required for construction (incorporating construction elements such as compounds, access tracks and construction sites)
Glare	*'Condition of vision in which there is discomfort or a reduction in ability to see, or both, caused by an unsuitable distribution or range of luminance, or to extreme contrasts in the field of vision.* (AS4282:2019)
Interchange	A location where customers transfer from one mode of transport to another or between two services of the same mode. Also includes a place where customers join or leave the public transport system on foot, by bicycle, motorcycle, or car.
Landscape	'All aspects of a tract of land, including landform, vegetation, buildings, villages, towns, cities and infrastructure.' (Transport for NSW, 2018)
Landscape character	The … *'combined quality of built, natural and cultural aspects which make up an area and provide its unique sense of place'.* (Transport for NSW, 2018)
Landscape character zone (or area)	*'An area of landscape with similar properties or strongly defined spatial qualities, distinct from areas immediately nearby.'* (Transport for NSW, 2018)
Legibility	The extent to which an urban environment can be easily understood. Legibility is enhanced through the provision of landmarks, clearly defined visual boundaries and other wayfinding elements.
Magnitude	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.'* (Transport for NSW, 2018)
the project	Sydney Metro- Western Sydney Airport

ABBREVIATIONS & GLOSSARY

Glossary

Term	Definition
Project alignment	The main rail line along which future metro trains would operate.
Public realm	Streets, spaces and places. *(State Government Architect NSW, 2016)*.
S170 Register	Section 170 Register under the NSW Heritage Act 1977
Sense of place	Is the intangible qualities and character of a place, interpreted and valued by people.
Sensitivity	*'Susceptibility of a landscape or receptor to accommodate change without losing valued attributes.'* (Australian Institute of Landscape Architects QLD 2018) The sensitivity of a landscape character zone or view is *'its capacity to absorb change'.* (Transport for NSW, 2018)
Sky glow	*'The brightening of the night sky that results from radiation (visible and non-visible), scattered from the constituents of the atmosphere (gaseous, molecules, aerosols and particulate matter), in the direction of observation.'* It comprises Natural sky glow and artificial sky glow. (AS4282:2019)
Spill light	*'Light emitted by a lighting installation that falls outside of the design area. Spill light may or may not be obtrusive depending on what it affects'* (AS4282:2019)
Urban design	*'Urban design is concerned with the arrangement, appearance and function of our suburbs, towns and cities. It is both a process and an outcome of creating localities in which people live, engage with each other, and the physical place around them. Urban design involves many different disciplines including planning, development, architecture, landscape architecture, engineering, law and finance.'* (Urban Design Protocol, 2011)
Values	*'Any aspect of landscape or views people consider to be important. Landscape and visual values may be reflected in local, state or federal planning regulations, other published documents or be established through community consultation and engagement, or as professionally assessed.'* (Australian Institute of Landscape Architects QLD 2018)
View	*'Any sight, prospect or field of vision as seen from a place, and may be wide or narrow, partial or full, pleasant or unattractive, distinctive or nondescript, and may include background, mid ground and/or foreground elements or features.'* (Australian Institute of Landscape Architects QLD 2018)
Viewpoint	*'The specific location of a view, typically used for assessment purposes.'* (Australian Institute of Landscape Architects QLD 2018)
Visual absorption capacity	*'The potential for a landscape or scene to absorb a particular change without a noticeable loss of valued attributes.'* (Australian Institute of Landscape Architects QLD 2018)
Western Sydney International	Western Sydney International (Nancy-Bird Walton) Airport

Glossary

EXECUTIVE SUMMARY

Sydney Metro – Western Sydney Airport (the project) is identified in the *Greater Sydney Region Plan* as a key element to delivering an integrated transport system for the Western Parkland City. The project would be located within the Penrith and Liverpool local government areas and would involve the construction and operation of a new metro railway line around 23 kilometres in length between the T1 Western Line at St Marys in the north and the Western Sydney Aerotropolis in the south. This would include a section of the alignment which passes through and provides access to the future Western Sydney International (Nancy-Bird Walton) Airport.

The project is characterised into components that are located outside Western Sydney International (off-airport) and components that are located within Western Sydney International (on-airport), to align with their different planning approval pathways required under State and Commonwealth legislation.

This technical paper provides an assessment of the landscape and visual impacts of the project, focusing on all aboveground works that would be seen during construction and operation of the project.

This assessment identifies **moderate adverse landscape** and **visual impacts** for the project during construction. These impacts are due primarily to the removal of trees and areas of rural character, and the scale and extent of construction activity. These impacts, however, would be temporary and experienced for a short to medium duration only.

Generally, the operational impacts of the project would be less than those expected during construction. These impacts would range from **moderate adverse** to **minor beneficial landscape** and **visual impacts** during operation of the project. This is due to a large section of the project being in tunnel and the compatibility of the stations with their context. The project would be more readily absorbed into the town centre character landscape and views at St Marys Station, than the predominantly rural landscape character areas to the south. The greatest visual impact would be between Orchard Hills and Western Sydney International where the project alignment is at the surface and would be more visually prominent. However, the large sections of tunnel, between St Marys and Orchard Hills, and between Western Sydney International and Bringelly, limits the visual impact. The above ground station and services facilities would not cause a substantial visual impact due to the small footprint and modest scale of the aboveground elements and the visual absorption capacity of the surrounding landscape.

In the longer term the project would be visually absorbed into the surrounding landscape which is intended to transition to become the Western Parkland City and Western Sydney Aerotropolis. This would involve the transformation of the landscape in a way that would result in landscape character change that is more compatible with the project stations and alignment, and an urban built form that would substantially reduce the potential visibility of the project.

Overall, the landscape and visual impacts of the project would reduce as this transformation occurs and development is designed to complement and integrate with the project.

Approach to this landscape and visual impact assessment

The assessment considers a 'study area' which extends beyond the construction footprint to include the publicly accessible areas within the visual catchment of the project. This technical paper assesses the project from St Marys in the north to the Aerotropolis precinct in the south according to landscape character areas which have been identified based on characteristics such as landform, land use and vegetation cover.

This assessment identifies the potential landscape and visual impact of the project during the day and at night, for the period of construction and operation.

Landscape character

The study area includes the urban areas of St Marys in the north, and continues south through a mix of residential, commercial and light industrial areas on the suburban fringe in Claremont Meadows, and to a mix of semi-rural and rural areas within Orchard Hills, Luddenham, Badgerys Creek and Bringelly in the south.

The project alignment is located within the lower lying areas of a broad open valley which is aligned generally parallel to South Creek, a major riparian corridor to the east of the project alignment. The alignment crosses several waterways which divide and contain views to smaller visual catchments.

ST MARYS STATION

The study area contains six main landscape character areas, these are the St Marys townscape; St Marys south suburban fringe (South Creek to the M4 Western Motorway); Orchard Hills rural landscape (M4 Western Motorway to the Warragamba to Prospect Water Supply Pipelines); Luddenham rural landscape (Warragamba to Prospect Water Supply Pipelines to Elizabeth Drive); Western Sydney International (Elizabeth Drive to Badgerys Creek); and the Bringelly rural landscape (Badgerys Creek to Thompsons Creek).

Identified potential landscape and visual impacts

The following section summarises the potential landscape and visual impact that is expected to be experienced within each landscape character area.

St Marys town centre

Landscape impact

There would be a **moderate adverse landscape impact** at the St Marys town centre during construction. This is due to impacts on amenity and recreational opportunities given the loss of mature trees along the rail corridor and temporary removal of an area of open space. There are also impacts on character, accessibility and legibility. During operation there would be a **minor beneficial landscape impact** at St Marys. While there would be some loss of open space, this would be offset by the considerable improvements in accessibility, wayfinding and legibility.

Visual impact

The project footprint at St Marys Station would have a relatively contained visual catchment due to the built form of the surrounding urban areas.

EXECUTIVE SUMMARY

During construction there would be a **moderate adverse visual impact** on views from most areas surrounding the station due to the scale and extent of the construction works, including the demolition of several buildings, trees and the potential use of an acoustic shed. At night, there would be a **negligible visual impact** in the town centre and a **minor adverse visual impact** in the vicinity of adjacent residential areas. This is because any additional lighting would be largely contained within the site and absorbed into the existing brightly lit night scene.

During operation, there would be **negligible visual impacts** in views from St Marys Station and from Harris Street towards the station as the new built form would be visually appropriate for a key transport interchange. There would also be **minor adverse visual impacts** in views from Station Street and Chesham Street, and adjacent residential properties, as the bus layover and some aboveground services buildings would be located within an area that is currently open space. While the remaining area of open space would be reinstated, it is noted that views across the rail corridor to the existing industrial areas would have been opened-up with the removal of the existing mature trees within this area. There would be a continuing adverse effect on these views until the proposed new trees mature and restore a leafy character to this view.

ARTISTS IMPRESSION OF ST MARYS STATION

At night there would be a **negligible visual impact** in the vicinity of St Marys Station as the project would be seen within the brightly lit town centre. There would be a **minor adverse visual impact** in areas closer to residential properties to the southwest of the station where the existing lighting levels are less and the project would both open up views to the existing lit station with the removal of existing vegetation, and introduce additional bright station lighting further east along the rail corridor.

St Marys suburban fringe

Landscape impact

There would be a **minor adverse landscape impact** on the St Marys suburban fringe character area during construction as the project which would have a relatively small construction footprint and be mainly within a site which is already cleared and used for construction support activities. During operation, there would continue to be a **minor adverse landscape impact** as the project would be consistent with the scale of development along the Great Western Highway and absorbed into the character of this area.

Visual impact

The project footprint would have a limited visual catchment with views to the services facility construction site mainly from surrounding major roads. There would be limited visibility from adjacent residential areas to the west and south-east within Claremont Meadows due to screening by existing acoustic fences and vegetation. There would be some short duration views to the construction power connection (for temporary TBM power supply) on local streets between Claremont Meadows substation at Nullaga Way to north of the M4 Western Motorway.

There would be a **minor adverse visual impact** on views near the services facility construction site from the Great Western Highway, Gipps Street and Sunflower Drive as the construction activity would be seen in the context of busy roads. Further south, there would be a **minor adverse visual impact** on views from Kent Road to the construction power connection works. At night there would be a **negligible visual impact** on views in the vicinity of the services facility construction site, due to the high visual absorption capacity of the settings.

During operation there would be a **minor adverse visual impact** on views from the Great Western Highway and Gipps Street as while the services facility would be consistent in character with the larger scale built form along the Great Western Highway, it would extend this character further west and adjacent to the lower density residential areas, occupying a site which is identified as a 'gateway' in the Penrith Local Environment Plan. Otherwise there would be **negligible visual impacts** due to the small scale of project in this setting. At night there would be a **negligible visual impact** on views in the vicinity of the facility site and M4 Western Motorway site, due to the high visual absorption capacity of the night setting.

Orchard Hills rural landscape

Landscape impact

During construction there would be a **moderate adverse landscape impact** at Orchard Hills due to the vegetation removal, scale and character of the works.

During operation there would be a **minor adverse landscape impact** due to the insertion of a new, station, plaza and surrounding street pattern into the existing rural landscape. There would be a **minor adverse landscape impact** in areas to the south of the station in views to the project alignment and stabling and maintenance facility which would contrast with the surrounding rural landscape but be seen in the distance of most existing views.

Visual impact

Orchard Hills Station would be seen mainly from surrounding local rural roads and be mostly screened from the M4 Western Motorway. The alignment would be visible from a relatively narrow visual catchment, being contained to the west by the Orchard Hills Cumberland Plain Woodland (Department of Defence land) and to the east by the vegetation along South Creek.

There would be a **moderate adverse visual impact** on views near Orchard Hills Station construction site at Kent Road, Lansdowne Road and Traminer Grove, due to the scale and extent of the construction works. In views from Samuel Marsden Road there would be a **minor adverse visual impact** due to intervening vegetation. There would be a **negligible visual impact** on elevated views from Homestead Road due to the distance and visual absorption capacity of the panoramic outlook. There would be a **moderate adverse visual impact** in views to the stabling and maintenance facility from Luddenham Road. At night, there would be a **moderate adverse visual impact** in areas of the Orchard Hills landscape near the project construction footprint as lighting for the works would contrast with the surrounding relatively dark night scene.

During operation, there would be a **minor adverse visual impact** on views from Kent and Lansdowne Roads towards Orchard Hills Station, as the alignment would be in a cutting and the station would not be prominent in views. There would be a **moderate visual impact** on easterly views from Traminer Grove towards the viaduct structure and from Luddenham Road to the viaduct structure and stabling and maintenance facility. At night, there would be a **moderate adverse visual impact** on the Orchard Hills rural character area due to the lighting of the corridor and stabling and maintenance facility.

Luddenham rural landscape

Landscape impact

There would be a **moderate adverse landscape impact** during construction due to the removal of vegetation and length of the project alignment which would divide this landscape.

During operation there would be a **minor adverse landscape impact** due to the introduction of large scale built elements into the landscape.

Visual impact

The project alignment would be visible from a wide visual catchment due to the open rural character of this landscape, with some screening by Cosgroves Creek and Badgerys Creek.

ARTISTS IMPRESSION OF LUDDENHAM STATION

There would be a **moderate adverse visual impact** on views from Luddenham Road due to the removal of vegetation, Luddenham Road Station construction and installation of viaduct and bridge structures. There would be a **minor adverse visual impact** in views from Elizabeth Drive as the project would be seen in the context of extensive large scale construction activity associated with Western Sydney International and the future M12 Motorway. At night, there would be a **negligible visual impact** to the Luddenham landscape due to the minor nature of the lighting required for construction of the project and local screening by undulating landform and vegetation.

During operation, there would be a **moderate adverse visual impact** on views from Luddenham Road towards the station and viaduct. There would be a **minor adverse visual impact** in views from Elizabeth Drive as the project alignment would be a small change to a view that would be substantially changed when the Western Sydney International and the future M12 Motorway are operational. At night, Luddenham Road Station would be brightly lit resulting in a **moderate adverse visual impact**.

Western Sydney International

Landscape impact

Overall, there would be a **negligible landscape impact** on the Western Sydney International site during construction as Western Sydney International is under construction and the works would be absorbed into this changing landscape.

During operation, the project would be compatible with the character of the future landscape and offer improvements to the accessibility, permeability of these precincts for users, resulting in a **minor beneficial landscape impact**.

Visual impact

During construction the alignment would be visible from parts of Elizabeth Drive and the rural areas to the north of the airport site. Public access within the airport site is limited, however, there would be views to the at-grade rail alignment from Badgerys Creek Road which has recently been realigned to the east between Elizabeth Drive and Longleys Road. There are broad, panoramic views across the airport site from the Airport Experience Centre and views to Badgerys Creek from rural areas to the south in Bringelly.

The scale of the project during construction would be largely consistent or of a lesser scale than the airport access road and works seen within the Western Sydney International Stage 1 Construction Impact Zone. There would be a **negligible visual impact** in views from the Western Sydney International Airport Experience Centre, Elizabeth Drive and Badgerys Creek Road due to the visual absorption capacity of this setting. There would also be a **negligible visual impact** in views to the Kemps Creek construction power corridor due to the minor scale of the works which would be sensitively set back from the vegetation along South Creek and not require the removal of street trees. At night, there would be a **negligible visual impact** on the Western Sydney International landscape character area due to the minor nature of the lighting required for the project during construction.

During operation there would be a **minor adverse visual impact** on views to the at-grade sections of the project alignment due to the compatibility of the project with the character of views expected within the future Western Sydney International. There would be **negligible visual impacts** on views to the project alignment, as the alignment would have limited visibility from surrounding areas. There would be a **negligible visual impact** on views to Airport Business Park Station and Airport Terminal Station as the built form of these stations would be modest in relation to the scale of the surrounding built form and infrastructure, and compatible with the expected character of future land uses within Western Sydney International. At night, there would be a **negligible visual impact** as lighting at the stations and along the project alignment in the Western Sydney International would be consistent in character with the setting of the future airport.

Bringelly rural landscape

Landscape impact

There would be a **minor adverse landscape impact** on the Bringelly landscape due to the relatively small scale of the construction sites and limited impact on vegetation and landform. Changes to the character and quality of this rural landscape would be localised and have a small visual influence over the surrounding landscape.

During operation, there would be a **minor adverse landscape impact** to the Bringelly landscape. The project alignment and Aerotropolis Core Station would be largely underground and the aboveground works would be compatible with the scale of the existing mixed rural uses in the area.

Visual impact

The project would be visible from a relatively limited visual catchment, mainly from the rural areas east of Badgerys Creek, including from The Retreat, and from Derwent Road. The vegetation along Badgerys and Thompsons Creeks partly enclose views from the broader landscape.

During construction there would be a **minor adverse visual impact** on views from Derwent Road, The Retreat and easterly views from Badgerys Creek Road due to the loss of vegetation, scale and extent of the construction works. At night, there would be a **negligible visual impact** to the Bringelly landscape during construction due to the distance between the project and adjacent scattered residences.

During operation, there would be a **negligible visual impact** in views from Derwent Road and The Retreat due to the visual absorption capacity of this landscape and relatively small scale of the aboveground works. At night there would be a **minor adverse visual impact** on the Bringelly landscape as the lighting would introduce additional lighting which would contrast with the predominantly rural setting.

Cumulative impacts

The assessment of landscape and visual impacts in this technical paper has considered the future M12 and Western Sydney International as a part of the future character of the landscape and views. Therefore, these projects have not been considered separately in the assessment of cumulative impacts. The assessment of cumulative impacts is limited to consideration of the St Marys Intermodal Facility and The Northern Road.

There would be a **cumulative landscape and visual impact** between the project and the St Marys Intermodal project during construction if the construction programs overlap. There would **not be a cumulative landscape or visual impact** during operation due to the visual separation of these projects.

There would also **not be a cumulative landscape or visual impact** on the project during construction or operations due to the spatial separation of The Northern Road from the project alignment.

Approach to management and mitigation

A Construction Environmental Management Framework (CEMF) (Appendix F of the Environmental Impact Statement) describes the approach to environmental management, monitoring and reporting during construction. Specifically, it lists the requirements to be addressed by the construction contractor in developing the Construction Environmental Management Plans (CEMPs), sub-plans, and other supporting documentation for each specific environmental aspect.

Potential operational visual and landscape impacts of the project would be managed through the design development process that would be guided by a suite of documents which include the following:

- Sydney Metro design objectives
- Design quality Framework
- Sydney Metro – Western Sydney Airport Design Guidelines (Appendix E of the Environmental Impact Statement).

These documents, along with community and stakeholder engagement and the establishment of a Design Review Panel, would allow for high quality standards throughout the whole design process. At relevant stages in the design process, the design would be reviewed against the Design Guidelines and design objectives.

1. INTRODUCTION

1.1 Project context and overview

1.1 Project context and overview

The *Greater Sydney Region Plan* (Greater Sydney Commission, 2018a) sets the vision and strategy for Greater Sydney to become a global metropolis of three unique and connected cities; the Eastern Harbour City, the Central River City and the Western Parkland City. The Western Parkland City incorporates the future Western Sydney International (Nancy-Bird Walton) Airport (hereafter referred to as Western Sydney International) and Western Sydney Aerotropolis (hereafter referred to as the Aerotropolis).

Sydney Metro – Western Sydney Airport (the project) (see Figure 1-1) is identified in the *Greater Sydney Region Plan* as a key element to delivering an integrated transport system for the Western Parkland City. The project would be located within the Penrith and Liverpool Local Government Areas (LGAs) and would involve the construction and operation of a new metro railway line around 23 kilometres in length between the T1 Western Line at St Marys in the north and the Aerotropolis in the south. This would include a section of the alignment which passes through and provides access to Western Sydney International.

The project is characterised into components that are located outside Western Sydney International (off-airport) and components that are located within Western Sydney International (on-airport), to align with their different planning approval pathways required under State and Commonwealth legislation.

1.2 Key project features

Key operational features of the project are shown on Figure 1-1 and would include:

- around 4.3 kilometres of twin rail tunnels (generally located side by side) between St Marys (the northern extent of the project) and Orchard Hills
- a cut-and-cover tunnel around 350 metres long (including tunnel portal), transitioning to an in-cutting rail alignment south of the M4 Western Motorway at Orchard Hills
- around 10 kilometres of rail alignment between Orchard Hills and Western Sydney International, consisting of a combination of viaduct and surface rail alignment
- around two kilometres of surface rail alignment within Western Sydney International
- around 3.3 kilometres of twin rail tunnels (including tunnel portal) within Western Sydney International
- around three kilometres of twin rail tunnels between Western Sydney International and the Aerotropolis Core

1.2 Key Project features

- six new metro stations:
  - four off-airport stations:
    - St Marys (providing inter-change with the T1 Western Line)
    - Orchard Hills
    - Luddenham Road
    - Aerotropolis Core
  - two on-airport stations:
    - Airport Business Park
    - Airport Terminal
- grade separation of the track alignment at key locations including:
  - where the alignment interfaces with existing infrastructure such as the Great Western Highway, M4 Western Motorway, Lansdowne Road, Patons Lane, the Warragamba to Prospect Water Supply Pipelines, Luddenham Road, the future M12 Motorway, Elizabeth Drive, Derwent Road and Badgerys Creek Road
  - crossings of Blaxland Creek, Cosgroves Creek, Badgerys Creek and other small waterways to provide flood immunity for the project
- modifications to the existing Sydney Trains station and rail infrastructure at St Marys (where required) to support interchange and customer transfer between the new metro station and the T1 Western Line
- a stabling and maintenance facility and operational control centre located to the south of Blaxland Creek, to the east of the project alignment and to the north of Patons Lane.
- new pedestrian, cycle, park-and-ride and kiss-and-ride facilities, public transport interchange infrastructure, road infrastructure and landscaping as part of the station precincts.

The project would also include:

- turnback track arrangements (turnbacks) at St Marys and Aerotropolis Core to allow trains to turn back and run in the opposite direction
- additional track stubs to the east of St Marys Station and south of Aerotropolis Core Station to allow for potential future extension of the line to the north and south respectively without impacting future metro operations
- an integrated tunnel ventilation system including services facilities at Claremont Meadows and at Bringelly
- all operational systems and infrastructure such as crossovers, rail sidings, signalling, communications, overhead wiring, power supply, lighting, fencing, security and access tracks/paths
- retaining walls at required locations along the alignment
- environmental protection measures such as noise barriers (if required), on-site water detention, water quality treatment basins and other drainage works.

1. INTRODUCTION

1.2 Key project features

1.2.1 Off-airport project components

The off-airport components of the project would include the track alignment and associated operational systems and infrastructure north and south of Western Sydney International, four metro stations, the stabling and maintenance facility, two service facilities and a tunnel portal.

1.2.2 Corridor-wide green infrastructure

Green infrastructure adopts an integrated approach to the design of landscape and infrastructure in order to create ecologically healthier, greener and more viable urban landscapes.

In the Western Parkland City, green infrastructure is planned to be implemented at the city scale, as a network of green spaces, natural and semi-natural systems that are strategically planned, designed and managed to support a good quality of life in an urban environment.

As the central spine of infrastructure supporting the new Western Parkland City, the project presents an opportunity to implement a multifunctional design approach that uses primarily nature based solutions to reduce urban heat, manage stormwater, protect the natural environment and improve liveability.

Aligned with the Sydney Metro – Western Sydney Airport Design Guidelines (Appendix E), the Design Quality Framework, Premier's Priorities and wider State government policies and vision for the Western Parkland City, the following green infrastructure objectives have been, and will continue to be, embedded in the design of the project:

- recognise and protect the existing natural and cultural environments (i.e. ecological restoration, connection with Blue and Green grids)
- mitigate urban heat island effect, thereby providing customer comfort and climate resilience
- mitigate stormwater impacts and preserve waterway health via integrated water management
- improve liveability and amenity and contribute to an attractive, green public domain for the Western Parkland City.

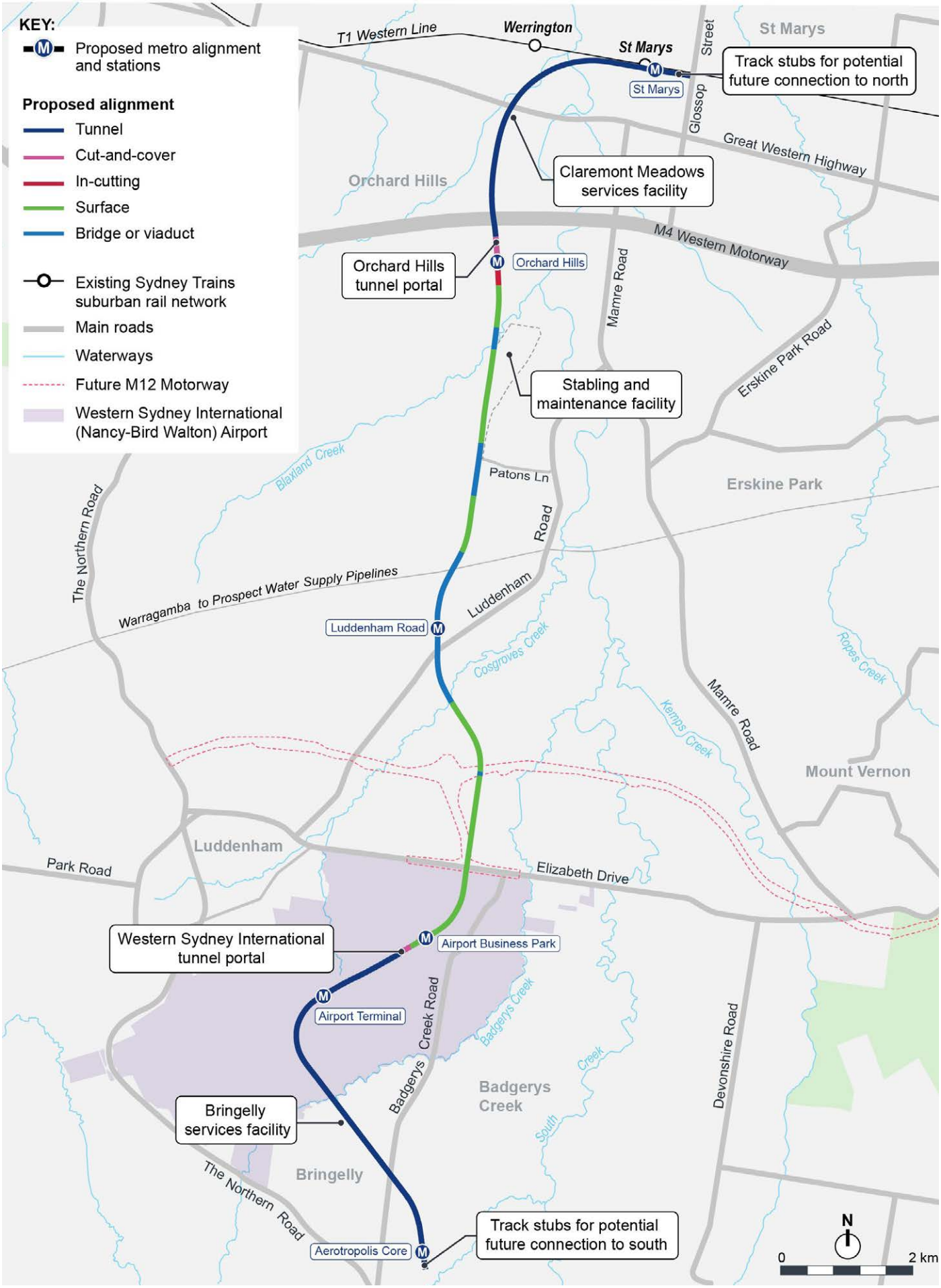
Implementation of the green infrastructure objectives would be undertaken as part of the design development process for the project.

Sydney Metro is also investigating the following opportunities to build upon the green infrastructure objectives:

- green infrastructure targets for the project including performance based metrics which would be measured and tracked throughout design development and project implementation
- seed salvage of targeted local species for future use in landscaping for the project where possible.

The project's green infrastructure approach supports the vision of a Western Parkland City that will be cool, green and liveable with healthy waterways and high quality landscapes, open spaces and recreational links.

FIGURE 1-1 PROJECT ALIGNMENT AND KEY FEATURES



The project performance outcomes and mitigation measures (see Section 20.5) support the green infrastructure objectives including ensuring a net increase in the number of trees within the project area and using a range of local species to enhance canopy coverage, subject to the constraints on tree planting associated with safe airport operations.

1.2.3 On-airport project components

The on-airport components of the project would include the track alignment and associated operational systems and infrastructure within Western Sydney International, two metro stations and a tunnel portal.

The key project features and the design development process are described in more detail in Chapter 7 (Project description – operation) of the Environmental Impact Statement.

1.3 Project construction

Construction of the project would involve:

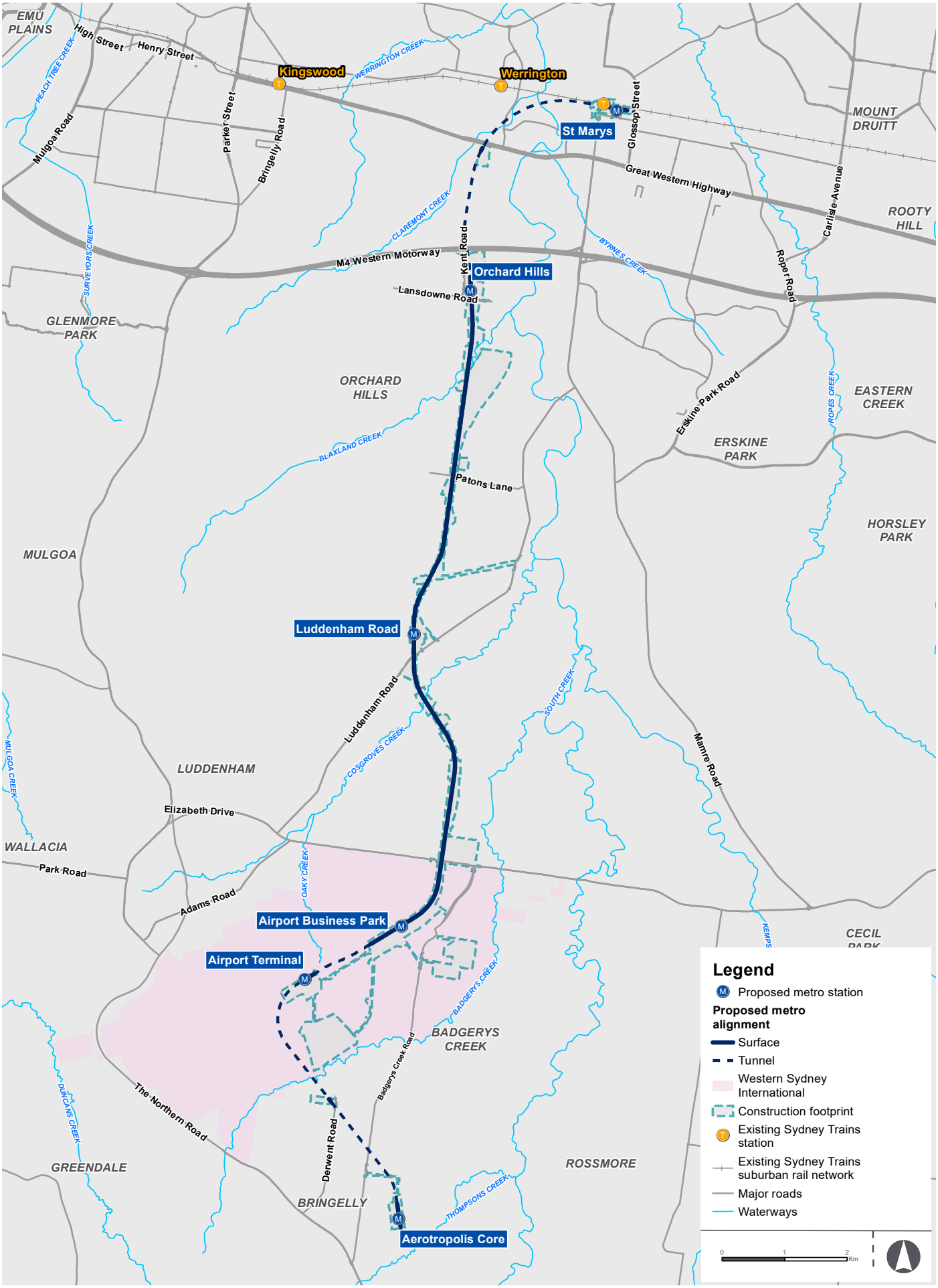
- enabling works
- main construction works, including:
  - tunnelling and associated works
  - corridor and associated works
  - stations and associated works
  - ancillary facilities and associated works
  - construction of ancillary infrastructure including the stabling and maintenance facility
- rail systems fitout
- finishing works and testing and commissioning.

These activities are described in more detail in Chapter 8 (Project description – construction) of the Environmental Impact Statement.

The construction footprint for the project is shown on Figure 1-2.

Construction of the project is expected to commence in 2021, subject to planning approval, and take around five years to complete. An overview of the construction program is provided in Chapter 8 (Project description – construction) of the Environmental Impact Statement.

FIGURE 1-2 CONSTRUCTION FOOTPRINT OVERVIEW



1. INTRODUCTION

1.4 Purpose of this technical paper

1.4 Purpose of this technical paper

This technical paper, Technical Paper 9 (Landscape and visual), is one of a number of technical documents that forms part of the Environmental Impact Statement. The purpose of this technical paper is to provide a landscape and visual assessment which aims to address the requirements outlined in Section 1.5.1 and Section 1.5.2. An overview of the structure of this technical paper is included in Section 1.5.3.

1.4.1 Assessment requirements

The Secretary's Environmental Assessment Requirements relating to landscape and visual, and where these requirements are addressed in this technical paper, are outlined in Table 1-1. These requirements were issued by the NSW Department of Planning, Industry and Environment (DPIE) to support the Critical State Significant Infrastructure application.

The Commonwealth Minister for the Environment has advised that the on-airport components of the project would be assessed based on the provision of preliminary documentation. Further information was requested to guide the assessment of the on-airport components of the project. This information is included in Appendix J of the Environmental Impact Statement.

1.4.2 Structure of this technical paper

The remainder of this technical paper is structured as follows:

- Chapter 2 – legislative and policy framework
- Chapter 3 – methodology used for the assessment
- Chapter 4 – existing environment
- Chapter 5 – St Marys town centre landscape and visual assessment
- Chapter 6 – St Marys suburban fringe landscape and visual assessment
- Chapter 7 – Orchard Hills landscape and visual assessment
- Chapter 8 – Luddenham landscape and visual assessment
- Chapter 9 – Western Sydney International landscape and visual assessment
- Chapter 10 – Bringelly landscape and visual assessment
- Chapter 11 – cumulative landscape and visual impacts
- Chapter 12 – management and mitigation measures
- Chapter 13 – conclusions.

1.4 Structure of this technical paper

TABLE 1-1 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

SEARs requirements	Where addressed in this document
3. Place designs, actions and outcomes for the project including in relation to: • Views and vistas 5. Green infrastructure designs, actions and outcomes for the project including in relation to: (b) how the project will achieve a net increase in tree numbers and canopy within proximity of the impacted area. (This relates to the number of trees to be cleared by the project (a tree is defined by Australian Standard 4970) that will not be covered by a biodiversity offset strategy).	Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4 Refer to Sydney Metro – Western Sydney Airport Design Guidelines
Visual representations of the project from key locations to illustrate the project, must be provided.	Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4
The Scoping Report for the project also committed to this assessment including the following:	
• desktop searches and background data review, including: – identification of the existing visual environment	Section 4.0
– description of the desired future character of the off-airport environment based on strategic planning initiatives. • assessment and reporting including:	Section 2.0
– identification of landscape character zones	Section 4.3
– consideration of relevant planning requirements and policies	Sections 2.0, 5.2, 6.2, 7.2, 8.2, 9.2 and 10.2
– identification of the landscape and visual sensitivity of the off-airport environment	Sections 5.0, 6.0, 7.0, 8.0 and 10.0
– assessment of potential landscape character impacts during construction and operation	Sections 5.3, 6.3, 7.3, 8.3, 9.3 and 10.3
– identification of the sensitivity of specific views to the site	Sections 5.4.2, 6.4.2, 7.4.2, 8.4.2, 9.4.2 and 10.4.2
– identification of representative views to the project	Sections 5.4.2, 6.4.2, 7.4.2, 8.4.2, 9.4.2 and 10.4.2
– assessment of visual impacts of the project using representative viewpoints and photomontages	Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4
– assessment of potential night time visual impact of the project during construction and operation	Sections 5.5 6.5, 7.5, 8.5, 9.5 and 10.5
• identification of mitigation measures to reduce landscape character and visual impacts.	Section 12

1. INTRODUCTION

1.6 Assessment assumptions

1.5 Study area

The study area for the landscape and visual technical assessment extends to include the potential visual catchment of the project. This area extends to an area at which the project would be discernible within a view.

Within the urban setting of St Marys, the containment provided by surrounding built form would limit the potential visual catchment of the project so that there is a smaller study area. In the rural areas, where the plains landform is broader and land cover is more open, the visual catchment has been considered to a distance of 2.5km. Beyond this, the project would be an element in the background of the view, have more potential for intervening elements, and be unlikely to cause an adverse visual impact (see Section 3.5.2.1 of this paper for further details).

1.6 Assessment assumptions

While there would be measures in place to minimise the removal of vegetation across the project, including the retaining of vegetation for biodiversity purposes, to consider the worst-case scenario from a landscape and visual amenity perspective, the following has been assumed:

For the project during construction:

- up to a 60 metre corridor would be cleared of vegetation in all aboveground sections of the project alignment
- all vegetation within the construction sites is removed
- the construction sites would be surrounding by hoarding or site fencing with shade cloth
- there would be light and heavy vehicle movement along the corridor during construction
- equipment would include visually bulky and tall plant including piling rigs and cranes
- where there is a possibility for acoustic sheds being used, this assessment has assumed these would rise up to 15 metres as a worst case for visual impact.

Further details of the construction method are contained in Chapter 8 (Project description – construction) of the Environmental Impact Statement.

1.6 Assessment assumptions

For the project during operation:

- viaducts would include concrete piers, a viaduct structure and overhead wiring structures
- lighting would be located within and not rise above the viaduct structure
- the at-grade sections of the alignment would be raised on an embankment, and include overhead masts and wires, rail corridor fencing, intermittent poles with CCTV cameras, lighting and communications, services on racks.
- there would be vegetation provided along the at grade sections of the corridor and proposed engineered batters and water management measures would be designed to integrate with the existing landforms and natural features of the site.
- noise barriers may be required in the vicinity of stations or along the alignment to mitigate operational noise impacts on surrounding sensitive receivers during operation of the project. The design of these structures would be consistent with the project's design guidelines (refer to Appendix E of the Environmental Impact Statement)
- station precinct works generally include transport integration infrastructure
- the multi-storey car parks would be no higher than three storeys
- residual land would be treated with temporary landscaping and fenced
- open space impacted by the project would be reinstated with a treatment coordinated with the property owner, it is assumed that this would include grass and trees as a minimum
- the stations would operate at night and be brightly lit for customer safety
- the entire project alignment would be lit.

Further details of the design are contained in Chapter 7 (Project description – operation) of the Environmental Impact Statement.

2. LEGISLATIVE AND POLICY CONTEXT

2.1 Commonwealth legislation

The following chapter provides a brief review of the Commonwealth legislation and State and local planning documents which provide guidance for the management of landscape character and the visual amenity values of the study area.

2.1 Commonwealth legislation

The *Airports Act 1996* and *Airports (Environmental Protection) Regulations 1997* set out the requirements for the project on-airport land in relation to landscape and visual amenity. The Western Sydney Airport – Airport Plan sets out the layout of the airport and includes some relevant objectives for the assessment of landscape and visual values of the on-airport areas of the project.

There are no Commonwealth legislation and policies relevant to the off-airport areas of the study area.

2.1.1 Airports (Environment Protection) Regulations

Under Division 2, Section 4.04 (Clause (1)) the operator of an airport is required to: '*take all reasonable and practicable measures to ensure that, in the operation of the undertaking, and in the carrying out of any work in connection with the undertaking… (a) there are no adverse consequences for: … (ii) existing aesthetic, cultural, historical ….values of the local area*'. (Australian Government, 2012, p.20). This technical paper will identify the potential impacts of the project on the aesthetic values of the airport site (see Chapter 9 – Western Sydney International).

2.1.2 Western Sydney Airport - Airport Plan

The Airport Plan prepared by the Australian Government (2016) provides the planning framework for Western Sydney International until the first master plan is approved. Stage 1 of the airport is currently being constructed within the study area and will operate in accordance with this plan.

The Airport Plan divides the airport site into seven land use zones as shown in Figure 2-1.

The project alignment would pass through the Business Development (BD1) Zone, where the proposed Airport Business Park Station would be located, and continue through the Aviation Reservation (AD4) to the Terminal and Support Services (AD2) Zone where Airport Terminal Station would be located. The project alignment would then continue through the Aviation Reservation and cross the Environmental Conservation area (EC2) at Badgerys Creek.

The master plan identifies Badgerys Creek as an Environmental Conservation (EC1) Zone. The relevant objectives of this zone include:

- *'protect the ecological and scenic values of the waterways in this area*
- *enhance, restore and protect the cultural heritage values of the land*
- *enable the land to be used as passive open space in a manner that is not inconsistent with the protection of its natural and cultural heritage*

2.1 Commonwealth legislation

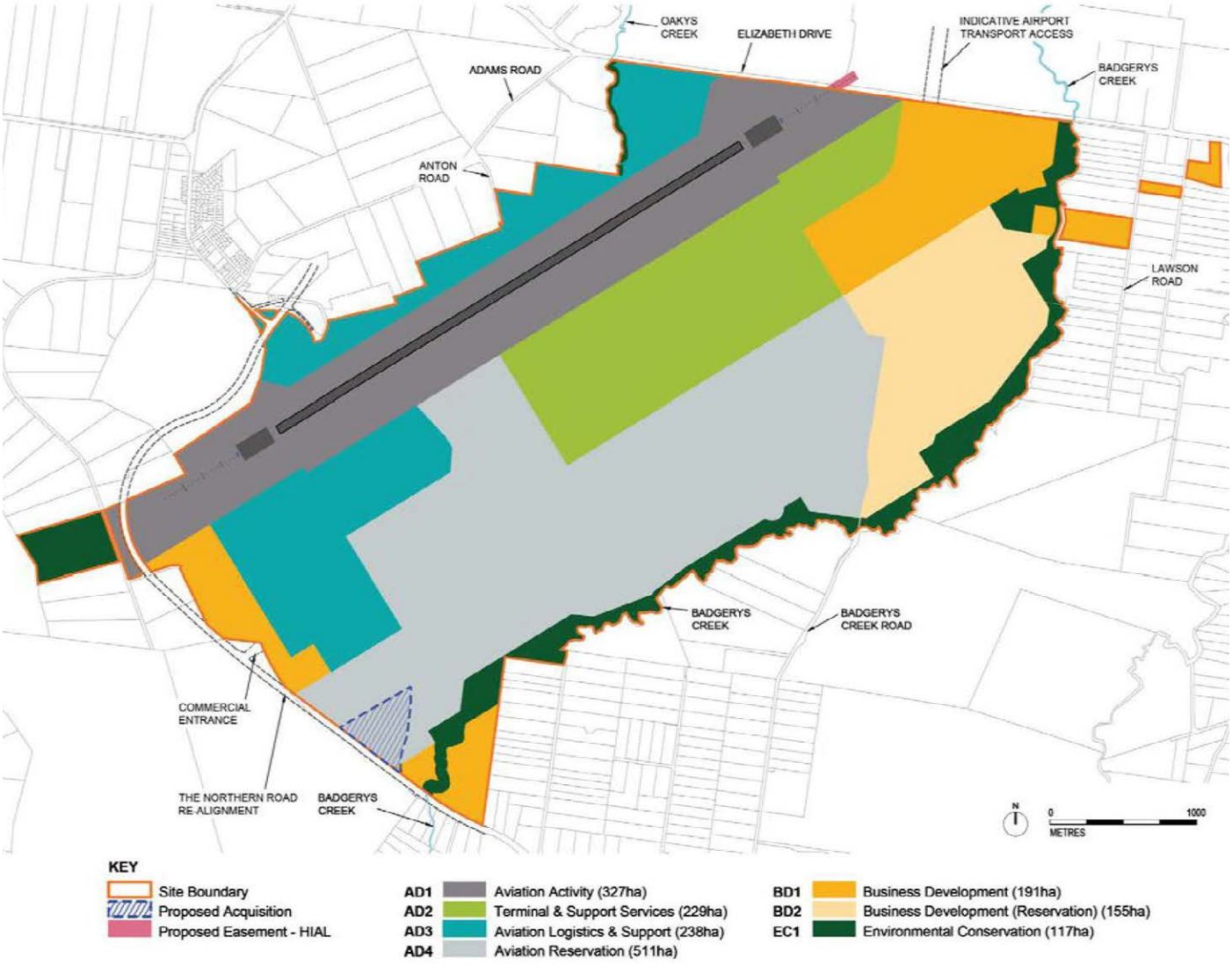


FIGURE 2-1 AIRPORT SITE LAND USE PLAN (SOURCE: AUSTRALIAN GOVERNMENT, 2016, S2.4.2, FIGURE 16, P59)

- *manage development to minimise impacts that could destroy, degrade, damage or otherwise have an adverse effect on natural and cultural heritage values' (Australian Government, 2016, s2.4.2.7, p68).*

2.2 State government policy

There are several State level policies which are of relevance to the project. These include the *Greater Sydney Region Plan 2056*, *Western City District Plan*, *Western Sydney Aerotropolis Plan*, *State Environmental Planning Policy (Western Sydney Aerotropolis) 2020,* and the *Western Sydney Aerotropolis Development Control Plan 2020 - Phase 1* which set out the strategy for this region of Sydney. A detailed review of these and other relevant policies and their relationship with the project is described in Chapter 2 (Strategic context) of the Environmental Impact Statement.

There are also several policies and guidelines which apply across the State, including the State Government Architect NSW's *Better Placed* series, the *Greener Places* policy and design guide, and the *Sydney Green Grid, Spatial Framework and Project Opportunities*.

2.2.1 Greater Sydney Region Plan 2056

Details of the Greater Sydney Region Plan 2056 is contained in Chapter 2 (Strategic context) of the Environmental Impact Statement. The following discussion includes the directions of relevance to this technical paper.

The project would be located in the planned Western Parkland City which will be focused around the Western Sydney International and the Aerotropolis. The strategy provides ten directions for delivering the plan which includes creating a '*city in its landscape*'. This aims to manage urban development within the city's natural and scenic landscapes and outlines a series of objectives, strategies and actions to achieve this.

In relation to Western Parkland City, the South Creek corridor is intended to form the '*basis for cool, green and attractive urban communities by retaining more water in the landscape and integrating waterways in the design of new neighbourhoods that also support the health and management of waterways'* under Objective 26 (Greater Sydney Commission, 2018, p.152). A series of urban design principles are identified to integrate the creek into the urban design of new communities:

- *areas of higher density and high quality public spaces will be orientated towards waterways.*
- *walking and cycling trails will connect continuous open space along South Creek.*
- *regularly spaced bridge crossings of South Creek will provide ways to experience the parkland landscape and connect communities on either side of the creek.*
- *the design of bridges will respect the local environment and enable the movement of wildlife along the corridor (Greater Sydney Commission, 2018, p.152).*

The scenic value of landscape is also acknowledged in the plan, including waterways, urban bushland; urban tree canopy and green ground cover; parks and open spaces, which create a sense of identity (Greater Sydney Commission, 2018, p.158). Strategy 28.1 aims to '*identify and protect scenic and cultural landscapes*' and Strategy 28.2 aims to '*enhance and protect views of scenic and cultural landscapes from the public realm*' (Greater Sydney Commission, 2018, p.158).

In relation to the Western Parkland City, the plan notes the following in relation to protecting scenic values:

- historic homesteads and significant views are protected through heritage curtilages under State heritage provisions.
- other significant scenic landscapes, such as the ridgeline through the Western Sydney Parkland and the Scenic Hills around Campbelltown, are protected through environmental planning instruments.
- views to the escarpment of the Blue Mountains to the west and to the ridgelines of the Western Sydney Parklands to the east can be highlighted by retaining or creating vistas along east-west road links.
- in the flatter and drier landscape of the Cumberland Plain, creek crossings may become more prominent features emphasising waterways within the landscape. (Greater Sydney Commission, 2018, p.158).

The Greater Sydney Green Grid provides a long-term vision for a network of high quality green areas which '*connect centres, public transport and public spaces to green infrastructure and landscape features*' and '*includes enhanced waterway corridors, transport routes, suburban streets, footpaths and cycleways*' under Objective 32 (Greater Sydney Commission, 2018, p.168).

2.2.2 Western City District Plan

The Western City District Plan establishes the Greater Penrith to Eastern Creek Growth Investigation Area, which connects the Penrith central business district, Nepean Hospital, Western Sydney University's Penrith campus (at Kingswood and Werrington) and St Marys through to the M7 Motorway and Eastern Creek. The plan provides direction for delivering a '*city in its landscape*' and outlines a series of planning priorities to achieve this.

Planning Priority W12 aims to protect and improve the District's waterways and recognises the importance of waterways such as South Creek in shaping the character and landscape of the Western City District (Greater Sydney Commission, 2018b, p108).

Planning Priority W13 aims to create a Parkland City *'urban structure and identity, with South Creek as a defining spatial elemen*t' consistent with the Greater Sydney Region Plan (Greater Sydney Commission, 2018b, p113).

Urban tree canopy cover is intended to be increased under Planning Priority W15 consistent with the Greater Sydney Region Plan through the delivery of green grid connections. South Creek, Kemps Creek, Kemps Creek Nature Reserve, Ropes Creek and Western Sydney Parklands are identified as priority corridors and projects important to the District.

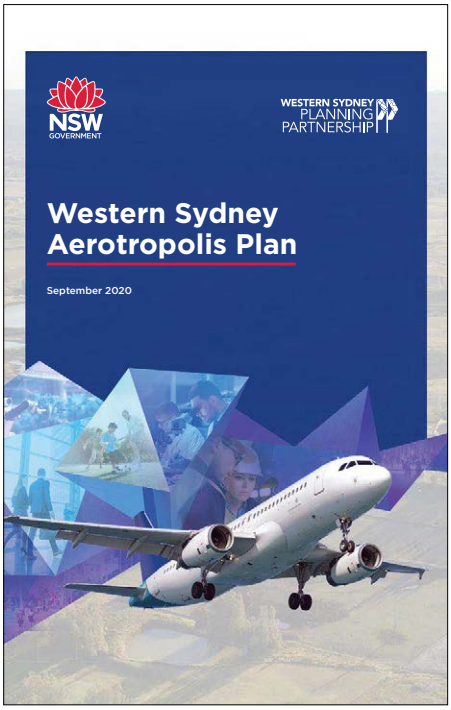
Planning Priority W16 aims to protect and enhance scenic and cultural landscapes which contribute to the *'identity and international profile of Greater Sydney'* (Greater Sydney Commission, 2018b, p124). Scenic landscapes important to the Western City District include *'the Greater Blue Mountains World Heritage Area, the Western Sydney Parklands, Mulgoa Valley, the Bargo and Nepean River gorges, the Razorback Range at Picton, the Scenic Hills between Campbelltown and Camden, and the rural hills and ridgelines of the Camden and Wollondilly'* (Greater Sydney Commission, 2018b, p124).

Key actions to achieve this include:

- *identify and protect ridgelines, scenic and cultural landscapes, specifically the Scenic Hills, Mulgoa Valley and the escarpments of the Blue Mountains. (Action 76)*
- *enhance and protect views of scenic and cultural landscapes from the public realm. (Action 77) (Greater Sydney Commission, 2018b, p124).*

2. LEGISLATIVE AND POLICY CONTEXT

2.2 State government policy



2.2.3 Western Sydney Aerotropolis Plan

The Western Sydney Aerotropolis Plan is a government policy framework which sets the vision, Structure Plan, planning objectives and principles for the Aerotropolis. It aligns with the Region Plan and District Plan and informs the development of precinct plans and master plans in the Aerotropolis.

The vision for the Aerotropolis anticipates a place where development … *'is framed around the Wianamatta–South Creek corridor and an expansive network of parklands and waterways to realise the cool and connected Western Parkland City. Above all, it respects and connects Country. It creates opportunity, amenity and sustainability for workers and residents in Western Sydney.'* (p.18)

To achieve this vision for the Aerotropolis there will be a landscape-led approach that innovatively *'interweaves urban planning, landscape and urban design'.* It is intended that this approach … *'brings new thinking to land use and transport patterns and focuses on the structural elements required to create a cool and green Western Parkland City.'*

In particular, it will recognise 'blue and green infrastructure – major waterways, parks or green spaces – as the kind of elements that should shape the future of a city, just as major roads, rail lines, universities or hospitals have done traditionally. (p.20)

This document includes a structure plan (see Figure 2.2) which shows the project and surrounding future land uses.

2.2.4 State Environmental Planning Policy (Western Sydney Aerotropolis) 2020

The Western Sydney Aerotropolis State Environmental Planning Policy 2020 (SEPP) is an instrument created under EP&A Act. It includes objectives and key controls for development in the Aerotropolis, zones land broadly to permit or prohibit land uses, and provides a framework for precinct and master planning.

This plan zones project alignment as SEPP (Major Infrastructure Corridors) 2020 (MIC). The Plan identifies the creek corridors as Environment and Recreation (ENZ) and areas outside of this as Enterprise (ENT) and Mixed Use (MU) between the Warragamba to Prospect Water Supply Pipelines and Elizabeth Drive in the north, and between Badgerys Creek and The Northern Road in the south. Western Sydney International is zoned (SPZ).

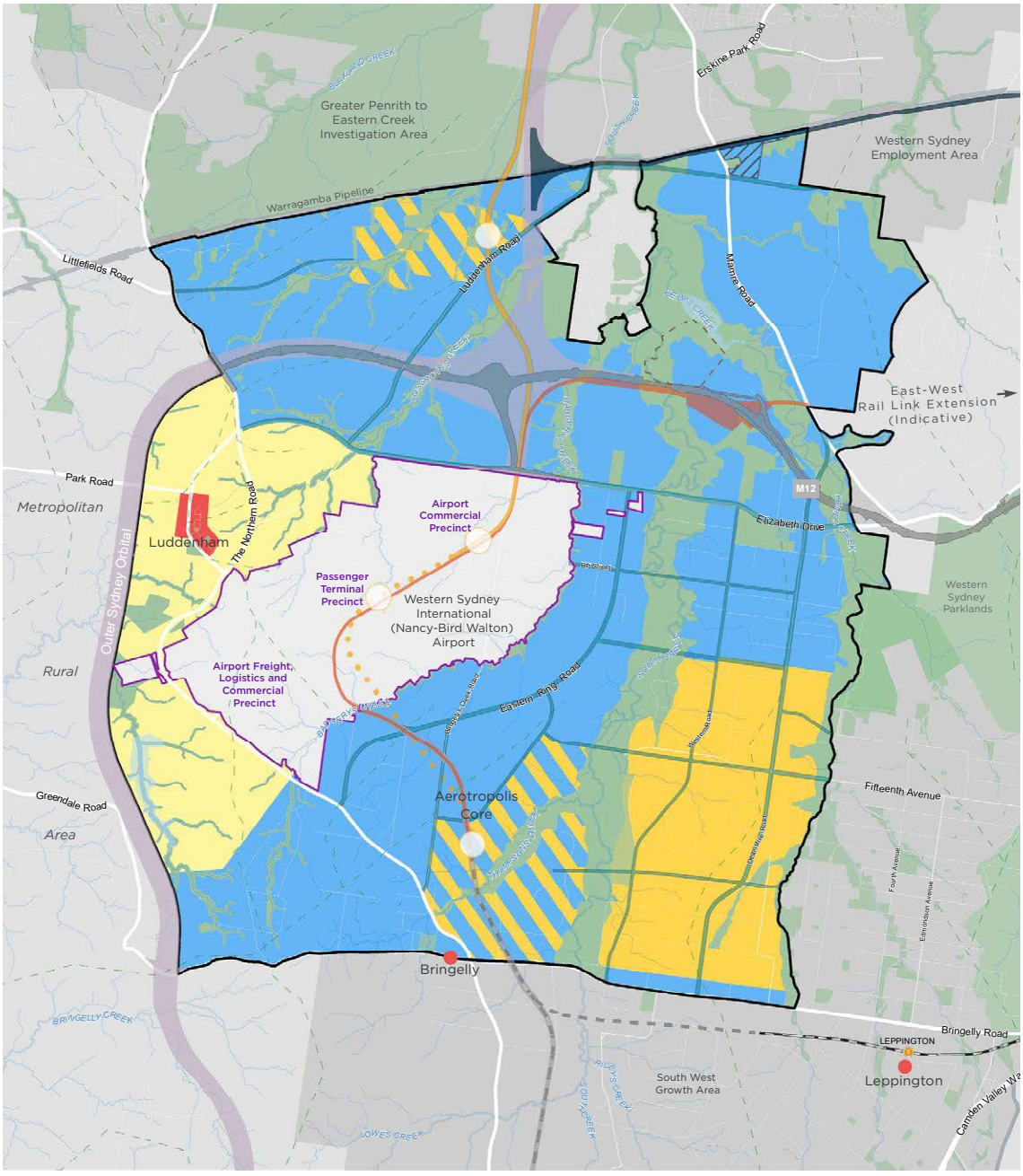
In relation to trees and vegetation in the Environment and Recreation Zone, the Policy intends to '*preserve the amenity of the Western Sydney Aerotropolis through the preservation of trees and vegetation.'* (Part 4, clause 27 (1) (a)).

The plan has a strong emphasis on achieving Design Excellence, with the following objectives:

'(a) to ensure development in the Western Sydney Aerotropolis is consistent with the policy entitled Better Placed, published by the Government Architect NSW in May 2017, and

(b) to deliver the highest standard of architectural, urban and landscape design.' (Part 5, Objective 31)

2.2 State Government Policy



Structure Plan
Western Sydney Aerotropolis

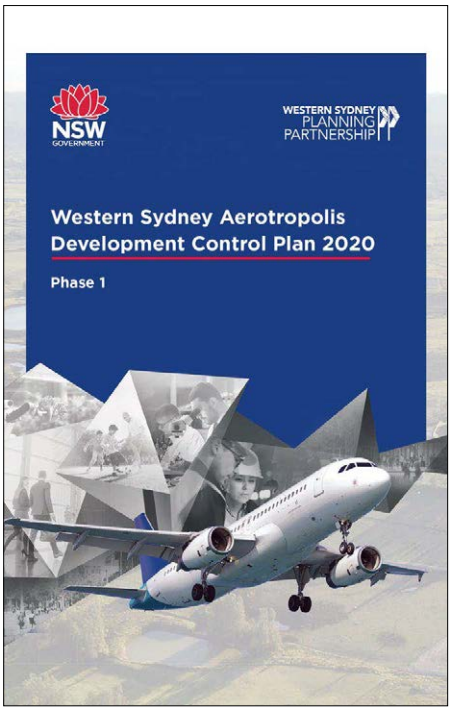
- Western Sydney Aerotropolis
- Western Sydney International (Nancy-Bird Walton) Airport
- Key Network Upgrade
- M12 Motorway Corridor
- Proposed Transport Corridor Potential
- Intermodal Terminal
- Upper South Creek Advanced Water Recycling Centre
- Metro Station
- Sydney Metro - Western Sydney Airport
- Sydney Metro - Western Sydney Airport Tunnel Alignment
- Proposed Future Rail Links
- Potential East-West Rail Link and Stabling
- Western Sydney Freight Line Corridor
- North South Rail Line Corridor
- Centre
- Topographic Ridgeline
- Luddenham Village
- Agribusiness
- Environment and Recreation
- Enterprise
- Urban Land
- Mixed Use

0 0.5 1 2 Kilometres
N

FIGURE 2-2 WESTERN SYDNEY AEROTROPOLIS STRUCTURE PLAN (SOURCE: NSW DEPARTMENT OF PLANNING AND ENVIRONMENT, 2020, P.27)

2. LEGISLATIVE AND POLICY CONTEXT

2.2 State government policy



The consent authority must have regard to how development addresses, among other things, the following considerations which are relevant to this landscape and visual impact assessment:

… *'(d) the relationship of the development with other buildings (existing or proposed) on the same site or neighbouring sites in terms of separation, setbacks, amenity and urban form,*

(e) the bulk, massing and modulation of buildings,

(f) street frontage heights,

(g) environmental performance and amenity standards, such as sustainable design, overshadowing and solar access, visual and acoustic privacy, noise, wind and reflectivity, …

(i) pedestrian, cycle, vehicular and service access and circulation requirements, including the permeability of pedestrian networks,

(j) the impact on, and proposed improvements to the public domain,

(k) the impact on special character areas,

(l) achieving appropriate interfaces at ground level between the building and the public domain,

(m) architectural diversity where the development is to consist of more than 2 buildings.' (Part 5 Design Excellence, clause 35 (2))

2.2.5 Western Sydney Aerotropolis Development Control Plan 2020 - Phase 1

The Western Sydney Aerotropolis Plan Development Control Plan 2020 (DCP) (NSW Government Department of Planning and Environment, 2020) provides a planning framework for the Western Sydney Aerotropolis and surrounds. This Phase 1 DCP identifies the precinct planning principles, objectives and performance outcomes to allow precinct planning to progress. (p.6)

The DCP provides controls which guide development to achieve connectivity, liveability, productivity, and sustainability including the following aims which are of relevance to this landscape and visual assessment:

- *'c) recognising and reinforcing the distinctive characteristics of the Western Parkland City;*
- *d) adopting the principles set in the Government Architect NSW's Better Placed and Greener Places; …*
- *f) protecting and enhancing the green and blue assets of the area; …*
- *h) encouraging design that maintains and enhances the character and heritage significance of Aboriginal and European heritage items and heritage conservation areas;'* (NSW Government Department of Planning and Environment, 2019, p.6).

This Plan embraces the transformational potential of the Aerotropolis and airport and advocates a Landscape-led approach. (NSW Government Department of Planning and Environment, 2020, p6).

This approach will: *'Recognise regional blue and green infrastructure as a major 'city shaper' at the same level of significance as transport and social infrastructure'.* It will also adopt a *'landscape led*' approach to planning and urban design, including to: a) start with Country, b) retain water in the landscape, c) preserve, extend and restore the green (structured around the Wianamatta-South Creek green spine and tributaries), d) locate transit corridors within walking distance to landscape amenity, e) orientate urban development towards landscape amenity and connected to transit corridors; and f) adopt urban typologies which '*retains water in the landscape*' and provides '*a high level of liveability*'. (NSW Government Department of Planning and Environment, 2020, p.9)

This document provides an overview of future land uses and the proposed sequence of development within Western Sydney Aerotropolis. It identifies the vision and objectives of the precincts shown in the structure plan (see Figure 2.2) contained within the *Western Sydney Aerotropolis Plan.*

The project alignment passes through two precincts identified in this DCP, the Northern Gateway and Aerotropolis Core, located to the north and south of Western Sydney International respectively.

A vision and objectives for each precinct has been provided in the DCP, and include the following:

Northern Gateway precinct

The vision statement for this precinct says in relation to the Northern Gateway precinct .. *'Wianamatta-South Creek will be the central structural element to the open space network within the Aerotropolis providing key connectivity linkages and environmental conservation areas. It will provide an important interface to surrounding development. The precinct will build on this connectivity, ensuring that the existing native vegetation, topography and Country connections are founding elements for the design of the precinct. Landscaped connections between Wianamatta-South Creek, Badgerys Creek and Cosgroves Creek will integrate remnant and additional vegetation and green shaded pedestrian paths and cycleways.*' (NSW Government Department of Planning and Environment, 2020, s2.2.1, p.15).

The vision statement also describes the intended outcome as … *'Quality urban design, landscape including large street trees, furnishing and material finishes will make streets attractive green places for pedestrians and cyclists. Landmark buildings are to be located on corner allotments to reinforce intersections as well as higher elevation points. All buildings will be of high design quality incorporating sustainability, renewable energy systems and environmentally friendly qualities.*' (NSW Government Department of Planning and Environment, 2020, s2.2.1, p.16).

The objectives relevant to this landscape and visual impact assessment include:

… *c) Provide for high quality architectural and design outcomes which take advantage of site characteristics and require buildings to face and activate creek lines, contributing to the character of the precinct.*

h) Achieve high levels of water retention in the landscape to achieve healthy waterways, facilitate and support effective flood mitigation. (NSW Government Department of Planning and Environment, 2020, s2.2.2, p.16).

Aerotropolis Core precinct

The vision statement for this precinct says in relation to the project ... *'The precinct will be planned around a new Sydney Metro station and be supported by commercial and retail uses, creative industries, civil and cultural facilities, and world-class public open spaces. The precinct will support a thriving, inclusive and safe day-time and night-time economy for workers, residents and visitors, both domestic and international.'* (NSW Government Department of Planning and Environment, 2020, s2.1.1, p.13).

The objectives relevant to this landscape and visual impact assessment include:

… *'e) Create a highly distinctive city character with a public domain of outstanding urban design, architectural and landscape merit that responds to site characteristics and context.*

2. LEGISLATIVE AND POLICY CONTEXT

2.2 State government policy

f) Develop street networks and links to rail stations to accommodate public transport infrastructure provision to allow for a 30-minute city and create pedestrian orientated development centred around key destinations and around transport nodes, for example metro station/s. …

h) Establish public and private domains which mitigate and adapt to urban heat and support innovative water sensitive urban design. …

k) Achieve high levels of water retention in the landscape to achieve healthy waterways, contribute to greening and cooling, and facilitate and support effective flood mitigation.' (NSW Government Department of Planning and Environment, 2020, s2.1.2, p.14).

In the future detailed precinct plans will be prepared that identify the development intent and development capacity across each precinct to ensure the development of a sense of place and identity for the Aerotropolis, whilst ensuring local character and amenity is maintained and enhanced.

2.2.6 Better Placed

The Office of the NSW State Government Architect has prepared a suite of documents under the title of 'Better Placed' which aim to improve the urban design quality of places in NSW. These documents include:

- Better Placed: An integrated design policy for the built environment of NSW (2018)
- Better Placed: Draft Good Urban Design Strategies for realising Better Placed objectives in the design of the built environment (2018)
- Better Methods: Evaluating Good Design, Implementing Better Placed design objectives into projects (2018).

These documents are intended to inform those involved in the design, planning, and development of the built environment in NSW. The overriding policy establishes the objectives and expectations in relation to design and creating good places. Further detail on these plans, and how they have been used in the evaluation of the landscape impacts of the project are included in Section 3 of this technical paper.

These documents include seven objectives and suggested criteria for the evaluation of projects against these objectives.

These objectives are:

- better fit contextual, local and of its place
- better performance sustainable, adaptable and durable
- better for community inclusive, connected and diverse
- better for people safe, comfortable and liveable
- better working functional, efficient and fit for purpose
- better value creating and adding value
- better look and feel engaging, inviting and attractive.

2.2.7 Greener Places

The *Greener Places, Establishing an urban Green Infrastructure policy for New South Wales* draft policy is intended to guide the design, planning and delivery of green infrastructure across NSW. This includes strategically planned, designed, and managed parks, bushland, gardens and tree lined streets to support '*good quality of life in an urban environment'* (Government Architect NSW, 2017 p.11).

Green Infrastructure is identified in this policy as an essential asset which '*should be as integral to NSW as its roads, rail lines and storm water pipes'* (Government Architect NSW, 2017, p.14). This policy identifies the Government's infrastructure and urban renewal projects as an opportunity for the delivery of quality Green Infrastructure.

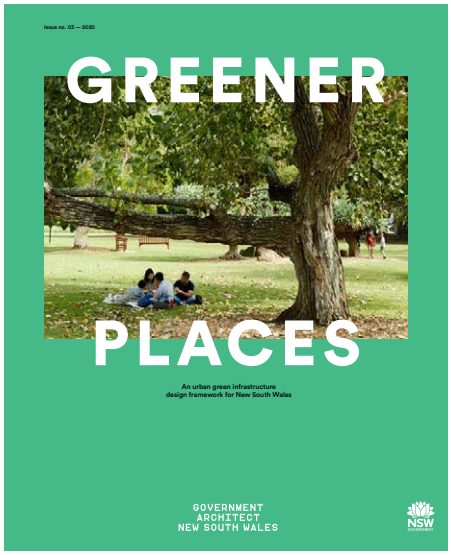
One of the four key principles to help deliver Green Infrastructure in NSW is the '*connectivity*' of green spaces, particularly in and around high-density precincts, including design actions to increase planting along rail corridors and streets. Another principle is '*multifunctionality*', which promotes the ability of Green Infrastructure projects to deliver multiple objectives such as strengthening the image and identity of a locality whilst improving access to open space.

Greener Places Design Guide

The draft Greener Places Design Guide, prepared by the Office of the State Government Architect NSW, is intended to provide a 'consistent methodology to help State and local government, and industry create a network of green infrastructure' across NSW (Government Architect NSW, 2020 p.4). The document provides a guide for each of the three categories that make up the green infrastructure network, including:

- Open space for recreation: green infrastructure for people
- Urban tree canopy: green infrastructure for climate adaptation and resilience
- Bushland and waterways: green infrastructure for habitat and ecological health.

The urban tree canopy guide proposes an 'improved approach for NSW, outlining the strategies and indicative targets to achieve improved canopy cover across the Greater Sydney Region, and other urban areas across NSW' (p.32). The target for the Greater Sydney Region is to achieve 40 per cent urban tree canopy cover by 2056 (p.35), which aligns with the Greater Sydney Region Plan, and the Department of Planning, Industry and Environment's 5 Million Trees



Program, and is based on international and national best practice. The guide proposed three strategies to reach this target, which are to: Protect, maintain, and enhance the existing urban tree canopy; Create an interconnected urban tree canopy across NSW' and Build knowledge and awareness of urban tree canopy across State and local government, and the community.

2.2.8 Sydney Green Grid

The *Sydney Green Grid, Spatial Framework and Project Opportunities* document, prepared by the State Government Architect NSW, identifies green space as a key hallmark of liveability. The Sydney Green Grid proposes the creation and consolidation of a *'network of high quality green areas that connect town centres, public transport networks and major residential areas*' (State Government Architect NSW, 2017, p.7), enhancing open space throughout greater Sydney.

The project is located in the '*West District'*, which '*forms the periphery of the Sydney metropolitan area*' (p.224). This district is strongly characterised by the Greater Blue Mountains, which provide a '*visual backdrop for the Western suburbs of the Sydney Metropolitan area*' (p.223). Other important landscape features in the district include the network of tributaries that traverse the district such as South Creek, areas of remnant bushland, and floodplains, often containing '*significant areas of open space*' or used for agricultural and rural resource lands.

These areas '*continue to come under pressure with urban development and housing growth within the district*' (p.223).

Two '*priority'* Green Grid projects opportunities have been identified within this district which are in close proximity to the project, include:

- South Creek project, which passes through the 'South West Growth Area' and '*will act as a major open space corridor for the future development of the region*' (p.247)
- Warragamba to Prospect Water Supply Pipelines Open Space Corridor, which aims to use '*surplus easement lands for recreational open space, urban greening and walking and cycling trails'* to provide a '*significant amount of linear open space through the South West Growth Centre'* (p.250)

Other important green grid opportunities which are near the project, include:

- Ropes Creek project aims to create a green link that connects nearby suburbs through provision of '*a diverse and connected sequence of recreational open spaces, walking and cycling trails*' (p.252)
- Great Western Highway: Penrith to Blackheath Active Transport Corridor will '*provide a safe and separated walking and cycling trail along the corridor that takes in views along the mountain escarpments*' (p.252)
- Blaxland Creek Bushland Reserve, Blaxland and Cosgrove Creek, which includes '*important open spaces for the future South West Growth Centre development'* (p.253)

Other Green Grid projects opportunities identified in the vicinity of the project include:

- South West Rail Link Extension: St. Marys to Badgerys Creek
- M4 Western Motorway Corridor Open Space; identified as '*important cross connection'* for green infrastructure (p.249)
- M12 Motorway Green Boulevarde
- The Northern Road Green Boulevarde: Badgerys Creek to Penrith.

2.3 Local government policy

The project alignment passes through the Penrith and Liverpool Council areas. The Local Environmental Plan (LEP) and Development Control Plan (DCP) provisions have been superceded by the *Western Sydney Aerotropolis State Environmental Planning Policy 2020* (SEPP) and *Western Sydney Aerotropolis Development Control Plan 2020 - Phase 1* in areas south of the Warragamba to Prospect Water Supply Pipelines.

The following section identifies the relevant local government policies provided by these local authorities for context.

2.3.1 Penrith City Council

Penrith City Council has recently prepared a Local Strategic Planning Statement which outlines Penrith's economic, social and environmental land use needs over the next 20 years. It highlights those characteristics that make Penrith special and outlines how growth and change will be managed into the future.

There are several studies and strategies which have been prepared to inform and support the *Penrith Local Strategic Planning Statement (2020)*. Of relevance to this assessment is the *Draft Penrith Rural Lands & Village Strategy* and the *Penrith Scenic & Cultural Landscapes Study*.

While this project is not subject to local government requirements, the following paragraphs describe the relevant special character values and strategies identified in the *Penrith Local Strategic Planning Statement*, *Draft Penrith Rural Lands & Villages Strategy* and *Penrith Scenic & Cultural Landscapes Study*. The relevant objectives within Penrith City Council's LEP and DCP, however, are addressed in the relevant assessment chapter of this report (see chapters 5-8) where they provide detail specific to each locality.

Penrith Local Strategic Planning Statement

The Western Sydney International, the Aerotropolis and the Sydney Metro - Western Sydney Airport (referred to as North South Rail Link) are identified in the *Penrith Local Strategic Planning Statement* (LSPS) as '*catalysts for re-imagining the Western Parkland City*' (Penrith City Council, 2020, p.51). Sydney Metro – Western Sydney Airport, between St Marys and the Western Sydney Aerotropolis, is described as '*city-shaping transport infrastructure*' (p.51). A Structure Plan has been developed to guide investment and development within and along the project alignment. It identifies a 'Green Corridor' along South Creek and across the rural areas between the proposed 'Orchard Hills Centre' and 'Sydney Science Park' to protect areas identified as scenic landscape features (p.53).

The Penrith LSPS refers to the *Scenic and Cultural Landscapes Study* for the protection and management of scenic landscapes and the *Draft Rural Lands and Villages Strategy* for measures to protect rural landscapes and village character. Both strategies have been prepared to inform and guide zoning, land use, protection of valued features and development within Greater Sydney's Metropolitan Rural Area, including the preparation of local character statements for each of the villages and rural localities.

Draft Penrith Rural Lands & Villages Strategy

The purpose of the Draft Penrith Rural Lands & Villages Strategy (2019) is to guide long term planning of Penrith's rural lands. It aims to protect and enhance the City's rural landscapes, natural areas and character by establishing and protecting rural area boundaries in the council area, including in the south-east, between the Orchard Hills and Aerotropolis Precinct.

South of the M4 Western Motorway, the project is located in the 'Rural South East Precinct', also identified as a 'transition area', between urban and rural parts of Penrith. Rural planning efforts within this precinct are largely focused around the South Creek Corridor (encompassing riparian lands associated with South Creek, Kemps Creek, Cosgroves Creek and Blaxland Creek) which is expected to remain '*characteristically rural, providing an important landscape-scale green break*' within this Precinct.

There are no 'visual gateways' or 'rural vistas' identified in the vicinity of the project.

Penrith Scenic & Cultural Landscapes Study

The purpose of the Penrith Scenic and Cultural landscapes Study (Penrith City Council, 2019c) is to identify, protect and manage Penrith's scenic and cultural landscapes. The alignment is not located in any of the landscapes identified as having significance.

Eight broad landscape character units (LCUs) have been identified within the Penrith LGA. These units are based on characteristics such as landform, land use and vegetation cover.

Areas of the project alignment, north of the M4 Western Motorway, would extend through the *Central Urban Area* LCU. The important characteristics of this LCU include:

- *regional views to the Blue Mountains and South Creek corridor from high points, along east-west aligned streets, and from M4 Western Motorway bridges*
- *rural areas and large tracts of vegetation which provide green breaks to the main urban area.*

Areas of the project alignment to the south of the M4 Western Motorway are located within the *South-eastern low hills and valleys* LCU. The important characteristics of this LCU include:

- large tracts of native vegetation in the north (Department of Defence land)
- regional views from locations including parts of Luddenham Road and Elizabeth Drive.

The project alignment crosses Blaxland and Cosgroves creeks which are identified as having '*an important scenic role in providing green breaks across the rural landscapes and separating urban areas from each other'* (s. 4.3.3).

Orchard Hills Station would be located in one of the five areas identified as '*highly visually-sensitive landscapes*'. This area, Visually Sensitive Landscape 1 (VSL1), includes areas to the north and south of the M4 Motorway between South Creek and The Northern Road. This area is described in the strategy as a rural area that forms part of a visual green break to Penrith's main urban area.

Penrith Cooling the City Strategy

This document draws upon existing programs and strategies as well as recommendations from expert consultants' reports to make suggestions for various activities to cool Penrith's urban areas. It identifies green infrastructure, particularly '*tree planting and landscaping'*, as '*one of the most successful approaches'* to cool cities (Penrith City Council, 2015, p.5). It also advocates use of '*light-coloured surfaces*' (as opposed to darker surfaces e.g. asphalt, dark tiles, dark paint) in urban areas to minimise their potential to store heat and Water Sensitive Urban Design measures such as '*permeable pavements*' for their cooling effect (p.19).

Recommended actions for Penrith are included in the '*Opportunities in Penrith*' section of this Strategy. Relevant actions include:

- Ensure trees removed by consent have replacement conditions wherever practicable (p.6)
- Establish canopy cover targets for priority urban areas and as appropriate integrate them with city planning documents (p.16)
- Create High and Station Streets as landscaped and cool 'complete streets' (p.24)
- Landscape and upgrade public squares, parks and spaces to 'cool down' the City Centre (p.25)
- Minimise impervious surfaces where practical by replacing asphalt and concrete with porous surfaces (p.27)

2.3.2 Liverpool City Council

Liverpool Council has recently prepared a Local Strategic Planning Statement to provide a plan for the community's social, environmental and economic land use over the next 30 years. The Local Strategic Planning Statement is a strategic document. In addition to the Local Strategic Planning Statement, Liverpool Council has a LEP and DCP which guide development and provides further detail.

While this project is not subject to local government requirements, the *Liverpool Local Strategic Planning Statement* is discussed below. There are no relevant objectives within the LEP and DCP which are relevant to this assessment.

Liverpool Local Strategic Planning Statement: 'Connected Liverpool 2050'

The LSPS acknowledges that there will be rapidly expanding development in Liverpool which will substantially alter its character over time. Relevant to the landscape and future character, a key priority of the *Liverpool Local Strategic Planning Statement* is the protection and enhancement of bushland, waterways (including Badgerys Creek and South Creek) and rural lands. Council also intends to '*substantially increase tree canopy cover*' and improve gateway entry experiences into the local government area, including through landscaping (p.64, Liverpool City Council, 2020).

2.4 Summary

In summary, these plans and strategies demonstrate that the Greater Sydney Commission, Penrith and Liverpool City councils are committed to maintaining green corridors and key vistas, as well as transforming the landscape character in a way that creates a high quality landscape character and visual amenity. These commitments are fundamental to creating a 'Western Parkland City' which is a 'city in its landscape'.

3. METHODOLOGY

3.1 Guidance for landscape and visual impact assessment

This section summarises the methodology which has been used to conduct the landscape and visual assessment for the project.

3.1 Guidance for landscape and visual impact assessment

A range of guidance is available for the assessment of landscape and visual impact. In New South Wales the following are typically referred to:

- *EIA-N04 Guidelines for Landscape Character and Visual Impact Assessment, Transport for NSW, 2018*
- *The Guidance Note for Landscape and Visual Assessment, Australian Institute of Landscape Architects Queensland, 2018.*

The methodology used for this project is described below and is consistent with the direction offered by these documents.

3.2 Approach

Due to the diversity of the landscape settings and changing character of the study area, several different approaches to the assessment of landscape character and visual impact assessment are required to adequately consider the impacts of the project and meet the requirements of the NSW SEARs and Commonwealth requirements.

The requirements for the assessment and approval of off-airport and on-airport land are not substantially different, however, Stage 1 of the airport is currently under construction which is changing the landscape character and the potential visibility of the project.

There is some certainty around the future condition of particularly the Stage 1 areas of the airport. The vision of a future Western Parkland City, however, is still emerging so that there remains some uncertainty around the future landscape character of the off-airport landscape. Therefore, a different assessment approach has been used for the on-airport and off-airport sections of the project.

For off-airport areas there are two approaches that suit the development density of the landscape, these are:

- An urban design approach for the existing highly urban area of St Marys, at the northern end of the project alignment. The nature of this environment is a dense townscape character which would require consideration of landscape features unique to the urban environment. For this reason, there is an urban design focused assessment of landscape impact in this section of the project alignment which considers accessibility, legibility, changes to the public realm, street trees and urban greenery.
- A landscape character approach for the suburban and rural area to the south of the St Marys town centre. A landscape character and viewpoint assessment is appropriate for these areas of the project. This assessment considers the existing landscape character of the area in terms of landform, landcover and changes to built form.

The assessment of landscape and visual impact for the on-airport areas of the project requires a third approach as it relates to a landscape which is transitioning from a rural landscape to an airport with a relatively predictable future character. This assessment has therefore applied a typology method to the landscape and visual assessment. This method assumes construction of the project concurrently with Western Sydney International Stage 1 construction for the assessment of construction impacts.

The future character of the completed Western Sydney International Stage 1 is assumed as a baseline for operational impacts. This approach identifies the different types of construction activities and built elements that are proposed and assesses these types against the predicted character of the Western Sydney International Stage 1 Construction Impact Zone and operation respectively. For the future stages of the airport it has been assumed that there would be an interim treatment for this area followed in the longer term by construction and then operation of the future stages of the airport as identified in the Western Sydney Airport Plan. The impact of the project in relation to these anticipated future landscape conditions has been considered generally.

The study area has been divided into areas based on landscape character (see Section 3.3.2 of this technical paper).

A detailed landscape and visual assessment for has been carried out for each of these landscape character areas in the following steps:

- Describe the existing environment for the landscape character area
- Describe the components and character of the project works for this area
- Identify landscape character impacts during construction and operation
- Identify daytime visual impacts during construction and operation
- Identify night-time visual impacts during construction and operation.

The following section describes in detail the method for each of these steps.

3.3 Existing environment

The existing environment has been described in terms of the aspects which are relevant to the assessment of landscape and visual impact. This involved the determination of a suitable study area for this assessment and dividing the study area into areas based on their landscape character.

3.3.1 Determining the study area

The study area for the project extends to include the potential visual catchment of the project, this was determined by considering the potential distance at which the proposed development would be discernible within a view. Within this area, a catchment has been identified to include those areas where the development would not be screened by intervening vegetation or built form (see Section 1.7 and 3.5.2.1).

3.3.2 Landscape character areas

Landscape is defined by RMS (2018) as … '*All aspects of a tract of land, including landform, vegetation, buildings, villages, towns, cities and infrastructure*.' Landscape character is defined as the … '*combined quality of built, natural and cultural aspects which make up an area and provide its unique sense of place'*. Landscape character areas have … *'broadly homogeneous characteristics or strongly defined spatial qualities*'.

The key landscape and visual features of each landscape character area have been identified to describe the existing environment of the study area. Site visits were carried out between February and September 2019, and the existing character, landscape elements and views were recorded from observations and with photographs. From this analysis, the study area has been divided into broad landscape character areas based upon these broad characteristics.

The identification of landscape character areas for the project has taken into consideration a range of factors including, but not limited to:

- topography, vegetation type and cover, waterways, agricultural uses, heritage qualities, open space, transport networks
- built form including the style of architecture, the materials, forms and design qualities
- the scale and pattern of infrastructure including rail, footpaths, roads, bridges, electricity pylons, dams etc.
- the spatial qualities of an area i.e. how enclosed or open it is, how settlements fit into their natural setting.

Any planning designations of an area relating to landscape character have been used, as appropriate, in the determining of landscape character areas.

The landscape and visual conditions of the study area are evolving and changing over time and future development is redefining land use and the character of the study area in some locations. Where this is occurring, the future character and conditions of each precinct have been identified. This includes developments with a high level of certainty, including those currently under construction or with planning approval.

For on-airport areas, the future anticipated landscape character of the airport has been described rather than the existing conditions, which are rapidly changing as the runway and airport precinct construction progresses (see Section 3.2).

3.4 Project components and character

A short summary of the key components of the project that would potentially cause a landscape or visual impact have been described for each landscape character area. This includes a description of the activities that would occur throughout construction and operation, during the day and at night.

3.5 Landscape and visual assessment methodology

The assessment considers landscape and visual impacts separately. The assessment of each is determined by combining the sensitivity of the receiver (landscape character area or view), with the magnitude of change that would occur as a result of the project, to assign a level of impact. The following section explains this approach further.

3.5.1 Landscape character impact assessment

Landscape sensitivity

Landscape sensitivity is the *'inherent capability of the area to absorb change of the order of the proposal*' (RMS 2018). Sensitivity is defined in the Australian Institute of Landscape Architects guideline (2018) as the *'capacity of the landscape to absorb change without losing valued attributes.'*

The identification of sensitivity relies on determining what the valued attributes are. In order to protect landscapes that are most valued by the community, the judgement of sensitivity includes reference to any recognition of landscape value in legislation such as for a National Park or World Heritage Listed landscapes as the community values are reflected in these designations.

The sensitivity of a landscape may reflect the frequency and volume of users in a location but may also be valued for other characteristics such as tranquillity, visual relief and contribution to microclimate. 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.

For landscape features and character areas not afforded national, state or regional recognition, the quality of the landscape compared to other landscape character areas is relevant. This includes factors such as landscape quality, coherence, uniqueness and rarity. The future desired character of the landscape as identified in the Penrith and Liverpool Local Strategic Planning Statements and the Western Sydney Aerotropolis Plan 2020 documents are also taken into consideration.

The sensitivity of landscape features is considered in the broadest context of possible landscapes, from those of national importance through to those considered to have a neighbourhood landscape importance (see Table 3-1). Landscape features which are afforded legislative protection are specifically identified in the policy context section of this assessment (see Section 2. Legislative and policy context).

TABLE 3-1 LANDSCAPE SENSITIVITY LEVELS – URBAN AREAS

Landscape sensitivity	Description
National	Landscape feature or character area with national or international protection, is valued as a national icon, such as the Greater Blue Mountains World Heritage Area, World Heritage Listed Parramatta Park, or the forecourt of the World Heritage Listed Sydney Opera House.
State	Landscape feature or area of the landscape that is heavily used and/or is iconic to the State, such as Martin Place.
Regional	A landscape feature or area of landscape that is heavily used and valued by residents of a major portion of a city or a non-metropolitan region, such as Western Sydney Parklands, Penrith Lakes Regional Park.
Local	Landscape feature valued and experienced by concentrations of residents and/or local recreational users. Provides a considerable service to the community. For example, it provides a place for local gathering, recreation, sport, street use by cafes and/or shade and shelter in an exposed environment, such as Werrington Lakes Reserve, Burton Street, Werrington.
Neighbourhood	Landscape feature valued and appreciated primarily by a small number of residents, such as street trees in a local street, or from workers in an intensive agricultural or industrial area. Provides a noticeable service to the community. For example, it provides a seat or resting place, passive recreation and/or some shade and shelter in a local street.

3. METHODOLOGY

3.5.1 Landscape character impact assessment

The landscape manifests itself differently in urban environments compared to suburban, rural and natural areas and as a result the categories for the assessment are different for each setting.

Table 3-2 summarises the landscape sensitivity levels that have been used for this assessment of suburban and rural areas.

TABLE 3-2 LANDSCAPE SENSITIVITY LEVELS – SUBURBAN AND RURAL AREAS

Landscape sensitivity	Description
National	Landscape feature or character area with national or international protection. It may be valued as a national icon, and would be a coherent, high quality landscape which has a limited capacity to absorb change without losing valued attributes, such as the Greater Blue Mountains World Heritage Area, World Heritage Listed Parramatta Park, or the forecourt of the World Heritage Listed Sydney Opera House.
State	Landscape feature or character area which is protected at a state level. It would attract visitors from across the state, have a high landscape quality and level of coherence. It has a limited capacity to absorb change without losing its valued attributes, such as Nattai National Park or the Burragorang State Conservation Area.
Regional	Landscape feature or character area which is valued by residents of a major portion of a city or a non-metropolitan region. It may be a rural or residential landscape with valued landscape qualities and a strong cohesion, or a regional park with landscape that attracts visitors from across the region with some capacity to absorb change without losing its valued attributes, such as Western Sydney Parklands or Penrith Lakes Regional Park.
Local	The landscape character is valued by the local community and may be recognised in a Local Environmental Plan, Development Control Plan, or Local Strategic Planning Statement. The landscape is of lower quality and cohesion, with some capacity to absorb change without losing its valued attributes, such as Werrington Lakes Reserve, Twin Creeks Golf and Country club and surrounding residential area, Luddenham Road and village.
Neighbourhood	Landscape character not widely valued. It may be appreciated primarily by workers or a small number of isolated residents, such as street trees in a local street. May be fragmented and mixed in character and use or highly modified. It would have a high capacity to absorb change without losing its valued attributes, such as the intensive agricultural landscapes of Luddenham or Bringelly, the working areas of Western Sydney International, or the industrial areas of Erskine Park.

3.5.1 Landscape character impact assessment

It is noted that there are no identified landscapes of Aboriginal cultural heritage value in the study area that would affect the landscape sensitivity levels. However, cultural values are present within the study area which can be interpreted as physical markers indicating the long-term presence of Aboriginal people in this region. This particularly relates to the landscapes in the vicinity of the Aerotropolis Core and the waterways which connect the larger features of the landscape and the sites across it. The impact of the project on Aboriginal cultural heritage values is contained in Technical Paper 5 - (Aboriginal) of the Environmental Impact Statement.

The Non-Aboriginal cultural heritage values of landscapes within the study area have also been considered in this technical paper where they contribute to landscape character and community values. An assessment of the direct impact on Non-Aboriginal heritage values is contained in Technical Paper 4 – (Non-Aboriginal heritage) of this Environmental Impact Statement.

Landscape magnitude of change

Magnitude is the nature of the change that would occur as a result of the project. It … *'refers to the physical scale of the project, how distant it is and the contrast it presents to the existing condition.*' (RMS, 2018). This includes direct impacts such as the removal of trees or parkland, as well as indirect impacts, such as changes to the cohesiveness or function of a landscape due to changing land use and access. Changes to the landscape can be adverse or beneficial.

The value and function of the landscape differs in urban areas compared to suburban and rural landscapes. Therefore, separate criteria have been used for these different settings. Table 3-3 summarises the landscape magnitude of change levels that have been used for this assessment in urban areas.

These levels have been informed by several national and state policies. The National Urban Design Protocol (Australian Sustainable Built Environment Council, 2011) has been endorsed by the NSW Government. Its principles of good urban places refer to: enhancing, connected, diverse, enduring, comfortable, vibrant, safe and walkable urban places. Furthermore, the guidance offered by the draft policy *Better Placed: A design led approach: developing an Architecture and Design Policy for New South Wales* (Government Architect NSW, 2016) and the subsequent paper Evaluating Good Design (2018) which suggest urban design principles including: Better fit contextual, local and of its place; Better performance sustainable, adaptable and durable; Better for community inclusive, connected and diverse; Better for people safe, comfortable and liveable; Better working functional, efficient and fit for purpose; Better value creating and adding value; Better look and feel engaging, inviting and attractive.

Specific note has also been made of considerations such as changes to the functioning of footpaths, built form, changes to public art, street trees, access to parks and open space, overshadowing, as well as the types of activities supported in the public realm.

3. METHODOLOGY

3.5.1 Landscape character impact assessment

TABLE 3-3 LANDSCAPE - MAGNITUDE OF CHANGE LEVELS IN URBAN AREAS

Magnitude of change	Description
Considerable reduction or improvement	Substantial portion of the landscape is changed. This may include substantial changes to vegetation cover, the area of open space or public realm area, accessibility, permeability, legibility and wayfinding, comfort and amenity, overshadowing, activation and safety, and diversity of the public realm.
Noticeable reduction or improvement	A portion of the landscape is changed. This may include some alteration to vegetation cover, the area of open space or public realm area, accessibility, permeability, legibility and wayfinding, comfort and amenity, overshadowing, activation and safety, and diversity of the public realm.
No perceived reduction or improvement	Either the landscape quality is unchanged or if it is, it is largely mitigated by proposed public realm improvements. Does not alter or not noticeably alter the vegetation cover, the area of open space or public realm area, accessibility, permeability, legibility and wayfinding, comfort and amenity, overshadowing, activation and safety, and diversity of the public realm.

Table 3-4 summarises the landscape magnitude of change levels that have been used for this assessment in suburban and rural areas.

These levels are based on changes to the aspects, identified in the *EIA-N04 Guidelines for Landscape Character and Visual Impact Assessment* (RMS 2018), that contribute to landscape character. These aspects include topography, vegetation, natural drainage patterns, ecological characteristics and landcover, heritage qualities, built form, infrastructure and transport networks, parks and open space, spatial qualities of an area, and how settlements (farms, villages, towns, cities) fit into their setting etc.

For the on-airport landscape, the magnitude of change relates to future types of development, compared with the future landscape.

The consideration of magnitude also considers how the change aligns with planning policy and desired future character where relevant.

3.5.1 Landscape character impact assessment

TABLE 3-4 LANDSCAPE MAGNITUDE OF CHANGE LEVELS – SUBURBAN, RURAL AND FUTURE AIRPORT LANDSCAPES

Magnitude of change	Description
Considerable reduction or improvement	Substantial portion of the landscape is changed. This may include substantial changes to topography, vegetation, natural drainage patterns, ecological characteristics and landcover, heritage qualities, built form, infrastructure and transport networks, parks and open space, spatial qualities of an area, overshadowing, and how settlements (farms, villages towns cities) fit into their setting. Inconsistency with planning designations of an area relating to landscape character.
Noticeable reduction or improvement	A portion of the landscape is changed. This may include some alteration to topography, vegetation, natural drainage patterns, ecological characteristics and landcover, heritage qualities, built form, infrastructure and transport networks, parks and open space, spatial qualities of an area, overshadowing, and how settlements (farms, villages, towns, cities) fit into their setting.
No perceived reduction or improvement	Either the landscape quality is unchanged or if it is, it is largely mitigated by proposed public realm improvements. Does not alter or not noticeably alter the topography, vegetation, natural drainage patterns, ecological characteristics and landcover, heritage qualities, built form, infrastructure and transport networks, parks and open space, spatial qualities of an area, overshadowing, and how settlements (farms, villages towns cities) fit into their setting. Consistency with planning designations of an area relating to landscape character.

3. METHODOLOGY

3.5.2 Visual impact assessment

3.5.2 Visual impact assessment

This visual impact assessment aims to identify the area over which visual impacts may be experienced, the visual catchment, and the likely level of visual impact that would be experienced from locations within this catchment. For each landscape character area, a range of viewpoints were selected to illustrate the range of views within the visual catchment of the project during both construction and operation.

Visual catchment

In the urban areas of St Marys and Claremont Meadows, where the alignment is largely in tunnel, the visual catchment of the project has been identified through the interpretation of topographic data and verified through site visits.

In suburban and rural landscapes, a visual catchment has been identified for the project using digital modelling techniques. LIDAR data was used to model the landscape in three dimensions, including terrain (land surface), buildings and vegetation. Future heights along the alignment (at 200 metre intervals) were identified and a visual catchment was generated from these points. As the project is a linear element, this analysis has graded the visibility of the project from low to high based on the number of points seen from the surrounding visual catchment.

Within the airport, the future landscape is changing and therefore assumptions as to the potential visual catchment of these stations is described, based on an interpretation of the future development potential of areas surrounding these stations, based on the Airport Plan.

Viewpoint and view type assessment

A viewpoint assessment was undertaken for off-airport areas of the project. A range of views to the project were selected, representing views from a range of receptor types. Views were selected to show the worst-case scenario where possible, and to show the project in context so that issues of scale and relationship can be identified.

The selection of representative viewpoints prioritises views from publicly accessible locations in a range of locations and viewing situations. Particular attention was paid to views from places where viewers are expected to congregate such as plazas, parks, recreation areas, public transport nodes and commercial areas, views to and from heritage items, and views representing groups of private residential properties.

Due to the extensive construction work underway and transformation of the on-airport landscape, there are no publicly accessible views to the stations and the context of any views to the project would be greatly altered by the construction of the airport. A typology approach to the assessment of visual impact has therefore been undertaken for the project on-airport. This typology approach identified view types and described the future visual conditions of these views, during construction and operation.

For each view, or view type, the assessment identifies: the existing condition, the sensitivity of the view, and the magnitude of change expected as a result of the project. An overall judgement is then made to assign a level of visual impact.

Visual sensitivity

Sensitivity refers to the … *'qualities of an area, the number and type of receivers and how sensitive the existing character of the setting is to the proposed nature of change'* (RMS, 2018).

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 Commonwealth planning regulations would, by nature of their recognition in these documents, have a higher sensitivity.

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 3-5).

TABLE 3-5 VISUAL SENSITIVITY LEVELS

Visual sensitivity	Description
National	Heavily experienced view to a national icon, such as views to The Three Sisters, Blue Mountains
State	Heavily experienced view to a feature or landscape that is iconic to the State, such as views towards the Blue Mountains escarpment
Regional	Heavily experienced view to a feature or landscape that is iconic to a major portion of a city or a non-metropolitan region, or an important view from an area of regional open space, such as views to Nepean River Gorge and views to the ridgelines of the Western Sydney Parklands
Local	High quality view experienced by concentrations of residents and/or local recreational users, local commercial areas and/or large numbers of road or rail users, such as views within Mulgoa Valley. View from a local road or residence including a local landscape feature or oriented specifically towards an area of scenic quality.
Neighbourhood	Views where visual amenity is not particularly valued by the wider community. Would include scattered and isolated residences in a working rural landscape or industrial areas.

Magnitude of change to the view

Magnitude 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 magnitude of change, these are:

- elements relating to the view, such as distance, landform, backdrop, and visual enclosure
- characteristics of the project, such as the size, scale, form, line and alignment of the project.

A high magnitude of change would result if the project contrasts strongly with the existing landscape.

TABLE 3-6 VISUAL MAGNITUDE OF CHANGE LEVELS

Magnitude of change	Description
Considerable reduction or improvement	Substantial part of the view is altered. The project contrasts substantially with surrounding landscape.
Noticeable reduction or improvement	Alteration to the view is clearly visible. The project contrasts with surrounding landscape.
No perceived reduction or improvement	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.

A low magnitude of change occurs if the view has a higher capacity to absorb the type of change proposed and there would be 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. Visual change can result in an improvement or reduction in visual

amenity. An assessment of magnitude was undertaken for the construction and operation of the project.

Table 3-6 lists the terminology used to describe the magnitude of change.

3.6 Assessment of night-time visual impact

The assessment of night-time impact has been carried out with a similar methodology to the daytime assessment. However, the assessment also draws upon the guidance contained within AS4282 *Control of the obtrusive effects of outdoor lighting* (2019).

AS4282 identifies four main potential effects of lighting, which are, the effects on residents, transport system users, transport signalling systems and astronomical observations. Of relevance to this assessment is the effects of lighting on the visual amenity of residents and transport system users.

AS4282 also notes the potential visual intrusion caused by the daytime appearance of outdoor lighting systems. This potential impact has also been addressed in the daytime assessment.

AS4282 identifies environmental zones to categorise night-time landscape settings. Using these broad categories allows for an assessment to be made with the detail available at the planning approval application stage of the project and is therefore the basis for the method applied to the night-time visual assessment contained within this technical paper.

The method for night-time visual assessment is as follows.

Night-time visual sensitivity

The environmental zone (defined in AS4282) which best describes the existing night-time visual condition for each landscape character area has been selected. These zones are typical night-time settings and reflect the predominant light levels likely, based on observations of land use and lighting structures. Each environmental zone has been assigned a level of sensitivity as described in Table 3-7.

Magnitude of change at night

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

- *Sky glow – the brightening of the night sky*
- *Glare – condition of vision in which there is discomfort or a reduction in ability to see*
- *Light spill – light emitted by a lighting installation that falls outside of the design area.*

These terms are further defined in the glossary of this technical paper and in AS4282:2019.

Table 3-8 lists the terminology used to describe the magnitude of change at night.

3.6 Assessment of night-time visual impact

TABLE 3-7 ENVIRONMENTAL ZONE SENSITIVITY – NIGHT-TIME

	Environmental Zones (AS4282:2019)	
Sensitivity level	Description	Examples
Very high	A0: Intrinsically dark	UNESCO Starlight Reserve IDA Dark Sky Parks Major optical observatories No road lighting – unless specifically required by the road controlling authority
High	A1: Dark	Relatively uninhabited rural areas No road lighting – unless specifically required by the road controlling authority
Moderate	A2: Low district brightness	Sparsely inhabited rural and semi-rural areas
Low	A3: Medium district brightness	Suburban areas in towns and cities
Negligible	A4: High district brightness areas	Town and city centres and other commercial areas Residential areas abutting commercial areas

TABLE 3-8 MAGNITUDE OF CHANGE LEVELS – NIGHT-TIME

Magnitude of change	Description
Considerable reduction or improvement	Substantial change to the level of skyglow, glare or light spill would be expected. The lighting of the project contrasts substantially with surrounding landscape at night.
Noticeable reduction or improvement	Alteration to the level of skyglow, glare or light spill would be clearly visible. The lighting of the project contrasts with surrounding landscape at night.
No perceived reduction or improvement	Either the level of skyglow, glare and light spill 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.

3.7 Assigning impact levels

Assessment of landscape and visual impact has been made by combining the landscape or visual sensitivity and landscape or visual magnitude of change levels for a landscape or visual element and assigning an impact level (see Table 3-9).

Assessment of night-time visual impact has been made by combining the visual sensitivity of the environmental zone with the night-time visual magnitude of change for each precinct generally and assigning an impact level (see Table 3-10).

3.8 Management and mitigation measures

Throughout the assessment there has been an acknowledgment of measures which have been integrated into the project design that minimise landscape and visual impacts.

Following the assessment of landscape and visual impact, measures to further mitigate potential impacts have been identified. These measures include opportunities for mitigation to address daytime and night-time impacts.

3.9 Cumulative impacts

An assessment of cumulative landscape and visual impacts has been undertaken. This includes consideration of the project with other projects that may interact with the project in the future. The developments which have the potential to have a cumulative impact with the project are identified in Chapter 27 (Cumulative impacts) of the Environmental Impact Statement. For this technical paper the cumulative landscape and visual impacts of The Northern Road and St Marys Intermodal Facility have been considered. The cumulative landscape and visual assessment will identify impacts during construction and operation of the project, during the day and night.

The Western Sydney International and the future M12 Motorway, however, have been considered within the main assessment (see Sections 5 – 10 of this technical paper). This is because the construction and operation of these projects is likely to occur concurrently with the project construction and operation respectively. The future land use change expected as a part of the Western Sydney Aerotropolis and Western Parkland City has also been considered as a part of the main landscape and visual impact assessment.

3.10 Conclusion

A conclusion has been drawn based on the assessment of landscape and visual impact. The conclusion includes consideration of the significance of identified landscape and visual impacts. The significance of any identified visual impact is determined by a range of factors including the likely duration of the impact, whether the impact is permanent or reversible, and whether the impact is reasonable. A project, for example, which is in accordance with planning intentions is more reasonable than one which is in conflict with planning intentions.

TABLE 3-9 LANDSCAPE AND VISUAL IMPACT LEVELS

		Sensitivity				
		National / Very high	State / High	Regional / Moderate	Local / Low	Neighbourhood / Negligible
Magnitude of change	Considerable reduction	Very high adverse	Very high adverse	High adverse	Moderate adverse	Minor adverse
	Noticeable reduction	Very high adverse	High adverse	Moderate adverse	Minor Adverse	Negligible
	No perceived change	Negligible	Negligible	Negligible	Negligible	Negligible
	Noticeable improvement	Very high beneficial	High beneficial	Moderate beneficial	Minor beneficial	Negligible
	Considerable improvement	Very high beneficial	Very high beneficial	High beneficial	Moderate beneficial	Minor beneficial

TABLE 3-10 NIGHT-TIME VISUAL IMPACT LEVELS

		Sensitivity				
		Very High / A0: Intrinsically dark	High / A1: Dark	Moderate / A2: Low district brightness	Low / A3: Medium district brightness	Negligible / A4: High district brightness
Magnitude of change	Considerable reduction	Very high adverse	Very high adverse	High adverse	Moderate adverse	Minor adverse
	Noticeable reduction	Very high adverse	High adverse	Moderate adverse	Minor Adverse	Negligible
	No perceived change	Negligible	Negligible	Negligible	Negligible	Negligible
	Noticeable improvement	Very high beneficial	High beneficial	Moderate beneficial	Minor beneficial	Negligible
	Considerable improvement	Very high beneficial	Very high beneficial	High beneficial	Moderate beneficial	Minor beneficial

4. EXISTING ENVIRONMENT

4.1 Land cover

4.1 Land cover

The study area includes the urban areas of St Marys in the north, and continues south through a mix of residential, commercial and light industrial areas on the suburban fringe in Claremont Meadows, and to a mix of semi-rural and rural areas within Orchard Hills, Luddenham, Badgerys Creek and Bringelly in the south.

The M4 Western Motorway forms a major east west arterial road in the north of the study area and separates suburban fringe development in Penrith from semi-rural areas in Orchard Hills. Elizabeth Drive, which is a busy east west rural road connects the eastern areas of Liverpool and M7 Motorway with rural areas to the west including the rural village of Luddenham. The Northern Road provides a major north south arterial road to the west of the study area and connects the southern areas of Liverpool including Bringelly with the M4 Western Motorway and Penrith to the north. A major rail corridor (the Main Western line) separates urban development areas at St Marys in the north of the study area.

South Creek is a major waterway corridor within the study area which extends in a north south direction between St Marys and Bringelly. A series of vegetated tributaries also traverse the landscape flowing from South Creek generally in a north-easterly direction. These include Blaxland Creek, an unnamed creek, Cosgroves Creek, Badgerys Creek and Thompsons Creek. These waterways provide a structure to the landscape, separating urban development areas, creating visual catchments, and providing an attractive feature within the landscape.

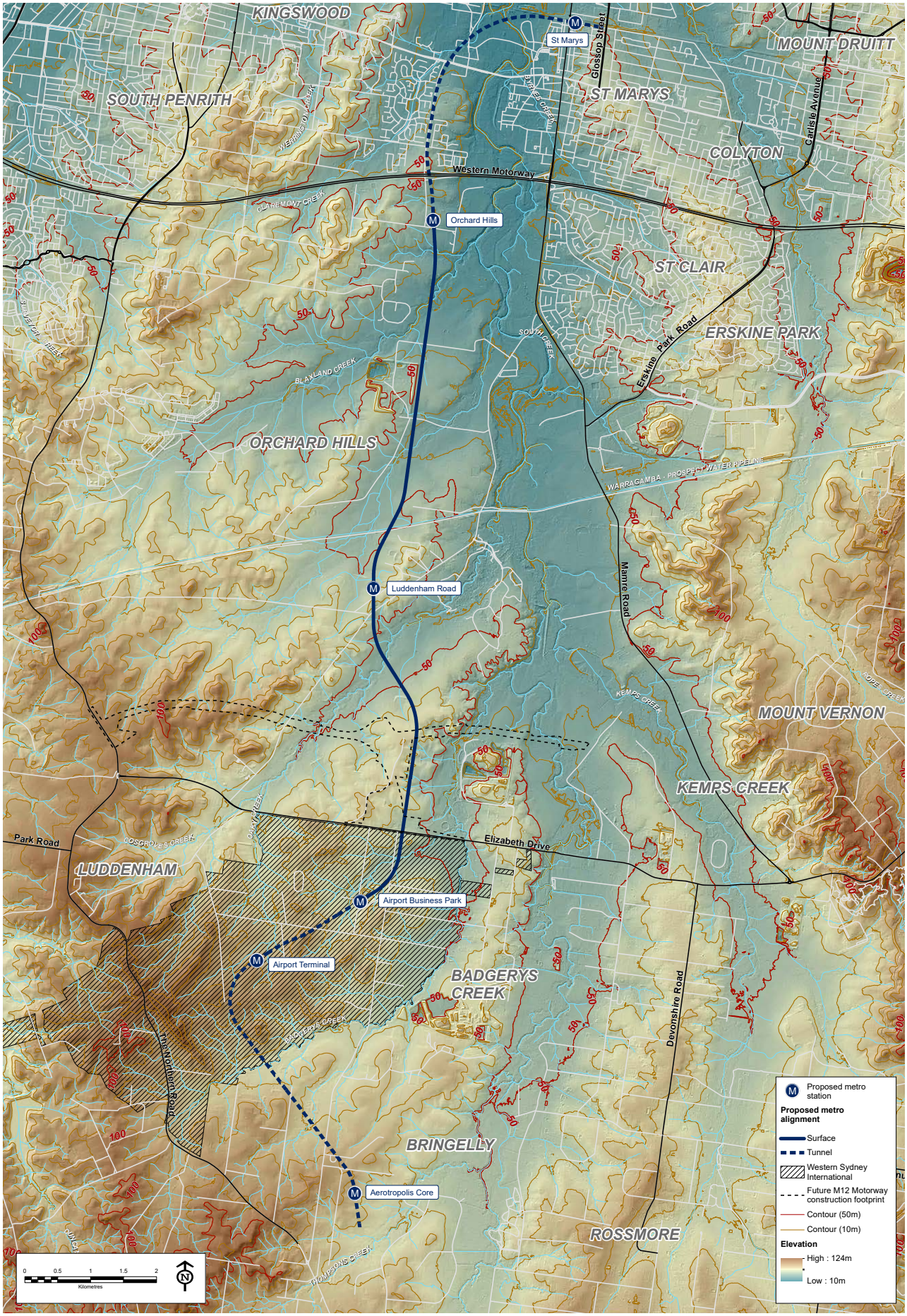
The rural areas are predominantly cleared apart from patches of vegetation within rural properties, along roadsides and within the waterway corridors. A large tract of bushland vegetation in the northwest of the study area known as the Orchard Hills Cumberland Plain Woodland (Department of Defence land) provides a major landscape feature.

The rural areas have been subject to several landscape modifications including a golf course residential estate in Luddenham, a landfill facility, high voltage powerline corridor and major water pipeline (Warragamba to Prospect Water Supply Pipelines) in Orchard Hills and the construction of Western Sydney International. Similarly, landcover within the semi-rural areas of Orchard Hills and Bringelly has been altered from intensive agriculture uses, nearby major road works (The Northern Road) and increasing smaller lot acreage residential development.

4.2 Topography

The project alignment is located within the low lying areas of a broad open valley which is aligned generally parallel to South Creek. The southern areas of the valley are partly enclosed by two major ridgelines which extend generally in a north south direction and form broad elevated plateaus.

FIGURE 4-1 TOPOGRAPHY PLAN



The Northern Road traverses the western ridgeline and includes a high point on the plateau near the rural village of Luddenham. The eastern ridgeline is located within the suburban of Mount Vernon and contains a high point near Elizabeth Drive. Other minor ridgelines include a local ridgeline east of the alignment which extends from the existing St Marys Station south to the suburbs of St Clair and Erskine Park and a minor ridgeline which extends east of the proposed Aerotropolis Core Station in Rossmore.

A series of local ridgelines extend in a north-easterly direction from the major ridgeline along The Northern Road to the west of the alignment and segregate the landscape into a series of smaller visual catchments. These include a local ridgeline in the northern part of Orchard Hills near the M4 Western Motorway (in close proximity to the proposed Orchard Hills Station) and a local ridgeline in Luddenham near the proposed Luddenham Road Station. The alignment also follows a local ridgeline within the airport in close proximity to Airport Business Park Station and Airport Terminal Station.

The alignment crosses several waterway corridors including South Creek in the north, Blaxland Creek, Cosgroves Creek, Badgerys Creek and Thompsons Creek in the south. The proposed Aerotropolis Core Station is located within low lying topography near Thompsons Creek.

4.3 Landscape character

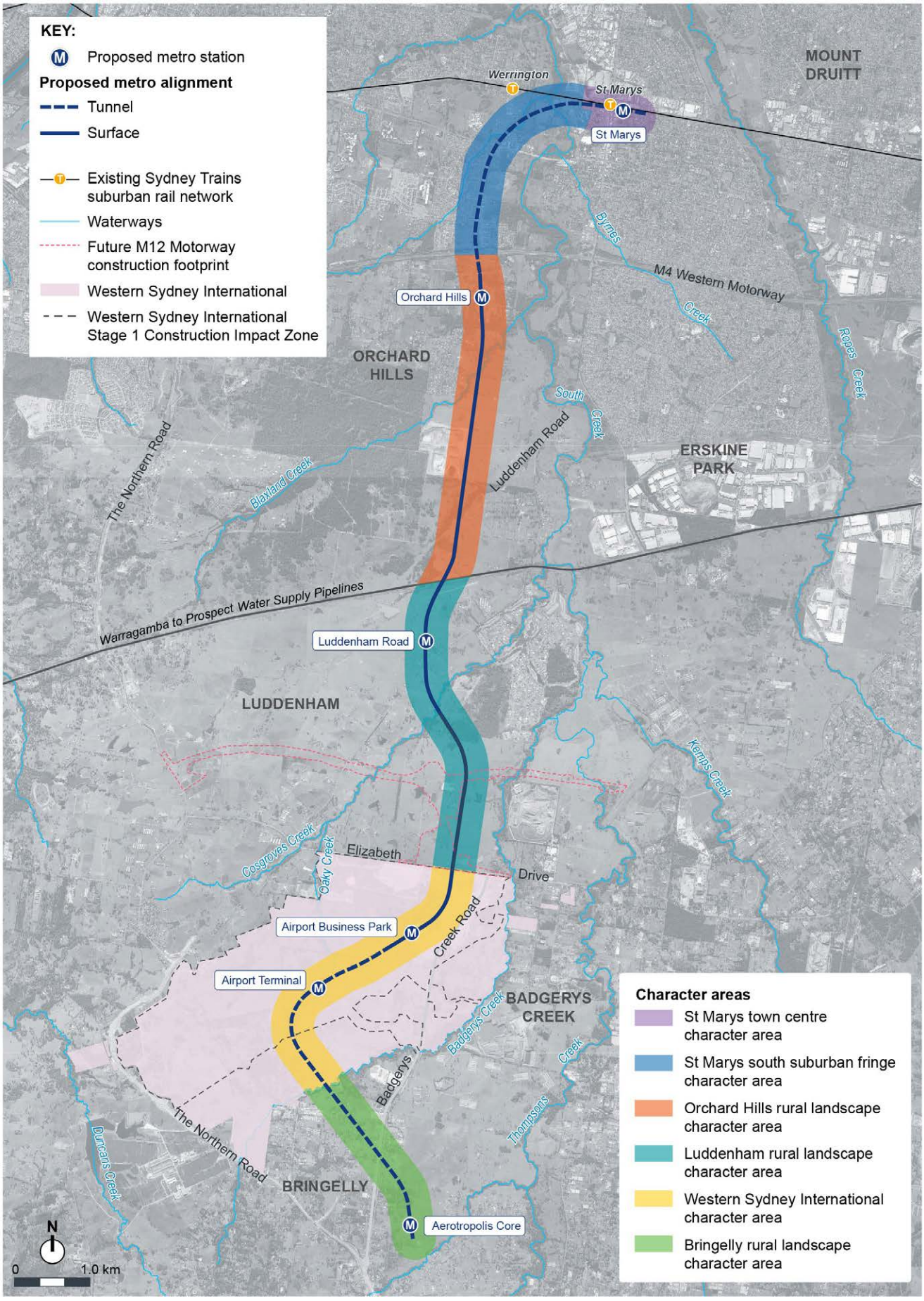
There are broad landscape character units (LCU) identified within the *Penrith Scenic & Cultural Landscapes Study (2019)* for the City of Penrith Council Area. Areas of the project located to the north of the M4 Western Motorway are within the 'central urban area' landscape character unit and areas between the M4 Western Motorway and Western Sydney International are located within the 'south-eastern low hills and valleys' landscape character unit. Western Sydney International and the Liverpool Council Area do not have identified landscape character units in local or strategic planning documents.

For the purposes of this project, the following landscape character areas have been identified:

- St Marys town centre character area (St Marys Station, Glossop Street to South Creek)
- St Marys south suburban fringe character area (South Creek to the M4 Western Motorway)
- Orchard Hills rural landscape character area (M4 Western Motorway to the Warragamba to Prospect Water Supply Pipelines)
- Luddenham rural landscape character area (Warragamba Pipeline to Elizabeth Drive)
- Western Sydney International character area (Elizabeth Drive to Badgerys Creek)
- Bringelly rural landscape character area (Badgerys Creek to Thompsons Creek)

The landscape and visual impact assessment will assess each of these landscape character areas.

FIGURE 4-2 LANDSCAPE CHARACTER AREAS



5. ST MARYS TOWN CENTRE

5.1 Key components of the project

5.1 Key components of the project

The project in this character area includes:

- alignment in tunnel
- new cut-and-cover station at St Marys Station
- elevated concourse over the existing St Marys Station
- vertical transport and new plazas to the north and south of the station
- bus layover and station services buildings to the east of the station

The St Marys construction site would be located between Harris Street, north of the T1 Western Line, across the existing St Marys Station and to the south across Station Street, between Carinya Avenue and Glossop Street. Night works would be required for haulage and deliveries, oversize deliveries, underground works, rail and road possessions.

Further details of the design are contained in Chapter 7 (Project description – operation) and details of the construction method are contained in Chapter 8 (Project description – construction) of the Environmental Impact Statement.

The following artists impression shows the potential character of St Marys Metro Station (see Figure 5-1).

FIGURE 5-1 ARTISTS IMPRESSION, VIEW FROM STATION STREET DURING OPERATION

5.2 Relevant planning context

The proposed St Marys Station would be located in the St Marys town centre which is in the City of Penrith LGA. While this project is not subject to local government requirements, the LEP and DCP offer some context to the local landscape and visual values of the study area.

5.2.1 Penrith Local Environmental Plan 2010

The LEP includes mapping which identifies an area including parts of St Marys Station and extending east to include land to the north and south of the existing rail corridor as *'Land with Scenic and Landscape Values'.* (see Figure 5-2)

5.2.2 Penrith Development Control Plan 2014

The Penrith DCP has identified character areas for the St Marys town centre. The project would be located within the '*North West mixed use'* and '*North East mixed use'* character areas as shown in Figure 5-3. These areas are described as the northern gateway to the St Marys Town Centre. The DCP intends for built form to '*emphasise the arrival to St Marys Town Centre from the railway'* (s.C.1, p. E15-4).

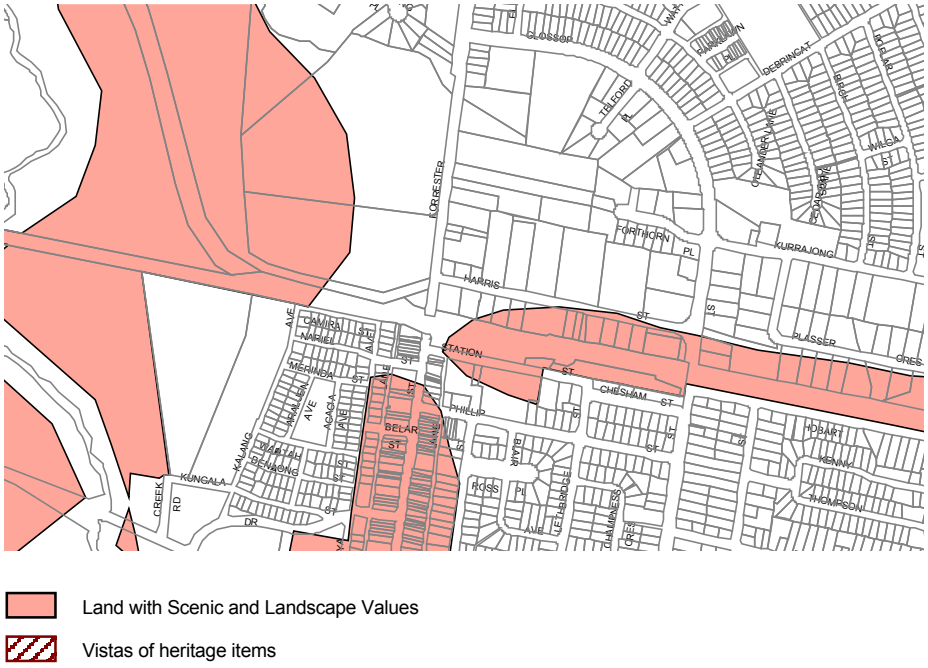


FIGURE 5-2 EXTRACT FROM SCENIC AND LANDSCAPE VALUES MAP (SOURCE: PENRITH LEP 2010, SHEET SLV-019)

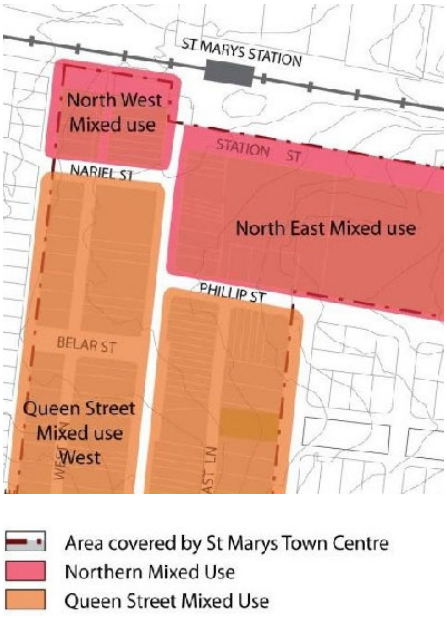


FIGURE 5-3 EXCERPT FROM TOWN CENTRE CHARACTER AREAS MAP (SOURCE: PENRITH DCP 2014, E15 PART A, FIGURE E15.3, P.E15-5)

5. ST MARYS TOWN CENTRE

5.2 Relevant planning context

The DCP also identifies key regional and local views, which include a western view from the existing St Marys Station towards the Blue Mountains (see Figure 5-4).

Within the vicinity of the study area the following '*Local Views within Town Centre*' were identified:

- *north along Queen Street towards St Marys Station*
- *west along Station Street*
- *east and west along Nariel Street.*

There are '*Regional – Views to the mountains*' identified:

- *west from St Marys Station*
- *west along Phillip Street.*

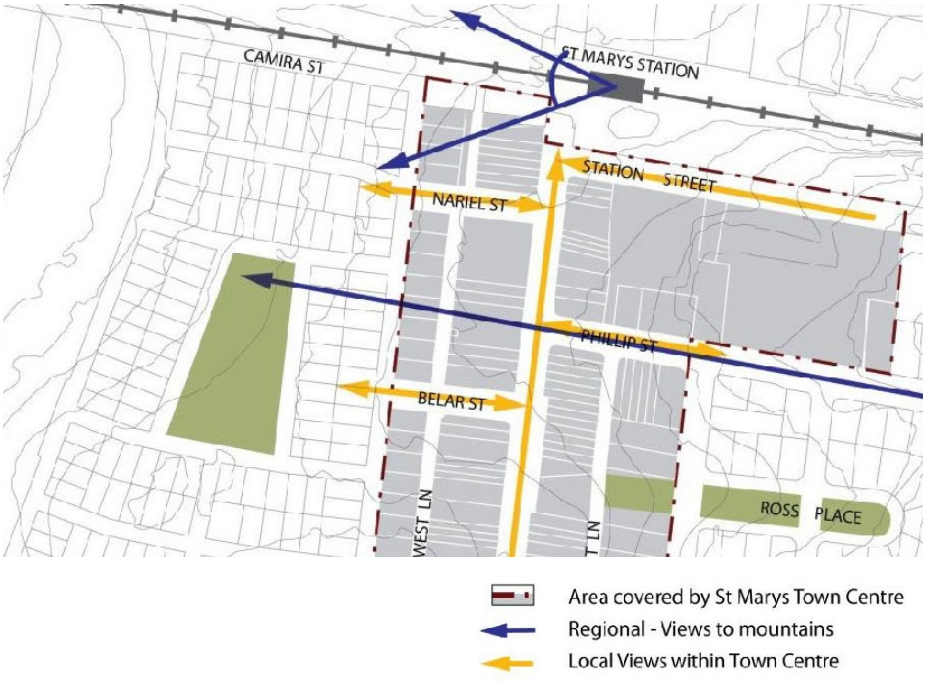


FIGURE 5-4 VIEWS (SOURCE: PENRITH DCP 2014, E15 PART A, FIGURE E15.6, P. E15-13)

The DCP identifies several precincts within the St Marys town centre. The construction footprint of the project would temporarily extend into Precinct 1 and 4.

Precinct 1 is located between Station Street, Queen Street and Phillip Street (see Figure 5-5). The Council intends to:

- *'Relocate the redundant public lane (East Lane) to provide north-south pedestrian connectivity through the site from Phillip Street to Station Street in the prolongation of Gidley Street*
- *Provide high quality and active public domain interface with new and existing public streets*
- *Investigate opportunities for expansion of the shopping centre to the west toward Queen Street' (s. 15.3.3.3.1 p. E15-45).*

Precinct 4 is located between Queen Street, Nariel Street, Carinya Avenue and the existing Sydney Trains suburban rail corridor as shown in Figure 5-6. This area is described as '*significant as it assists in forming the entry gateway for public transport commuters as well as marking the northern most urban edge of the Town Centre itself'* (s. 15.3.3.3.4 p. E15-49). The Council intends to:

- *'Provide a vehicular and pedestrian connection from the existing West Lane through to Queen Street adjacent to the northern most boundary*
- *Provide a distinctive commercial/ mixed use multi-level development on the northern section fronting onto Queen Street' (s. 15.3.3.3.4 p. E15-50).*

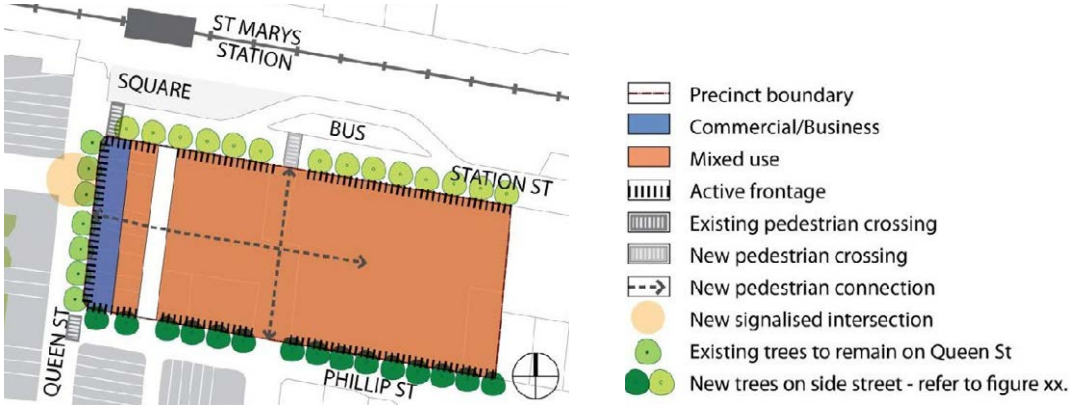


FIGURE 5-5 PRECINCT 1 (SOURCE: PENRITH DCP 2014, E15 PART A, FIGURE E15.22, P. E15-46)

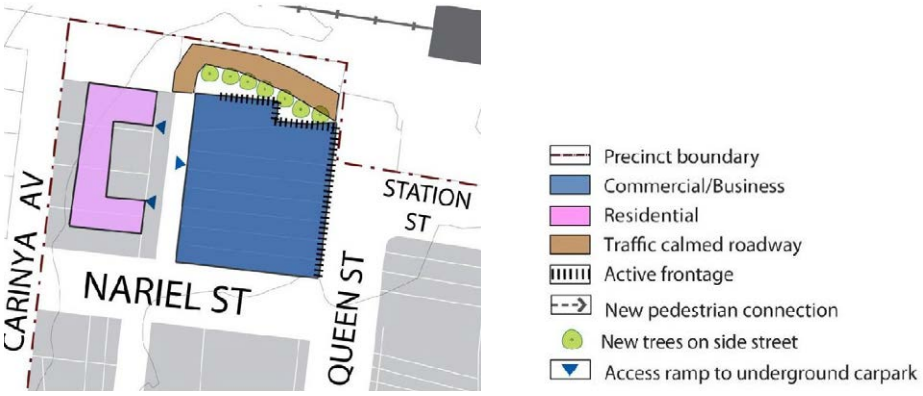


FIGURE 5-6 PRECINCT 4 (SOURCE: PENRITH DCP 2014, E15 PART A, FIGURE E15.25, P. E15-50)

5.3 Landscape impact

5.3.1 Existing landscape conditions

St Marys town centre comprises a mix of commercial, retail and civic uses, extending generally between the residential areas east of Glossop Street and to Forrester Road and Kalang Avenue in the west (see Figure 5-7). The T1 Western Line forms a strong edge to the town centre in the north, separating the town centre from the industrial areas in the Dunheved Industrial Estate. The town centre has a grid street pattern with commercial development centred on Queen Street. This main street is characterised by one and two storey commercial buildings. While there is a variation in building styles, awnings and intermittent street trees provide continuity to the street.

Two large existing shopping centres are located to the east of Queen Street, separated from the town centre by large surface car parking areas. These commercial areas are surrounded by low density residential areas, and some medium density multi-residential units to the south east of the existing St Marys Station.

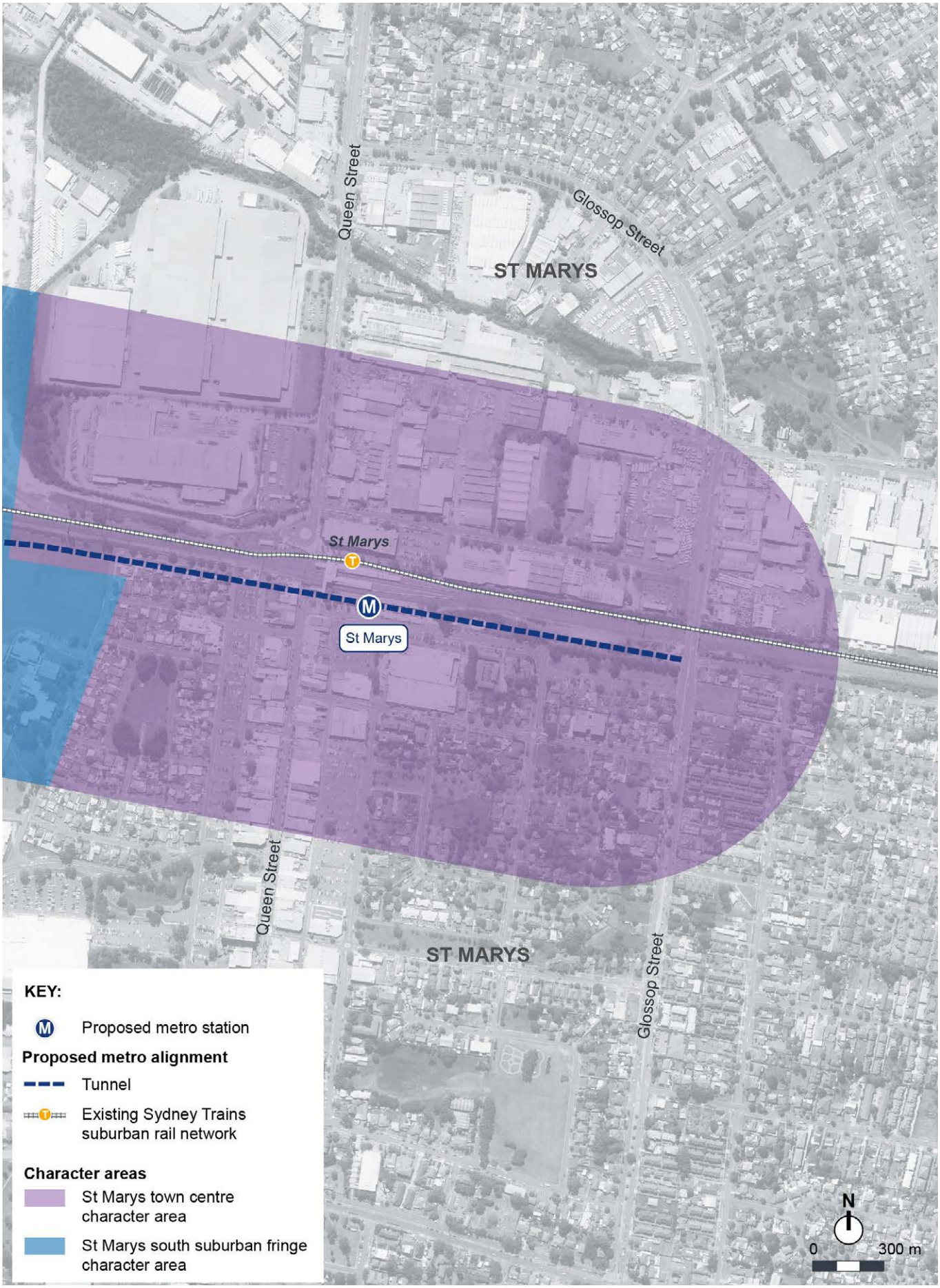
Penrith City Council intends to facilitate the redevelopment of St Marys Town Centre (See section 5.2). Recent works to revitalise the town centre include the creation of a town square at Coachmans Park on the corner of Chapel and Queen Streets, streetscape improvements to Queen Street including street trees, gardens, murals and high-quality street furniture.

The town centre is identified as land with '*scenic and landscape values*' under the Penrith LEP 2010. The areas surrounding St Marys Station are identified in the Penrith DCP 2014 as the '*North West mixed use*' and '*North East mixed use*' character areas (See section 5.2). The DCP identifies a westerly view along Station Street as a view of local importance. There is also a westerly view from the existing station concourse building which is identified as being of regional importance.

Located at the northern end of Queen Street, the existing St Marys Station is an arrival point marked by a visually prominent structure. The station is flanked by a bus interchange on Station Street in the south, and a multi-storey and surface commuter car park on Harris Street in the north.

St Marys Station (c1862) and the adjacent Sydney Trains rail corridor has a State and local heritage listing and is also listed on the Section 170 Heritage and Conservation Register. The brick station platform buildings are '*good examples of the Colonial Georgian style of late nineteenth century railway architecture*' (NSW Heritage Register, 2005). The goods shed, located to the south of the station on Station Street, is identified as '*a rare early brick shed of high significance with only several remaining in the State*' (NSW Heritage Register, 2005). Although the heritage listed station platform buildings and goods shed contribute to the character of the precinct, providing visual interest due to their architectural quality, the modern station buildings rise above and surround these buildings so that their visibility is limited from the wider precinct.

FIGURE 5-7 ST MARYS TOWN CENTRE LANDSCAPE CHARACTER AREA



5. ST MARYS TOWN CENTRE

5.3 Landscape impact

5.3.2 Landscape sensitivity

The St Marys town centre character area comprises a highly urban setting with a diverse mix of land uses. This centre attracts high concentrations of residents, workers and visitors from across the region. The station is an important public transport gateway and sections of the rail corridor are located within areas identified as having scenic and landscape values under the Penrith LEP (2010) and are important to local identity and character. The character of the precinct is mixed and varies in quality. While this precinct attracts people from across the region, due to its mixed quality, the St Marys precinct is of **local landscape sensitivity**.

5.3.3 Magnitude of change during construction

St Marys Station construction site would require alterations to pedestrian and vehicular access along Station Street, between Lethbridge and Queen Street, and the demolition of all buildings and vegetation within a large area to the south of the station. This would include the demolition of the Station Plaza shopping centre between Station and Philip Streets. The removal of these commercial and retail uses would alter the patterns of pedestrian movement around the centre of St Marys.

To the south of the station, work would include the removal of the vegetation along the rail corridor between the goods shed and Glossop Street and the temporary loss of a large area of open space to the north of Chesham Street which provides passive recreation opportunities for local residents. The vegetation forms a visual edge, screening views to the industrial areas in the north, and contributing to the amenity of the area. The rail maintenance area and large surface car park east of Gidley Street would also be removed. However, as these detract from the streetscape character, this would have less of an effect on the landscape.

Equipment within the construction site and a potential acoustic shed (if required to mitigate environmental impacts such as noise emissions) would be visible surrounding the station. The construction site would become a new visually dominant element, reducing visibility towards and into the station, and as a consequence would reduce legibility and the sense of place at this important transport gateway point.

While the heritage listed goods shed would be retained, it would have less influence over the character of the station precinct as the construction site and a possible acoustic shed would limit its visibility from surrounding streets.

Access to the existing St Marys Station from the existing northern and southern access points would be maintained during construction, however, the legibility of this access would be somewhat reduced. While temporary pedestrian access to the existing St Marys Station would be provided via Lethbridge Street, Phillip Street and Queen Street during construction, this would require alternative approach and result in a less direct access.

The relocation of the bus interchange would require modifications to West Lane, Nariel Street and Queen Street, and increase the distance between transport modes. The temporary location

of the bus interchange away from the station would also somewhat reduce the role of the existing St Marys station as a public transport gateway.

There would be road and footpath alterations in the vicinity of the station, including road closures, the conversion of several streets surrounding the site to a one-way network, and changes to pedestrian routes. These would affect the permeability, wayfinding and legibility within this area of the town centre. To the north of the station, several commercial properties along Harris Street would be demolished as would the adjacent surface commuter car park at Harris Street. Pedestrian access to the station would be provided via Forrester Road, reducing the permeability of the station precinct in this area, and resulting in reduced legibility and accessibility for pedestrians.

The construction footprint would include station platform areas to the east of the station. This would include works to construct an aerial concourse and vertical transport connecting the concourse to the existing station platforms. The works would involve the removal of existing commuter shelters and relocation of platform lighting which would temporarily affect the comfort of rail passengers.

5.3.4 Landscape impact during construction

Generally, there would be adverse effects on recreation and amenity with the temporary loss of a large area of open space and mature trees as a result of the project. Alterations to adjacent roads and footpaths, demolition of the Station Plaza shopping centre, and the relocation of the bus interchange would affect

1 ST MARYS STATION FROM QUEEN STREET
2 QUEEN STREET
3 STATION STREET TO STATION PLAZA SHOPPING CENTRE
4 ST MARYS STATION VIEW EAST
5 THE GOODS SHED

wayfinding and legibility within the town centre and adversely affect permeability for residents, rail and bus passengers.

While the project construction works would be of a similar character to the industrial areas to the north of the rail corridor, the changes to the station platforms and the introduction of an intensive construction character and loss of trees within the vicinity of the station, would reduce the level of comfort and amenity for station users.

Overall, this would result in a considerable reduction in the valued qualities of the St Marys town centre character area which is of local landscape sensitivity, resulting in a **moderate adverse landscape impact**.

5.3.5 Magnitude of change during operation

St Marys Station would be established to the east of the existing heritage-listed goods shed along Station Street and aligned parallel and to the south of the existing station platforms. The entry to the new station would be framed by two new public plazas and would provide access to a new pedestrian overbridge and elevated concourse enabling direct access and interchange between the existing station platforms and new St Marys Station platform via escalators, stairs and lifts.

A new bus interchange, bus stops and bus layover area would be located in close proximity to St Marys Station entrance on Station Street. There would be upgraded commuter car parking facilities, bicycle parking and a kiss and ride and taxi rank located on Nariel Street. These facilities would improve accessibility for users.

The existing St Marys Station entrances to the north and south of the rail corridor would remain unchanged, as would the associated buildings and structures including the existing station concourse building, maintaining the current access to the station in the west.

The new St Marys Station would improve transport connectivity within St Marys town centre and the role of the stations as a public transport gateway through the co-location of the project with the existing Sydney Trains station and the relocated bus interchange. Proposed active transport links along nearby streets, streetscape upgrades, cycle facilities and pedestrian crossing would further enhance accessibility to the station.

While much of the new station would be located below ground, reducing the overall scale and mass of the new St Marys Station, the aboveground station buildings would rise above the station platforms and extend along the Station in the north, at each platform, and to the south along Station Street to accommodate vertical transport. This new building would have a larger overall mass and scale than the existing station. The station design would include a roof structure which would be light and open and reflect the roofline shapes of the adjacent heritage buildings. These architectural treatments would aim to reduce the apparent visual bulk of the structure. The landmark qualities of the new station building would enhance legibility and wayfinding within the station precinct overall.

While there would be shadows cast by the station throughout the day in during mid-winter, the station would create shadows similar to those expected within an urban area such as St Marys. This urban density is expected to increase over time with the realisation of the north east and north west mixed use zones. Furthermore, the station is separated from neighbouring properties by Station Street in the south and the residential properties and open space areas south of Station Street are located to the east of the station and unlikely to be affected by overshadowing.

Part of the new bus layover area and a services building would be located within the open space area to the east of the station, reducing the overall area of this open space which would be reinstated. However, the remaining area of the open space would be restored including reinstating some tree cover which would establish in this area over time.

5.3.6 Landscape impact during operation

Substantial improvements in accessibility, wayfinding and legibility would result from the location and architectural treatment of the new St Marys Station. While there would be a reduction in the area of open space along the rail corridor, new plaza areas would be established around the station and the remaining open space area would be reinstated. Overall, this would result in a noticeable improvement in the valued qualities of the St Marys town centre character area, which is a landscape of local sensitivity, and a **minor beneficial landscape impact**.

1 VIEW TO THE RAIL CORRIDOR FROM CHESHAM STREET
2 VIEW TO CHESHAM STREET
3 TREES ALONG RAIL CORRIDOR FROM GLOSSOP STREET OVERBRIDGE
4 HARRIS STREET
5 COMMUTER CARPARK NORTH OF ST MARYS STATION

5.4 Visual impact

5.4.1 Visual catchment

The project footprint at St Marys Station would have a relatively contained visual catchment due to the built form of the surrounding urban areas. The project footprint would be seen from surrounding adjacent streets including Harris Street in the north, Station Street, Chesham Street, Glossop Street, Phillip Street, Nariel Street, Belar Street, Carinya Avenue and Queen Street in the south. The visual catchment would include nearby industrial areas to the north, residential areas to the south-east extending to a local ridgeline along Glossop Street, and southwest to include the northern areas of the town centre.

Large scale commercial and medium density built form within the town centre and bulky industrial buildings together with intervening vegetation would contain and obstruct views. However, there would be some elevated views from the upper levels of medium rise residential buildings to the south of Station Street and other medium density buildings bordering the town centre towards the project.

5.4.2 Viewpoint assessment

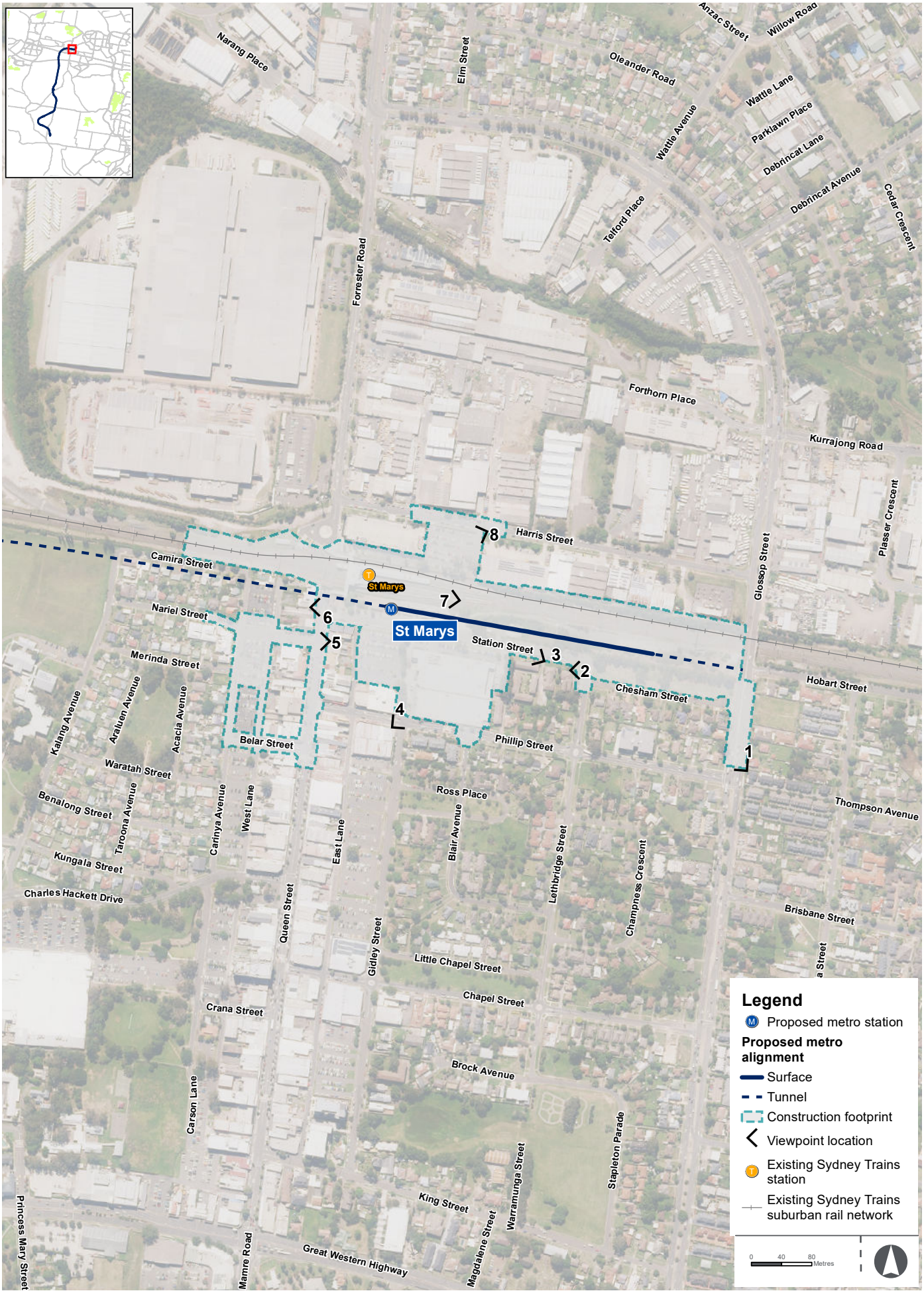
The following viewing locations were selected as representative of the range of views to the project:

- Viewpoint 1: View north along Glossop Street
- Viewpoint 2: View east from Station Street to Chesham Street
- Viewpoint 3: View west from Station Street
- Viewpoint 4: View northeast from the corner of Gidley and Philip Streets
- Viewpoint 5: View west from Queen Street
- Viewpoint 6: View east from the corner of Station and Queen Streets
- Viewpoint 7: View west from St Marys Station platform
- Viewpoint 8: View southwest from Harris Street

The following plan identifies the location of these viewpoints (see Figure 5-8).

The following sections summarise the daytime visual impact identified for each representative viewpoint during construction and operation.

FIGURE 5-8 VIEWPOINT LOCATION PLAN



5. ST MARYS TOWN CENTRE

5.4 Visual impact

FIGURE 5-9 VIEWPOINT 1: VIEW NORTH ALONG GLOSSOP STREET, EXISTING VIEW

Viewpoint 1: View north along Glossop Street

Existing conditions: This view is directed along Glossop Street, a broad, heavily trafficked five lane arterial road. Low rise residential properties are located to the east (right of view) set behind gardens and low garden walls. Power poles and lines create visual clutter in this view, crossing the view in several locations and leading to a substation, located in the background and screened from this view. To the west (left of view) there is a mix of low and medium density residential properties located behind fences and oriented away from the road. In the middle to background of this view, to the west (left) of the road, there is a small open space with mature trees which form a vegetated backdrop to the centre of this view.

Sensitivity: Views along Glossop Street would be experienced mainly by residents and visitors to the area, including nearby residential, retail and industrial uses. While this view includes a partly vegetated backdrop, it has a varied character. Overall, this view is of **local visual sensitivity**.

Magnitude of change during construction: The eastern end of the project construction footprint would be visible in the middle ground of view, occupying the open space to the west of Glossop Street (left of view). The vegetation within the construction footprint would be removed, including the mature trees alongside the rail corridor, which form the backdrop to this view. This would open up views to the industrial areas to the north, in the background of this view. A site entry, at the south eastern corner of the site, with a left-in only access point to the site from Glossop Street would be visible in the centre of this view. Beyond this, the site would be used for laydown and include large scale equipment and activities.

Visual impact during construction: The construction footprint would be seen in the context of a busy road and nearby industrial development, but also adjacent to residential properties directly to the south of the site. Due to the loss of mature vegetation within the view, and scale of the construction activity, there would be a considerable reduction in the amenity of this view, which is of local sensitivity, and a **moderate adverse visual impact** during construction.

Magnitude of change during operation: The open space would be reinstated, and new trees planted on the land adjacent to Glossop Street which would filter views to the industrial areas to the north of the rail corridor over time.

Visual impact during operation: This view to open space would be restored and trees would establish over time so that there would be a no perceived change to the amenity of this view. This is a view of local sensitivity and would result in a **negligible visual impact**.

Viewpoint 2: View east from Station Street to Chesham Street

Existing conditions: This view includes an area of open space with a row of mature trees filtering views to the rail corridor (left of view). The landform rises to a ridge along Glossop Street in the east (background of view). The single storey detached houses and medium rise apartment blocks on Phillip Street (right of view) overlook this open space. While this view is located close to the existing rail corridor (left and out of view), this view has a suburban character.

Sensitivity: This view would be experienced mainly by local residents and visitors to this suburban area of St Marys north. While this is an incidental view, the mature trees along the rail corridor are a local visual feature and provide some amenity to this view. This view is of **local visual sensitivity**.

Magnitude of change during construction: The vegetation along the rail corridor would be removed and the open space in the centre of this view would be temporarily replaced with a construction site. The work would extend across the entire view, from the rail corridor (left of view), to Glossop Street (background of view) and Chesham Street (right of view).

FIGURE 5-10 VIEWPOINT 2: VIEW EAST FROM STATION STREET TO CHESHAM STREET

An acoustic shed may be installed over an area of the site, in the background of the view, adjacent to Glossop Street. If required, the shed would rise about three times the height of the adjacent residential properties, enclosing views to tunnel construction. A haul road would be installed alongside Chesham Street, south of (right of view) the possible acoustic shed. Following the cut-and-cover station works, a bus layover and services building would be constructed in the middle ground of this view, extending into the middle ground of the view.

Impact during construction: The construction site would temporarily replace an area of open space and require the removal of all trees on the site. There would be some minor building and civil works seen in this view. Overall, this would result in a considerable reduction in the amenity of this view. This view is of local visual sensitivity and there would be a **moderate adverse visual impact**.

Magnitude of change during operation: A bus layover and single storey services building would be located alongside the rail corridor within the northern area of the park (left of view) and extending part way into the park. The remaining areas of this open space, in the middle and background of this view would be reinstated. This would include some new tree planting which would filter views from the adjacent residential properties along Chesham Street over time.

Impact during operation: Overall, there would be a noticeable reduction in the amenity of this view, which is of local sensitivity, resulting in a **minor adverse visual impact**.

Viewpoint 3: View west from Station Street

Existing conditions: This view shows the interface between the rail corridor (right of view) and adjacent residential (foreground) and retail (middle ground) properties on Station Street (left of view). Located at a local high point, this view includes a glimpse to the Blue Mountains in the distance. The landform gently descends to the west towards the existing St Marys Station, with the station concourse building and bus interchange visible rising above the trees within the rail corridor and breaking the skyline. The track and station platforms are out of view due to a cutting and the existing mature trees located along the rail corridor (right of view). Station Street is two lanes wide with two lanes of parallel parking, it is a relatively active street with buses and other vehicles approaching the town centre and activating the view. To the south of Station Street, double storey detached houses and townhouses, can be seen. The rear of the Station Plaza shopping centre, and car park entry, can be seen in the middle ground of this view, filtered through existing mature trees.

Sensitivity: Westerly views along Station Street are identified in the Penrith DCP as of 'local' importance. This view would be experienced by concentrations of local residents and visitors approaching the station and town centre. The station is also a local visual feature in this view. This view is of **local visual sensitivity**.

Magnitude of change during construction: St Marys Station construction site would extend across much of this view, from the centre of Station Street north to the existing rail corridor, resulting in a part road closure. The bus interchange and all existing vegetation within the site, including the mature trees alongside the rail corridor, would be removed. The site would be enclosed by site fencing and/or hoarding and views to the existing station building and mountains beyond would be partly obstructed. Following the cut-and-cover tunnelling and station excavation works, construction of the station entry building, bridges and concourse would be seen in the middle ground of view, extending over the rail corridor between Station and Harris streets. This would be followed by streetscape upgrades.

Impact during construction: Due to the removal of vegetation, size and proximity of the construction site, which would extend across much of the view, there would be a considerable reduction in the amenity of this view. This is a view of local visual sensitivity and there would be a **moderate adverse visual impact** during construction.

Magnitude of change during operation: The architecture of the new St Marys Station would be a new focal point in this view. In the middle ground of this view would be a single storey services building and bus layover. The new station building would include an aerial concourse which would extend across the existing station platforms, with a series of escalators, stairs and lifts on each platform and to the south of the existing station, adjacent to Station Street. The roofline of the new station buildings would be varied, including a series of gables with glazing along the facades, providing visual interest and breaking up the visual mass of the structure. While the vegetated rail corridor would be lost, views to the Blue Mountains west along Station Street would be restored.

Impact during operation: While this view would become more urban and developed in its character, with the loss of the vegetation along Station Street, this view has the capacity to absorb further built form in the context of the existing station and surrounding urban development. The new built form would be in scale with the character of the town centre. Overall, this would result in no perceived change in the amenity of this view, which is of local visual sensitivity, resulting in a **negligible visual impact**.

FIGURE 5-11 VIEWPOINT 3: VIEW WEST FROM STATION STREET, EXISTING VIEW

FIGURE 5-12 VIEWPOINT 3: VIEW WEST FROM STATION STREET– PHOTOMONTAGE DURING CONSTRUCTION

5. ST MARYS TOWN CENTRE

5.4 Visual impact

FIGURE 5-13 VIEWPOINT 4: VIEW NORTHEAST FROM THE CORNER OF GIDLEY AND PHILIP STREETS

Viewpoint 4: View northeast from the corner of Gidley and Philip Streets

Existing conditions: The Station Plaza shopping centre is visible in the centre of this view, extending along Philip Street for the length of the view, about 100 metres. The shopping centre is a two-storey concrete building with a relatively blank façade. The southern pedestrian entry to the shopping centre is identified by a gable roof, and some shop fronts, and is visible in the middle ground (left of view). There is signage mounted on the building oriented towards Philip Street. A ramping footpath leads from Philip Street to a south facing shopping centre entry, also highlighted by a gable roof. The shopping centre building does not contribute positively to the character of this view as it lacks articulation and pedestrian scale. A carpark entry road (left of view) with some garden areas can be seen in front of the building. This section of Philip Street includes two traffic lanes and two lanes of on street parking. There are intermittent street trees along this section of Philip Street, including one in front of the shopping centre. The carpark combined with Philip Street give a vehicular dominated character to the shopping centre building. In the background of the view, to the east and south of the view, the character is predominantly residential with smaller scale buildings and leafy gardens.

Sensitivity: This view is of **local visual sensitivity** as it would be experienced mainly by residents and visitors using the shopping centre. This view is also experienced from commercial and residential properties located to the south of Philip Street.

Magnitude of change during construction: Works to demolish the shopping centre would be seen in the middle ground and extending across much of this view. This would include the removal of all buildings and garden areas. A construction site would be established in this location and would be used as a site laydown area to support works at the station. There would be construction vehicles seen on Philip Street and large equipment used within the site.

Impact during construction: The construction site would cover a large area and substantially alter the character of this view. While the site is located with a partly residential setting, the existing shopping centre is of a large scale and has limited visual interest and aesthetic appeal from Philip Street. While, the scale and character of the construction activity would be somewhat compatible with the character of this view, due to the extent of demolition works required, there would be a considerable reduction in the amenity of this view. As this is

a view of local visual sensitivity, there would be a **moderate adverse visual impact** during construction.

Magnitude of change during operation: The future use of the site would be subject to separate planning approval but would be required to achieve beneficial precinct outcomes.

Impact during operation: Due to the removal of the large scale built form of the Station Plaza shopping centre, which has limited visual appeal, there would be a no perceived change in the amenity of this view, which is of local sensitivity, and a **negligible visual impact**.

Viewpoint 5: View west from Queen Street

Existing conditions: Along the western side of Queen Street (right of view) a row of commercial shopfronts frames the view. These extend north towards the entrance of St Marys Station, and frame views along Queen Street. While these buildings are currently disused, reducing their visual appeal, their form contributes to the pedestrian scale of the streetscape and contributes to the historic character of this part of Queen Street. Beyond this building, some street trees are visible screening the view of an existing surface car parking area. To the south of Nariel Street (left of view) the built form steps down to a contemporary drive through commercial building, which erodes the continuity of the built form along Queen Street and creates a vehicular dominated character to this section of the street. In the background, there are residential properties with small scale houses and leafy gardens. There is a long-range view to the Blue Mountains glimpsed from this location, which contributes to the sense of place of St Marys.

FIGURE 5-14 VIEWPOINT 5: VIEW WEST FROM QUEEN STREET

Sensitivity: This view is of **local visual sensitivity** as it would be experienced mainly by local residents and visitors to the centre of St Marys, including the station. The view is seen from a main approach route to the station and within the central commercial spine of St Marys.

Magnitude of change during construction: Construction of a bus interchange would be seen along Nariel Street in the middle of this view and extending to include the existing surface car parking areas to the north (right) and south (left). Once completed, this temporary bus interchange would be operating during construction of the station with buses seen travelling along Queen Street and accessing the interchange in the centre, middle ground of this view.

5. ST MARYS TOWN CENTRE

5.4 Visual impact

FIGURE 5-15 VIEWPOINT 6: VIEW EAST FROM THE CORNER OF STATION AND QUEEN STREETS

Viewpoint 6: View east from the corner of Station and Queen Streets

Existing conditions: The southern station entrance plaza and pedestrian overbridge can be seen to the north (left) of this view, including stair and lift structures leading to the elevated concourse building which extends over the platforms. The heritage listed goods shed can be seen in the middle ground of the view, beyond the station, providing some visual interest and a heritage character to the streetscape. The northern side of Station Street includes paved pedestrian areas and trees, which filter and screen views to the built form of the station. Beyond this, the bus interchange can be seen with bus shelters and a widened paved road area. The landform gently rises to the east (centre right of view), to a local ridge at Glossop Street (background of view), where the rail corridor transitions into a cutting and out of view. The top of the cutting is fringed by mature groups of trees, which block views to the Glossop Street road over bridge beyond. To the south (right of view) two storey terrace buildings with ground level retail and awnings, along with the street tree planting can be seen along Station Street, adding to the streetscape quality and historic character of this part of St Marys.

Sensitivity: This view is of **local visual sensitivity** as it would be experienced mainly by local residents and visitors to the centre of St Marys, including the station. The station, including the goods shed, is a historic and visual feature in this view.

Impact during construction: The works to construct and operate the bus interchange would be visually compatible with the road and existing parking areas in the background of this view.

Overall, there would be a no perceived change in the amenity of this view, which is of local visual sensitivity, resulting in a **negligible visual impact**.

Magnitude of change during operation: Any areas impacted by the project would be reinstated and the bus interchange would be relocated to a location near Station Street. As a result, there would be no notable changes to this view.

Impact during operation: Overall, there would be no perceived change in the amenity of this view, which is of local sensitivity, and a **negligible visual impact**.

Magnitude of change during construction: St Marys Station construction site would extend across much of the middle and background of this view, extending away from the view along Station Street to Glossop Street. The existing station, including the entry plaza (and planting), and the goods shed (centre of view) would also be retained. However, Station Street and the Station Plaza car park would be partially closed east of East Lane. The vegetation within the site, the bus interchange and the Station Plaza car park (right of view) would be removed during construction. There would be a range of large scale construction activities undertaken within the site to support tunnelling works and cut-and-cover station box excavation. Following these construction works, the construction of a new aerial concourse would be seen in the middle ground of view, with work extending across the rail corridor between Station and Harris streets. This would be followed by streetscape upgrade works.

Impact during construction: The construction site would extend across a large portion of this view, the vegetated character of the middle and background of this view would be lost, and while the heritage goods building would be retained, there would be construction activity within its setting so that its contribution to the character of the station precinct during this time would be reduced. Overall, there would be a considerable reduction in the amenity of this view, which is of local visual sensitivity, resulting in a **moderate adverse visual impact**.

FIGURE 5-16 VIEWPOINT 6: VIEW EAST FROM THE CORNER OF STATION AND QUEEN STREETS, EXISTING VIEW

FIGURE 5-17 VIEWPOINT 6: VIEW EAST FROM THE CORNER OF STATION AND QUEEN STREETS – PHOTOMONTAGE DURING OPERATION

Magnitude of change during operation: The proposed St Marys Station would be a focal point in this view, extending the character of the station east (centre of view) along Station Street. The existing historic goods shed building would be retained and set in front of a new aerial concourse building, which would be visible in the background of the view, extending north across the station (left of view) between Station and Harris Streets. The roofline of the proposed St Marys Station would be varied, including a series of gables with glazing along the facades, providing visual interest and reflecting the roof form of the goods shed and other heritage buildings within the station precinct. Station services buildings and a bus layover area would be located in the background of the view, along the northern verge of Station Street.

Impact during operation: Despite the loss of vegetation along Station Street, the heritage character of the goods shed building would be retained, and the new built form would be in scale with the surrounding town centre built form. As the works would be largely absorbed into this view, there would be no perceived change in the amenity of this view, which is of local sensitivity, and a **negligible visual impact**.

Viewpoint 7: View west from St Marys Station platform

Existing conditions: This view from the northern platform of the existing St Marys Station includes two island platforms, and the modern concourse building extending over the station, with lifts and stairs to the north and south of the station as well as on each of the two platforms. This structure rises above the skyline and is a prominent background feature. The heritage listed platform buildings (centre of view) and goods shed (left of view) can be seen in front of the modern concourse building, however, they are not prominent in this view due to their relative scale.

Trains are visible and provide movement within this view, as they approach and depart the station. To the south of the station, on Station Street (left of view) the bus interchange can be seen, with glimpses to the commercial buildings in the town centre in the background. There are some trees along the rail corridor which filter this portion of the view. To the north (right of view) the multi-storey commuter car park can be seen in the background with some surface car parking in front of this. There are some mature trees along the rail corridor and within the car park which filter the built form in this area. There are glimpses between the station and the commuter car parking structure to distant views of the Blue Mountains in the far background of view.

Sensitivity: This view is of **local visual sensitivity** as it would be experienced mainly by local residents and visitors to the station. The station, including the platform buildings and goods shed, is a historic and visual feature in this view.

Magnitude of change during construction: During tunnelling and station excavation works, the construction footprint would occupy the surface commuter car park (right of view) and Station Plaza car park and bus interchange (left of view). Vegetation within the site would be removed, including the street trees along Station Street and mature trees alongside the rail corridor (left and right of view). To the south of the Station, on Station Street (left of view), there would be a construction site extending west to the heritage goods shed building. Within this site there would be large-scale construction activities to support tunnelling and station box excavation works. This work would partly obstruct views to St Marys town centre.

To the north (right of view) there would be support works on the site of the surface commuter car park. Trees within the site would be removed including the mature trees along the rail corridor.

FIGURE 5-18 VIEWPOINT 7: VIEW WEST FROM ST MARYS STATION PLATFORM, EXISTING VIEW

FIGURE 5-19 VIEWPOINT 7: VIEW WEST FROM ST MARYS STATION PLATFORM – PHOTOMONTAGE DURING OPERATION

Impact during construction: During construction of the new metro station and station aerial concourse, work would extend across much of this view. Works to construct the bridging structure, lifts, stairs and canopies would be prominent in this view. This work would obstruct views to the existing station platform and concourse building. It would also block the existing glimpsed view to the Blue Mountains.

Due to the extent and scale of the construction activity there would be a considerable reduction in the amenity of this view, which is of local visual sensitivity, resulting in a **moderate adverse visual impact**.

Magnitude of change during operation: The new aerial concourse would be prominent in the foreground of this view, wrapping around the view from the proposed St Marys Station entry on Station Street (left of view), with stair and lift access to the existing rail platforms, and an entry with stairs and a lift in the vicinity of the commuter car park (right of view). The roofline of the new buildings and structures would be varied, with a series of gables with glazing along the facades, providing visual interest and visual lightness to the structure. Two new station plazas would be visible, to the north and south of the station. The bus interchange and layover area along Station Street would be reinstated beside the southern plaza (left of view).

Impact during operation: The view would be more urban in character with the removal of existing vegetation and introduction of built form which would extend across the entire view. However, the new built form would have a scale, form and massing which contributes to its role as a local landmark and is visually appropriate for a key transport interchange. On balance, there would be no perceived change to the amenity of this view, which is of local visual sensitivity, resulting in a **negligible visual impact**.

Viewpoint 8: View southwest from Harris Street

Existing conditions: This view from Harris Street includes St Marys Station commuter car park facilities in the foreground, consisting of an open surface car park (centre of view) and an adjacent multi-storey car park (right of view). A row of mature gum trees located along the rail corridor visually soften the view to the station. The station platforms are aligned across this view. The platform buildings and awnings can be seen in the middle ground of view, beyond the car park. The existing station aerial concourse building can be seen above the platform buildings, to the west, but is mostly out of view (right of view).

Trains are visible and provide movement to the view, as they arrive and depart the station. The town centre, south of the station in Station Street, can be seen in the background of this view, behind the station. It is varied in building form and includes Station Plaza, a large stand-alone shopping centre building, (left of view) and two storey terrace buildings with ground level retail (right of view) at the corner of Queen Street.

Sensitivity: This view is of **local visual sensitivity** as it would be experienced mainly by local residents and visitors to

the station and commuter car park. The station, including the platform buildings and goods shed, are a historic and visual feature in this view.

Magnitude of change during construction: During tunnelling and station excavation works, the construction site would occupy the surface commuter car park, in the foreground of this view. This site would include a range of support facilities such as site offices and workforce parking. A construction site would be established to the south of the existing station along Station Street and would support tunnelling and cut-and-cover station box excavation works. Vegetation within the construction site would be removed, including the mature trees along to the north and south of the rail corridor.

During construction of the proposed St Marys Station, work including the demolition of some of the structures on the existing platforms, and the construction of the stairs, lifts, and aerial concourse building would be seen across much of the view. Works to construct the northern station entry would be prominent and located in the middle ground of this view.

Impact during construction: Due to the extent and scale of the construction activity, including the removal of mature trees, there would be a considerable reduction in the amenity of this view, which is of local visual sensitivity, resulting in a **moderate adverse visual impact**.

Magnitude of change during operation: The new aerial concourse and northern station entry plaza would be new built features in the fore and middle ground of this view. They would provide a new focal point and improve the legibility and the overall visual prominence of the station from this point of arrival for commuters. The roofline of the new aerial concourse building would be varied, including a series of gables with glazing along the facades, which would break up the scale of the structure, provide some visual interest and lightness to the structure. The surface commuter car park would be reinstated beside the plaza.

FIGURE 5-20 VIEWPOINT 8: VIEW SOUTHWEST FROM HARRIS STREET

Impact during operation: The view would be more developed with the removal of existing vegetation, however, the new building would have a scale, form and massing which is visually appropriate for a key transport interchange and reinforce the station's role as a local visual landmark. Overall, there would be no perceived change to the amenity of this view, which is of local visual sensitivity, resulting in a **negligible visual impact**.

5.5 Assessment of night-time visual impact

Existing conditions: St Marys Station is located in an area of **High district brightness (A4)**. This is due to its location within a local urban centre including the brightly lit St Marys Station, commercial and retail buildings to the south, commuter car parks and industrial areas to the north. The lighting along Station Street and at the bus interchange, including vehicle headlights, also contribute to night-time lighting levels.

To the southeast of St Marys Station there are some residential areas, to the south of Station and Chesham Streets. These areas are of **Medium district brightness (A3)** as this area is set back from the commercial centre and has smaller scale uses with lit streets and some major transport routes.

Magnitude of change during construction*:* There would be night works required as a part of the construction works. This would include underground works which may be contained within an acoustic shed to the south east of the Station on Station Street. There would, however, be some lighting required outside of these areas including lighting associated with site offices, car parking and construction support areas to the north of the station. This lighting would be somewhat contained by the industrial areas to the north of Harris Street. There would also be 24-hour deliveries of large equipment along Station and Harris Streets.

Some residential properties to the south of the site, including the upper levels of the medium rise residential buildings near on Phillip Street would potentially overlook these works. It is expected that there would not be any direct light spill onto these properties.

Visual impact during construction: Most of the night work would either be contained within an acoustic shed if required or screened by site hoarding and fencing with shade cloth. Any additional light sources and skyglow that would be seen during construction would be generally absorbed into the existing brightly lit night scene. Overall, it is expected that this lighting would result in a noticeable reduction in the amenity of these areas. This would result in a **negligible visual impact** at night in areas of high district brightness (A4), and a **minor adverse visual impact** in areas of medium district brightness (A3).

Magnitude of change during operation: During operation St Marys Station would be brightly lit, including the station itself, station entries, entry plazas and interchange areas. This lighting would be seen within the context of the existing station and brightly lit surrounding streets and commercial areas to the south of Station Street.

To the north the multi-storey commuter car park and industrial areas would contain any additional lighting and would be largely absorbed into the character these areas. In areas both to the north and south of the station there would be few sensitive receivers at night and the lighting levels would be consistent with the station and surrounding streets.

There are some residential properties, to the southeast of the station, which would have some views to the new brightly lit St Marys Station. While these properties are located in a relatively bright setting, the station and lighting would extend further east, towards these properties. There would also be views across the bus layover, and to some lighting at the station services buildings. It is expected that there would not be any direct light spill onto these properties.

Visual impact during operation: While St Marys Station would be brightly lit, it would be consistent in character with the existing station and town centre setting. The additional light sources and skyglow that would be seen, would be generally absorbed into the brightly lit night scene. This additional would create no perceived change in the amenity of the areas surrounding the existing station, which are high district brightness (A4) areas, resulting in a **negligible visual impact** at night.

The brightly lit St Marys Station would be located closer to the existing residential areas, to the south of Station and Chesham Streets, increasing the light levels in the vicinity of areas which are of medium district brightness areas (A3). This would result in a noticeable reduction in the amenity of these areas at night and a **minor adverse visual impact**.

1 VIEW EAST ALONG STATION STREET
2 VIEW WEST ALONG STATION STREET

5. ST MARYS TOWN CENTRE

5.6 Summary of impact

VIEW EAST FROM ST MARYS STATION

5.6 Summary of impact

Table 5-1, Table 5-2 and Table 5-3 summarise the potential landscape and visual impacts of the project at St Marys town centre character area.

Overall, there would be **moderate adverse landscape and visual impacts** during construction which are temporary, short term impacts. During operation of the project there would be **minor adverse** to **negligible landscape and visual impacts**.

In the long term, the landscape and visual impacts experienced as a result of the project would reduce as planned urban renewal increases urban density and transitions the land use to mixed use (Penrith Development Control Plan 2014) in areas to the south of St Marys Station. As a result, the station setting would be more visually compatible with the project, vegetation would mature and the increase in urban built form would reduce the potential visibility of the project from residential areas.

5.6 Summary of impact

TABLE 5-1 LANDSCAPE IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	St Marys town centre	Local	Considerable reduction	Moderate adverse	Noticeable improvement	Minor beneficial

TABLE 5-2 DAYTIME VISUAL IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	View north along Glossop Street	Local	Considerable change	Moderate adverse	No perceived change	Negligible
2	View east from Station Street to Chesham Street	Local	Considerable change	Moderate adverse	Noticeable reduction	Minor adverse
3	View west from Station Street	Local	Considerable change	Moderate adverse	No perceived change	Negligible
4	View northeast from the corner of Gidley and Philip Streets	Local	Considerable reduction	Moderate adverse	No perceived change	Negligible
5	Viewpoint 5: View west from Queen Street	Local	No perceived change	Negligible	No perceived change	Negligible
6	View east from the corner of Station and Queen Streets	Local	Considerable reduction	Moderate adverse	No perceived change	Negligible
7	View west from St Marys Station platform	Local	Considerable reduction	Moderate adverse	No perceived change	Negligible
8	View southwest from Harris Street	Local	Considerable reduction	Moderate adverse	No perceived change	Negligible

TABLE 5-3 NIGHT-TIME VISUAL IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	St Marys town centre	A4: High district brightness	No perceived change	Negligible	No perceived change	Negligible
2	St Marys residential areas	A3: Medium district brightness	Noticeable reduction	Minor adverse	Noticeable reduction	Minor adverse

6. ST MARYS SUBURBAN FRINGE

6.1 Key components of the Project

The St Marys suburban fringe character area extends from South Creek to the M4 Western Motorway.

6.1 Key components and character of the project

The project in this character area includes:

- alignment in tunnel
- a Claremont Meadows services facility
- construction power connection (for temporary TBM power supply).

The services facility construction site would be located on the south eastern corner of the intersection of Gipps Street and the Great Western Highway. This site would support tunnelling works. Night works would be required for haulage and deliveries, oversize deliveries, underground works and road possessions during construction.

The construction power connection would extend between the existing Claremont Meadows substation at Nullaga Way and the M4 Western Motorway via Gipps Street.

Further details of the design are contained in Chapter 7 (Project description – operation) and details of the construction method are contained in Chapter 8 (Project description – construction) of the Environmental Impact Statement.

6.2 Relevant planning context

The St Marys suburban fringe landscape character area is located in the City of Penrith LGA. While this project is not subject to local government requirements, the LEP offers some context to the local landscape and visual values of the study area. In addition to this, the *Penrith Local Strategic Planning Statement* (2020) and *Penrith Scenic & Cultural Landscapes Study* (2019) provide an indication of the future landscape character and visual planning guidance. A review of these planning documents is contained in Section 2 of this technical paper.

6.2.1 Penrith Local Environmental Plan, City of Penrith Council, 2010

In addition to the general controls the Penrith LEP identifies particular controls for particular identified precincts. The project footprint of the project includes some areas of the area identified in the DCP as the Claremont Meadows Stage 2 Precinct. The site of the services facility is identified as a 'gateway site' within this precinct.

Planning provisions for the gateway site on the Great Western Highway are '*to ensure that this high profile site that will act as a gateway to Claremont Meadows is appropriately developed'* (City of Penrith Council, 2010, Part E2, 2.2.4A(a), pE2-9). Specific controls require development to *'recognise its visual prominence to the Great Western Highway and role as an entry point to Claremont Meadows*' (City of Penrith Council, 2010, Part E2, 2.2.4B (1), pE2-9).

VIEW WEST ALONG THE GREAT WESTERN HIGHWAY

VIEW SOUTH ALONG GIPPS STREET FROM THE GREAT WESTERN HIGHWAY

VIEW EAST FROM SUNFLOWER DRIVE TO GIPPS STREET

6.3 Landscape impact

6.3.1 Existing landscape character

The St Marys south suburban fringe residential area extends from South Creek west of the St Marys town centre to the M4 Western Motorway in the south. (See Figure 6-1) The character area forms the suburban fringe to the city of Penrith. The landscape is in transition from a former rural landscape on the South Creek floodplain to an increasingly urban setting. The landscape is fragmented by a mix of uses, major arterial roads, patches of mature bushland and areas of vacant former rural land which reduce the cohesiveness of the overall landscape character.

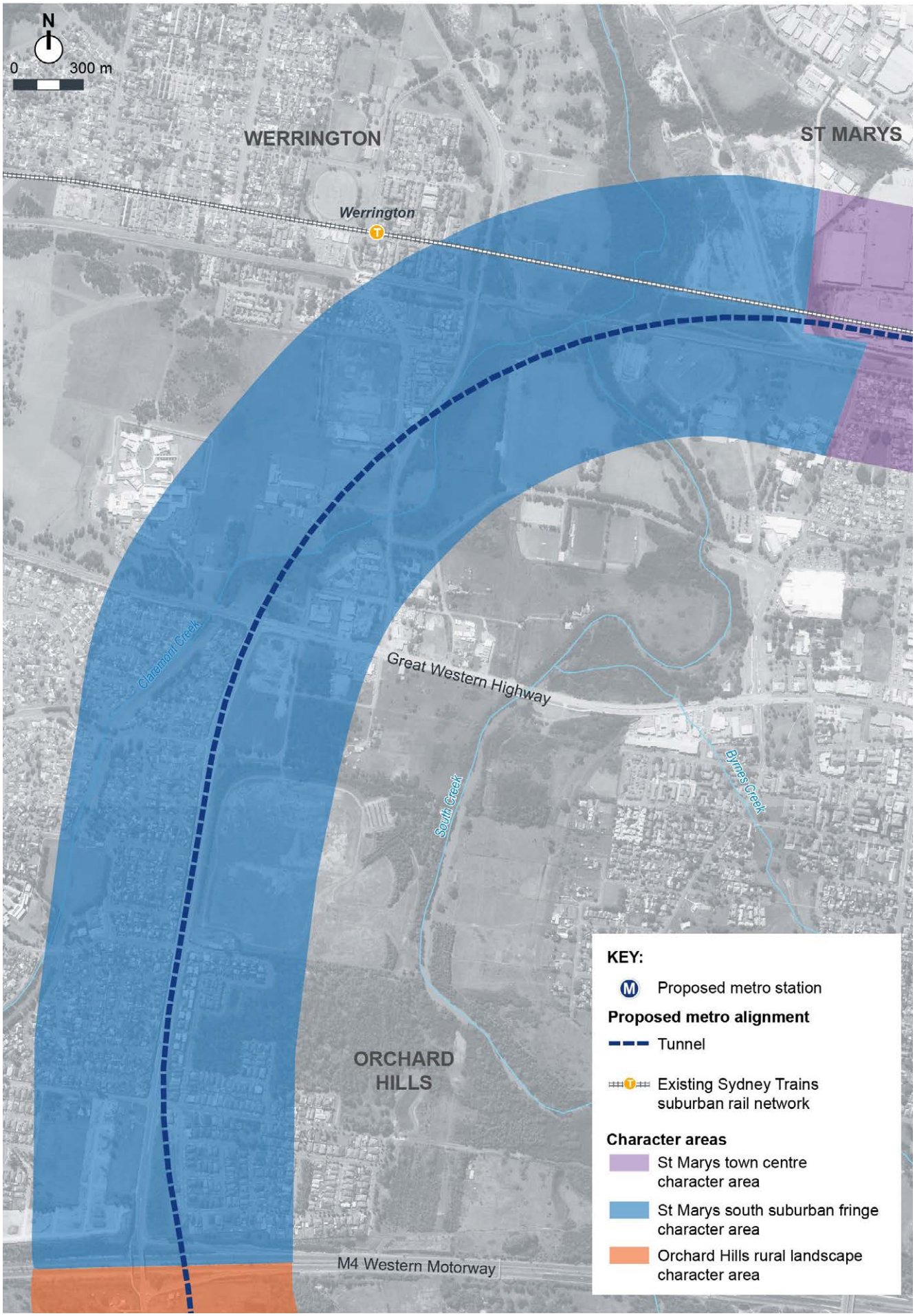
The northern areas in the suburb of Werrington comprise a mix of educational, institutional, low density residential, industrial, open space and recreation uses interspersed with vacant rural land. These areas are bound by the Main Western Railway Line, the Western Sydney University's Penrith campus (at Kingswood and Werrington), a major east west arterial road (Great Western Highway) and the riparian corridors of South Creek and Claremont Creek. The landform of this area generally slopes in an easterly direction towards South Creek and Claremont Creek and presents as a broad open landscape that is predominantly cleared, apart from the occasional patch of vegetation.

The southern areas in the suburb of Claremont Meadows comprise a mix of low density residential, retail, community uses, patches of bushland and open space interspersed with vacant rural land. These areas are bound by the M4 Western Motorway and South Creek. The landform generally slopes from elevated land near the M4 Western Motorway towards the north and also east towards South Creek.

Patches of mature bushland and vegetated creeks are a unifying element within this fragmented landscape character area. South Creek, in particular, provides a strong visual edge to the urban areas of Claremont Meadows and Werrington. The creek corridor is recognised as an important spatial element which defines the character and landscape of the Western Parkland City under the Western City District Plan and Greater Sydney Region Plan 2056 (see Sections 2.2 and 2.3 of this technical paper). To the east of Claremont Meadows, a major patch of mature bushland comprising Cumberland Plain Woodland, adjoins South Creek and forms an attractive landscape feature. South Creek forms part of a major regional open space corridor and is identified as a priority corridor which is important to strengthen green grid connections (Western City District Plan).

Gipps Street, which becomes Kent Road to the south, provides north south access between the M4 Western Motorway and Great Western Highway. It is a wide dual carriageway road which segregates the adjoining land uses. Vacant land at the corner of Gipps Street and the Great Western Highway is intended to be developed as a 'gateway' and entrance to Claremont Meadows according to the Penrith DCP 2014.

FIGURE 6-1 ST MARYS SUBURBAN FRINGE LANDSCAPE CHARACTER AREA



6. ST MARYS SUBURBAN FRINGE

6.3 Landscape impact

The site of the services facility is within the Claremont Meadows Stage 2 Precinct and identified as a '*gateway site'* and '*entry point to Claremont Meadows'* in the Penrith DCP 2014. The M4 Western Motorway is located in a cutting, with vegetation and landform screening the carriageway from adjacent residential areas to the north. The M4 Western Motorway upgrade between Lapstone to Mays Hill, as part of the M4 Smart Motorway project, is due for completion in 2020.

6.3.2 Landscape sensitivity

With the exception of riparian vegetation along Claremont Creek and South Creek, this former rural landscape is transitioning into an increasingly urban setting and lacks a cohesive landscape character. Landscape features within the St Marys south suburban fringe residential area would be experienced mainly by residents, visitors and local workers with moderate to high volumes of traffic along the Great Western Highway and Gipps Street, and the M4 Western Motorway offering transient views of the landscape.

A site at the corner of the Great Western Highway and Gipps Street is identified as a 'gateway site' in the Claremont Meadows Stage 2 Precinct in the Penrith DCP 2014.

Land to the east of Gipps Street and adjoining South Creek (in which a former landfill is located) and some sections of land bordering the M4 Western Motorway corridor are recognised as land with scenic and landscape values under the Penrith LEP 2010 and important to local character. There is an area along the M4 Western Motorway which is identified as '*highly visually-sensitive landscapes'* in the Penrith Local Strategic Planning Statement (2020). This includes parts of the construction power corridor site. Overall, this landscape character area has a **local landscape sensitivity**.

South Creek, however, is recognised as an important regional corridor for the proposed Western Parkland City under the Greater Sydney Region Plan 2056 and Western City District Plan. South Creek is of **regional landscape sensitivity**.

6.3.3 Magnitude of change during construction

Construction of the services facility would be undertaken on land to the south east of the intersection of the Great Western Highway and Gipps Street. The project would result in the removal of a few scattered mature trees and the loss of a large area of vacant land which contributes to the open character along Gipps Street and allows views to the adjacent patches of bushland. There would not be an impact to regional landscape features such as South Creek.

The construction site would be accessed via Putland Street, which would be extended to the site, from Gipps Street and the intersection with Sunflower Drive. Pedestrian footpaths alongside the site may be narrowed or diverted at times during construction. Overall, these changes would not substantially alter wayfinding and legibility within the local area.

The site would be transformed into an intensive construction site, which would contrast with the suburban residential character west of Gipps Street. Notwithstanding the presence of industrial activity in areas to the northeast of the site and the busy Great

Western Highway, these changes would result in a noticeable reduction to the character of St Marys south suburban fringe landscape character area, which is of local landscape sensitivity, resulting in a **minor adverse landscape impact**.

The construction power corridor would be constructed along Kent Road between Caddens Road and the M4 Western Motorway on mostly vacant land and within the road reserve. This may include a small site office, worker amenities and light and heavy vehicle parking north of the Motorway. Access to the site would be from Kent Road, to the south of Caddens Road, and would require an upgrade to Kent Road north of the M4 Western Motorway.

Temporary footpath diversions may also be required adjacent to the construction sites. This may include temporary diversion of the shared pathway and the footpath to the west and east of Gipps Street and Kent Road which provides regional cycle access between Orchard Hills and Kingswood. While local routes would be altered, the accessibility and legibility for pedestrians and cyclists would be generally maintained during construction.

6.3.4 Landscape impact during construction

The project would have a relatively small construction footprint with intensive construction activity in this character area and there would be some minor alterations to the adjacent footpaths. The outcome of these changes would be a noticeable reduction in the character of St Marys south suburban fringe residential area, which is of local landscape sensitivity, resulting in a **minor adverse landscape impact**. There would be no impact upon the character of the nearby M4 Western Motorway corridor.

6.3.5 Magnitude of change during operation

The services facility would be established on the south-eastern corner of the Great Western Highway and Gipps Street. The building would be comparable in scale with two storey detached dwellings opposite within Claremont Meadows. This corner is identified as a local 'gateway Site' in the Claremont Meadows Stage 2 Precinct in the Penrith DCP 2014, intended to be '*developed appropriately as an entrance to Claremont Meadows*' (s2.1.2). All other areas within the project footprint would be reinstated, including areas of the construction footprint between Caddens Road and the M4 Western Motorway.

6.3.6 Landscape impact during operation

Given the fragmented landscape character of the St Marys south suburban fringe residential area, and the sites location adjacent to a major road, the project would be somewhat absorbed into the character of this area. Overall, there would be a noticeable reduction in the character of this area, which is of local landscape sensitivity, resulting in a **minor adverse landscape impact.**

6.4 Visual impact

6.4.1 Visual catchment

The project footprint would have a limited visual catchment with views to the services facility construction site mainly from surrounding major roads including Gipps Street and the Great Western Highway, Caddens and Kent Roads. There may be some visibility along Sunflower Drive, however, otherwise the residential areas to the west and south-east within Claremont Meadows would be screened by acoustic fences along Gipps Street and Kent Road.

During construction there would be views to the construction power connection on local streets between Claremont Meadows substation at Nullaga Way to north of the M4 Western Motorway, and from Kent Road and Caddens Road to a small area of the project footprint for a short duration. There would be limited views from the M4 Western Motorway as patches of bushland within the suburb of Claremont Meadows would obstruct and contain views.

6.4.2 Viewpoint assessment

The following viewing locations were selected as representative of the range of views to the works:

- Viewpoint 1: View southeast across the Great Western Highway
- Viewpoint 2: View north along Gipps Street
- Viewpoint 3: View east from Sunflower Drive

The following plans identify the location of these viewpoints.

The following sections summarise the daytime visual impact identified for each representative viewpoint during construction and operation.

FIGURE 6-2 VIEWPOINT LOCATION PLAN, NORTHERN AREA

6. ST MARYS SUBURBAN FRINGE

6.4 Visual impact

Viewpoint 1: View southeast across the Great Western Highway

Existing conditions: This view across the Great Western Highway and Gipps Street intersection shows the services facility site in the centre of the view. The landform gently rises across the site to the south enabling views across the site which includes a large vacant site and a Council depot for temporary machinery storage and laydown. This view includes a mixture of uses, including the suburban area of Claremont Meadows (right of view) and industrial and retail development along the highway (left of view). There is a backdrop of mature bushland vegetation which encloses and provides some amenity to this otherwise harsh urban view.

Gipps Road can be seen extending south from the intersection. It is a straight north-south aligned road extending between the Great Western Highway and the M4 Western Motorway, which has recently been upgraded to a dual lane dual carriageway. It is a wide corridor, visually separating the suburban area of Claremont Meadows from the site. The Great Western Highway, which can be seen in the foreground of this view, is a busy route with three lanes of traffic in each direction. There is a constant movement of vehicles along these roads, which dominates the character of this view.

Sensitivity: Views along the Great Western Highway are experienced by a high volume of road users, as well as residents and visitors approaching the Claremont Meadows residential community, nearby retail, industrial educational and institutional uses. The site is identified as a 'gateway site' and is intended by Penrith Council to become an entrance to the Claremont Meadows area. Overall, this view is of **local visual sensitivity**.

Magnitude of change during construction: A construction site for the services facility would be established in the middle ground of view, replacing the vacant site to the southeast of the Great Western Highway and Gipps Street intersection. There would be site fencing and hoarding established along the site perimeter and works to construct the facility, including excavation works, would be located close to the corner of the intersection. Machinery used in construction, including cranes, piling rigs and for haulage as well as spoil storage areas would be clearly visible. A water treatment facility would also be seen within the services facility site. Following tunnelling works, works to construct the services facility would be seen.

Site offices, car park and worker amenities would be located in the centre of the site, in the middle to background of this view. These elements are likely screened by the construction activity in the middle and foreground.

The intersection at Gipps Street and Sunflower Drive, to the south (right of view) and in the background of this view would be upgraded. Light and heavy construction vehicles would be seen

FIGURE 6-3 VIEWPOINT 1: VIEW SOUTHEAST ACROSS THE GREAT WESTERN HIGHWAY

accessing the site from this intersection in the background of view.

Visual impact during construction: The construction activity at this site would be seen in the context of busy roads and replace an existing disused site. This would result in a noticeable reduction in the amenity of this view, which is of local visual sensitivity, resulting in a **minor adverse visual impact**.

Magnitude of change during operation: The services facility would be a new structure in the middle ground of this view, at the corner of the intersection. The facility would be a simple building, enclosing tunnel ventilation plantrooms and associated air-distribution equipment. The main facility building would be about two storeys high. It would have a footprint of a similar scale to the nearby light industrial and commercial buildings. Security fencing would contain the facility and would be visible extending along the verge of Gipps Street and the Great Western Highway.

The remainder of the construction site would be reinstated and the mature trees which provide a leafy backdrop to this view would be retained.

Visual impact during operation: The services facility would be a somewhat prominent new feature in this view due to its location on the corner of the site. It would contrast in scale with the built form of suburban development at Claremont Meadows, but be somewhat absorbed into the streetscape of the Great Western Highway, which has a number of large retail and industrial buildings. Overall, there would be a noticeable reduction in the amenity of this view, which is of local sensitivity, resulting in a **minor adverse visual impact**.

Viewpoint 2: View north along Gipps Street

Existing conditions: This view from the footpath of Gipps Street shows the site in the background of the view. Gipps Street has two lanes of traffic in each direction and is heavily trafficked. The intersection of Gipps Street with the Great Western Highway can be seen in the background of view. The site is located on the southeastern corner of the intersection (right of view), and is currently a vacant site, mostly cleared of vegetation and currently used as a council depot for temporary machinery storage and laydown.

This view is on a local rise so that there is a view across much of the site. The site is visually enclosed to the east and south (right of view) by a stand of existing mature trees. The trees to the south of the site partially filter views to northern parts of the site. There is also a backdrop of mature trees (centre of view), associated with the Claremont Creek, which enclose the view to the north.

Noise walls along the western side of Gipps Street (left of view) block views to the adjacent suburban area of Claremont Meadows.

Sensitivity: Views along Gipps Street are experienced by a high volume of road users, as well as residents and visitors approaching the Claremont Meadows residential community, nearby retail, industrial, educational and institutional uses. The site is identified as a 'gateway site' and is intended by Penrith City Council to become an entrance to the Claremont Meadows area. Overall, this view is of **local visual sensitivity**.

Magnitude of change during construction: A construction site for the services facility would be established at the vacant site to the east of Gipps Street in the middle to background of this view (right of view). Works to construct the services facility would be located near the corner of the Great Western Highway. Site fencing and hoarding would be erected along the site perimeter, along Gipps Street, partially blocking views into the site at street level. Taller equipment would be seen rising above the fencing including cranes and piling rigs. There would be light and heavy vehicles visible entering and egressing the site on Gipps Street. Works to upgrade the intersection at Gipps Street and Sunflower Drive (centre of view) would be seen in the foreground of the view.

Visual impact during construction: The construction site would replace a temporary depot and partly vacant site and be seen in the context of the heavily trafficked Gipps Street. This view has a high visual absorption capacity for works of this type. Overall, there would be a noticeable reduction in the character and quality of this view, which is of local sensitivity, resulting in a **minor adverse visual impact**.

Magnitude of change during operation: The services facility would be located in the middle to background of this view, at the corner of the Gipps Street and Great Western Highway intersection. The facility would be a simple building about two storeys high. The building would have a large footprint which would partly screen views to the highway in the background. There would be security fencing which would contain the facility and would be seen along the verge of Gipps Street. The backdrop of existing mature trees (centre of view) would be partly screened by the

FIGURE 6-4 VIEWPOINT 2: VIEW NORTH ALONG GIPPS STREET

services facility building. The trees to the south of the site (left of view) would also be retained and would continue to filter views to the northern areas of the site which would be reinstated following construction.

Visual impact during operation:
The facility would increase the area of development visible from this location. While the existing residential buildings within the community of Claremont Meadows are of a smaller scale, the visual separation between the site and this residential area reduces any perceived visual contrast or incompatibility. Furthermore, the services facility building would be consistent in character with the industrial and commercial development to the east (right of view). Overall, there would be a noticeable reduction in the amenity of this view, which is of local sensitivity, resulting in a **minor adverse visual impact**.

Viewpoint 3: View east from Sunflower Drive

Existing conditions: This view shows the view available from the residential area of Claremont Meadows. Gipps Street is visible in the centre of view, which includes a heavily trafficked dual carriageway road. Acoustic barriers enclose views from the adjacent residential properties from Gipps Street. The site is located in the middle ground of this view, to the east of Gipps Street (centre of view). It is a vacant site which has been cleared of vegetation. The landform gently rises to the east where there are mature trees which enclose the view. This vegetation extends to Gipps Street to the south of the site (right of view).

Sensitivity: Views along Sunflower Drive would be experienced by local road users, including residents and their visitors, departing the residential area of Claremont Meadows. This view is of **local visual sensitivity**.

Impact during construction: A construction site for the services facility would be established in the middle ground of view, on the vacant site to the east of Gipps Street. Works to upgrade the intersection at Gipps Street and Sunflower Drive (centre of view) would be seen in the foreground of this view. There would be light and heavy construction vehicles seen travelling along Gipps Street, and accessing the site via a new site access, opposite Sunflower Drive. To the north of this new entry, temporary fencing and hoarding would be erected along the site perimeter, along Gipps Street, partially blocking views into the construction site. Site offices, car park and worker amenities would be installed on the site. While views to the services facility building construction site would be mostly out of view, the upper parts of machinery used on the site, such as cranes, may be visible rising above the residential properties and noise wall (left of view) in the background of this view.

Impact during construction: While the construction site would extend across the middle ground of this view, and be seen in the context of constant traffic movement along Gipps Street, this view would be limited to a relatively small slot view, by the intervening acoustic wall and vegetation that would remain to the south of the site. Overall, there would be a noticeable reduction in the amenity of this view, which is of local sensitivity, resulting in a **minor adverse visual impact**.

Magnitude of change during operation: An entry to the services facility site would be visible, extending from Sunflower Drive. Maintenance vehicles would occasionally be seen accessing the site in the centre of this view. The services facility building would be in the background and out of view. The remainder of the construction site would be reinstated and the existing mature trees in the background (right of view) and to the south of the site would be retained, maintaining the otherwise leafy character of this view.

Impact during operation: The intersection works would be largely absorbed and consistent in character with the heavily trafficked Gipps Street which characterises this view. Overall, there would be no perceived change in the amenity of this view, which is of local visual sensitivity, resulting in a **negligible visual impact** overall.

FIGURE 6-5 VIEWPOINT 3: VIEW EAST FROM SUNFLOWER DRIVE

6.5 Assessment of night-time visual impact

Existing conditions: The St Marys suburban fringe has areas of both high and medium district brightness at night. The services facility site is located in an area of **high district brightness (A4)** due to its location adjacent to the industrial and commercial areas along the highly trafficked Great Western Highway. The headlights of vehicles along this heavily trafficked highway, at the intersection and along Gipps Street contribute to night-time lighting levels.

In the vicinity of the M4 Western Motorway, the setting is of **medium district brightness (A3)** as this area is more residential in nature and has smaller scale uses with lit homes, streets and some lighting along district transport routes including Gipps Street.

Magnitude of change during construction*:* Night works required at this site during construction would include lighting for haulage and deliveries, underground works and road possessions. There would also be some minor security lighting associated with the site.

Visual impact during construction: Due to the minor nature of the lighting required at this site and high visual absorption capacity of the setting, there would be no perceived change in the amenity of the site at night during construction. This would result in a **negligible visual impact** at night in areas of high district brightness (A4) and also a **negligible visual impact** in areas of medium district brightness (A3).

Magnitude of change during operation*:* The services facility building would have some minor lighting at night for security.

Visual impact during operation: Due to the minor nature of the lighting required at this site and high visual absorption capacity of the setting, there would be no perceived change in the amenity of the site at night during operation. This would result in a **negligible visual impact** at night in areas of high district brightness (A4) and also a **negligible visual impact** in areas of medium district brightness (A3).

6.6 Summary of impact

Table 6-1, Table 6-2 and Table 6-3 summarise the potential landscape and visual impacts of the project in the St Marys suburban fringe character area.

Overall, there would be **minor adverse landscape and visual impacts** during construction which are temporary, short term in nature. During operation the project there would be **minor adverse** to **negligible landscape and visual impacts**.

In the long term, the landscape and visual impacts experienced as a result of the project would reduce as the future precincts of Claremont Meadows are developed and proposed vegetation matures, assisting in the visual absorption of the services facility.

6.6 Summary of impact

TABLE 6-1 LANDSCAPE IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	St Marys suburban fringe	Local	Noticeable reduction	Minor adverse	Noticeable reduction	Minor adverse

TABLE 6-2 DAYTIME VISUAL IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	View south across the Great Western Highway	Local	Noticeable reduction	Minor adverse	Noticeable reduction	Minor adverse
2	View north along Gipps Street	Local	Noticeable reduction	Minor adverse	Noticeable reduction	Minor adverse
3	View east from Sunflower Drive	Local	Noticeable reduction	Minor adverse	No perceived change	Negligible

TABLE 6-3 NIGHT-TIME VISUAL IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	St Marys suburban fringe	A4: High district brightness	No perceived change	Negligible	No perceived change	Negligible
2	St Marys suburban fringe	A3: Medium district brightness	No perceived change	Negligible	No perceived change	Negligible

7. ORCHARD HILLS

7.1 Key components and character of the project

The Orchard Hills character area extends from the M4 Western Motorway to the Warragamba to Prospect Water Supply Pipelines.

7.1 Key components and character of the project

The project in the Orchard Hills landscape character area includes:

- in-cutting station- Orchard Hills Station
- tunnel portal south of the M4 Western Motorway
- alignment in-cutting, at-grade and on viaduct including a bridge crossing of Blaxland Creek and the Warragamba to Prospect Water Supply Pipelines
- stabling and maintenance facility.

Orchard Hills Station would be in a cutting, with a concourse at ground level and an island platform below the surface level.

The stabling and maintenance facility site would be located at Orchard Hills to the south of Blaxland Creek, to the project alignment and to the north of Patons Lane. The stabling and maintenance facility would operate 24 hours a day and be brightly lit.

The Orchard Hills construction site would be located south of the M4 Western Motorway and north and south of Lansdowne Road. A range of construction activities would be carried out at this site to including TBM launch and support, and the construction of Orchard Hills Station. Night works would be required for haulage and deliveries including oversize deliveries, underground and tunnelling works, and road possessions.

Further details of the design are contained in Chapter 7 (Project description – operation) and details of the construction method are contained in Chapter 8 (Project description – construction) of the Environmental Impact Statement.

The following artists impression shows the potential character of Orchard Hills Metro Station. (see figure 7.1).

7.2 Relevant planning context

The Orchard Hills landscape character area is located in the City of Penrith LGA. While this project is not subject to local government requirements, the LEP offers some context to the local landscape and visual values of the study area.

The *Penrith Local Strategic Planning Statement* (2020) and *Penrith Scenic & Cultural Landscapes Study* (2019) provide an indication of the future landscape character and visual planning guidance. A review of these planning documents is contained in section 2 of this technical paper.

7.2.1 Penrith Local Environmental Plan, City of Penrith Council, 2010

The LEP includes mapping which identifies an area extending across parts of the project footprint to the south of the M4 Western Motorway, as well as rural areas to the east of Blaxland Creek and surrounding Luddenham Road as *'Land with Scenic and Landscape Values'.*

7.2 Relevant planning context

FIGURE 7-1 ORCHARD HILLS STATION ARTISTS IMPRESSION

7. ORCHARD HILLS

7.3 Landscape impact

7.3 Landscape impact

7.3.1 Existing landscape character

The Orchard Hills rural landscape character area is bound by the M4 Western Motorway to the north, South Creek to the east and extends to the Warragamba to Prospect Water Supply Pipelines to the south. (See Figure 7-2) The pipeline forms the boundary between the suburbs of Orchard Hills and Luddenham and also the boundary between the City of Penrith and City of Liverpool LGAs.

The northern areas of Orchard Hills comprises a semi-rural landscape character which is characterised by detached dwellings on medium sized lots, set back from the road, with small dams and scattered sheds together with some small scale agricultural uses. These properties are interspersed with patches of bushland. Historically, the landscape of Orchard Hills '*was mainly overlaid with orchards and grapevines, and with rural farmhouses and outbuildings'* (City of Penrith Council, 2014, s E10.B, pE10-2) however, this character has since become fragmented as properties are divided into smaller semi-rural residential lots.

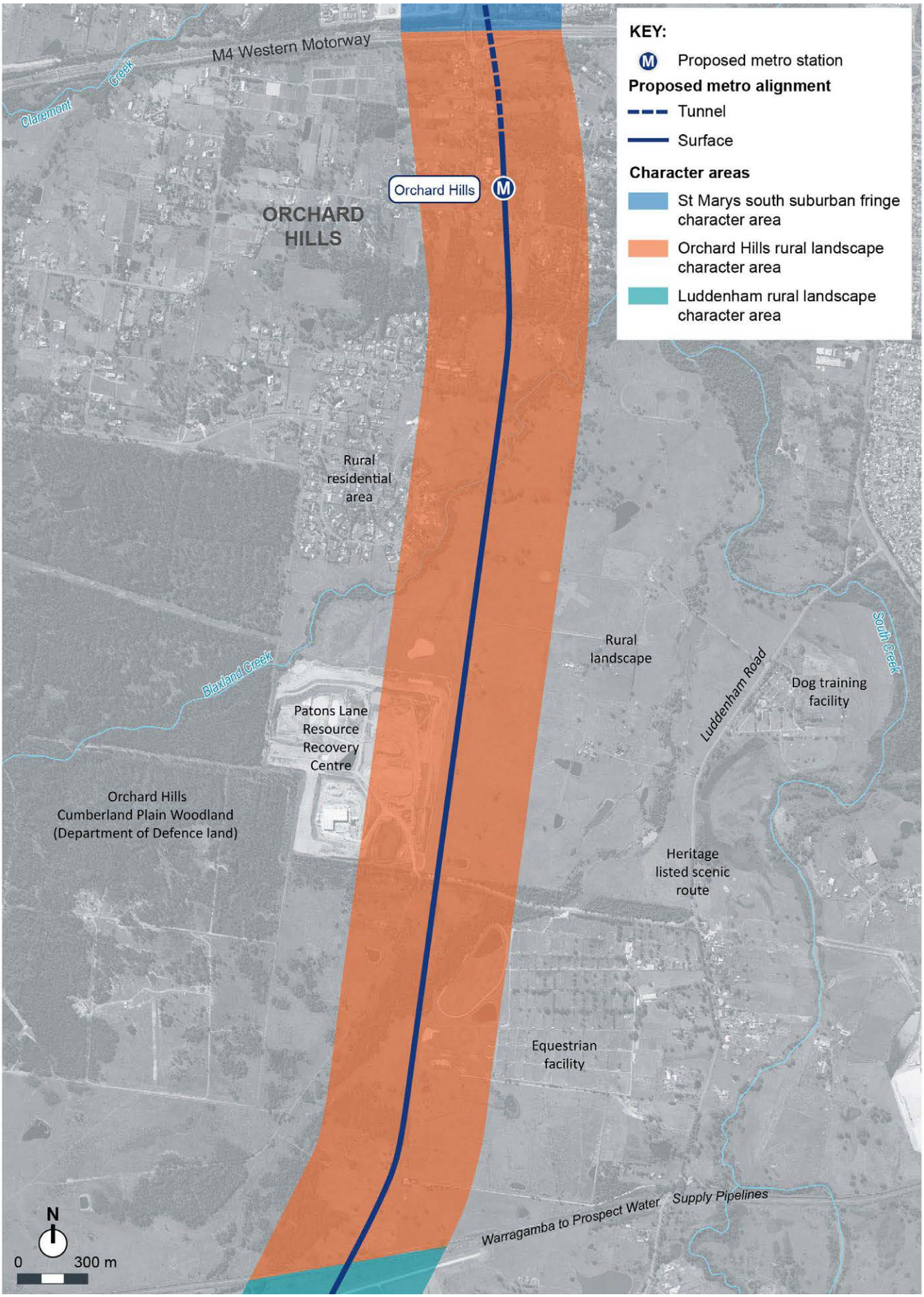
The topography in the north of Orchard Hills is defined by a series of rolling hills in an east-west orientation which offer scenic vistas to bushland and to nearby vegetated creeks including South Creek and Blaxland Creek to the east. The bushland areas and creeks provide important edges buffering low density residential development to the north in Claremont Meadows and in St Clair to the east.

Areas to the north and south of the M4 Western Motorway and extending into the Orchard Hills construction site are identified in the Penrith Local Strategic Planning Statement as being a '*highly visually significant landscape*'.

Located to the east of South Creek, the Mamre Homestead (at 181-275 Mamre Road), Orchard Hills is a State heritage listed site. The early 19th century Colonial Georgian style homestead and former residence has '*historic and aesthetic significance as a rare, regional example of a fairly intact pre-1860 colonial landscape and homestead on the Cumberland Plain. The Mamre farmhouse is an iconic feature in the St Marys region and immediate landscape' (*NSW Heritage Register, 2007). The homestead is noted for its aesthetic significance as it demonstrates the '*landscape and architectural characteristics typical of pre-1860 Cumberland Plain Colonial Landscapes. The colonial Georgian homestead in its farm setting, surrounded by farmland with distant views to South Creek, has high aesthetic value. The preservation of the rural landscape and line of original watercourses is significant to the local region, where spreading urban development threatens open space and natural habitats' (*NSW Heritage Register, 2007). Dense riparian vegetation along South Creek screens views towards the site from this property.

Blaxland Creek, which is a minor tributary of South Creek, forms a physical and visual boundary separating semi rural residential uses in the northern part of Orchard Hills from rural land uses to the south. Blaxland Creek flows through a large tract of mature bushland known as the Orchard Hills Cumberland Plain Woodland (Department of Defence

FIGURE 7-2 ORCHARD HILLS LANDSCAPE CHARACTER AREA



7. ORCHARD HILLS

7.3 Landscape impact

VIEW EAST ALONG LANSDOWNE ROAD

VIEW SOUTH ALONG KENT ROAD

land) to the southwest of the character area which has both State and Commonwealth heritage significance.

South of Blaxland Creek, the landscape transitions into a generally open rural landscape interspersed with small clusters of semi-rural residential dwellings together with some large scale horticultural uses and other non residential uses including a dog training facility located to the east of Luddenham Road. The flat terrain provides occasional distant views to the Blue Mountains in between scattered trees and mature vegetation along Blaxland Creek and South Creek. Sections of the creek corridors and rural landscape are identified as scenic and landscape values land in the Penrith LEP 2010.

Luddenham Road forms the main north south road in Orchard Hills and connects to Mamre Road in Luddenham. The road alignment is local heritage listed and identified as exhibiting aesthetic significance under the NSW Heritage Register (2008a) as '*the continuing rural character of Luddenham Road, characterised by the undulating traverse of the road, sparsely settled pastoral land and surviving timber post and rail fencing gives the road a high level of aesthetic appeal*'. Stands of mature vegetation further enhance the aesthetic experience of the rural road.

The Leeholme Horse Stud Rotunda at 391–395 Mamre Road, Orchard Hills located near Luddenham Road has a local heritage listing, and is significant … '*for its association with early 20th century horse studs in the area and a rare surviving remnant of the operation of Sydney's*

livestock markets at Flemington in the early twentieth century' (NSW Heritage Register, 2004a). An explorer's memorial cairn at Luddenham Road, Orchard Hills adjacent to the Leeholme farm is also identified as having local heritage significance. The Mamre Homestead, Luddenham Road and explorer's memorial cairn are identified on Penrith City Council's 'Penrith Heritage Drive'.

The rural character of this landscape is eroded by several infrastructure elements including the Warragamba to Prospect Water Supply Pipelines and a series of high voltage powerline corridors which cross the landscape with strong horizontal and vertical line. Other substantial alterations to the landscape include a large waste management facility at Patons Lane, however, this facility is set back from Luddenham Road and does not have a strong influence over the character of the landscape in this area.

The landscape character of Orchard Hills is intended to transition from a rural residential landscape to a future commercial and mixed-use precinct as part of the Western Parkland City Vision under the Greater Sydney Regional Plan 2056. The *Local Strategic Planning Statement* (City of Penrith Council, 2020) includes a North South Rail Structure Plan which identifies the Proposed Orchard Hill Station at the centre of the future Orchard Hills Centre, which will be a … '*compact mixed use urban village with a focus on residential land uses.*'

7.3.2 Landscape sensitivity

The landscape character area varies from rolling semi rural areas in the north to a flat open rural landscape in the south. The landscape has been altered for agricultural practices and degraded by infrastructure uses including a high voltage powerline corridor, water supply pipeline and landfill facility which reduce the cohesiveness of the rural landscape character.

Land within Orchard Hills and in particular the rural areas and creek corridors are identified as scenic and landscape values land under the Penrith LEP 2010 and important to local character. There is an area along the M4 Western Motorway which is identified as '*highly visually-sensitive landscapes'* in the Penrith Local Strategic Planning Statement (2020). This area extends south to include much of Orchard Hills Station construction site. The aesthetic qualities of Luddenham Road are recognised under the local heritage listing of the road corridor. These landscape features would be generally valued and appreciated primarily by the local community and would be considered to be of **local landscape sensitivity**.

South Creek and its tributaries, however, is recognised as an important regional corridor under the Greater Sydney Region Plan 2056 and Western City District Plan and would be of **regional landscape sensitivity**.

7.3.3 Magnitude of change during construction

The project construction footprint would form a wide linear corridor extending south from the M4 Western Motorway to the Warragamba to Prospect Water Supply Pipelines. The length of this construction site would create a divide through the centre of this landscape character area for the duration of construction and would have an influence over a large part of this landscape (see Figure 7-2).

Within the construction sites, the landscape would be substantially modified with the removal of the trees and vegetation, demolition of buildings and structures, and changes to the landform through civil works.

The project would include the construction of rail bridges across both Blaxland Creek and the unnamed creek, north of the Warragamba to Prospect Water Supply Pipelines. This work would require the removal of riparian vegetation and earthworks for bridge footings. This activity would reduce the visual buffer that the creek corridor provides between the semi-rural areas in the west of Orchard Hills and more open rural landscape and mixed character uses to the east. The work would not extend to include South Creek, protecting this regionally important landscape.

The project footprint would be located to the east of the Orchard Hills Cumberland Plain Woodland (Department of Defence land) and would not impact on this important Commonwealth heritage listed vegetation. In the northern areas of the Orchard Hills landscape character area, the construction site would, however, require the clearing of several smaller patches of mature bushland. This would reduce the area of bushland and tree cover, which contributes to the amenity of these areas. Small patches of vegetation would also be cleared in the south of the Orchard Hills landscape character area, however, this would be more consistent with the open rural landscape of these areas which is sparsely vegetated between the tributaries of South Creek.

Alterations to the topography of this landscape would be required in the vicinity of Orchard Hills Station for a dive structure and a tunnel portal south of the M4 Western Motorway. The rail corridor would transition from an open cutting to surface with the corridor continuing at-grade before rising to a bridge structure over Blaxland Creek. Landform modifications would also be required to construct viaduct piers, access roads and the embankments for the at-grade sections of rail in the southern parts of the landscape character area.

The changes to landform within the vicinity of Orchard Hills Station would be contained and occur mostly below ground. The construction site would, however, comprise large scale industrial structures including a concrete batching plant, water treatment plant, pre-cast concrete lining segment factory, material storage areas and potentially an acoustic shed which would introduce an intensive character to the landscape. The extent of the construction footprint and scale of machinery and structures would contrast in scale and character with the surrounding low scaled semi-rural landscape.

A stabling and maintenance facility construction site would be located south of Blaxland Creek, to the east of the project alignment and to the north of Patons Lane. Construction works at this site would result in a substantial change to the rural landscape due to the size of the site, footprint and height of structures, and extent of earthworks. However, the quality of the rural landscape in this area is somewhat reduced by the presence of two high voltage powerline corridors. The construction site would contrast in scale and character with the semi-rural residential areas to the west in Orchard Hills, however, the stabling and maintenance facility construction site would not extend west into Blaxland Creek, maintaining this visual and physical edge between these uses.

The off-airport corridor construction site, further to the south, would also contrast with the existing rural landscape character. This contrast would be less where there are other incoherent elements in the landscape such as the large landfill site, transmission lines and water supply pipeline.

There would be several road alterations required around the site to maintain access in the vicinity of the Orchard Hills construction site and off-airport corridor construction site. This would include the temporary diversion of Lansdowne Road and the upgrade and widening of Kent Road between the M4 Western Motorway and Lansdowne Road, the upgrade of the Kent Road and Lansdowne Road intersection and the construction of a westbound turning lane from Kent Road to the M4 Western Motorway. Patons Lane would be reduced to one-way traffic near

1 LANSDOWNE ROAD
2 M4 MOTORWAY
3 EXISTING RESIDENCE ON KENT ROAD
4 TRANSMISSION LINES FROM LUDDENHAM ROAD
5 RESIDENCE ON HOMESTEAD ROAD

the off-airport corridor construction site to maintain access to the nearby waste management facility during construction of the viaduct in this area. Luddenham Road would be upgraded to accommodate turning lanes into the two construction site access points at the Warragamba to Prospect Water Supply Pipelines site. These changes would expand the footprint of the works somewhat and require local modifications to vegetation and landform that would further erode the rural character of this landscape. During construction there is the potential for an acoustic shed located to the south of the adjacent residential properties on Samuel Marsden Road. This location limits the potential for overshadowing of these properties. Similarly, the potential acoustic shed and large workshop structures adjacent to Kent Road would be separated from neighbouring residential properties by the road and roadside vegetation and it is therefore unlikely that there would be a potential for overshadowing.

While the views from Luddenham Road are already influenced by other infrastructure, such as transmission lines, the scenic quality of views from this road would be reduced somewhat due to the scale and extent of changes to the landscape seen in the middle to background of views from this locally heritage listed '*scenic route*'. The proposed works would not impact on the heritage listed Mamre Homestead east of South Creek.

7.3.4 Landscape impact during construction

Overall, there would be a considerable reduction in the character and quality of this landscape due to the scale of the changes to the vegetation cover, landform and overall size and orientation of the construction sites. As this landscape is of local sensitivity, this would result in a **moderate adverse landscape impact**.

7.3.5 Magnitude of change during operation

Orchard Hills Station would be established to the east of Kent Road, about 500 metres to the south of the M4 Western Motorway. The station would be aligned generally north-south.

The station would form part of a new urban precinct which would include a new street network surrounding the station. The station would be accessed from a new public plaza to the west of the station connecting the station with Kent Road. The station entrance would be integrated with the surrounding pedestrian footpaths and upgrades would be undertaken to the existing road reserves to provide pedestrian connectivity to the station.

New bus stops with shelters would be located to the east of the station. Other facilities would include a three storey car park for commuter car parking south of Lansdowne Road, bicycle parking, kiss and ride facilities and a taxi rank. The multi-storey car park structure would have a built form character and scale that contrasts with the surrounding rural residential properties and would contribute to the transformation of the character of this area of the site.

The new station would improve transport connectivity within Orchard Hills through the co-location of the facility with a bus interchange. Proposed active transport links along nearby streets, streetscape upgrades, cycle facilities and pedestrian crossings would further enhance accessibility to the station for local residents.

The station would introduce a large scale modern civic structure into the landscape which would contrast with the surrounding semi-rural landscape character of the northern part of Orchard Hills. The increased density of roads would also result in a changed streetscape and urban form character.

In the vicinity of the station, the rail alignment would be underground, so that it would have no impact on the station precinct. However, to the south of Lansdowne Road there would be a tunnel portal and the rail corridor would emerge in a trough before it would surface and extend at-grade. The track alignment in the southern areas of Orchard Hills would comprise a series of bridge structures, viaduct and sections of track located on an elevated embankment.

The bridge structure over Blaxland Creek and the unnamed creek and viaduct would introduce a new large-scale feature in the rural landscape. The viaduct sections would be supported by evenly spaced piers. The massing and scale of the viaduct and bridge structures, and associated signalling, communications and overhead wiring, would introduce a strong horizontal element into the landscape, which would contrast in scale and form with the adjacent low lying, undulating rural landscape.

The corridor created by the viaduct would be cleared of vegetation, however, the landform would continue largely unaltered across the corridor. There would, however, be some localised landform changes for the viaduct and bridge piers, access roads and rail corridor embankments.

There would be vegetation provided along the at grade sections of the corridor and proposed engineered batters. Water management measures would be designed to integrate with the existing landforms and natural features of the site.

The stabling and maintenance facility construction site would comprise a series of large sheds, site car parking and a stabling area. The facility would be connected to the main rail alignment and trains would arrive and depart the stabling and maintenance facility at-grade on embankments. The stabling and maintenance facility would introduce a new large scale infrastructure element into the surrounding rural landscape.

7.3.6 Landscape impact during operation

Within the vicinity of Orchard Hills Station, the changes to the landscape would be substantial due to the insertion of a new, urban character built form, plaza and surrounding street pattern. The existing character of the northern areas of the Orchard Hills rural character area lacks coherence with a mixed and transitioning character. While the car park would, however, be out of scale and character, the new station built form elements are consistent with the transitioning character and would be largely absorbed into the surrounding landscape due to the existing vegetation.

In this area there would be a noticeable reduction in the character of this landscape, which is of local sensitivity. This would result in a **minor adverse landscape impact.**

In the southern areas of Orchard Hills, the track alignment and stabling and maintenance facility would contrast somewhat with the surrounding rural landscape. The change to the landscape would extend across a large portion of the landscape character area and increase the presence of urban development. Overall, there would be a noticeable reduction in the character of this landscape, which is of local sensitivity. This would result in a **minor adverse landscape impact.**

7.4 Visual impact

7.4.1 Visual catchment

Orchard Hills Station would be seen mainly from surrounding local rural roads including Kent Road and Lansdowne Road. Large patches of bushland surrounding the low rise buildings on nearby semi-rural properties together with dense vegetation along South Creek and Blaxland Creek would contain the visual catchment to the immediate local area. There would be no views expected from the M4 Western Motorway itself, however there would be some views from the motorway exit and entry ramps and from the overbridge.

Figure 7-4 shows the potential visual catchment of the project alignment. This plan highlights areas where a greater length of the project would be seen with an increasingly darker colour. This visual catchment diagram shows that the alignment would be visible from a relatively narrow visual catchment. It would be contained to the west by the Orchard Hills Cumberland Plain Woodland (Department of Defence land) and to the east by the vegetation along South Creek. The catchment includes the elevated ridge to the northeast, on Homestead Road around 1.5km from the alignment, across Luddenham Road and to the industrial areas to the east of South Creek where the landform rises to Mamre Road. There would also be some greater visibility to the alignment from elevated rural areas to the west of the alignment and north of Luddenham Road.

The stabling and maintenance facility would be seen mainly from Luddenham Road in the east. There would be limited visibility of the stabling and maintenance facility from the small rural residential area to the west of Blaxland Creek due to the screening effect of the vegetation along the creek (see Figure 7-3).

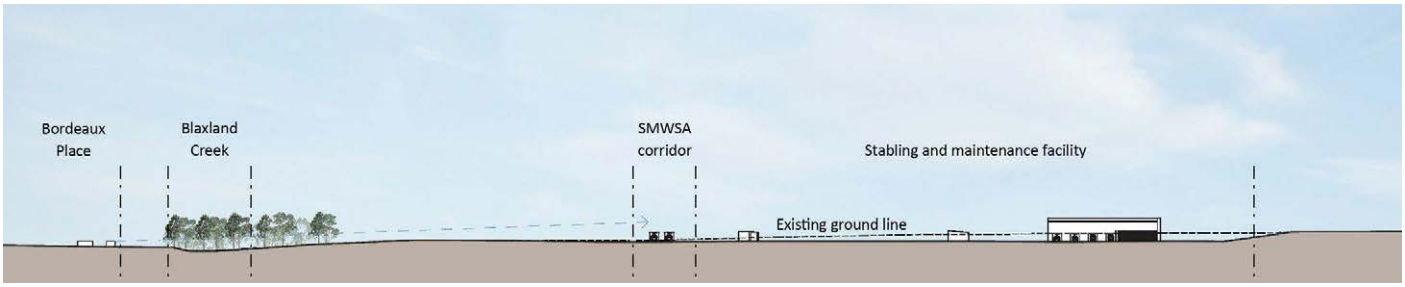
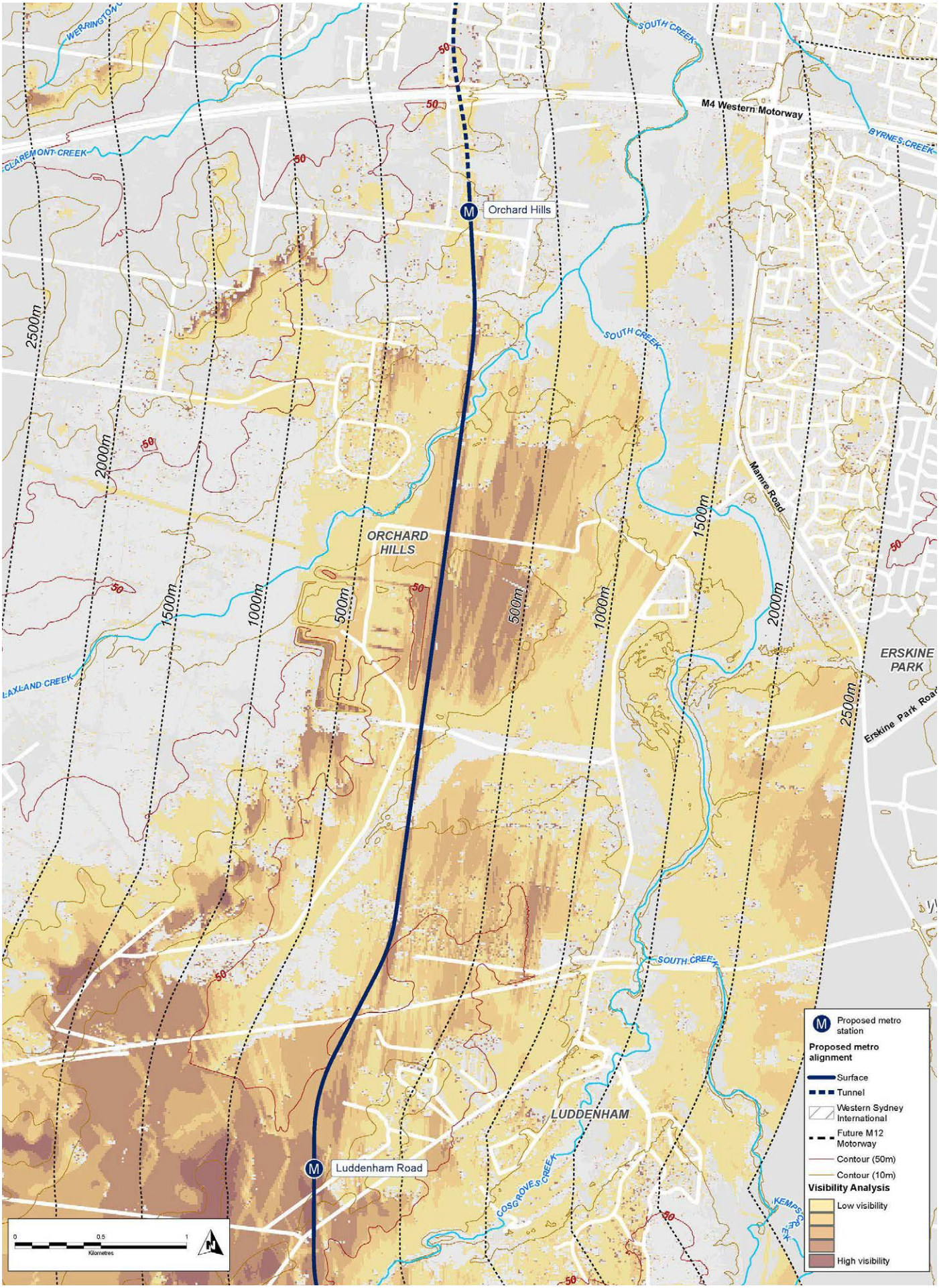


FIGURE 7-3 VIEW LINE BETWEEN BORDEAUX PLACE AND THE PROPOSED STABLING AND MAINTENANCE FACILITY

FIGURE 7-3 POTENTIAL VISIBILITY OF THE RAIL ALIGNMENT SOUTH OF ORCHARD HILLS STATION



7.4.2 Viewpoint assessment

The following viewing locations were selected as representative of the range of views to the project:

- Viewpoint 1: View southeast along Kent Road
- Viewpoint 2: View west from Samuel Marsden Road
- Viewpoint 3: View northeast from Kent Road
- Viewpoint 4: View northeast from Lansdowne Road
- Viewpoint 5: View west from Lansdowne Road
- Viewpoint 6: View southeast from Homestead Road
- Viewpoint 7: View east from Traminer Grove
- Viewpoint 8: View west from Luddenham Road

The following plan identifies the location of these viewpoints (see Figure 7-5).

In addition to these views, views to the Orchard Hills permanent power supply route were considered generally.

The following sections summarise the daytime visual impact identified for each representative viewpoint during construction and operation.

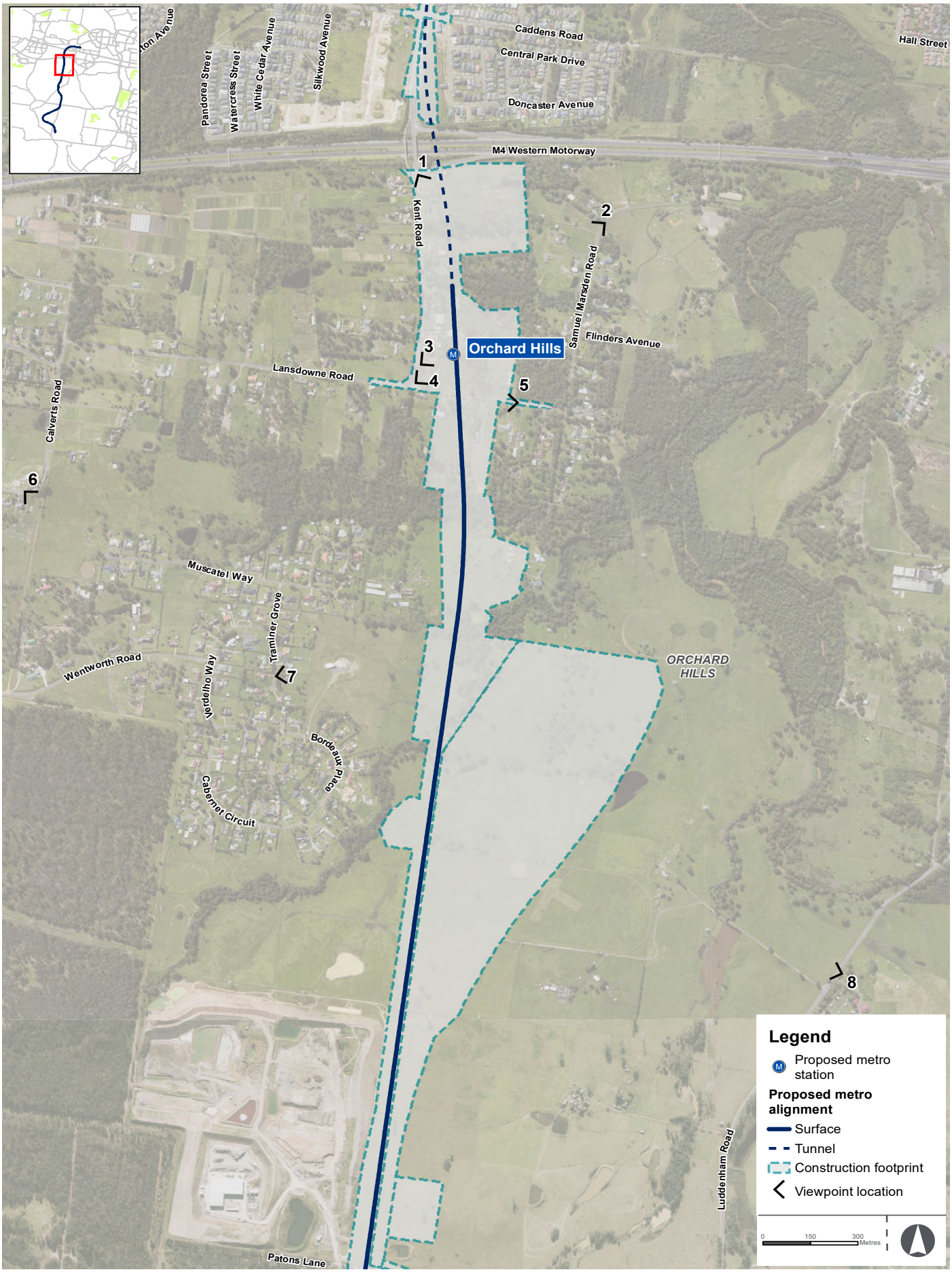
Viewpoint 1: View southeast along Kent Road

Existing conditions: This view is along Kent Road, a four lane wide, moderately trafficked road with a wide shared pathway on the western road verge (right of view). This road and footpath extend south from the M4 pedestrian bridge and residential areas of Claremont Meadows in the north. To the east of Kent Road (left of view) there are a few scattered low rise residential properties on large rural residential and acreage lots. This view has a vegetated backdrop with bushland vegetation located in the middle to background of this view.

Sensitivity: This view would be appreciated by pedestrians and commuter cyclists using the shared pathway which is a regional route and also moderate volumes of traffic travelling south along Kent Road. This area is identified as *'highly visually-sensitive landscapes'* in the Penrith Local Strategic Planning Statement (2020). Bushland vegetation to the rear of the properties forms a continuous vegetated backdrop to this view. The vegetated backdrop provides some amenity to this view. Overall, this view is of **local visual sensitivity.**

Magnitude of change during construction: A construction site for Orchard Hills Station would be established on the eastern side of Kent Road (left of view). Kent Road would be widened to include turning lanes for light and heavy construction vehicle access at two site access points along Kent Road. These site access points would be located in the foreground and also in the middle ground of this view. All vegetation and buildings within the properties to

FIGURE 7-5 VIEWPOINT LOCATION PLAN



7. ORCHARD HILLS

7.4 Visual impact

FIGURE 7-6 VIEWPOINT 1: VIEW SOUTHEAST ALONG KENT ROAD, EXISTING VIEW

FIGURE 7-7 VIEWPOINT 1: VIEW SOUTHEAST ALONG KENT ROAD – PHOTOMONTAGE SHOWING POTENTIAL ACOUSTIC SHED DURING CONSTRUCTION

the east of Kent Road would be removed and the site would be converted to a construction site. The area of mature trees to the west of the site (centre of view) would be retained. The site would be enclosed by hoarding and fencing, and there would be workshops located on the corner (left of view). There would potentially be an acoustic shed established in the middle ground of this view, alongside Kent Road. This shed would rise about three times the height of the existing residential buildings currently located on the site and would have a large footprint and simple façade. The potential acoustic shed adjacent to Kent Road and the adjacent workshops would mostly screen views to works within the site.

If there is no acoustic shed required adjacent to Kent Road, the view would include a range of large scale construction activities on the site, including a spoil handling facility, excavation of the tunnel dive structure and a precast segment storage area.

Visual impact during construction: As much of this view would be transformed into a construction site and the scale with two potential acoustic sheds about three times the height of the homes on the adjacent rural residential properties, there would be a considerable reduction in the amenity of this view, which is of local sensitivity, and a **moderate adverse visual impact**.

Magnitude of change during operation: To the south and in the background of this view, the opening up of the site would allow clear views to Orchard Hills Station. The rail alignment and station platforms would be located below ground level in an open cutting which would be surrounded by throw screens

and fencing. The new station entry building would have a contemporary civic character and be set within plazas and a new network of streets. The station building would be oriented away from this view, extending about 100 metres and rising about two storeys above the surrounding plaza level. Two of the three new intersections along Kent Road would be visible, providing access to a new bus interchange (east of the station) and pedestrian plaza. The station entry building would be viewed against a background of trees.

Visual impact during operation: While the station building would contrast to the scale and form of the existing rural view, much of the mature vegetation would be retained and the station would not rise above the skyline of trees. Overall, there would be a noticeable reduction in the amenity of this view, which is of local visual sensitivity, and a **minor visual impact**.

Viewpoint 2: View west from Samuel Marsden Road

Existing conditions: This view includes the rural residential properties along Samuel Marsden Road, south of the M4 Western Motorway in Orchard Hills in the foreground. These houses are generally single storey, set on large cleared rural residential and acreage lots. The landform rises to the west where there is a small ridge. Mature trees extend along this ridgeline, forming a continuous backdrop to this view, including a block of dense trees to the south (left of view) and some scattered mature trees to the north (right of view).

Sensitivity: This view is an incidental view from a local road which would be appreciated mainly by local residents

FIGURE 7-8 VIEWPOINT 2: VIEW WEST FROM SAMUEL MARSDEN ROAD, EXISTING VIEW

and their visitors who reside on nearby scattered and isolated semi-rural properties. Bushland vegetation to the rear of the properties forms a vegetated backdrop which is partially fragmented. This area is located within an area identified as a *'highly visually-sensitive landscape'* in the Penrith Local Strategic Planning Statement (2020). This view is of **local visual sensitivity**.

Magnitude of change during construction: The construction site for Orchard Hills Station would be established in the background of this view. The block of dense woodland vegetation to the rear of the property at 71 Samuel Marsden Road (left of view) would be retained and would obstruct any views to the works at Orchard Hills Station and along Kent Road.

Works within the northern part of the construction site would, however, be seen in the centre and right of this view, behind the houses. This would include the removal of some scattered mature trees. However, the vegetation within the neighbouring properties would screen much of the works within the site from view.

Visual impact during construction: While there would likely be large scale, construction activity located on the site intervening vegetation would filter and screen views to the works. Overall this would result in a noticeable reduction in the amenity of this view, which is of local visual sensitivity, and a **minor adverse visual impact**.

Magnitude of change during operation: All construction equipment and structures would be removed, and the site would be reinstated. The vegetation on the ridge in the centre and right of view, beyond the homes, would be slightly thinner, but there would continue to be a vegetated backdrop to this view.

Visual impact during operation: As there would be no visible elements in this view there would be no change to the amenity of this view, which is of local visual sensitivity, and a **negligible visual impact**.

Viewpoint 3: View northeast from Kent Road towards Orchard Hills Station

Existing conditions: This view includes scattered rural residential homes and out buildings as seen from Kent Road. These are small, single storey homes set within large cleared rural residential and acreage lots. There are large mature trees within these properties and the background of this view is enclosed by a continuous backdrop of mature vegetation associated with Blaxland and South Creeks. There are large transmission line towers glimpsed above this vegetation in the background of the view.

Sensitivity: This view would be appreciated by road users travelling south along Kent Road and from scattered residences to the west of Kent Road. The bushland vegetation to the rear of the properties forms a continuous vegetated backdrop to this view and is within an area identified as a '*highly visually-sensitive landscape'* in the Penrith Local Strategic Planning Statement (2020). This view is of **local visual sensitivity**.

Magnitude of change during construction: The project construction footprint would be located east of Kent Road, extending across the fore and middle ground of this view. Properties within the construction footprint would be removed including all buildings, structures and vegetation. Temporary site offices and staff car parking would be located adjacent to Kent Road, in the foreground of this view. Kent Road would remain open during construction and a new access road for light and heavy vehicle access would be installed within the site, running parallel to Kent Road, behind the offices and car park. Orchard Hills Station would be constructed in the middle ground of this view, including excavation of a tunnel portal to the north (left of view) and open cutting and belowground station (centre of view), requiring major earthworks and foundation works, and clearing of some of mature native vegetation in the fore and middle ground of this view. Machinery would be visible above the site including piling rigs and cranes.

Visual impact during construction: The construction site would extend across this entire view and include intensive construction activity that would contrast with the surrounding semi rural setting.

This would result in a considerable reduction in the amenity of this view, which is of neighbourhood visual sensitivity, resulting in a **moderate adverse visual impact**.

Magnitude of change during operation: Orchard Hills Station entry would be seen in the centre, middle ground of this view. The platforms, track and trains would be located in an open cutting, below ground and out of view. The station entry would be clearly seen, set back about 100 metres east of Kent Road, in the middle ground of this view. The station entry and concourse building would be generally orientated north to south, so that it is angled away from Kent Road. A new plaza would link the station with Kent Road, visible in the middle ground of this view. The main roof canopy over the station would extend along the length of the station and rise about two storeys above the plaza level. There would be services at each end of the station entry building. While the station entry structure roof would rise above the trees, the existing backdrop of mature vegetation would continue to somewhat contain views to the station.

Visual impact during operation: The station would introduce a large scale, contemporary civic structure, with a new style and materials, into this fragmented semi-rural setting. The proposal would contrast with the scale and character of existing built form in the surrounding area, however, it would be consistent with the transitioning character of this area and would be largely absorbed into the surrounding landscape due to the surrounding existing vegetation. Overall, there would be a noticeable reduction in the amenity of this view, which is of local visual sensitivity, and a **minor adverse visual impact**.

FIGURE 7-9 VIEWPOINT 3: VIEW NORTHEAST FROM KENT ROAD TOWARDS ORCHARD HILLS STATION, EXISTING VIEW

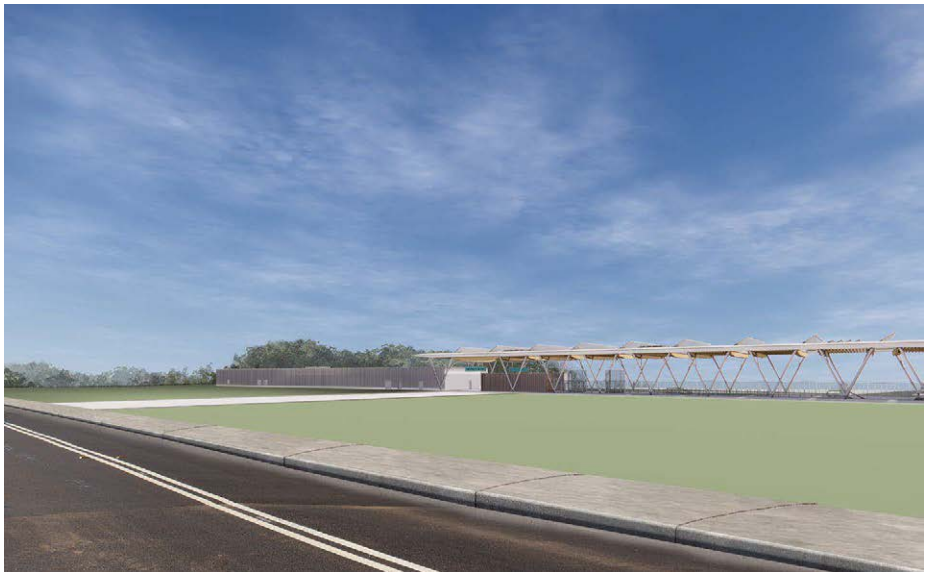


FIGURE 7-10 VIEWPOINT 3: VIEW NORTHEAST FROM KENT ROAD TOWARDS ORCHARD HILLS STATION, PHOTOMONTAGE DURING OPERATION

7. ORCHARD HILLS

7.4 Visual impact

Viewpoint 4: View northeast from Lansdowne Road towards Orchard Hills Station

Existing conditions: This view from the intersection of Kent and Lansdowne Roads shows several single storey homes, and rural outbuildings, located within large cleared rural residential and acreage lots. There is a dense framework of mature trees and shrubs within these properties and along the road corridor. The bushland vegetation intermixed with ornamental plantings contributes to a fragmented landscape character of this view.

Sensitivity: This view would be appreciated mainly by local residents and their visitors who reside on nearby scattered rural residential properties. Some of the bushland vegetation in the backdrop of the view is identified as a '*highly visually-sensitive landscape'* in the Penrith Local Strategic Planning Statement (2020), however, this forms only a minor portion of this view. This view is of **local visual sensitivity**.

FIGURE 7-11 VIEWPOINT 4: VIEW NORTHEAST FROM LANSDOWNE ROAD TOWARDS ORCHARD HILLS STATION, EXISTING VIEW

Magnitude of change during construction: The project construction footprint would be located to the east of Kent Road, in the middle ground of view, and east along Lansdowne Road. All structures and vegetation within the site would be removed. There would be site parking located in the middle ground of this view. Beyond this, would be a construction staging area for station excavation works. There would be site fencing and hoarding enclosing this area, however, equipment would be seen rising above the site perimeter fencing in this area, including piling rigs and cranes.

Visual impact during construction: While the construction site would extend across much of this view, the works would be set back from this view. However, due to the removal of vegetation and rural residential properties, there would be a considerable reduction in the amenity of this view, which is of local visual sensitivity, resulting in a **moderate adverse visual impact**.

Magnitude of change during operation: The entrance to Orchard Hills Station would be seen in the centre, middle ground of this view. While the platforms, track and trains would be located in an open cutting, below ground and out of view, the station entry would rise prominently above a new plaza. The station entry building would be generally oriented north to south and angled across this view. A new area of public domain would link the station with Kent Road. The main roof canopy over the station would be about 100 metres long and rising about two storeys above the plaza level. The station entry

structure roof would rise above the trees, however, the existing backdrop of mature vegetation would continue to provide a visual backdrop and somewhat enclose views to the station.

Visual impact during operation: The station would introduce a large scale, contemporary civic structure, with a new style and materials, into this fragmented semi-rural setting. The backdrop of vegetation would be maintained and would assist in the visual absorption of the station and station precinct into the surrounding landscape. While the project would contrast with the scale and character of existing semi-rural landscape, it would be consistent with the transitioning character of this area. Overall, there would be a noticeable reduction in the amenity of this view, which is of local visual sensitivity, and a **minor adverse visual impact**.

Viewpoint 5: View west from Lansdowne Road

Existing conditions: This view includes several scattered rural residential properties with small, single storey homes with scattered sheds and out-buildings, set within large cleared rural residential lots. There are some mature ornamental trees within the property gardens and a backdrop of mature trees to the west of the view. There is a block of taller bushland vegetation to the south of the residence (right of view). Lansdowne Road is a single lane surfaced road in this section, with power poles and overhead lines along the southern verge.

Sensitivity: This view represents an incidental view from a local road which would be appreciated mainly by local residents who reside on nearby scattered

FIGURE 7-12 VIEWPOINT 5: VIEW WEST FROM LANSDOWNE ROAD

semi- rural properties and their visitors. Bushland vegetation contributes to the leafy character of this part of Orchard Hills but is highly fragmented. This area is identified as a '*highly visually-sensitive landscape'* in the Penrith Local Strategic Planning Statement (2020). Overall, this view is of **local visual sensitivity**.

Magnitude of change during construction: The project construction footprint would be located to the south of Lansdowne Road (centre and left of view) and north of Lansdowne Road (far right of view). The houses and sheds and all vegetation within these properties this view would be removed. The construction footprint would extend across Lansdowne Road and an overbridge road would be constructed (right of view).

Construction of the alignment in a cut-and-cover tunnel, tunnel portal and open cutting would be undertaken on this site. This activity would require excavation, major earthworks and rail corridor construction works.

A multi-storey commuter car park would also be constructed south of Lansdowne Road in the centre of the view. Other construction activities within the site would include car parking, laydown areas and a concrete pump pad. Temporary fencing and hoarding would be erected along the site perimeter; however, taller machinery would be visible above the hoarding.

Impact during construction: This work would extend across and transform much of this view. It would include large scale construction activity, in close proximity to this local road. Overall, there would be a considerable reduction in the amenity of this view, which is of local visual sensitivity, resulting in a **moderate adverse visual impact**.

Magnitude of change during operation: A multi-storey commuter car park would be seen in the centre, middle ground of this view, and would contrast in scale and character with the surrounding semi-rural landscape. Lansdowne Road would be upgraded as a wider formed road with verges and footpaths. The project alignment would emerge from tunnel with a portal, located to the south of the site and oriented away from this view. There would be some throw screens and security fencing associated with this portal.

A new road intersection would be constructed in the foreground of the view to provide access to the bus stops adjacent to the station. The intersection of Lansdowne Road and Kent Road would also be upgraded in the background of the view. While much of the vegetation in the middle ground would have been removed, the vegetated in the background of this view would largely remain.

Visual impact during operation: The proposed multi-storey commuter car park would be visually prominent and contrast in scale with and character of the existing semi-rural landscape. The project alignment would be seen in the background of this view, emerging from a tunnel. The project would transform a substantial portion of this view, and there would be a noticeable reduction in the amenity of this view. As this view is of local visual sensitivity this would result in a **minor adverse visual impact**.

Viewpoint 6: View southeast from Homestead Road

Existing conditions: This view from Homestead Road in Orchard Hills offers elevated panoramic views from this local ridgeline to the east across rural areas within the northern parts of Orchard Hills. Dense vegetation within the Orchard Hills Cumberland Plain Woodland is visible as a large tract of continuous vegetation in the middle ground (centre and right of view). The vegetated Blaxland Creek and South Creek are also visible in the middle ground and background of the view together with a corridor of large steel transmission line structures. The elevated residential suburbs of St Clair and Erskine Park can be seen on the skyline in the far background of the view.

Sensitivity: This view represents an incidental view from a local road which would be appreciated mainly by local residents who reside on nearby scattered semi- rural properties and their visitors. The Orchard Hills Cumberland Plain Woodland (Department of Defence land) has State and Commonwealth heritage significance and provides a landscape feature in this view. South Creek is also recognised as an important regional corridor under the Greater Sydney Region Plan 2056 and Western City District Plan, however, the creek does not form a major landscape element within this view. Blaxland Creek is also identified as having local 'scenic and landscape values' under the Penrith LEP 2010.

The rural landscape character lacks cohesiveness due to the fragmentation of bushland vegetation and visible landscape alterations such as infrastructure elements and the proximity of expansive areas of urban

FIGURE 7-13 VIEWPOINT 6: VIEW SOUTHEAST FROM HOMESTEAD ROAD

development on the horizon. This view is of **neighbourhood visual sensitivity** due to the low volume of viewers and the quality of the landscape.

Magnitude of change during construction: The off-airport corridor construction site would be established in the left and background of the view approximately 1.5 kilometres away. The corridor would be cleared of vegetation to accommodate construction of the project. This would create large gaps in the vegetation along the creek corridors, fragmenting the visual cohesiveness of these corridors. Earthworks would be required along the corridor, particularly in the vicinity of bridge footings. Laydown and storage areas, light and heavy vehicle car parking areas and site offices and worker amenities would be constructed within the site footprint. The viaduct sections would be constructed with the structure rising approximately ten metres above the ground level. While the construction activity would be clearly visible, it would result in a change to only a portion of the overall landscape, which would be seen at a distance.

The stabling and maintenance facility construction site would be established to the east of the off-airport corridor construction site, in the centre and background of the view. Extensive earthworks would be required at this site and there would be works to construct buildings within this facility. From this viewpoint, this construction site would be mostly screened by the mature vegetation along Blaxland Creek and within the Orchard Hills Cumberland Plain Woodland (Department of Defence land). Taller components, such as construction of the infrastructure maintenance shed, may be visible to the east of the off-airport corridor construction site but would not be noticeable in this view.

The construction of the project alignment, including an elevated embankment, would extend from Blaxland Creek in the north, south towards Luddenham (far right and out of view). This work would be mostly screened by intervening vegetation.

Impact during construction: As the construction footprint would be seen mainly in the background of the view and occupy a small portion of the overall panoramic view, there would be a noticeable reduction in the amenity of this view, which is of neighbourhood visual sensitivity, resulting in a **negligible visual impact**.

Magnitude of change during operation: Trains would be seen travelling across the viaduct over Blaxland Creek between Orchard Hills Station and Luddenham Road Station within the background of the view. All equipment would be removed from the Blaxland Creek construction site and the footprint would be reinstated. However, vegetation along Blaxland Creek would be fragmented from the bridge crossing. The stabling and maintenance facility would comprise a series of large buildings, however, the facility would be mostly screened by intervening vegetation. Taller elements such as the infrastructure maintenance shed may be visible to the rear of the Blaxland Creek viaduct.

The alignment would be located on an elevated embankment extending from the Blaxland Creek crossing in the north towards Luddenham (far right and out of view). However, the overhead wire masts and trains would not be visible from this viewpoint.

Impact during operation: While the loss of vegetation would fragment the vegetation within this view, and there would be a new linear infrastructure seen within this view, due to the distance, there would only be a noticeable reduction in the amenity of this view. As this is a view of neighbourhood visual sensitivity, this would result in a **negligible visual impact**.

Viewpoint 7: View east from Traminer Grove

Existing conditions: This is a view east from the rural residential properties on Traminer Grove towards the rural landscape and Blaxland Creek. The properties in the foreground are single storey houses, set on large cleared rural residential lots. These east facing properties have an open view across pasture grazing fields. The landform is gently undulating and slopes towards Blaxland Creek (background of view). Blaxland Creek creates a continuous vegetated backdrop, enclosing this view in the middle ground. Transmission towers can be seen in the background of this view, rising above the vegetation.

Sensitivity: This view represents an incidental view from a local road which would be appreciated mainly by local residents of the rural residential properties to the west of Blaxland Creek. This is a small concentration of residents and the properties are oriented to appreciate the views towards the adjacent rural landscape. Blaxland Creek is also identified as having local *'scenic and landscape values'* under the Penrith LEP 2010. This is an attractive rural view with some detracting infrastructure elements. This view is of **local visual sensitivity** due to the concentration of residential viewers and the quality of the landscape.

Magnitude of change during construction: The off-airport corridor construction site would be seen in the middle ground of this view (about 500 metres away). Works would include the clearing of a 60 metre corridor of vegetation across the creek and through the rural landscape, and construction works to erect an elevated viaduct structure (left of view) and a bridge over Blaxland Creek (right of view).

Temporary fencing and hoarding would be erected along the site perimeter, and work would include heavy equipment such as cranes and piling rigs which would rise prominently above the treeline. There would be limited earthworks required for the viaduct structure, and a construction support site located to the south of the creek. This work would be seen unobstructed across the intervening rural fields.

Beyond the off-corridor construction site, the stabling and maintenance facility construction site would be established on rural land east of Blaxland Creek. While there would be extensive construction activity including earthworks and the erection of several large sheds at the stabling and Maintenance Facility construction site, these works would be largely screened by the existing vegetation along Blaxland Creek.

Visual impact during construction: The construction activity in the middle ground of this view would be visually prominent and contrast with the character of this predominantly rural view. This would result in a considerable reduction in the amenity of this view, which is of local visual sensitivity, and a **moderate adverse visual impact**.

FIGURE 7-14 VIEWPOINT 7: VIEW NORTHEAST FROM TRAMINER GROVE, EXISTING VIEW

FIGURE 7-15 VIEWPOINT 7: VIEW EAST FROM TRAMINER GROVE – PHOTOMONTAGE DURING OPERATION

Magnitude of change during operation: A viaduct structure and bridge would be seen extending north-south across the rural floodplain and Blaxland Creek in the middle ground of this view. This structure would consist of elevated concrete structure with trains and overhead lines rising above the parapet, supported by a series of piers. The viaduct would not rise above the tree canopy level but would introduce a new large scale built structure which would be a visually dominant horizontal element, partially blocking views to the creek vegetation beyond (see Figure 7.14) Trains would be seen moving in each direction along the alignment. The sheds at the stabling and maintenance facility would not be seen from this location, as the shed rooftops would sit below the treeline.

Impact during operation: A visually heavy viaduct structure would be seen extending across this view, contrasting with the rural landscape which contains no precedent structures of this scale and form. Overall, there would be a considerable reduction in the amenity of this view, which is of local visual sensitivity and a **moderate adverse visual impact**.

Viewpoint 8: View west from Luddenham Road

Existing conditions: This is a view from Luddenham Road across the floodplain between South Creek and Blaxland Creek. The landform is generally flat and enclosed by vegetation and a view to the Blue Mountains to the west, in the far background. There are large open fields with scattered vegetation, currently used for livestock grazing, located between the vegetation of the surrounding creeks. There are scattered rural homesteads in this view, including single storey houses, sheds and outbuildings. Several large-scale transmission towers can be seen crossing this view at various angles, detracting from the rural qualities of this view.

Sensitivity: Luddenham Road is a local heritage item (Penrith LEP 2010) and is one of the earliest roads in the area and the views from this road are a part of the scenic route that is protected in this listing. This view is also located adjacent to the heritage listed (Penrith LEP 2010) Leeholme Horse Stud rotunda (out of view), which is considered to have '*landmark qualities due to its picturesque form and its prominent location on Luddenham Road*' (NSW Heritage Register, 2004). Blaxland Creek, in the background of this view, is also identified as having 'scenic and landscape values' under the Penrith LEP 2010. There are views to the Blue Mountains from this location, however, large-scale transmission lines erode the scenic qualities of views from this route. There would be a moderate number of road users experiencing this view and views would be available from scattered residences. This view is of **local visual sensitivity** due to the protections

placed on views from this location and the number of locally important scenic elements contained within this view.

Magnitude of change during construction: Work to construct the rail corridor would extend generally north to south across this view and be located immediately to the east of the Blaxland Creek in the far background of this view. The stabling and Maintenance Facility site would also be established in the middle to background of this view.

There would be extensive earthworks required at these sites. For the stabling and maintenance facility there would be embankments to the north and excavation to the south. Works to construct the rail alignment would include the construction of a bridge in the north, embankments and at grade sections as it passes the stabling site and then viaduct to the south as it approaches a road crossing at Luddenham Road (left and out of view). Much of this activity will be in the far background and not prominent in this view.

Construction traffic would be seen travelling along Luddenham Road and there would be construction access roads constructed around the site. Temporary site offices and staff car park would be located at the northern and southern end of the site. Works within the stabling site would include the erection of large buildings, and the use of heavy vehicles and large equipment including piling rigs and cranes.

FIGURE 7-16 VIEWPOINT 8: VIEW WEST FROM LUDDENHAM ROAD, EXISTING VIEW

FIGURE 7-17 VIEWPOINT 8: VIEW WEST FROM LUDDENHAM ROAD, PHOTOMONTAGE DURING OPERATION

Visual impact during construction: While the scale of construction activity would be substantial and this work would extend across much of this view, the project works would be located in the background of this view and would not be visually prominent. As a result, there would be a noticeable reduction in the amenity of this view, which is of local sensitivity, resulting in a **minor adverse visual impact**.

Magnitude of change during operation: The stabling and maintenance facility would be seen in the background of this view, including large maintenance sheds extending north-south over the tracks, to the east of the project alignment. The simple form and use of materials would be similar to agricultural sheds, however they would have a much larger footprint and visual mass. These sheds would rise above the vegetated backdrop of Blaxland Creek, reducing the visual enclosure of the rural landscape. While the rail corridor would extend north to south across the background of the view, activated by the movement of trains, it would be largely absorbed into the background of this view with vegetation provided along the corridor and engineered batters designed to integrate with the existing landform.

Impact during operation: The industrial scale and character stabling and maintenance facility would be largely absorbed into the surrounding rural landscape. There are other visually intrusive elements in this view, the project would contrast with the rural landscape. Overall, there would be a noticeable reduction in the amenity of this view, which is of local visual sensitivity and a **minor adverse visual impact**.

Views to the Orchard Hills permanent power supply route

Existing conditions: The Orchard hills permanent power supply route would connect the construction site at Orchard Hills with an existing substation located at Lenore Drive, Erskine Park. The power supply route would extend east along Patons Lane to Luddenham Road, passing alongside rural properties and bushland areas. The route would continue north along Luddenham Road before extending east through the rural landscape and crossing South Creek. The route would continue along Mandalong Close, a short cul-de-sac road providing access to rural residential properties. The route would extend south along Mamre Road before continuing east along Erskine Park Road and Lenore Drive, then north along John Morphett Place, joining the transmission line easement at Erskine Park. East of Mamre Road, the route would be located within the general industrial land use zone of the Western Sydney Employment Area (State Environmental Planning Policy (Western Sydney Employment Area) 2009).

Sensitivity: West of Mamre Road, the power supply route is located in a predominantly rural landscape, with areas of bushland and riparian vegetation. The landscape between Mamre Road and Luddenham Road are considered to have '*Scenic and Landscape Values*', with '*rural landscape*' and '*environmental conservation*' zoning (Penrith City Council, 2019, *Penrith Local Environmental Plan 2010*), increasing its visual sensitivity. Views along this route are generally experienced by road users, residents and visitors to adjacent rural properties and are of **local visual sensitivity**.

In the vicinity of South Creek, which is recognised as an important regional corridor under the Greater Sydney Region Plan 2056 (2018) and Western City District Plan (2018), and planned to become future open space for the Western Parkland City, views along the creek corridor would have an increased visual sensitivity, and are of **regional visual sensitivity**.

Views to the power supply route to the west of Mamre Road are, however, of **neighbourhood sensitivity**, due to the industrial character of this area and existing predominance of power infrastructure.

Magnitude of change during construction: There would be open trench construction activity seen within the road corridors, and through some areas of private property between Mandalong Close and Patons Lane. This work would require some short term (around four weeks) road lane reductions, or closure and temporary diversion. The works would not require the removal of existing trees and the small scale construction activity would be undertaken sequentially along the route.

The works in the vicinity of South Creek would be undertaken by horizontal directional drilling to avoid surface impacts to riparian vegetation. There would be areas to launch and receive the horizontal direction drill where this equipment and activity would be seen.

While some of the views along the route would contain landscape features of value, including views along South Creek and within the rural landscape, west of Mamre Road, the works would not noticeably obstruct views to or detract from the appreciation of these features.

In the areas to the east of Mamre Road which is a highly urban landscape with existing transmission pylons and heavily trafficked roads, the scale and extent of construction work would generally be absorbed into views along the route. Due to the visual compatibility of the construction work with the character of this emerging industrial precinct, the works would be largely absorbed into views in this area.

Visual impact during construction: Overall, it is expected, due to the minor scale of these works, that there would be no perceived change in the amenity of views from roads along the power supply route and adjacent properties. These views are of neighbourhood, local and regional sensitivity, however, there would be a **negligible visual impact** across these locations.

Magnitude of change during operation: The power supply route would be located underground, and the construction site would be reinstated to its former condition.

Visual impact during operation: As there would be no aboveground evidence of the power supply route, there would be no perceived change in the amenity of views along the route. These views are of neighbourhood, local and regional sensitivity and there would be a **negligible visual impact** during operation.

7.5 Assessment of night-time visual impact

Existing conditions: The Orchard Hills landscape character is an area of **Low district brightness (A2)** as this area includes sensitive predominantly rural uses and relatively dark urban locations. The heavily trafficked M4 Western Motorway which increases the lighting levels to the north of the character area.

Magnitude of change during construction*:* There would be night works required as a part of the construction works at this site. These night works would include underground works which would potentially be contained within an acoustic shed to the east of Kent Road. There would also be some lighting required outside of these areas including lighting associated with site offices, car parking and construction support areas. This would require lighting that would extend across the site and be seen from Kent Road and the semi-rural areas to the west, south from Lansdowne Road and the scattered semi-rural properties to the south. While the existing vegetation located to the east of the site would contain the lighting somewhat, there would also be some lighting visible from the scattered rural residential properties to the east on Samuel Marsden Road. There would also be 24-hour haulage and deliveries of large equipment along Kent Road.

From these locations there would be direct views to the lit areas of the site, however, lighting would be designed so that there would not be direct light spill on homes. The lighting at the site would increase the skyglow visible above the site, which would be seen from a wider catchment, particularly the elevated residential areas of Orchard Hills to the south-west of the site. This lighting would be seen in the context of the brightly lit M4 Western Motorway and moderately lit suburban areas of Orchard Hills.

Visual impact during construction: At the Orchard Hills construction site, while some of the night work would potentially be contained within the acoustic shed, the light sources and skyglow generated by works on the other areas of the site would contrast with the surrounding relatively dark night scene. Overall, this lighting would create a noticeable reduction in the amenity of these areas. This would result in a **moderate adverse visual impact** at night in areas of low district brightness (A2).

Magnitude of change during operation*:* The stabling and maintenance facility would be operational 24hrs a day and would require lighting for operational purposes. This lighting would create an area with direct light sources and a sky glow above the surrounding landscape. In particular, from the residential areas to the west of the stabling and maintenance facility, while there would be no direct views to the facility, there would be a skyglow visible above the intervening vegetation along Blaxland Creek. There would also be views to the brightly lit facility from Luddenham Road, which would be prominent and contrast with the surrounding, predominantly dark landscape. The rail corridor would be elevated and lit along its length. There would also be train headlights seen moving across the view.

Orchard Hills Station would be a brightly lit for customer safety at night. It would also be located within a new urban precinct which would include transport

integration infrastructure. There would be views from surrounding rural residential properties to the station and station precinct, with some enclosure by existing trees which would be retained to the west of the station.

Visual impact during operation: While there would be no direct light spill on adjacent residences, the lighting of the corridor and stabling and maintenance facility would be inconsistent with the surrounding lower light level environment. This additional lighting would extend through the landscape and the stabling and maintenance facility would be brightly lit feature contrasting with the surrounding rural area of this landscape. From elevated residential areas to the east and west of the site, the rail corridor would be seen within the landscape as a continuous line of light, and the stabling and maintenance facility would be a new lit feature. However, in these more panoramic views, this lighting would be seen in the context of brightly lit streets of the industrial areas to the east of South Creek and the surrounding residential areas. Generally, there would be a limited number of receptors to this change, and these changes in light levels would be visible at a distance. Orchard Hills Station would be brightly lit and contrast with the existing semi-rural setting.

Overall, there would be a noticeable reduction in the amenity of the site at night during operation. This would result in a **moderate adverse visual impact** at night in this area which is of low district brightness (A2).

LANSDOWNE ROAD, ORCHARD HILLS

TRAMINER PLACE, ORCHARD HILLS

7. ORCHARD HILLS

7.6 Summary of impact

7.6 Summary of impact

Table 7-1, Table 7-2 and Table 7-3 summarise the potential landscape and visual impacts of the project at Orchard Hills.

Overall, there would be **moderate** and **minor adverse landscape** and **visual impacts** during construction which are temporary, short term in nature. During operation the project there would be mainly **minor adverse** to **negligible landscape** and **visual impacts** with a **moderate adverse visual impact** in views to the bridge over Blaxland Creek from the nearby residential areas and at night**.**

In the long term, the landscape and visual impacts experienced as the project would be visually absorbed into the surrounding landscape which will become a compact mixed use urban village within the wider 'Western Parkland City'. The increased built form density would reduce the potential visibility of the project, increase the visual compatibility of the station with the surrounding urban form, and create an improved public realm and landscape framework, resulting in reduced landscape and visual impacts during the day and at night.

ELEVATED VIEW FROM HOMESTEAD ROAD, ORCHARD HILLS

7.6 Summary of impact

TABLE 7-1 LANDSCAPE IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	Orchard Hills rural landscape	Local	Considerable reduction	Moderate adverse	Noticeable reduction	Minor adverse

TABLE 7-2 DAYTIME VISUAL IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	View southeast along Kent Road	Local	Considerable reduction	Moderate adverse	Noticeable reduction	Minor adverse
2	View west from Samuel Marsden Road	Local	Noticeable reduction	Minor adverse	No perceived change	Negligible
3	View southeast from Kent Road towards Orchard Hills Station	Local	Considerable reduction	Moderate adverse	Noticeable reduction	Minor adverse
4	View northeast from Lansdowne Road towards Orchard Hills Station	Local	Considerable reduction	Moderate adverse	Noticeable reduction	Minor adverse
5	View west from Lansdowne Road	Local	Considerable reduction	Moderate adverse	Noticeable reduction	Minor adverse
6	View southeast from Homestead Road	Neighbourhood	Noticeable reduction	Negligible	Noticeable reduction	Negligible
7	View northeast from Traminer Grove	Local	Considerable reduction	Moderate adverse	Considerable reduction	Moderate adverse
8	View west from Luddenham Road	Local	Noticeable reduction	Minor adverse	Noticeable reduction	Minor adverse
9	Views to the permanent power supply route	Local	Noticeable reduction	Minor adverse	No perceived change	Negligible

TABLE 7-3 NIGHT-TIME VISUAL IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	Orchard Hills rural landscape	Low district brightness (A2)	Noticeable reduction	Moderate adverse	Noticeable reduction	Moderate adverse

8. LUDDENHAM

8.1 Key components and character of the project

The Luddenham character area extends from the Warragamba to Prospect Water Supply Pipelines to Elizabeth Drive.

8.1 Key components and character of the project

The project in the Luddenham landscape character area would include:

- viaduct (elevated) station- Luddenham Road Station
- Alignment on viaduct including a bridge crossing of the Warragamba to Prospect Water Supply Pipelines and Cosgroves Creek
- Alignment at-grade including a bridge crossing over the future M12 Motorway and under Elizabeth Drive.

The Luddenham Road Station would be a viaduct station comprising three storeys with a platform at viaduct level, mezzanine and ground floor concourse. The station would be located to the west of Luddenham Road.

The Luddenham Road construction site would be located to the north and south of Luddenham Road at Luddenham. The off-airport construction corridor site would extend through the character area from the pipeline to Elizabeth Drive.

Night works would be required for haulage and deliveries, oversize deliveries, underground works and road possessions.

Further details of the design are contained in Chapter 7 (Project description – operation) and details of the construction method are contained in Chapter 8 (Project description – construction) of the Environmental Impact Statement.

FIGURE 8.1 ARTISTS IMPRESSION, VIEW TO LUDDENHAM STATION DURING OPERATION

The following artists impression shows the potential character of Luddenham Metro Station (see figure 8.1).

8.2 Relevant planning context

The Luddenham rural landscape character area is located in the City of Penrith LGA. While this project is not subject to local government requirements, the following LEP and DCP objectives and requirements offer some insight into the landscape and visual amenity values of the study area.

The *Penrith Local Strategic Planning Statement* (2020) and *Penrith Scenic & Cultural Landscapes Study* (2019) provide an indication of the future landscape character and visual planning guidance. A review of these planning documents is contained in section 2 of this technical paper.

This character area is land subject to the *Western Sydney Aerotropolis Plan*, *State Environmental Planning Policy (Western Sydney Aerotropolis) 2020* and the *Western Sydney Aerotropolis Plan Development Control Plan 2020 - Phase 1*. This area is identified in these documents as the Northern Gateway precinct. The relevant strategic outcomes and provisions for the Northern Gateway precinct are included in Chapter 2 of this technical paper.

8.2.1 Penrith Local Environmental Plan

Luddenham Road Station would be located within the Sydney Science Park (Penrith LEP 2010). Sydney Science Park comprises an area of approximately 287 hectares located on the western side of Luddenham Road. This future employment, research and knowledge-based employment precinct would extend north to the Warragamba to Prospect Water Supply Pipelines, east to Luddenham Road, south and west across existing rural land.

Areas identified as having 'scenic and landscape values' are identified in the LEP include land generally between Luddenham Road and Cosgroves Creek, and land north of Elizabeth Drive.

8.2.2 Penrith Development Control Plan, City of Penrith Council

Luddenham Road Station would be located within the area identified as a future Sydney Science Park in the Penrith DCP (2010). The Sydney Science Park Vision states that … *'Sydney Science Park will respect the area's landscape setting and achieve a high level of scenic quality. The public domain will make a significant contribution to defining the place and making it special. '* (Part E16, s.E16.1, p E16-4).

The proposed Luddenham Road Station is located within the '*Interim Local Village Character Are*a' on the eastern portion of the Science Park. It is also identified as the *'broader WSEA Structure Plan proposed railway alignment and potential station'* and within an area identified as a *'station location for underground railway option'*.

The landscape and open space vision for Sydney Science Park is to *'embrace the sites undulating topography and vistas to Blue Mountains'* (Part E16, s.E16.2.1.2, p E16-8).

8.3 Landscape impact

8.3.1 Existing landscape character

The Luddenham rural landscape character area extends from the Warragamba to Prospect Water Supply Pipelines in Luddenham to Elizabeth Drive in Badgerys Creek to the south. (See Figure 8-2) This area is characterised by predominantly broad open rural grazing areas located on undulating terrain with patches of bushland. A series of vegetated watercourses including South Creek, Badgerys Creek, Cosgroves Creek and Oakey Creek, meander in a generally north south direction and form attractive features within the landscape.

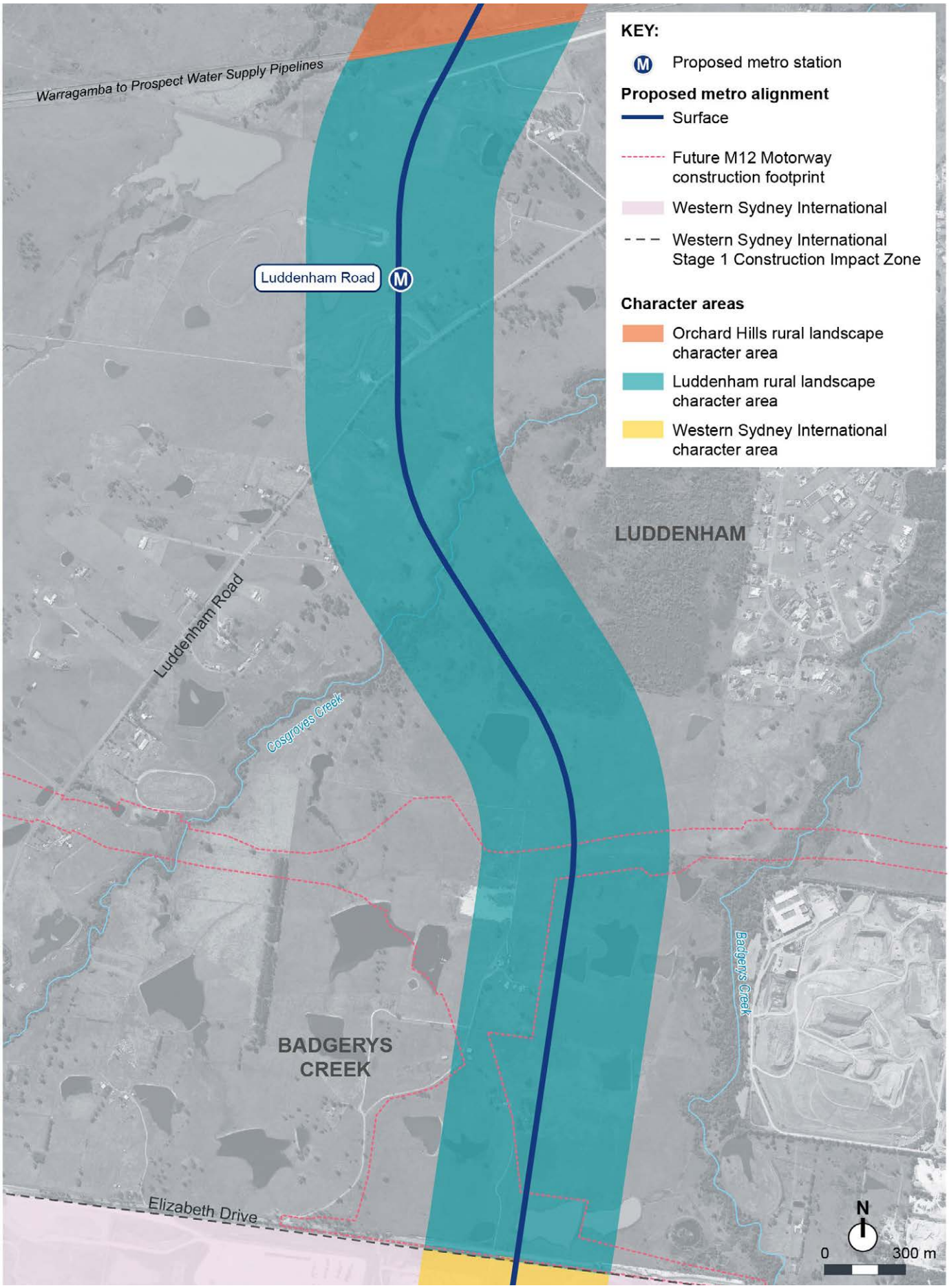
Luddenham Road provides the main access through Luddenham and extends from Mamre Road in the north east to Elizabeth Drive in the south west. This road has a local heritage listing. It cuts through a somewhat rolling terrain and is sparsely settled with detached dwellings on rural and large acreage lots set back from the road. Small dams, sheds, agricultural structures and patches of mature vegetation contribute to the overall rural character of Luddenham.

The residential estate of Twin Creeks is located to the north east of the Luddenham rural character area and extends from Luddenham Road east to South Creek. The estate is set around a golf course and the vegetated banks of Cosgroves Creek. It includes mainly large detached dwellings and includes a golf club which forms a central focus for the development. The street pattern, building form and density of dwellings generally reflects a suburban character which contrasts with the surrounding rural landscape. However, this juxtaposition is softened somewhat by the golf course, creeks and adjacent bushland to the south. The estate is also buffered from Luddenham Road by the golf course and roadside vegetation. The entry to the estate at the intersection of Twin Creeks Drive and Luddenham Road is defined by formal hedges, mature planting, low feature walls and contemporary signage which also contrasts with the rural landscape character of Luddenham Road.

There is a proposed 287 hectare Sydney Science Park precinct under the Penrith DCP 2014 which is intended to represent *'a new vision for Australia to cluster leading science based businesses, tertiary institutions, research and development providers' (*City of Penrith Council, 2014, p.E16.2). The science park would also comprise employment, retail and residential uses. The entrance to the future proposed Science Park is marked by a short entry road which terminates in a cul-de-sac and is lined by solar street lighting, however, this road is not open to the public.

Elizabeth Drive forms a distinct edge in character between Luddenham and Western Sydney International, which is currently under construction, to the south. This busy two-lane rural road connects The Northern Road in the west with the M7 Motorway and the metropolitan areas of Liverpool in the east. Elizabeth Drive crosses a series of vegetated riparian corridors including Badgerys Creek, Oakey Creek and Cosgroves Creek.

FIGURE 8-2 LUDDENHAM LANDSCAPE CHARACTER AREA



8. LUDDENHAM

8.3 Landscape impact

1 LUDDENHAM ROAD
2 GRAZING LAND ALONGSIDE SOUTH CREEK
3 TRANSMISSION LINES FROM LUDDENHAM ROAD
4 SCATTERED VEGETATION ALONG LUDDENHAM ROAD
5 RESIDENTIAL PROPERTIES ON LUDDENHAM ROAD

A local heritage listed rural property has frontage to Elizabeth Drive. The McGarvie-Smith Farm located at 1793–1951 Elizabeth Drive, Badgerys Creek comprises a collection of houses and farm buildings (c1936) which were used as a veterinary research centre for the Sydney University. The farm has aesthetic significance as the buildings provide '*representative examples of Inter-War design applied to rural research buildings'* (NSW Heritage Register, 2008b). The buildings are also important as they are the '*only known example of rural research institution buildings in the Penrith City Council area'* (NSW Heritage Register, 2008b).

The southern parts of the Luddenham rural landscape character area is intended to transition from a rural landscape to a future commercial and mixed-use precinct under the Western Sydney Aerotropolis Plan (2020). This area forms part of the Northern Gateway precinct and will comprise flexible employment, mixed flexible employment, and urban land.

The structure plan identifies South Creek as a major green spine. Badgerys Creek and Cosgroves Creek are also identified as part of this open space network. The Sydney Metro – Western Sydney Airport corridor is identified in the Western Parkland City Vision under the Greater Sydney Region Plan 2056 as connecting St Marys with the Western Sydney International. The future M12 Motorway is also shown on the structure plan as a major transport corridor within this area.

In line with the Western Parkland City Vision, the *Local Strategic Planning Statement* (City of Penrith Council, 2020) includes a North South Rail Structure Plan which identifies a Green Corridor across the northern areas of the character area, and a Northern Gateway in the southern areas of the character area. The Northern Gateway is intended to be a commercial precinct linked to WSI and would include manufacturing, freight and logistics. The proposed Luddenham Road Station is identified at the centre of the future Sydney Science Park.

The future M12 Motorway is a State significant infrastructure project which will extend in an east west direction, connecting the M7 Motorway at Cecil Hills to The Northern Road in Luddenham. It will be a dual-carriageway four to six-lane motorway. A grade-separated interchange, known as the Western Sydney Airport interchange, will connect the future M12 Motorway with the proposed Western Sydney Airport Main Access Road, also a dual-carriageway four-lane road leading south to the airport.

The future M12 Motorway alignment will be located parallel with and to the north of Elizabeth Drive. Elizabeth Drive would be modified to include a bridge over the airport access road, proposed project alignment, Luddenham Road, Cosgroves Creek and Badgerys Creek.

8.3.2 Landscape sensitivity

The landscape character area is a predominantly open, rural landscape comprising mainly large rural properties with some semi-rural residential properties bordering Luddenham Road. The landscape has been altered for agricultural practices and there is evidence of transitioning landscape elements such as the golf course residential estate and new entrance to the proposed science park which reduces the cohesiveness and intactness of the overall rural landscape character.

Landscape features within the Luddenham rural landscape character area would be experienced mainly by residents and their visitors. They would also be experienced by low volumes of traffic along Luddenham Road and moderate volumes of traffic along Elizabeth Drive which provides an important connection to the M7 Motorway and airport construction site to the south.

Land between Luddenham Road and Cosgroves Creek and to the north of Elizabeth Drive is identified as having '*scenic and landscape values'* under the Penrith LEP 2010 and is important to local character. The aesthetic qualities of the Luddenham Road are also recognised under the local heritage listing of the road corridor. With the exception of South Creek, these areas are not identified as important to regional landscape character under the Western City District Plan. These landscape features would be generally valued and appreciated primarily by the local community and have a **local landscape sensitivity**.

South Creek, however, is recognised as an important regional corridor for the proposed Western Parkland City under the Greater Sydney Region Plan 2056, Western City District Plan, and in the Western Sydney Aerotropolis Plan. South Creek is of **regional landscape sensitivity**.

8.3.3 Magnitude of change during construction

The project footprint would follow a wide linear arc, extending southeast from the Warragamba to Prospect Water Supply Pipelines to Elizabeth Drive, and dividing this landscape character area. The removal of all vegetation within the project footprint has been assumed as a worst case scenario. The project alignment crosses Cosgroves Creek, and a work site would be established in the vicinity of the creek to construct a bridge crossing. Clearing of the creek vegetation would reduce the visual edge that the creek corridor provides within the landscape. Badgerys Creek and Oakey Creek would not be altered. The large patches of bushland between Cosgroves Creek and Twin Creeks Estate would remain with minor clearing required near the project alignment for a proposed water quality basin.

Alterations to the topography would be localised around the locations of the bridge footings, viaduct piers, access road and the Luddenham Road Station. Earthworks would also be required to create cutting and fill embankments for the alignment in the southern areas north of Elizabeth Drive and in the vicinity of the future M12 Motorway.

The changes to landform would be more easily absorbed in the northern areas of the landscape character area due to the

rolling landform which would somewhat reduce the degree of contrast with the surrounding landscape. Roadside vegetation, riparian vegetation and areas of bushland vegetation, particularly near the Twin Creeks residential estate, would also assist with absorbing these landform changes. While the rural landscape is under transition with the proposed Science Park road entry and increased urbanisation evidenced in the adjacent golf course residential estate, the scale of this construction activity, including temporary structures and the use of machinery and would contrast with the surrounding landscape.

Changes to the topography would be more apparent in the generally low lying, open rural areas to the south of the site near Elizabeth Drive adjacent to Badgerys Creek. These landform changes would be in character with future landform modifications proposed at the upgrade of the intersection of Elizabeth Drive and recent realignment of Badgerys Creek Road (part of the Western Sydney International project), future M12 Motorway and broad scale earthworks underway within Western Sydney International.

New roads would be constructed between Luddenham Road and proposed Luddenham Road Station, resulting in the provision of turning lanes into three construction site access points. These new roads, and alterations to Luddenham Road, would be minor in nature and not substantially contrast with the road patterns in this area of the landscape. Temporary one-way traffic control would be undertaken during construction of the viaduct over Elizabeth Drive. These changes to Elizabeth Drive would be absorbed into the landscape which will transition substantially with future changes as part of the Elizabeth Drive upgrade project.

Construction of the project would dissect the local heritage listed McGarvie-Smith Farm at Elizabeth Drive, Badgerys Creek. However, the aesthetic value of the farm relates mainly to the farm buildings and there would be no direct impact on these buildings or any important landscape features. The aesthetic experience of the Luddenham Road corridor would be diminished in the vicinity of the viaduct crossing, although these construction works would represent only a small proportion of the overall road corridor experience and the broader rural landscape would be generally maintained.

8.3.4 Landscape impact during construction

Overall, there would be a considerable reduction in the character and quality of this landscape, which is of local sensitivity, resulting in a **moderate adverse landscape impact**.

8.3.5 Magnitude of change during operation

The proposed Luddenham Road Station would be established to the north of Luddenham Road and would be accessed from two new streets connecting to Luddenham Road. The station would form part of a new urban precinct which would comprise a grid street network surrounding the station. The station would be arranged generally in a north south direction. The main entrance would be located to the northern end of the station adjoining a new public plaza.

The station entrance would be integrated into the surrounding public realm with surrounding proposed pedestrian footpaths and upgrades. There would be a new bus interchange with shelters, a multi-storey commuter car park, bicycle parking, a kiss and ride and taxi rank located near the station. The co-location of these facilities would improve transport connectivity and accessibility within the rural areas of Luddenham.

The station would be elevated to viaduct level and would rise substantially above the surrounding rural landscape, contrasting in form, height and scale with nearby scattered low scale rural residential dwellings. This would introduce a large scale modern civic structure which would be visually prominent within the landscape and contrast with the undulating rural landscape.

The project alignment would extend via viaduct from the Luddenham Road Station north towards the Warragamba to Prospect Water Supply Pipelines and south across Cosgroves Creek. It would be a continuous feature, extending across the landscape. Due to its length, the viaduct would be viewed from multiple locations and angles and in sequence as receptors move around the landscape. The horizontal line and mass of this structure would contrast with the surrounding undulating rural landscape. The character of the future proposed Warrangamba Pipeline Open Space Corridor, would be influenced by the scale and character of both the existing pipeline and the project alignment, with views to the project alignment likely to be seen for a considerable length east and west along any future open space in this area given the linear nature of the pipeline and easement.

The viaduct would be elevated and cast a shadow in the landscape and has the potential to overshadow properties which are scattered in the surrounding rural areas. However, the general north-south orientation of the viaduct reduces the potential for mid-winter overshadowing. Similarly, the north south orientation of the viaduct station would reduce the potential for an overshadowing effect. Furthermore, the station would also be separated from adjacent development by streets and plaza areas. While there would be long shadows cast by the station throughout the day in mid-winter, the orientation of the station would reduce the potential for any neighbouring property to have a substantial overshadowing effect. The station would create shadows similar to those expected within a developed urban area as would be developed around the station precinct over time as a part of the Western Parkland City.

The project alignment would transition into sections of at-grade track as it extends south towards Western Sydney International. In these sections, the project alignment would be slightly elevated on an embankment. The project alignment in this section of the landscape, which is flatter and more open, would result in less contrast but also less opportunity for the corridor to be screened by landform. There would be vegetation provided along the at grade sections of the corridor and proposed engineered batters and water management measures would be designed to integrate with the existing landforms and natural features of the site.

The trains travelling across the landscape would emphasise the linear nature of the corridor and reinforce the severing of landscape elements. In particular, the wide breaks in vegetation at the creek crossings would fragment the character of the landscape.

These changes would, however, be in character with other major infrastructure projects including the future M12 Motorway, the proposed new intersection of Elizabeth Drive, recently realigned Badgerys Creek Road, and Western Sydney International.

The rural landscape character of Luddenham is somewhat fragmented resulting from the presence of transitioning landscape elements such as the golf course residential estate, proposed science park and proposed major road infrastructure. The Luddenham Road Station, viaduct and at-grade sections of the alignment would add to this fragmentation, adding substantial built elements into the landscape, and reducing the continuity and cohesiveness of the landscape character.

8.3.6 Landscape impact during operation

Overall, there would be a considerable reduction in the quality and character of this landscape during construction. As this landscape is of local sensitivity, this would result in a **moderate adverse landscape impact.**

8.4 Visual impact

8.4.1 Visual catchment

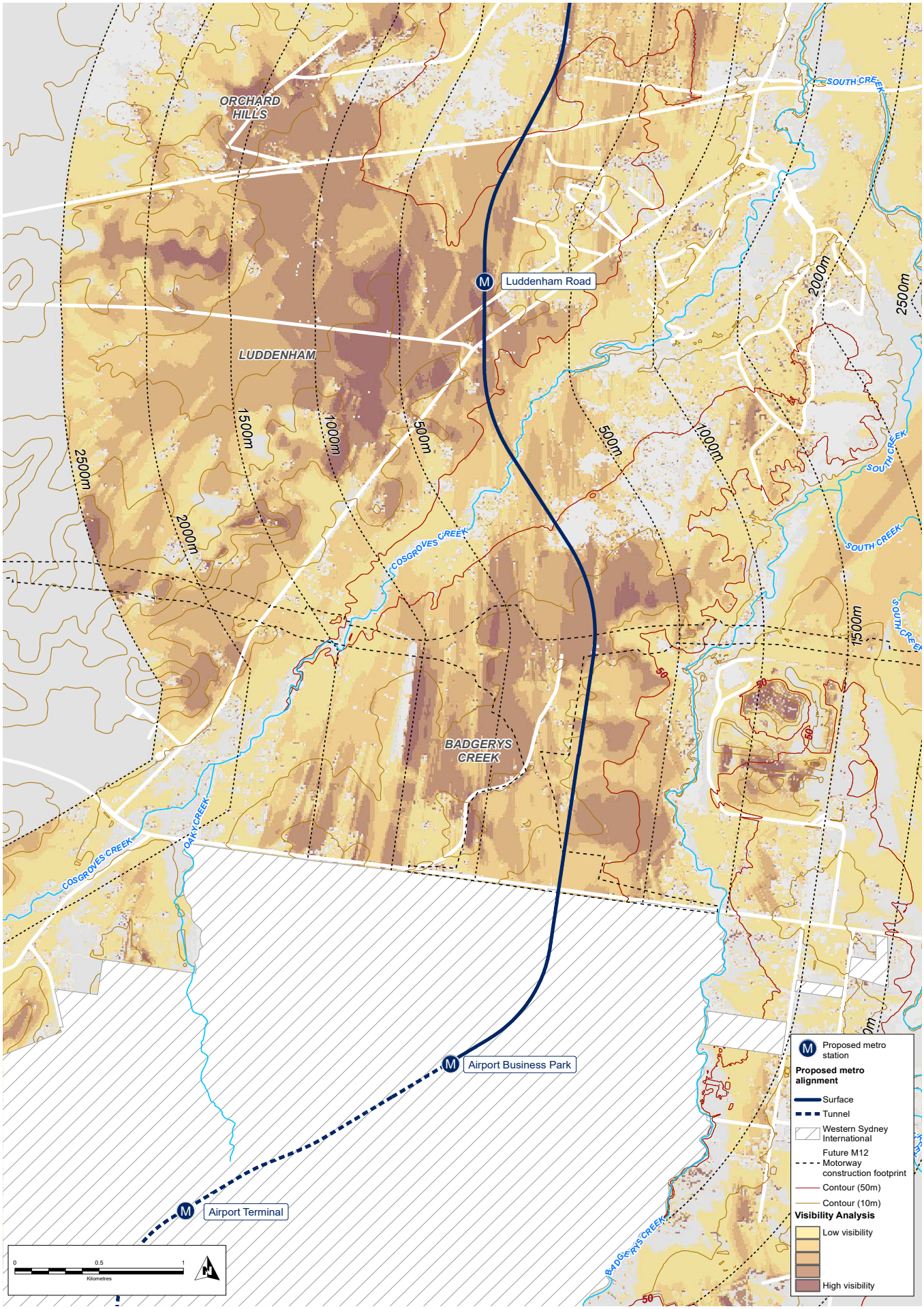
The Luddenham Road Station would be visible from a short section of Luddenham Road, and from rural properties surrounding the station in the west. The diagram Figure 8-3 at shows the potential visual catchment of the project alignment. This plan highlights areas where a greater length of the project would be seen with an increasingly darker colour. This visual catchment diagram shows that the alignment would be visible from a broad visual catchment. The project alignment would be visible from a wide visual catchment due to the open rural character of this landscape.

The alignment would be highly visible from areas to the west and north of Luddenham Road extending over several kilometres. The visual catchment would extend to the east and south of Luddenham Road towards Cosgroves Creek, which would enclose these views. There may be views from some residences within the Twin Creeks estate, in the east, at distance of over a kilometre where vegetation along Luddenham Road and within the golf course do not intervene.

The alignment would be highly visible from the rural areas surrounding the alignment between Cosgroves and Badgerys Creek. This would include views from Elizabeth Drive, north towards the alignment.

VIEW TO TWIN CREEKS RESIDENTIAL DEVELOPMENT

FIGURE 8-3 VISUAL CATCHMENT – RAIL CORRIDOR AT-GRADE AND VIADUCT SECTIONS



8. LUDDENHAM

8.4 Visual impact

8.4.2 Viewpoint assessment

The following viewing locations were selected as representative of the range of views to the project:

- Viewpoint 1: View southwest from Luddenham Road
- Viewpoint 2: View northeast along Luddenham Road
- Viewpoint 3: View east from Luddenham Road
- Viewpoint 4: View east along Elizabeth Drive

The location of these viewpoints is shown on Figure 8-4.

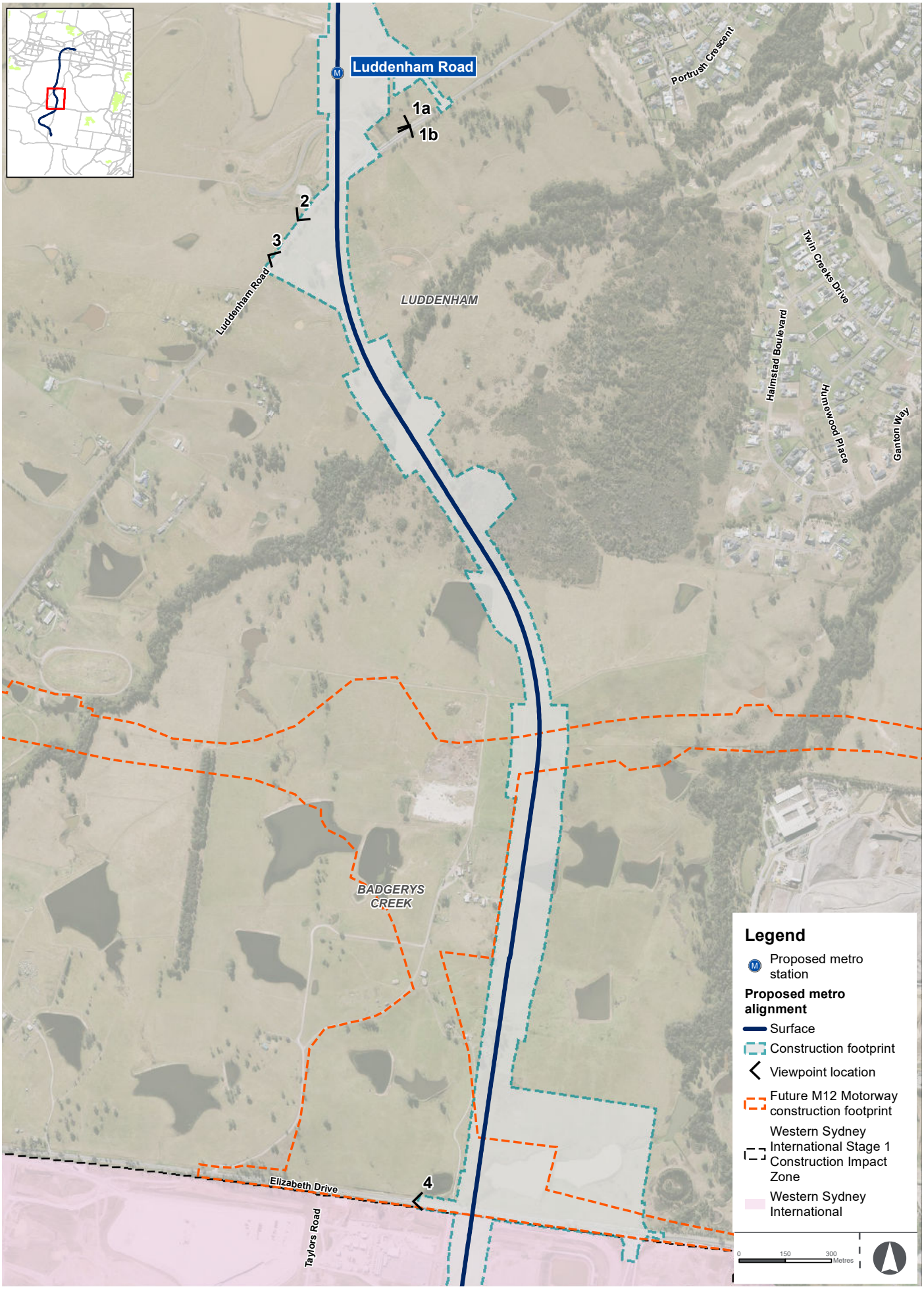
The following sections summarise the daytime visual impact identified for each representative viewpoint during construction and operation.

Viewpoint 1: View southwest along Luddenham Road

Existing conditions: This view from a local rise along Luddenham Road shows an elevated view across the rural landscape to the Blue Mountains in the distant background. Luddenham Road is a straight, narrow rural road which is wider in this section with a line marked right turning lane approaching the entry to the future Science Park. The entrance road to the future Sydney Science Park is seen to the west (right) of the road, defined by fencing and lighting. The landform encloses the view somewhat and screens the wider landscape to the east and west of this view. This rolling landform creates visual interest and frames the view across the rural landscape in the middle to background of the view. Mature trees along the road verge, and along the field boundary to the south west, both filter and frame the view.

Sensitivity: Views along Luddenham Road would be experienced by low volumes of road users. The rural land to the east of the Luddenham Road (left of view), extending to Cosgroves Creek, and a narrow strip to the west of Luddenham Road (right of view) are identified as having 'scenic and landscape values' in the Penrith LEP 2010. Luddenham Road is identified as local heritage value due to the continuity of rural character along the road corridor. It is also recognised as exhibiting aesthetic significance under the NSW Heritage Register (2008a). Distant views to the Blue Mountains can

FIGURE 8-4 VIEWPOINT LOCATION PLAN



8. LUDDENHAM

8.4 Visual impact

FIGURE 8-5 VIEWPOINT 1A: VIEW SOUTHWEST ALONG LUDDENHAM ROAD, EXISTING VIEW

FIGURE 8-6 VIEWPOINT 1A: VIEW SOUTHWEST ALONG LUDDENHAM ROAD – PHOTOMONTAGE DURING OPERATION

be seen in the far background of the view. The Blue Mountains are recognised as a key regional natural feature which contributes to the regional character of Penrith under the Penrith DCP 2014, however, there are no specific regional view corridors to the Blue Mountains along Luddenham Road identified under the DCP. This view is therefore of **local visual sensitivity**.

Magnitude of change during construction: The project construction footprint would be located in the middle ground of view, extending north and south of Luddenham Road (left and right of view). Construction of the station (right of view) and viaduct (centre and left of view) would be visible in the middle to background of this view. Luddenham Road would be widened including a turning lane for light and heavy construction vehicle access to the southwest of the existing access road to the future Sydney Science Park. Construction of a multi-storey commuter car park would be visible from this location, further to the north (right of view). Construction activity would be seen along the alignment including use of piling rigs and cranes to install the concrete pylons, columns, precast viaduct elements. The mature trees along the field boundary, seen in the foreground of this view would be retained, filtering views to the works in this area of the view.

Visual impact during construction: Overall, there would be a considerable reduction in the amenity of this view, which is of local sensitivity, resulting in a **moderate adverse visual impact** during construction.

Magnitude of change during operation: Luddenham Road Station would be visible to the right of view, consisting of two elevated side platforms extending over 90 metres long with a centrally located track alignment. The viaduct structure would be seen in the centre and aligned across the view, spanning Luddenham Road. It would be a solid concrete structure supported by central piers, extending south from the station over Luddenham Road.

Visual impact during operation: Although the line of mature trees following the field boundary (right of view) would be partly retained, filtering views to the station, overall, there would be a considerable reduction in the character and quality of this rural view, which is of local sensitivity. This would result in a **moderate adverse visual impact**.

FIGURE 8-7 VIEWPOINT 1B: VIEW SOUTHWEST ALONG LUDDENHAM ROAD, EXISTING VIEW

FIGURE 8-8 VIEWPOINT 1B: VIEW SOUTHWEST ALONG LUDDENHAM ROAD – PHOTOMONTAGE DURING OPERATION

Viewpoint 2: View northeast along Luddenham Road

Existing conditions: This is a view northeast along Luddenham Road towards a predominantly rural setting is characterised by broad open pasture fields and patches of mature vegetation lining the road corridor and within the rural properties. The topography of the area is undulating and slopes from a local ridgeline in the west (left of view) towards Cosgroves Creek to the east (far right and out of view). The entrance road to the future Sydney Science Park is visible in the middle ground of the view to the west of the road (left of view), defined by fencing and lighting which is also visible on the skyline along the ridgeline (far left of view). There are small blocks of mature trees along the road and within the adjacent fields, creating a vegetated backdrop to the centre of this view, whereas to the west, the open field can be seen to the skyline.

Sensitivity: Views along Luddenham Road would be experienced by low volumes of road users. The rural land to the east of the Luddenham Road (right of view), extending to Cosgroves Creek, and a narrow strip to the west of Luddenham Road (left of view) are identified as having 'scenic and landscape values' in the Penrith LEP 2010. Luddenham Road is identified as local heritage value due to the continuity of rural character along the road corridor. It is also recognised as exhibiting aesthetic significance under the NSW Heritage Register (2008a). This view is therefore of **local visual sensitivity**.

Magnitude of change during construction: The project would be located in the middle ground and extending across this view. The existing vegetation north of Luddenham Road would be removed, to establish the off-airport corridor construction site. Luddenham Road would be widened to include turning lanes and a site access point would be located to the southwest of the existing access road to the future Sydney Science Park, in the middle ground of the view. Construction vehicles would be seen along Luddenham Road and accessing and egressing the site from this location.

The construction of Luddenham Road Station would be located behind the small local ridgeline in the centre, background of this view. Due to the scale of the works, construction activity would be seen rising above this landform including the upper levels of the station and approaching viaduct sections. Works to construct the viaduct section of the project alignment, to the south of the station, would be seen across Luddenham Road. The work across this view would include the use of piling rigs and cranes to install the concrete piers, concrete viaduct structures and overhead wiring structures, and also to construct the station.

Visual impact during construction: While the undulating landform would screen some areas of the Luddenham Road Station construction site, the off-airport corridor construction site would be seen at close proximity and would introduce an intensive construction character, associated with viaduct construction, to the predominantly rural landscape. Due to the removal of vegetation and the scale of the works there would be a considerable reduction in the amenity of this view, which is of local visual sensitivity, resulting in a **moderate adverse visual impact**.

Magnitude of change during operation: The viaduct structure would be seen extending across this view and spanning Luddenham Road. It would consist of an elevated concrete structure supported by central piers. The viaduct would rise above the surrounding tree canopy level. Overhead wiring and masts would be seen against the skyline of this view, above the viaduct. Trains would be seen moving in each direction towards the new Luddenham Road Station.

Luddenham Road Station would be located approximately 330 metres to the north of Luddenham Road (left of view). The station would be located in the background of this view and would rise prominently above the surrounding landscape. Due to the orientation, the short end of the station would be seen, viewed across a section of the approaching viaduct.

FIGURE 8-9 VIEWPOINT 2: VIEW NORTHEAST ALONG LUDDENHAM ROAD

Visual impact during operation: The viaduct would be a visually dominant new built element across much of this view. It would contrast with the scale and form of the existing rural view. Overall, there would be a considerable reduction in the amenity of this rural view, which is of local visual sensitivity. This would result in a **moderate adverse visual impact**.

Viewpoint 3: View east from Luddenham Road

Existing conditions: This is a view east along Luddenham Road across open pasture fields towards mature vegetation along Cosgroves Creek which forms a continuous vegetated corridor and natural skyline to most of the view. The landform gently slopes from the road towards Cosgroves Creek but also contains some undulating areas in the right of the view. Beyond this, an elevated plateau with open rural land can be seen in the far background (centre of view) above the treeline of Cosgroves Creek. Occasional stands of mature trees border Luddenham Road and contribute to the aesthetic appeal of the undulating rural road. Agricultural equipment can also be seen in the background of the view near Cosgroves Creek but forms a minor element within this rural view (right of view).

Sensitivity: This view is a peripheral view from Luddenham Road which would be experienced by low volumes of road users travelling along this rural road. It would also be appreciated by local residents who live on nearby scattered properties and their visitors. The rural land bordering Luddenham Road is identified as having 'scenic and landscape values' in the Penrith LEP 2010. The road alignment is also identified to be of local heritage value and recognised as exhibiting aesthetic significance under the NSW Heritage Register (2008a). This is an attractive rural view with few detracting elements. This view is of **local visual sensitivity**.

Magnitude of change during construction: The off-airport corridor construction site would be established in the middle ground of this view, extending across the field from the north (left of view) to Cosgroves Creek. Vegetation along the creek would be cleared and a wide gap created, opening up views to the rural areas in the background. Works to construct the viaduct section of the rail alignment and bridge crossing of Cosgroves Creek would be seen across the view. This would include heavy and light vehicle movement, the use of piling rigs and cranes to install the viaduct concrete piers, columns, precast viaduct elements and overhead wiring structures.

Visual impact during construction: Overall, due to the removal of the vegetation along the creek which is a local feature, the scale of the works and extent of the view that would change, there would be a considerable reduction in the amenity of this view. As this is a view of local visual sensitivity this would result in a **moderate adverse visual impact**.

Magnitude of change during operation: The viaduct would be visible across the fields in the middle ground of this view. There would be a bridge crossing through a gap in the vegetation along Cosgroves Creek and glimpses through this gap to the rural areas in the background of the view.

FIGURE 8-10 VIEWPOINT 3: VIEW EAST FROM LUDDENHAM ROAD

Visual impact during operation: The project alignment would be a visually dominant new built element extending across much of this view. It would contrast with the scale and form of the existing rural view and rise above the vegetated backdrop which forms a backdrop to this view. Overall, there would be a considerable reduction in the amenity of this rural view, which is of local visual sensitivity, and a **moderate adverse visual impact**.

8. LUDDENHAM

8.4 Visual impact

FIGURE 8-11 VIEWPOINT 4: VIEW EAST ALONG ELIZABETH DRIVE

Viewpoint 4: View east along Elizabeth Drive

Existing conditions: This view east along Elizabeth Drive near the intersection with Badgerys Creek Road (right of view) is enclosed to the east by the vegetation along Badgerys Creek. There are some scattered trees within the adjacent rural fields and beyond the creek there are some more elevated fields currently being used for stockpiling.

This view will be transformed with the upgrading of Elizabeth Drive, which will become elevated in this area, and the construction of the new Airport Access Road, which would extend across this view, leading to the future Western Sydney International (right of view). Construction of the future M12 Motorway would also be visible from this location, to the north (left of view).

Sensitivity: While this view is experienced by moderate to high volumes of road users, this view includes a substantial amount of construction related vehicle activity. This view across the rural landscape includes several intrusions on the rural character due to the construction activities of the adjacent Western Sydney International and several other sites. The rural land to the north of Elizabeth Drive (left of view) is identified as having 'scenic and landscape values' in the Penrith LEP 2010. This view is of **local visual sensitivity** due to the volume of users and identified scenic values.

Magnitude of change during construction: The off-airport corridor construction site, for the at-grade section of the project alignment, would be seen in the middle ground of this view, extending across the fields from the north (left of view) to Elizabeth Drive (right of view). While there would be some vegetation cleared for this alignment, the vegetation along Badgerys Creek would remain and continue to

form a vegetated backdrop to this view. This work would be seen in the context of other large-scale construction activity including work associated with the future M12 Motorway, and the Airport Access Road and Elizabeth Drive upgrade, which would both be elevated.

Visual impact during construction: Overall, while the scale of the works would be substantial, it would be seen in the context of substantial construction activity associated with Western Sydney International, associated access roads and the future M12 Motorway. This work would not contrast substantially with this transitioning landscape character. Overall, there would be a noticeable reduction in the amenity of this view, which is of local visual sensitivity and a **minor adverse visual impact**.

Magnitude of change during operation: An at-grade section of the rail corridor would be seen in the middle ground of this view, extending across the fields from the north (left of view) to Elizabeth Drive (right of view). This new rail corridor would be somewhat obstructed by Elizabeth Drive. The vegetation along Badgerys Creek would form a backdrop to this view. It would also be seen in the context of other large-scale linear infrastructure including the future M12 Motorway, the airport access road and Elizabeth Drive upgrade. There would be vegetation provided along the at grade sections of the corridor and proposed engineered batters and water management measures would be designed to integrate with the existing landforms and natural features of the site.

Visual impact during operation: The character of this view would be substantially altered with the introduction of this intensive infrastructure. While the rail corridor would be less visually obtrusive than the intersecting road upgrades, the rail alignment would be a dominant visual feature in the landscape due to infrastructure which would be required along the corridor and regular train movements. Overall, there would be a noticeable reduction in the amenity of this view, which is of local visual sensitivity and a **minor adverse visual impact**.

8.5 Assessment of night-time visual impact

Existing conditions: The Luddenham landscape character is an area of **Low district brightness (A2)** as this area includes predominantly rural uses and relatively dark urban locations. The heavily trafficked Elizabeth Drive increases the lighting levels to the north of the character area.

Magnitude of change during construction*:* There would not be night works required as a part of the construction works in this area of the project. There would, however, be some minor security lighting associated with the project footprint.

Visual impact during construction: Due to the minor nature of the lighting required for the project in this landscape character area, and local screening provided by the undulating landform and vegetation along creek lines, there would be no perceived change in the amenity of the project footprint at night, and a **negligible visual impact**.

Magnitude of change during operation*:* There would be lighting visible along the length of the rail corridor. Where the alignment is elevated, particularly in the northern sections of the project and at bridge crossings, there would be a glow created by the illuminated structure which would have lighting at rail level and not rising above the viaduct structure. The at-grade sections of the project would be lit and there would train headlights seen moving across the landscape. Luddenham Road Station would be brightly lit and elevated above the surrounding landscape. It would also be located within a new urban precinct which would include transport integration infrastructure including bus stops and layover, kiss and ride and bike parking.

Visual impact during operation: While there would be no direct light spill on adjacent residences, which are scattered across the landscape. The lighting of the corridor would introduce additional lamination into the surrounding lower light level environment. This additional lighting would extend through the landscape and be seen from various vantage points at a range of distances. The rail corridor would be seen within the landscape as a continuous line of light, and the station would be a new bright feature set within lit streets.

In particular, there would be views to Luddenham Road Station from elevated residences within the rural properties surrounding the site, and from Luddenham Road. Overall, there would be a noticeable reduction in the amenity of the site at night during operation. This would result in a **moderate adverse visual impact** at night in this area which is of low district brightness (A2).

8.6 Summary of impact

Table 8-1, 8-2 and 8-3 summarise the potential landscape and visual impacts of the project at Luddenham.

Overall, there would be **moderate** and **minor adverse landscape and visual impacts** during construction which are temporary, short term in nature. During operation the project there would be mainly **moderate adverse** and **minor adverse landscape and visual impacts.**

In the long term, the impacts experienced in the areas to the south of the Luddenham Character area would reduce as the landscape is transformed from relatively open rural landscapes into a Science Park and Northern Gateway precinct which will comprise flexible employment, mixed flexible employment, and urban land.

The density of this proposed built form would reduce the potential visibility of the project, increase the visual compatibility of the station with the surrounding urban form, and create an improved public realm and landscape framework, resulting in reduced landscape and visual impacts during the day and at night.

8.6 Summary of impact

TABLE 8-1: LANDSCAPE IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	Luddenham rural landscape	Local	Considerable reduction	Moderate adverse	Considerable reduction	Moderate adverse

TABLE 8-2: DAYTIME VISUAL IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	View southwest from Luddenham Road	Local	Considerable reduction	Moderate adverse	Considerable reduction	Moderate adverse
2	View northeast along Luddenham Road	Local	Considerable reduction	Moderate adverse	Considerable reduction	Moderate adverse
3	View east from Luddenham Road	Local	Considerable reduction	Moderate adverse	Considerable reduction	Moderate adverse
4	View east along Elizabeth Drive	Local	Noticeable reduction	Minor adverse	Noticeable reduction	Minor adverse

TABLE 8-3: NIGHT-TIME VISUAL IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	Luddenham rural landscape	Low district brightness (A2)	No perceived change	Negligible	Noticeable reduction	Moderate adverse

9. WESTERN SYDNEY INTERNATIONAL

9.1 Key components and character of the project

The Western Sydney International character area extends from Elizabeth Drive to Badgerys Creek.

9.1 Key components and character of the project

The project in this character area proposes the following development types:

- at-grade rail alignment
- at-grade (shallow cutting) station- Airport Business Park Station
- cut-and-cover station- Airport Terminal Station
- tunnel portal
- tunnel rail alignment
- tunnel ventilation facility

Construction sites for the on-airport construction corridor, Business Park station, Western Sydney International tunnel portal, Airport Terminal Station, and Airport construction support site (including viaduct and tunnel segment precast facilities) would be located within the Western Sydney International Stage 1 Construction Impact Zone and on areas outside the airport. A range of construction activities would be carried out at these sites to construct the project alignment, stations and support tunnel construction.

Night works would be required for haulage and deliveries, oversize deliveries, underground works, rail and road possessions.

Further details of the design are contained in Chapter 7 (Project description – operation) and details of the construction method are contained in Chapter 8 (Project description – construction) of the Environmental Impact Statement.

The following artists impression shows the potential character of Luddenham Metro Station (see figures 9-1 and 9-2).

9.2 Relevant planning context

This character area is land subject to the *Western Sydney Aerotropolis Plan*, *State Environmental Planning Policy (Western Sydney Aerotropolis) 2020* and the *Western Sydney Aerotropolis Plan Development Control Plan 2020 - Phase 1*. The relevant planning context for the Western Sydney International landscape character area is contained in Section 2 of this technical paper.

9.2 Relevant planning context

FIGURE 9-1 ARTISTS IMPRESSION, VIEW TO AIRPORT BUSINESS PARK STATION DURING OPERATION

FIGURE 9-2 ARTISTS IMPRESSION, VIEW WITHIN AIRPORT TERMINAL STATION DURING OPERATION

9.3 Landscape impact

9.3.1 Existing landscape character

The Western Sydney International landscape character area is located between Elizabeth Drive in the north, and Badgerys Creek in the south (see Figure 9-3). This former rural landscape undergoing a substantial transformation with the current construction of Western Sydney International Stage 1. This includes construction of a single runway, airport terminal, airport access roads and other support facilities. Western Sydney International Stage 1 will be completed and operational in 2026.

As a part of this construction activity, there is substantial earthworks being undertaken on the site. This work will transform the undulating landform of the site to a newly formed flat landscape to accommodate the runway aviation activity areas, as well as the built form at the associated terminal and support services areas.

The airport access road network would include an elevated road connecting south from the future M12 Motorway in the north, and the future upgraded Elizabeth Drive, which would also be elevated. This intersection would be a grade-separated interchange and introduce a highway character to the northern area of the Western Sydney International site. The airport access road would continue south as a grade-separated route generally extending southwest and parallel to the future runway. It would form a central spine for the airport, with future stages planned for the areas to the south east of the access road.

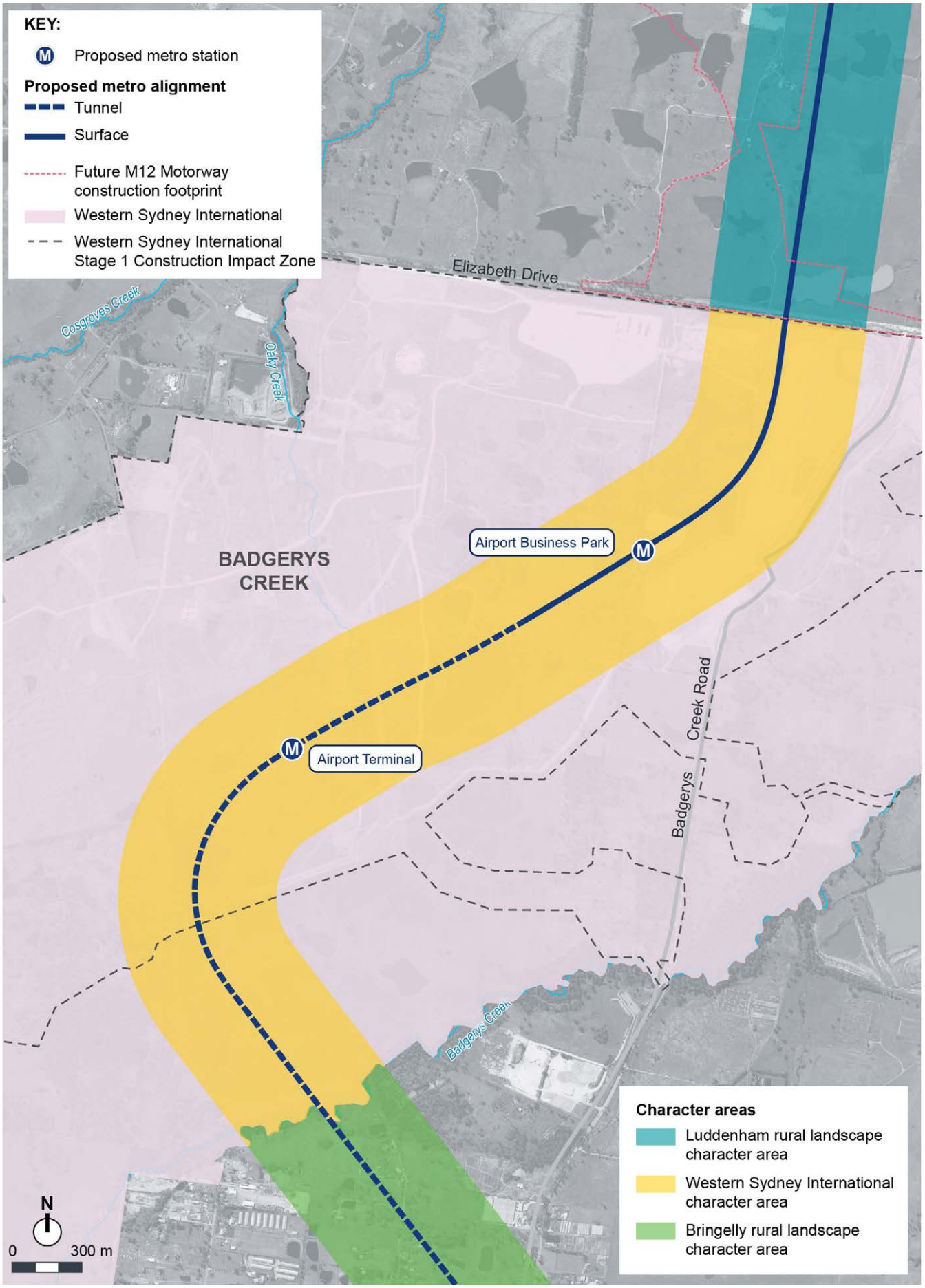
Airport Business Park Station is proposed for an area in the northern part of the Western Sydney International, approximately one kilometre to the south of Elizabeth Drive. The site is located within the future 191-hectare Business Development Zone under the Western Sydney Airport- Airport Plan (2016). The Western Sydney International business park is intended to include a mix of business, retail and industrial uses.

Airport Terminal Station is proposed for an area in the centre of Western Sydney International, approximately 1.3 kilometres to the southeast of the Business Park Station. It would be located within the 229 hectare Terminal and Support Services area. The station would be surrounded to the north by multi-storey parking and commercial development. The future terminal and support services areas would have an intensive urban character and include medium density built form and an urban street layout.

A state-of-the-art Airport terminal precinct is currently being designed by a team of local and international designers who were selected following a design competition. The terminal building would have an exterior which … '*complements the natural landscape, paying tribute to the local area*'. '*Arriving passengers will be greeted by landscaped gardens within a grand public plaza with a great choice of retail, dining and entertainment*.' (Western Sydney Airport, 2020)

For the purposes of this assessment, the future conditions and end state of construction of Western Sydney International (Stage 1) will be assumed as the baseline for assessment.

FIGURE 9-3 WESTERN SYDNEY INTERNATIONAL LANDSCAPE CHARACTER AREA



9.3.2 Landscape sensitivity

During construction, Western Sydney International Stage 1 Construction Impact Zone has limited public access and the landscape is undergoing substantial and continuous changes in landform and land cover. While there are, however, broad, panoramic views across the airport site from the Airport Experience Centre and views to Badgerys Creek from rural areas to the south in Bringelly. Overall, this landscape is of neighbourhood landscape sensitivity.

9.3.3 Magnitude of change during construction

While the project would introduce large scale landform changes and intensive construction activity to the Western Sydney International landscape character area, this area has limited public access and is a landscape undergoing considerable change within the Western Sydney International Stage 1 Construction Impact Zone. The scale of work required for the project would be largely consistent with or of lesser scale than the surrounding airport, future M12 Motorway and Elizabeth Drive upgrade construction works.

9.3.4 Landscape impact during construction

Overall, the project would be consistent in character with the existing scale of construction activity and absorbed into this changing landscape. This would result in a negligible landscape impact on the Western Sydney International site during construction.

9.3.5 Magnitude of change during operation

Where the project is in tunnel there would be no effect on the landscape. However, in some short sections, where the project is aboveground, there would be some minor landform change to accommodate the alignment. This landscape change would be consistent with the character and scale of the future land uses at the airport. The Metro stations would have a high-quality architectural treatment and be set within landscaped plazas and streetscapes so that they are integrated with the surrounding urban fabric. In particular, Airport Terminal Station would complement the Airport terminal precinct and airport terminal buildings, providing direct and legible access to the heart of this precinct.

9.3.6 Landscape impact during operation

During operation, the project would be compatible with the character of the future landscape and offer improvements to the accessibility of these precincts for users, resulting in a minor beneficial landscape impact.

1 AIRPORT EXPERIENCE CENTRE
2 WORKS IN THE STAGE 1 CONSTRUCTION IMPACT ZONE
3 REALIGNED BADGERYS CREEK ROAD
4 VEGETATION ALONG BADGERYS CREEK ROAD

9.4 Visual Impact

9.4.1 Visual impacts during construction

The following viewing locations were selected as representative of the range of views to the project:

- Viewpoint 1: View east along Elizabeth Drive to Badgerys Creek Road
- Viewpoint 2: View northwest along Badgerys Creek Road
- Viewpoint 3: View north east along Badgerys Creek Road
- Viewpoint 4: View north east from the Western Sydney International Airport Experience Centre

The following plan identifies the location of these viewpoints (see Figure 9-5).

In addition to these views, views to the Kemps Creek construction power corridor were considered generally. The following sections summarise the daytime visual impact identified for each representative viewpoint during construction. An assessment for the visual impact of the project during operation has been in Section 9.4.3.

FIGURE 9-4 VIEWPOINT 1: VIEW EAST ALONG ELIZABETH DRIVE TO BADGERYS CREEK ROAD

Viewpoint 1: View east along Elizabeth Drive to Badgerys Creek Road

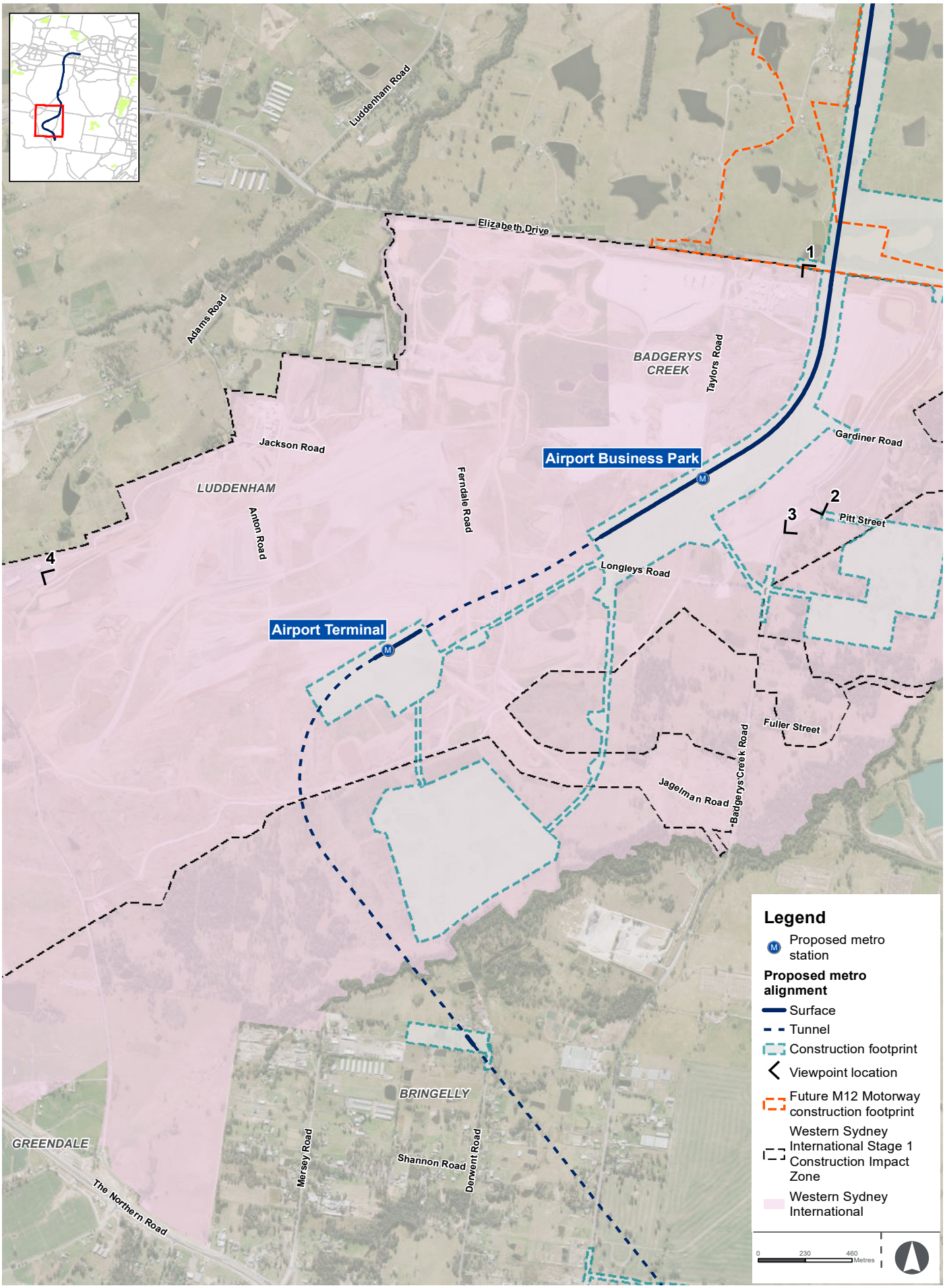
Existing conditions: Areas to the south of Elizabeth Drive form part of a former rural landscape which is currently within the Western Sydney International Stage 1 Construction Impact Zone. The view is enclosed to the east by the vegetation along Badgerys Creek (background of view).

This view will be transformed with the upgrading of Elizabeth Drive, which will become elevated in this area, and the construction of the new airport access road, which will extend across this view, leading to the future Western Sydney International (right of view). Construction of the future M12 Motorway will also be visible from this location, to the north (left of view).

Visual sensitivity: Views towards the airport from Elizabeth Drive are experienced by moderate to high volumes of road users including a substantial amount of construction related vehicle activity. This view is of **local visual sensitivity** due to the volume of users.

Magnitude of change during construction: The construction footprint would extend at ground level across the background of this view, east of Badgerys Creek Road. The construction works would be located under the future elevated roadways and interchange and be would not be easily differentiated from the roadworks and surrounding airport construction activities.

FIGURE 9-5 VIEWPOINT LOCATION PLAN



Visual impact during construction: The scale of work required for the project would be largely consistent or of lesser scale than the works being undertaken in the Western Sydney International Stage 1 Construction Impact Zone, future M12 Motorway and Elizabeth Drive upgrade. This would result in no perceived change in the amenity of this view, which is of local visual sensitivity, and a **negligible visual impact**.

Viewpoint 2: View north west along Badgerys Creek Road

Existing conditions: This view from the recently realigned Badgerys Creek Road includes a view to the Western Sydney International Stage 1 Construction Impact Zone with some construction underway and areas of site parking and laydown. This view will be substantially transformed as bulk earthworks is undertaken and the Western Sydney International Stage 1 is constructed.

FIGURE 9-6 VIEWPOINT 2: VIEW NORTHWEST ALONG BADGERYS CREEK ROAD

Visual sensitivity: Badgerys Creek Road provides a north south connection between The Northern Road in the south and Elizabeth Drive in the north. The realigned road will connect with the new future M12 Motorway and provide an entry point to the airport when it opens. It is currently used by low to moderate volumes of road users, including a substantial number of construction related vehicles. While this view includes some glimpses to the surrounding rural landscape, the character of this view is heavily influenced by the adjacent construction activity on the airport site. While Western Sydney International is under construction, this view is of **neighbourhood visual sensitivity**.

Magnitude of change during construction: Construction of the at-grade sections of the project alignment would be seen extending across the fields to the northwest (right of view) in the background of view. Construction of the Airport Business Park Station would be visible to the west (centre of view). There may also be glimpses to the tunnel portal works to the south of the station (left of view). Following tunnel construction, the aboveground structure of the station building and precinct works would be visible. This work would include the use of large scale construction equipment, including cranes, piling rigs and heavy vehicles.

Visual impact during construction: The scale of work required for the project would be largely consistent in scale to the activities seen in the surrounding Western Sydney International Stage 1 Construction Impact Zone. The project would be seen in the background of this view, and somewhat absorbed into this context. Overall, there would be a

noticeable reduction in the amenity of this view, which is of neighbourhood visual sensitivity, and a **negligible visual impact**.

Viewpoint 3: View north east along Badgerys Creek Road

Existing conditions: This view along the recently realigned Badgerys Creek Road includes the new intersection at Elizabeth Drive in the background. To the west (left of view) major bulk earthworks can be seen underway within the Western Sydney International Stage 1 Construction Impact Zone. To the north, beyond Elizabeth Drive, the undulating hills of Luddenham can be seen with open fields and scattered trees. There is a large stockpile visible on the horizon to the east of the vegetation along Badgerys Creek. This view will continue to be transformed as Western Sydney International Stage 1 is constructed. There would also be distant views to the construction of the future M12 Motorway to the north of Elizabeth Drive, in the background of the view.

Visual sensitivity: Badgerys Creek Road provides a north south connection between The Northern Road in the south and Elizabeth Drive in the north. The realigned road will connect with the future M12 Motorway and provide an entry point to the airport when it opens. It is currently experienced by low to moderate volumes of road users, including a substantial amount of construction related vehicle activity. While this view includes some glimpses to the surrounding rural landscape, the character of this view is heavily influenced by the adjacent construction activity on the airport site. While Western Sydney International is under construction, this view is of **neighbourhood visual sensitivity**.

FIGURE 9-7 VIEWPOINT 3: VIEW NORTHEAST ALONG BADGERYS CREEK ROAD

Magnitude of change during construction: Construction of the at-grade sections of the project alignment would be seen extending across the fields to the northwest (left of view), and passing under the future elevated Elizabeth Drive, in the background of view. The viaduct and tunnel segment casting facilities would be seen to the east of Badgerys Creek Road (centre and right of view). These facilities would include batch plants, workshops, sheds and adjacent laydown areas with stacked segments. There would also be heavy vehicles travelling along Badgerys Creek Road, hauling segments and equipment to and from these sites.

9. WESTERN SYDNEY INTERNATIONAL

9.4 Visual impact

FIGURE 9-8 VIEWPOINT 4: VIEW NORTH EAST FROM THE WESTERN SYDNEY INTERNATIONAL AIRPORT EXPERIENCE CENTRE

Visual impact during construction: The sheds, boilers and gantry cranes in the segment casting facilities would introduce large scale construction activity into this view. However, this work would be of a similar scale and character to the surrounding Western Sydney International Stage 1 Construction Impact Zone, also seen from this location. The Airport construction support site (viaduct and tunnel segment precast facilities) would be seen in the middle ground of this view, partly screened by roadside vegetation in parts. Overall, there would be a noticeable reduction in the amenity of this view, which is of neighbourhood visual sensitivity, and a **negligible visual impact**.

Viewpoint 4: View north east from the Western Sydney International Airport Experience Centre

Existing conditions: The Western Sydney International Experience Centre is located on a locally prominent rise in Luddenham, west of the airport. This location offers panoramic views across the Western Sydney International Stage 1 Construction Impact Zone. While there is substantial bulk earthworks being undertaken in the vicinity of Elizabeth Drive, much of the construction work is out of view. This view will continue to be transformed as construction of the airport and runway progresses.

Visual sensitivity: The experience centre has been positioned in this location to view the construction activity on the airport site. It is a scenic panoramic view, which would be appreciated by visitors with an interest in viewing the airport construction works. Overall, this is a view of **regional visual sensitivity** due to its purpose to the regional community.

Magnitude of change during construction: The project alignment would be seen in the background of this view, with two station construction sites and the on-airport construction support site (including viaduct and tunnel segment precast facilities). Construction work would include the use of heavy vehicles and equipment, warehouses, spoil piles, and precast concrete segment storage areas.

Visual impact during construction: The scale of work required for the project would be largely consistent or of lesser scale than the surrounding airport, future M12 Motorway and Elizabeth Drive upgrade construction works. Due to the compatibility of this work within this context, and the distance at which it is seen, there would be no perceived change in the amenity of this view, which is of regional visual sensitivity, and a **negligible visual impact**.

Views to the Kemps Creek construction power corridor

Existing conditions: A temporary construction power supply route would extend between Airport Business Park Station construction site and the Kemps Creek Zone substation. The power supply route would extend east along Pitt Street, passing over Badgerys Creek towards Lawson Road and through rural residential areas. The route would continue north along Lawson Street and east along Cuthel Road, through rural lots containing dense bamboo forest and areas of bushland. The route would extend north along Martin Road, then east through the rural landscape towards Western Road. In this area, the route would cross South Creek, and pass along the rear boundaries of rural residential properties along Sumbray and Turnbull Avenues. The route would extend north alongside Western Road and east along Cross Street, past a bushland reserve (not publicly accessible) and Kemps Creek Public School, before connecting to Kemps Creek Zone Substation at the corner of Devonshire Road.

Sensitivity: Views along this route are generally experienced by road users, residents and visitors to adjacent rural properties and rural residential areas at Badgerys Creek and Kemps Creek. The route would also be viewed by visitors, staff and students at Kemps Creek Public School. Badgerys Creek and South Creek are identified as important regional landscape features and views to and along these creeks are valued, which are identified as future linear parkland corridors. Overall, views along the route would be generally valued and appreciated by the local community and are of **local visual sensitivity**.

Visual impact during construction: Construction of the Kemps Creek power supply route would require temporary open trench construction activity which would be seen within the road corridors, requiring short term road lane reductions or temporary closures. This small scale construction activity would be undertaken sequentially along the route. The works would not require the removal of existing street trees. While some of the views along the route would contain landscape features of value, including Badgerys Creek and South Creek, the works would not noticeably obstruct views to these features.

Overall, due to the minor scale of these works, there would be no perceived change in the amenity of views along the power supply route from roads and adjacent properties. These views are of local and regional sensitivity, and there would be a **negligible visual impact** during construction.

9.4.2 Visual impacts during operation

The Western Sydney International is currently under construction, and the landscape setting will be entirely changed when the airport is operational. There will be publicly accessible views within the site that currently do not exist. For this reason, the following assessment has taken a typology approach to consider the types of visual impacts that would be expected in the future landscape (refer Section 3 of this technical paper).

Visual sensitivity

Views within the airport would be mainly by pedestrians and cyclists at short range, approaching and transiting between the stations and the airport terminal, car parking and commercial areas. This would include a large volume of commuters using the airport for regional, national and international travel, and associated workers at the airport and surrounding airport related business park.

There would be some short to medium range views from the airport access road. While this is an arrival route to the airport and for visitors to the city, these views would be appreciated from moving vehicles.

On balance, the views within the airport are considered to be of **local visual sensitivity**, as while they are appreciated by large numbers of viewers, they include a range of incidental views within a highly developed setting.

At-grade corridor

Magnitude of change during operation: There would be at-grade corridor sections of the alignment in the Western Sydney International Stage 1 Construction Impact Zone, extending south from Elizabeth Drive. The project alignment would be viewed from adjacent commercial areas and the airport access road. The corridor would be fenced and include a range of linear infrastructure along its length including CCTV cameras, services and communications conduits. The rail alignment would be located on a small embankment and include overhead poles and wires. Trains would also be viewed travelling along the corridor.

Visual impact during operation: This scale of infrastructure would be visually compatible with the operational Western Sydney International Stage 1 landscape, which will include the major airport access roads and interchanges, airport commercial areas and parking structures. Overall, there would be a noticeable reduction in the amenity of views to the at-grade rail alignment, and a **minor adverse visual impact**.

Airport Business Park Station

Magnitude of change during operation: The Airport Business Park Station would be centrally located within the business park so that most views to the station would be at close range. While the single storey station would appear as a large, long structure, the open and light design of the canopy structure would somewhat reduce the apparent visual bulk of the overall structure. The platforms, rail alignment, maintenance and service areas would be located below ground level, and less visible with the main

access point being via the upper level concourse level and pedestrian and cycle bridge.

There would be views to the station from the new airport access road, which would be seen by large numbers of vehicles moving at speed past the station. These views would be contained by the landform along the airport as the road would be below ground level in this location.

It is expected that any other views to the station from a medium to long distance would be somewhat contained by the intervening built form of the future business park. If visible at these greater distances, the station building would form part of the urban landscape and would be visually consistent with the large scale buildings within the business park. The scale of the architecture would assist with local legibility and wayfinding within precinct.

Visual impact during operation: Overall the station building would be largely compatible with the surrounding land uses and would be integrated into the future character of the business park. There would be no perceived reduction in the amenity of views to the Airport Business Park Station and a **negligible visual impact**.

FIGURE 9-9 VIEW TO AIRPORT BUSINESS PARK STATION – ARTISTS IMPRESSION

FIGURE 9-10 VIEW TO AIRPORT BUSINESS PARK STATION – ARTISTS IMPRESSION

Tunnel portal and tunnel ventilation facility

Magnitude of change during operation: In this location the project alignment is located alongside the Airport entry road, and the project alignment, including trains, would disappear out of view as it descends gradually from the surface into the tunnel. There would be a ventilation facility integrated into the portal, including several aboveground structures set within a green roof.

Visual impact during operation: The project alignment would become less visible as it descends into the portal. The portal structure would have a relatively simple form, with aboveground structures that are relatively small within the context of the surrounding airport buildings. These buildings would appear as service-related structures, however, this would be mitigated by the green roof which would visually soften the structure, and improve its visual appeal.

Overall, due to the size of the structure, there would be no perceived change in the amenity of views to the tunnel portal and tunnel ventilation facility and a **negligible visual impact**.

Airport Terminal Station

Magnitude of change during operation: Airport Terminal Station would be located centrally within the airport, adjacent to the future airport terminal building. This context would contain views to the station from surrounding areas so that the potential impacts would be only on short range views.

The station platforms, rail alignment and services would be located below ground, and the station would include an aboveground concourse level. This would considerably reduce the scale of the station building when viewed from the surrounding terminal areas. The overall proportions of the station building would be long and narrow due to its long length and low height. The scale of the station would therefore be generally consistent with the scale and character of built form expected at the airport terminal which would be of a similarly or larger scale. The contemporary materials, open and light design of the proposed canopy structure would also reduce the apparent visual bulk.

It is expected that any other views to the station from a medium to long distance would be largely contained by the intervening built form of the future airport terminal buildings. If visible at these greater distances, the station building would form part of the dense urban setting and would be visually consistent with the surrounding large scale buildings. The scale of the station building, and landmark qualities of the architecture would assist with local legibility and wayfinding within precinct.

Visual impact during operation: Overall there would be no perceived change in the amenity of views to Airport Terminal Station, and a **negligible visual impact**.

FIGURE 9-11 VIEW TO AIRPORT TERMINAL STATION – ARTISTS IMPRESSION

FIGURE 9-12 VIEW TO AIRPORT TERMINAL STATION – ARTISTS IMPRESSION

9.5 Assessment of night-time visual impact

Existing conditions: The Western Sydney International landscape character area is currently an area of **Low district brightness (A2)** as this area includes predominantly rural uses and relatively dark urban locations. The heavily trafficked Elizabeth Drive increases the lighting levels to the north of the character area.

In the future, the Western Sydney International landscape character area will become an area of **High district brightness (A4).** The airport would operate 24 hours a day 7 days a week and include brightly lit access roads, terminal buildings, airport operation, commercial buildings, car parking structures, and other associated infrastructure. These elements would contribute to an overall skyglow within the Western Sydney International.

Magnitude of change during construction*:* There would be lighting required at night for haulage and deliveries including oversize deliveries, tunnelling and underground works, as well as some minor security lighting associated with the site.

Visual impact during construction: Due to the minor nature of the lighting required and the limited vantage points from which the site would be seen, for the project there would be no perceived change in the amenity of the site at night, and a **negligible visual impact**.

Magnitude of change during operation*:* The at-grade sections of the alignment would be lit and there would be train headlights seen moving along this section of the corridor. Both the Airport Business Park Station and Airport Terminal Station would be brightly lit to accommodate station activities. These stations would also be set within a well-lit pubic realm, including transport integration infrastructure on surrounding streets (provided as part of the wider development of Western Sydney International).

Visual impact during operation: This lighting would be consistent in character with the brightly lit setting of Western Sydney International, and absorbed into views to the station and aboveground features of the project alignment.

Overall, there would be no perceived change in the amenity of the project at night. This would result in a **negligible visual impact** in this area which is of low district brightness (A2) during operation.

9.6 Summary of impact

Table 9-1 to Table 9-4 summarise the potential landscape and visual impacts of the project at Western Sydney International.

Overall, there would be **negligible landscape and visual impacts** during construction due to the project works being seen within the context of extensive landscape and visual change that will occur across the Western Sydney International Stage 1 Construction Impact Zone. During operation, the project would result in mostly **negligible landscape and visual impacts** due to the context of the operational Western Sydney International Stage 1. There would also be some **minor adverse visual impact** in views to the at-grade corridor and tunnel portal and ventilation facility due to the scale and presence of this infrastructure.

9.5 Assessment of night-time visual impact

TABLE 9-1 LANDSCAPE IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	Airport landscape character area	Neighbourhood (during construction) Local (during operation)	No perceived change	Negligible	No perceived change	Minor beneficial

TABLE 9-2 DAYTIME VISUAL IMPACT SUMMARY – DURING CONSTRUCTION

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	View east along Elizabeth Drive to Badgerys Creek Road	Local	No perceived change	Negligible	-	-
2	View north west along Badgerys Creek Road	Neighbourhood	No perceived change	Negligible	-	-
3	View north east along Badgerys Creek Road	Neighbourhood	Noticeable reduction	Negligible	-	-
4	View north east from the Western Sydney International Airport Experience Centre	Regional	No perceived change	Negligible	-	-
5	Views to the Kemps Creek construction power corridor	Local	No perceived change	Negligible	-	-

TABLE 9-3 DAYTIME VISUAL IMPACT SUMMARY- DURING OPERATION

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	At-grade corridor	Local	-	-	Noticeable reduction	Minor adverse
2	Airport Business Park Station	Local	-	-	No perceived change	Negligible
3	Tunnel portal and tunnel ventilation facility	Local	-	-	Noticeable reduction	Minor adverse
4	Airport Terminal Station	Local	-	-	No perceived change	Negligible

TABLE 9-4 NIGHT-TIME VISUAL IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	Airport landscape character area	Low district brightness (A2)	No perceived change	Negligible	-	-
		High district brightness (A4)	-	-	No perceived change	Negligible

10. BRINGELLY

10.1 Key components and character of the project

The Bringelly character area extends from Badgerys Creek to Thompsons Creek.

10.1 Key components and character of the project

The project in the Bringelly landscape character area includes:

- alignment in tunnel
- services facility
- cut-and-cover station- Aerotropolis Core Station.

The following artists impression shows the potential character of Aerotropolis Core Station. (See Figure 10-1)

Aerotropolis Core Station construction site would be located to the east of Badgerys Creek Road, and north of Thompsons Creek. A range of construction activities would be carried out at this site to construct Aerotropolis Core Station.

The Bringelly services facility would be a single storey building located on Derwent Road.

Night works would be required for haulage and deliveries, oversize deliveries, underground works and road possessions.

Further details of the design are contained in Chapter 7 (Project description – operation) and details of the construction method are contained in Chapter 8 (Project description – construction) of the Environmental Impact Statement.

10.2 Relevant planning context

The Bringelly landscape character area is located in the City of Liverpool LGA. While this project is not subject to local government requirements, the Liverpool *Local Strategic Planning Statement* (2020) provides an indication of the future development intentions and therefore landscape character.

This character area is subject to the *Western Sydney Aerotropolis Plan*, *State Environmental Planning Policy (Western Sydney Aerotropolis) 2020* and the *Western Sydney Aerotropolis Plan Development Control Plan 2020 - Phase 1*. This area is identified in these documents as the Aerotropolis Core precinct. The relevant strategic outcomes and provisions for the Aerotropolis Core precinct are included in Chapter 2 of this technical paper.

FIGURE 10-1 ARTISTS IMPRESSION, VIEW TO AEROTROPOLIS STATION

10.3 Landscape impact

10.3.1 Existing landscape character

The Bringelly landscape character area extends between Badgerys Creek in the north, Thompsons Creek in the south-east, and The Northern Road in the south-west. (See Figure 10-2) The topography of the Bringelly landscape character area varies from undulating hills near Badgerys Creek to flat open areas adjacent to Thompsons Creek. Both Badgerys and Thompsons Creeks are lined with mature native vegetation which identify these corridors in the landscape. This vegetation contains views and provides an attractive feature within the landscape.

This area comprises mainly rural land with patches of mature bushland, detached dwellings on large lots which are generally set back from the road, with small dams, sheds and other farming structures. There are pockets of more intensive agriculture concentrated along Badgerys Creek Road which contain large scale agricultural structures such as hydroponic greenhouses and agricultural sheds. The Royal Australian Air Force Telecommunications Unit, located to the east of Badgerys Creek Road, is largely vacant apart from a single dwelling, some shed structures and scattered vegetation.

Badgerys Creek Road provides the main access road through Bringelly and extends from The Northern Road in the south and into the airport land in the north. There are a series of smaller no through roads which are aligned generally parallel with and to the west of Badgerys Creek Road. This street pattern results in limited permeability, with all access being via The Northern Road in the south.

The Northern Road forms the southwestern boundary to Bringelly. The Northern Road connects the southern areas of the City of Liverpool with the M4 Western Motorway and Penrith to the north and is currently being upgraded. The upgrade is being delivered in six stages all of which are expected to be operational by 2021 except Stage 5: Littlefields Road, Mulgoa to Glenmore Parkway, Glenmore Park, which is expected to be operational in 2022. Extensive tree clearing and excavation works have recently been undertaken at the intersection of Badgerys Creek Road and The Northern Road which has reduced the rural landscape character of this entry road to Bringelly.

Further south, the construction of an interchange at the intersection of Bringelly Road and The Northern Road is also currently underway which has involved the realignment of The Northern Road and similar broad scale earthworks and clearing.

A local and state heritage listed property '*Kelvin Park Group'* at 34 The Retreat, Bringelly is located on a low hill near Thompsons Creek and contains a homestead, former coach house, a series of outbuildings (c.1820) and other relics which form '*part of the setting of an intact early 19th century farm complex'* that is considered *'aesthetically pleasing'* (NSW Heritage Register, 2004b). The former coach house is an important component of the group as it is '*representative of an early country homestead coach house'* (NSW Heritage Register, 2004b). In addition, there are several important early tree plantings such as a Bunya pine, three camphor laurels, and a fig which '*contribute to making the site a notable landmark in*

1 RESIDENTIAL PROPERTIES AT 'THE RETREAT'
2 MATURE TREES ON BADGERYS CREEK ROAD
3 ARABLE FIELDS VIEWED FROM BADGERYS CREEK ROAD
4 RURAL RESIDENCES ON MERSEY ROAD, BRINGELLY
5 AGRICULTURAL ACTIVITIES, BRINGELLY

10. BRINGELLY

10.3 Landscape impact

1 TELECOMMUNICATIONS RADIO STATION COMPLEX

2 VIEW TO THE 'KELVIN PARK GROUP' FROM THE RETREAT

the area' (NSW Heritage Register, 2004c). The main living spaces of the house are orientated north and east, towards Thompsons Creek.

Other relevant heritage properties include the former Overseas Telecommunications Radio Station Complex which occupies 317 hectares at Badgerys Creek Road, Bringelly and has a local heritage listing. The complex includes a radio receiving station, staff housing and water tank. Constructed between 1950-1955 the station '*was one of the last of three pairs of transmitting and receiving stations built in Australia and the only receiving station in NSW*' (NSW Heritage Register, 2017). The station has since been decommissioned but operates as an unmanned facility and is the main receiving base for the Maritime Services from Ships at Sea and Qantas. The buildings are identified as exhibiting a post-war functionalist style of architecture and the landscape setting and mature gardens are identified as an '*important component of the aesthetic qualities of the complex'* (NSW Heritage Register, 2017). The entrance to the complex contains a historical plaque identifying the '*Bringelly Radio Receiving Station'*.

The Bringelly landscape character area is intended to transition from a semi-rural landscape to a future commercial and mixed-use precinct under the Western Sydney Aerotropolis Plan (2020). This area forms part of the Aerotropolis Core precinct and is intended to comprise urban land and mixed flexible employment and urban land. The structure plan identifies South Creek, Badgerys Creek and Thompsons Creek as part of the major open space network.

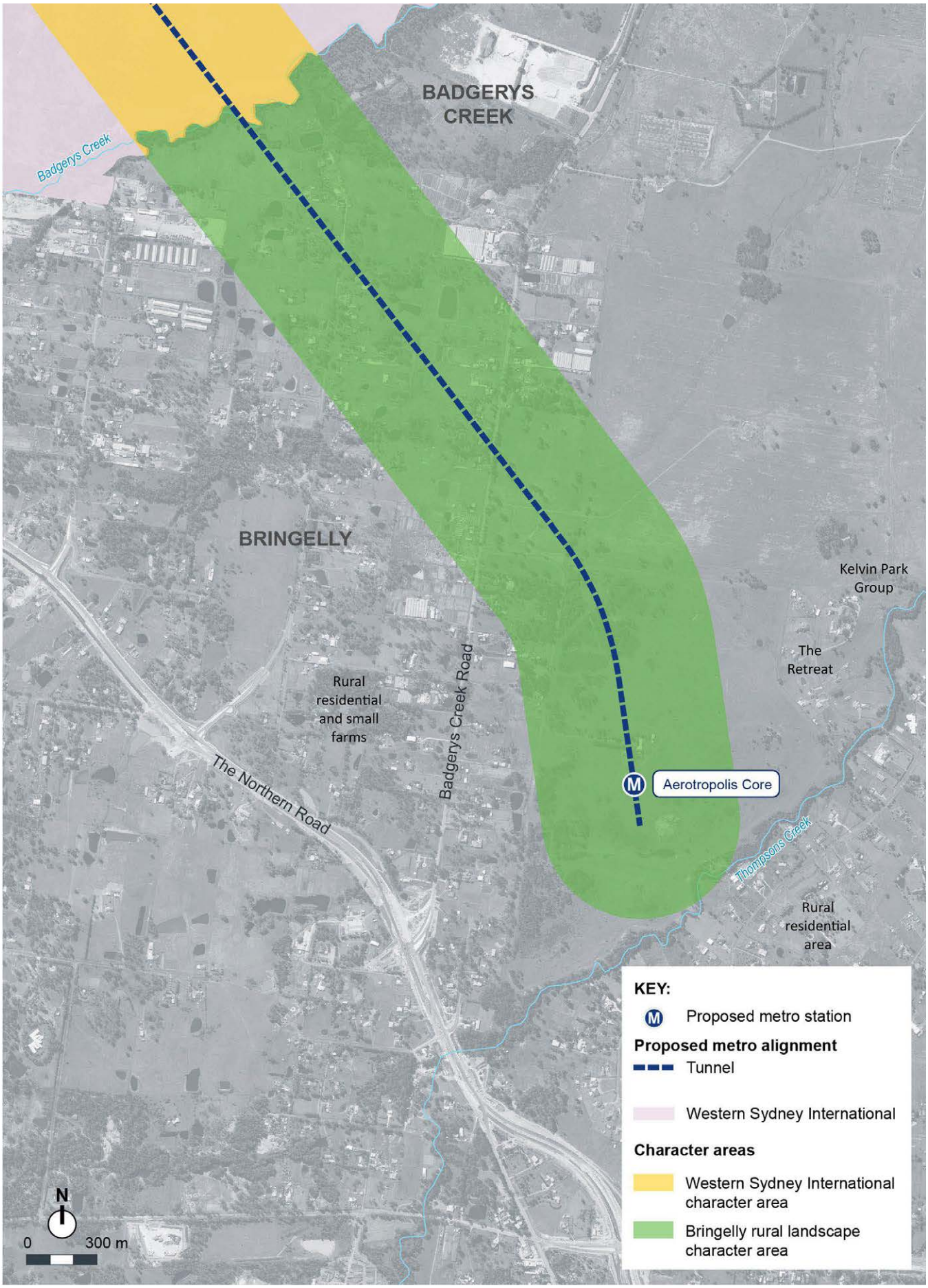
10.3.2 Landscape sensitivity

This landscape character area comprises a fairly open, settled rural landscape, with a mixture of small to medium acreage residential lots and farms, subdivided from former large rural properties together with areas of intensive agriculture. The landscape has been modified for agricultural practices. The proximity and scale of construction works along The Northern Road has degraded the rural landscape character of the southern parts of this character area and changed the rural nature of The Northern Road.

Landscape features within the Bringelly landscape character area would be experienced mainly by residents and their visitors and workers within the various rural industries. They would also be experienced by low volumes of traffic along Badgerys Creek Road and other rural roads and moderate volumes of traffic along The Northern Road. The farm setting of the heritage listed 'Kelvin Park Group' which comprises several landmark trees are important to local character.

Overall, this landscape would be generally valued and appreciated primarily by the local community and has a **local landscape sensitivity**. South Creek, Badgerys Creek and Thompsons Creek are identified as important regional landscape features and are of **regional landscape sensitivity**.

FIGURE 10-2 BRINGELLY LANDSCAPE CHARACTER AREA



10.3.3 Landscape impact during construction

There would be two construction sites within the Bringelly landscape character area, one for the services facility, north west of Derwent Road, and a second for Aerotropolis Core Station construction site, east of Badgerys Creek Road.

All vegetation within the construction footprint would be removed. At Aerotropolis Core Station the landform would be altered slightly to accommodate future precinct works. Road closures and diversion would be required at Badgerys Creek Road and Derwent Road, altering accessibility in these areas.

The scale of the construction footprint and machinery used to construct the services facility and station (including earthmoving equipment, piling rig, crane etc.) would contrast in scale and proportion to the existing equipment used in this landscape, which services nearby small rural operations. However, the footprint of the works would be small relative to works at the airport, for example. The presence of construction activity would be slightly more noticeable at the proposed Aerotropolis Core Station construction site, where the landscape consists of an open floodplain, and works would contrast in scale and character with the surrounding landscape. However, the works near Derwent Road would be consistent with the surrounding land use activities.

There would be no direct impact or loss of the valued landscape features at Kelvin Park, such as the early tree plantings and farm buildings. Nor would the project result in direct impacts on any important features of the former Overseas Telecommunications Radio Station Complex.

There would be some construction traffic seen on Badgerys Creek Road and Derwent Road, somewhat intruding upon the rural character of this landscape.

Overall, there would be a noticeable reduction in the character and quality of this landscape, and a **minor adverse landscape impact.**

10.3.4 Landscape impact during operation

Aerotropolis Core Station would introduce a low rise contemporary structure into the largely open rural setting north of Thompsons Creek. The station would form part of a new urban precinct which would comprise a grid street network surrounding the station. There would be a new access road linking the station with Badgerys Creek Road, and a large commuter car park, partly following the alignment of an existing gravel road.

While the heritage listed Kelvin Park Group is in close proximity to the station (about 900 metres to the northeast), there would be no direct impact on the landscape setting of this building group.

The services building would be small scale and have a consistent working character to the existing land uses. The existing trees in this landscape would assist in the absorption of this building into the landscape.

The rural landscape character of Bringelly is fragmented with a mix of intensive agricultural uses as well as intrusive road upgrades to the south and west, and the airport construction to the north. The services facility and Aerotropolis

Core Station would be absorbed into the character of this landscape due to their scale and this setting. Overall, there would be a no perceived change in the character and quality of this landscape, which is of local landscape sensitivity, which would result in a **negligible landscape impact.**

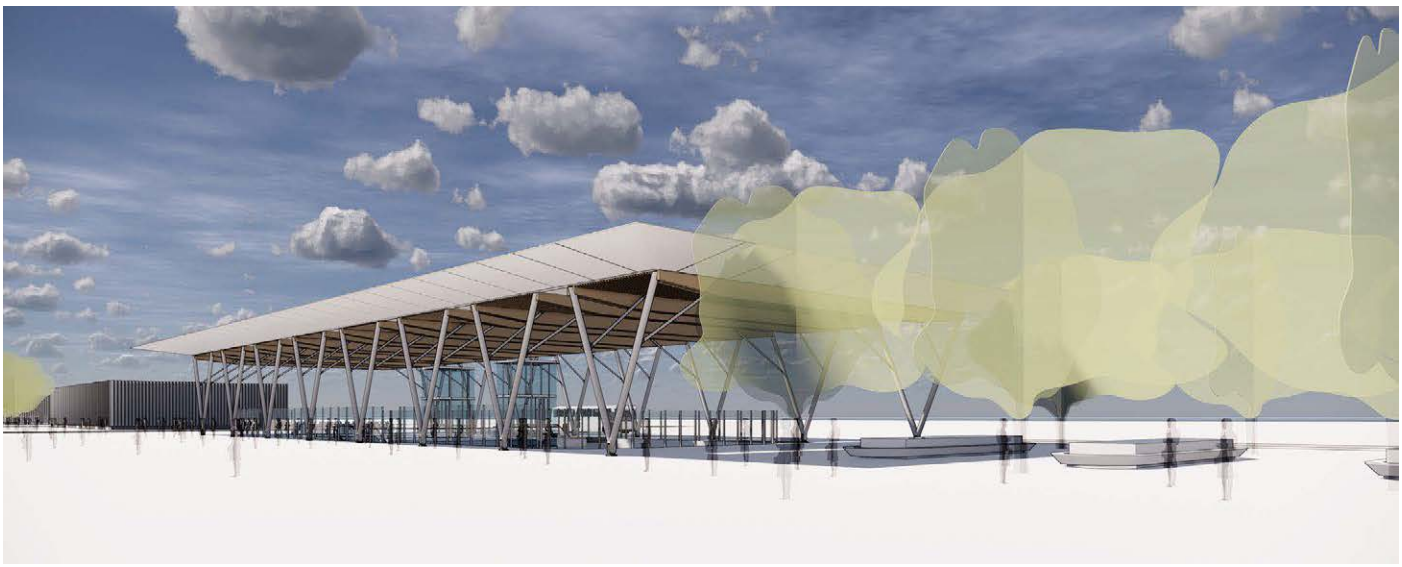


FIGURE 10-3 AEROTROPOLIS CORE STATION – ARTISTS IMPRESSION

FIGURE 10-4 AEROTROPOLIS CORE STATION – ARTISTS IMPRESSION

10.4 Visual impact

10.4.1 Visual catchment

Aerotropolis Core Station would be visible from small sections of Badgerys Creek Road and the rural areas surrounding the station, including from The Retreat. There would also be views to the services facility from Derwent Road and adjacent rural residential properties. Vegetation along Thompsons creek and in the rural properties around Badgerys Creek Road would filter and contain views from the broader landscape.

10.4.2 Viewpoint assessment

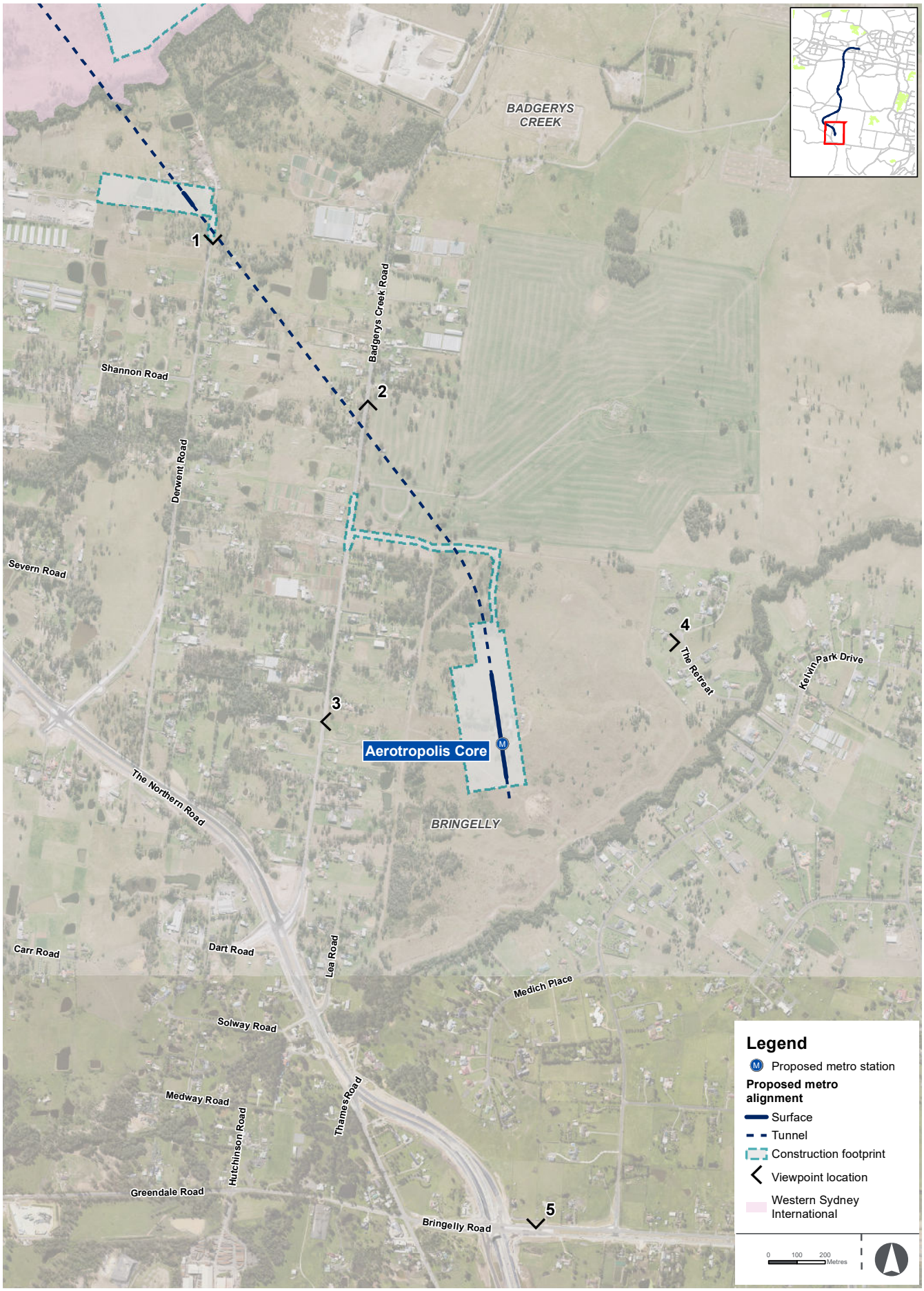
The following viewing locations were selected as representative of the range of views to the project:

- Viewpoint 1: View north from Derwent Road
- Viewpoint 2: View south from Badgerys Creek Road
- Viewpoint 3: View east from Badgerys Creek Road
- Viewpoint 4: View west from The Retreat
- Viewpoint 5: View north from Bringelly Road.

The following sections summarise the daytime visual impact identified for each representative viewpoint during construction and operation.

Figure 10-5 identifies the location of these viewpoints.

FIGURE 10-5 VIEWPOINT LOCATION PLAN



Viewpoint 1: View north from Derwent Road

Existing conditions: Derwent Road is a straight, narrow rural road providing access to several rural residential properties and farms. The topography in this location is generally flat and low lying, typical of the Badgerys Creek floodplain. The landscape is rural with fields with scattered trees and groups of mature trees along the road filtering views to the adjacent residences and rural properties. Badgerys Creek forms a continuous vegetated backdrop, enclosing this view.

FIGURE 10-6 VIEWPOINT 1: VIEW NORTH FROM DERWENT ROAD, EXISTING VIEW

Sensitivity: This view represents an incidental view from a local road which would be appreciated mainly by local residents and their visitors on adjacent scattered and isolated semi- rural properties. Bushland vegetation along Badgerys Creek forms a natural skyline feature in the background of the view and is identified as Environmentally Significant Land in the Liverpool LEP 2008. This view is of **neighbourhood visual sensitivity**.

Magnitude of change during construction: The construction of the services facility would be seen in the middle ground of this view, set back from Derwent Road. Derwent Road would be widened with turning lanes and construction vehicles would be seen accessing the site from this road. The works would require the removal of some trees, however, the surrounding context of trees. Temporary fencing and hoarding would be erected along the perimeter of the site, and machinery including piling rigs and cranes would be seen at the site installing services equipment.

Visual impact during construction: Due to the removal of vegetation and minor scale of the works, there would be a noticeable reduction in the amenity of this view, which is of neighbourhood sensitivity, resulting in a **negligible visual impact**.

Magnitude of change during operation: The services facility would be seen in this view, and include a building, set back from the road, located within an area of site vehicle parking and surrounded by site fencing. The aboveground built form of the services facility would be a small single storey building, similar in character

to other buildings in this rural landscape. Retained existing trees would provide a backdrop and some filtering to this view.

Visual impact during operation: The services facility would be similar in character to other medium scale rural buildings in this landscape, and largely absorbed into the character of the rural landscape. Overall, there would be no perceived change in the amenity of this view, which is of neighbourhood sensitivity. This would result in a **negligible visual impact**.

Viewpoint 2: View south from Badgerys Creek Road

Existing conditions: In this view, Badgerys Creek Road is a narrow rural road with rough shoulders and grassed verges with powerlines to the east and west of the road and trees to the east (left of view). The landscape is generally flat with rural properties along the road but set within larger rural properties. There scattered trees within the adjacent fields and along the roadside filter views to the surrounding landscape.

Sensitivity: Views along Badgerys Creek Road would be experienced by a moderate number of road users travelling within the local area and between The Northern Road and Elizabeth Drive. This view is of **local visual sensitivity**.

Magnitude of change during construction: The road corridor would be widened and turning lanes would be installed, providing access for light and heavy vehicles to Aerotropolis Core Station construction site (which is out of view). Heavy vehicles would be seen travelling along Badgerys Creek Road hauling materials and equipment.

FIGURE 10-7 VIEWPOINT 2: VIEW SOUTH FROM BADGERYS CREEK ROAD, EXISTING VIEW

Visual impact during construction: Overall, there would be a noticeable reduction in the amenity of this view due to the additional heavy vehicle use. As this is a view of local sensitivity, this would result in a **minor adverse visual impact**.

Magnitude of change during operation: Aerotropolis Core Station would be out of view. However, there would be additional vehiclular traffic seen on Badgerys Creek Road, accessing the station via a new entry road which would extend east towards the station.

Visual impact during operation: Due to the considerable increase in traffic and new road leading to the station, there would be a noticeable reduction in the amenity of this view, which is of local sensitivity and a **minor adverse visual impact**.

Viewpoint 3: View east from Badgerys Creek Road

Existing conditions: This easterly view from Badgerys Creek Road includes rural properties with scattered residences and associated buildings including sheds, garages, and water tanks. The properties include undulating fields with small dams and scattered trees. A dense group of native trees is visible in the middle ground of view, enclosing the view and partly screening views to the rural land in the background of view, on the Thompsons Creek floodplain. The Royal Australian Air Force Telecommunications Unit mast can be seen in the background, rising above the buildings and trees in the middle ground of this view.

Sensitivity: Views along Badgerys Creek Road would be experienced by a moderate number of road users travelling within the local area and between The Northern Road and Elizabeth Drive.

FIGURE 10-8 VIEWPOINT 3: VIEW EAST FROM BADGERYS CREEK ROAD

Bushland vegetation along Thompsons Creek in the far background of the view is identified as Environmentally Significant Land under the Liverpool LEP 2008. The cohesiveness of the landscape is reduced by the fragmented vegetation cover, telecommunication infrastructure and other agricultural structures. This view is of **local visual sensitivity**.

Magnitude of change during construction: The construction site for Aerotropolis Core Station would be established on the Royal Australian Air Force Telecommunications Unit site, in the vicinity of the mast (centre-left of view). The works would be located at ground level and therefore would be concealed by intervening landform and vegetation located in the foreground of this view. However given the easterly aspect of properties in the foreground of this view, clear views would be available to the construction works. These views would include construction activity at the station, including tall machinery such as piling rigs and cranes. The work would be seen in the middle ground of this view and may be filtered by intervening vegetation.

Visual impact during construction: Due to the distance and small change in this view, there would be a noticeable reduction in the amenity of this view, which is of local visual sensitivity, resulting in a **minor adverse visual impact**.

Magnitude of change during operation: The Aerotropolis Core Station building would be at ground level and out of view. From the residences on properties east of Badgerys Creek Road, the

FIGURE 10-9 VIEWPOINT 4: VIEW NORTH FROM THE RETREAT, EXISTING VIEW

aboveground station building and associated supporting infrastructure, including multi storey car parks, would be visible in the middle ground of their view. The aboveground levels of the station would be longer than other buildings within the landscape, but only rise a single storey above the surrounding landscape. The commuter car parks would rise up to three storeys and be more visually prominent.

Visual impact during operation: The scale and form of the station and associated park and ride and bus layover areas would somewhat contrast with the prevailing rural character of this landscape. Overall, there would be a noticeable reduction in the amenity of this view, which is of local sensitivity, resulting in a **minor adverse visual impact**.

Viewpoint 4: View west from The Retreat

Existing conditions: This westerly view is from The Retreat across the generally flat and low lying landscape. The foreground of this view includes modern single storey residences and gardens, beyond this there are open fields in the middle ground of view. This view is enclosed by vegetation along Thompsons Creek. The Royal Australian Air Force Telecommunications Unit mast (centre of view) can be seen in the middle to background of this view, rising above the trees.

Sensitivity: This view from a small cul-de-sac which provides access to a small number of residential properties would be appreciated mainly by local residents and their visitors. The Royal Australian Air Force Telecommunications Unit mast is heritage listed, however, not for aesthetic reasons. The cohesiveness of the rural landscape is reduced due to the fragmented vegetation cover, prominence of large modern dwellings on acreage farms in the foreground and presence of infrastructure elements (the Royal Australian Air Force Telecommunications Unit mast in the background of the view). This view is of **neighbourhood visual sensitivity**.

Magnitude of change during construction: The construction footprint for Aerotropolis Core Station would be established in the middle ground of view, extending north from the Royal Australian Air Force Telecommunications Unit building (centre of view). The site would include laydown and storage areas, light and heavy vehicle car parking areas, site offices and worker amenities. Large machinery would be visible including piling rigs and cranes to install the station building and commuter car parking structures.

The properties in the foreground of this view would have clear views to the construction works from their westerly aspect.

Visual impact during construction: The project would be located in the background of these views and the open flat landscape would allow the full length of the station building to be appreciated in this view. There would be large scale equipment seen including piling rigs and cranes, and there would be heavy vehicles moving across the rural landscape. While the works to construct the station and proposed temporary park and ride areas and bus layover areas would contrast with the prevailing rural character, the distance would assist in absorbing the scale of the construction works,

Overall, there would be a noticeable reduction in the amenity of this view, which is of neighbourhood sensitivity, resulting in a **negligible adverse visual impact**.

Magnitude of change during operation: The project would be located in the background of these views and the open flat landscape would allow the full length of the station building to be appreciated in this view. There would be access to the station via new roads which would extend from Badgerys Creek Road in the background of the view. This station and surrounding infrastructure would include large numbers of people and vehicles moving around the new station precinct.

Visual impact during operation: While the station and proposed temporary park and ride areas and bus layover areas would somewhat contrast with the prevailing rural character of this landscape, the project would be somewhat absorbed into the surrounding landscape because of the distance, vegetated backdrop and intervening scattered trees. Overall, there would be a noticeable reduction in the amenity of this view, which is of neighbourhood sensitivity, resulting in a **negligible adverse visual impact**.

Viewpoint 5: View north from Bringelly Road

Existing conditions: This view from Bringelly Road is located on elevated land which slopes in a northerly direction towards Thompsons Creek in Bringelly (left and centre of view). The middle ground of this view includes open fields. Rural residential lots in Bringelly can be seen in the background (right of view). Vegetation along Thompson Creek provides a forested skyline in the far background of the view and the Royal Australian Air Force Telecommunications Unit mast can be seen as a small structure rising above the treeline (left and centre of view).

Sensitivity: Views along Bringelly Road would be experienced by moderate volumes of road users accessing The Northern Road, a busy arterial route. The cohesiveness of the rural landscape is reduced by the presence of new road infrastructure and the visibility of large dwellings and shed structures on acreage farms in the background. This view is of **local visual sensitivity**.

FIGURE 10-10 VIEWPOINT 5: VIEW NORTH FROM BRINGELLY ROAD

Magnitude of change during construction: The construction site for Aerotropolis Core Station would be established in the background of this view (about 1.5 kilometres away) in the vicinity of the Royal Australian Air Force Telecommunications Unit mast. Taller machinery such as piling rigs and cranes would be visible rising above the treeline, however, most of the construction activity would be underground and concealed by dense vegetation along Thompsons Creek.

Visual impact during construction: Due to the distance and limited visibility of the construction activity there would be no perceived reduction in the amenity of this view, which is of local sensitivity, and a **negligible visual impact**.

Magnitude of change during operation: Aerotropolis Core Station would be located to the north of the Royal Australian Air Force Telecommunications Unit mast in the centre of the view and would rise around 8 metres above the existing ground level. The station building would be mostly screened by vegetation along Thompsons Creek. Where it is glimpsed through the vegetation, it would be largely absorbed into the background of the view, due to the distance.

Visual impact during operation: Overall, due to the distance and intervening vegetation there would be no perceived reduction to the character and quality of this rural view, which is of local sensitivity. This would result in a **negligible visual impact**.

10. BRINGELLY

10.6 Summary of impact

10.5 Assessment of night-time visual impact

Existing conditions: The Bringelly rural landscape character is an area of **Low district brightness (A2)** as this area includes predominantly rural uses and relatively dark urban locations. The heavily trafficked The Northern Road increases the lighting levels to the south of the character area.

Magnitude of change during construction*:* There would be limited night construction works required as a part of the construction works in this area of the project. There would also be some security lighting associated with the site.

Visual impact during construction: Due to the minor nature of the lighting required for the project in this landscape character area and distance between the site and adjacent scattered residences, there would be no perceived change in the amenity of the site at night, and a **negligible visual impact**.

Magnitude of change during operation*:* Aerotropolis Core Station would be brightly lit and located within a new urban precinct which would include transport integration infrastructure on surrounding streets, which would all be lit at night.

Visual impact during operation: While there would be no direct light spill on adjacent residences, which are scattered across the landscape, the lighting of the station would introduce additional lighting into the surrounding lower light level environment. In particular, there would be views to Aerotropolis Core Station from residences to the west on Badgerys Creek Road, and to the east on The Retreat. Overall, there would be a noticeable reduction in the amenity of the site at night during operation. This would result in a **moderate adverse visual impact** at night in this area which is of low district brightness (A2).

10.6 Summary of impact

Table 10-1, Table 10-2 and Table 10-3 summarise the potential landscape and visual impacts of the project at Bringelly.

Overall, there would be a **minor adverse landscape and visual impacts** during construction which are temporary and short term in nature. When the project is operating there would be **minor adverse** and **negligible landscape and visual impacts** in the short term.

However, in the long term, the impacts experienced in the Bringelly Character area would reduce as the surrounding area is transformed from a predominantly rural /rural residential landscape into the Aerotropolis, including the Aerotropolis Core to the east Badgerys Creek Road of which Aerotropolis Core Station would be a part.

The proposed mix of flexible employment and urban land would have a development density that would reduce the potential visibility of the project, increase the visual compatibility of the station with the surrounding urban form, and create an improved public realm and urban landscape setting for the station, resulting in reduced landscape and visual impacts during the day and at night.

10.6 Summary of impact

TABLE 10-1 LANDSCAPE IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	Bringelly landscape character area	Local	Noticeable reduction	Minor adverse	No perceived change	Negligible

TABLE 10-2 DAYTIME VISUAL IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	View north from Derwent Road	Neighbourhood	Noticeable reduction	Negligible	No perceived change	Negligible
2	View south from Badgerys Creek Road	Local	Considerable reduction	Minor adverse	Considerable reduction	Minor adverse
3	View east from Badgerys Creek Road	Local	Noticeable reduction	Minor adverse	Noticeable reduction	Minor adverse
4	View west from The Retreat	Neighbourhood	Considerable reduction	Negligible	Considerable reduction	Negligible
5	View north from Bringelly Road	Local	No perceived change	Negligible	No perceived change	Negligible

TABLE 10-3 NIGHT-TIME VISUAL IMPACT SUMMARY

			Construction		Operation	
No.	Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
1	Bringelly landscape character area	Low district brightness (A2)	No perceived change	Negligible	Noticeable reduction	Moderate adverse

11. CUMULATIVE IMPACTS

There is the potential for cumulative landscape and visual impacts from the project and other proposed developments within the study area. The developments which have the potential to have a cumulative impact with the project are identified in Chapter 27 (Cumulative impacts) of the Environmental Impact Statement. The Western Sydney International and the future M12 Motorway have been considered within the main assessment as the construction and operation of these projects is likely to occur concurrently with the project construction and operation respectively (see Sections 5 – 10 of this technical paper).

The projects considered to be relevant to this technical assessment, and which have not been considered in the impact assessment, are:

- The Northern Road
- St Marys Intermodal Facility.

The following assessment identifies the potential cumulative landscape and visual impacts of these developments with the project. This includes potential cumulative impact during construction and operation, during the day and at night.

11.1 The Northern Road

The Northern Road upgrade project will be located approximately 4.5 kilometres west of the project alignment. Due to the separation between this project and the project alignment there are no cumulative landscape or visual impacts anticipated during the day or at night, as the projects would be experienced and viewed separately.

11.2 St Marys Intermodal Facility

11.2.1 Landscape Impact

St Marys Intermodal is proposed for land northwest of St Marys Station and would include construction of a freight terminal (road and rail) and container park. During construction, there may be combined effects on wayfinding, legibility and accessibility in the vicinity of St Marys Station due to temporary alterations to roads and footpaths adjacent to these construction sites. The removal of trees within both sites and intensive construction activities being undertaken in areas adjacent to the public realm would also reduce the level of comfort and amenity for people approaching the station and local businesses in areas to the north of the Station, particularly along Harris Street.

During operation, there would not be an appreciable cumulative landscape impact anticipated between the project and the St Marys Intermodal project as these projects are spatially separated.

11.2.2 Visual Impact

During construction there may be some cumulative visual impacts between the project and St Marys Intermodal for a short duration if the construction programs overlap. It is unlikely that both projects would be visible in any one view, as the St Marys Intermodal is set back from the road, and largely screened by the large scale commercial and industrial built form along Forrester Street. However, additional heavy vehicles may be seen from Harris and Forrester streets. The removal of vegetation may also be visible at both construction sites when viewed from the station, the adjacent multi-storey car park and from Forrester and Harris streets.

During operation, there are no cumulative visual impacts anticipated between the project and St Marys Intermodal Facility, as they are visually separated by distance and intervening built form. There may be some broader views across the landscape which include both projects, however, broader views have a greater visual absorption capacity so that there would be no perceived adverse cumulative visual effect.

A night, there would be no cumulative visual impacts. Any additional light sources and skyglow that would be seen during construction would be generally absorbed into the existing brightly lit night scene of St Marys Station and adjacent industrial areas, which are of high district brightness (A4).

Similarly, at night there would not be a cumulative visual impact expected between the project and St Marys Intermodal Facility during operations as these projects are physically separate and there is a high visual absorption capacity in the areas surrounding St Marys Station and the industrial areas of North St Marys at night.

12. PROPOSED MANAGEMENT AND MITIGATION MEASURES

12.1 Approach to management and mitigation

This chapter describes the environmental management approach for the project for landscape and visual amenity during construction and operation. Further details on the environmental management approach for the project are included in Chapter 25 of the Environmental Impact Statement (Environmental management and mitigation).

A Construction Environmental Management Framework (CEMF) (Appendix F of the Environmental Impact Statement) describes the approach to environmental management, monitoring and reporting during construction. Specifically, it lists the requirements to be addressed by the construction contractor in developing the Construction Environmental Management Plan (CEMP)s, sub-plans, and other supporting documentation for each specific environmental aspect.

The Visual and Landscape CEMP for the on-airport works would be developed in consultation with Western Sydney Airport and would be consistent with the existing Western Sydney Airport Visual and Landscape Construction Environmental Management Plan (Western Sydney Airport, 2019).

12.2 Performance outcomes

Performance outcomes have been developed consistent with the requirements of the SEARs for the project. The performance outcomes for the project are summarised below in Table 12.1 and identify measurable, performance-based standards for environmental management.

12. Proposed management and mitigation measures

TABLE 12.1: PERFORMANCE OUTCOMES FOR THE PROJECT IN RELATION TO LANDSCAPE AND VISUAL AMENITY

SEARS desired performance outcome	Project performance outcome	Timing
Design, Place and Movement		
Supporting the provision of successful places - the project is integrated with and enhances the environment where it is located, including improved accessibility and connectivity for communities	• The Sydney Metro – Western Sydney Airport Design Guidelines and Design Quality Framework are implemented to deliver a rail corridor, stations and ancillary facilities that achieve the project vision and design objectives	Operation
	• Design excellence is exhibited in the project to complement the anticipated character of the precincts in which the project is located	Operation
	• Accessibility and connectivity between future communities is supported by the project through opportunities to integrate with key project components such as stations	Operation
	• Within Western Sydney International, the project is integrated with and supports the outcomes and design objectives set out in the Airport Plan, future master plans for Western Sydney International and design guidelines for Western Sydney International	Operation
The project contributes to greener places through supporting the enhancement and provision of green infrastructure	• The number of trees within the project area is increased using a range of local species to enhance canopy coverage, subject to the constraints on tree planting associated with safe airport operations	Operation

12. PROPOSED MANAGEMENT AND MITIGATION MEASURES

12.3 Proposed mitigation measures

In addition to the development and implementation of the management plans described in the CEMF, specific mitigation measures have been identified.

Proposed mitigation measures for construction and operation are detailed below in Table 12.2.

12. Proposed management and mitigation measures

TABLE 12.2: PROPOSED MITIGATION MEASURES

Ref	Mitigation measures	Applicable location (s)
	Construction	
LV1	Opportunities for the retention and protection of existing street trees and trees within the construction sites would be identified during detailed construction planning	Off-airport
LV2	Existing trees to be retained would be protected prior to the commencement of construction in the vicinity of these trees in accordance with AS4970-2009 Protection of Trees on Development Sites	All
LV3	All structures (including potential acoustic sheds, site offices, workshop sheds and site hoarding) would be finished in a colour which aims to minimise their visual impact where appropriate. This finish is to be applied to all visible fixtures and fittings (such as exposed downpipes)	All
	Operation	
LV4	The landscape design for the project would include consideration of appropriate species lists to minimise opportunities to attract wildlife at levels likely to present a hazard to aviation operations. The landscape design would have regard to relevant requirements and species lists under Western Sydney Airport's Wildlife Management Plan and other relevant guidelines, including the National Airports Safeguarding Framework (Guideline C) and Recommended Practices No. 1 – Standards for Aerodrome Bird/Wildlife Control (International Birdstrike Committee 2006)	All
LV5	Lighting at stations would be designed and operated in accordance with AS4282- 2019 Control of the obtrusive effects of outdoor lighting and the National Airports Safeguarding Framework Guideline E: Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports (where relevant)	All
LV6	Opportunities to provide vegetation screening of the stabling and maintenance facility (from sensitive receivers such as Luddenham Road and the surrounding rural areas within the viewshed) would be investigated during design development	Stabling and maintenance facility
LV7	Landscape screening would be provided along the corridor including restoring vegetation along the creeks to contain local views, in accordance with the Sydney Metro – Western Sydney Airport Design Guidelines, to minimise adverse visual impacts where feasible	All
LV8	Corridor services, including the combined services route would be designed to reduce visual clutter and minimise visual impact ensuring these structures have a low profile and do not obstruct views across the corridor	All
LV9	Proposed engineering batters and water management measures would be designed to integrate with the existing landforms and natural features	All

13. CONCLUSION

Overall, there have not been any significant landscape or visual impacts identified as a result of the project. This is due to the long sections of tunnel and the relatively high visual absorption capacity of the landscape.

13.1 Construction impacts

During construction there would be some **moderate adverse landscape impacts** in the St Marys, Orchard Hills, and Luddenham rural landscape character areas. In St Marys this is due to the scale and extent of the construction activity and the temporary impact on legibility, accessibility, and permeability as well as the loss of an area of open space. At Orchard Hills and Luddenham this impact would result from the scale of the works, the removal of trees, and removal of an area of rural residential and rural landscape.

uring construction there would also be some **moderate adverse visual impacts** on views in the vicinity of the St Marys, Orchard Hills and Luddenham Road Station construction sites. This would include impacts on close range views to the St Marys construction site from the northern end of Queen Street, from Station Street, Glossop Street, Harris Street, and from the platforms of St Marys Station. This would also include views to Orchard Hills Station construction site from locations on Kent Road, Lansdowne Road and Traminer Grove, and in westerly views from Luddenham Road towards the stabling and maintenance facility site and project alignment. Views from Luddenham Road towards Luddenham Road Station and the adjacent viaduct and bridge structures would also be impacted to a moderate adverse extent.

At night, there would be a **moderate adverse visual impact** experienced in areas of the Orchard Hills landscape during construction. However, in all other locations the construction works would be largely absorbed into the existing night time setting.

Overall, while the scale of the works during construction would result in some adverse landscape and visual impact, due to the removal of vegetation built form and the scale and extent of construction activity, these impacts would be temporary and for a short to medium duration.

13.2 Operational impacts

Generally, the operational impacts of the project would be less than those expected during construction due to the scale of the construction works and the compatibility of the stations with their context. During project operations there would be a **moderate adverse landscape impact** on the Luddenham rural character area due to the introduction of large scale built elements into the landscape.

There would be some **minor beneficial landscape impacts** experienced in the St Marys town centre during operations due to the public realm improvements and increased visual prominence of the station which would reinforce its role as a transport interchange.

There would also be **moderate adverse visual impacts** on easterly views from rural residential properties on Traminer Grove to Orchard Hills Station, and westerly views from Luddenham Road to the viaduct structure and stabling and maintenance facility, and from Luddenham Road towards the station during operations.

The lighting of the corridor and stations would contrast with the surrounding rural landscapes of Orchard Hills, Luddenham, and Bringelly, resulting in **moderate adverse visual impacts**.

In the longer term the project would be visually absorbed into the surrounding landscape which is intended to transition into become the 'Western Parkland City' and Western Sydney Aerotropolis. This will involve the transformation of the landscape in a way that will result in landscape character change that is more compatible with the project stations and alignment, and an urban built form that would substantially reduce the potential visibility of the site. Overall, the landscape and visual impacts of the project would reduce as this transformation occurs and development is designed to complement and integrate with the project.

14. REFERENCES

Australian Heritage Database, 'Orchard Hills Cumberland Plain Woodland, The Northern Rd, Orchard Hills'.

Australian Government, 2011. Airports Act 1996

Australian Government, 2012. Airports (Environment Protection) Regulations 1997

Australian Government, 2016. Western Sydney Airport- Airport Plan

Australian Institute of Landscape Architects Queensland, 2018. Guidance Note for Landscape and Visual Assessment

Australian Standard, 2019. AS4282 Control of the obtrusive effects of outdoor lighting

Australian Sustainable Built Environment Council, 2011. Creating Places for People—an urban design protocol for Australian Cities

Department of Planning, Industry and Environment, 5 Million Trees, URL: https://5milliontrees.nsw.gov.au/about-the-project (accessed 15/09/2020)

Department of Sustainability, Environment, Water, Population and Communities, 2013. Significant impact guidelines 1.2- Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies

Department of Urban Affairs and Planning, 2001. Crime prevention and the assessment of development applications, Guidelines under section 79C of the Environmental Planning and Assessment Act 1979

Government Architect of NSW, 2017. Better Placed – An integrated design policy for the built environment

Government Architect of NSW, 2018. Better Methods: Evaluating Good Design, Implementing Better Placed design objectives into projects

Government Architect of NSW, 2018. Better Placed: An integrated design policy for the built environment of NSW

Government Architect of NSW, 2018. Better Placed: Draft Good Urban Design Strategies for realising Better Placed objectives in the design of the built environment

Government Architect of NSW, 2020. Draft Greener Places Design Guide

Government Architect of NSW, 2017. Greener Places Establishing an urban Green Infrastructure policy for New South Wales

Government Architect of NSW, 2020. Designing with Country

Government Architect of NSW, 2017, Sydney Green Grid- Spatial Framework and Project Opportunities: West District

Greater Sydney Commission, 2016. Towards Our Greater Sydney 2056

Greater Sydney Commission, 2018. Greater Sydney Region Plan: A Metropolis of Three Cities – connecting people

Greater Sydney Commission, 2018b. Our Greater Sydney 2056 Western City District Plan – connecting communities

Greater Sydney Commission, 2018c. Western City District Plan – connecting communities

Liverpool City Council, 2019. Liverpool Development Control Plan 2008

Liverpool City Council, 2019. Liverpool Local Environmental Plan 2008

14. References

Liverpool City Council, 2020. Local Strategic Planning Statement

NGH Environmental, 2019. St Marys Freight Hub- Visual Impact Assessment

NSW Government Department of Planning and Environment, 2018. Western Sydney Aerotropolis Stage 1 Western Sydney Aerotropolis Land Use and Infrastructure Implementation Plan Stage 1: Initial Precincts

NSW Government, 2020. Western Sydney Aerotropolis Plan

NSW Government, 2020. Western Sydney Aerotropolis Development Control Plan 2020- Phase 1

NSW Government, 2020. State Environmental Planning Policy (Western Sydney Aerotropolis) 2020

NSW Health, 20019, Healthy Urban Development Checklist

NSW Heritage Register, 2004a. Leeholme Horse Stud Rotunda

NSW Heritage Register, 2004b. Kelvin Park Coach House (former)

NSW Heritage Register, 2004c. Kelvin Park Site Landscaping

NSW Heritage Register, 2004d. Kelvin Park Other Works/Relics

NSW Heritage Register, 2005. St Marys Railway Station

NSW Heritage Register, 2007. Mamre-Homestead

NSW Heritage Register, 2008a. Luddenham Road Alignment

NSW Heritage Register, 2008b. McGarvie-Smith Farm

NSW Heritage Register, 2008c. The Fleurs Radio Telescope Site

NSW Heritage Register, 2017. OTC Site Group (former)

NSW Office of Environment and Heritage, 2015. Technical guideline for Urban Green Cover in NSW

NSW State Government, 2009. State Environmental Planning Policy (Western Sydney Employment Area) 2009

Penrith City Council, 2006. Penrith Landscape Character Strategy- Character Statements and Maps

Penrith City Council, 2006. Penrith Landscape Character Strategy- Character Statements and Maps

Penrith City Council, 2014. Penrith Development Control Plan

Penrith City Council, 2015. Cooling the City Strategy

Penrith City Council, 2019. Penrith Local Environmental Plan 2010

Penrith City Council, 2019b. Draft Penrith Rural Lands & Villages Strategy

Penrith City Council, 2019c. Penrith Scenic & Cultural Landscapes Study

Penrith City Council, 2020. Local Strategic Planning Statement

Penrith City Council, 2020. Penrith Local Strategic Planning Statement, URL: https://www.yoursaypenrith.com.au/penrith-LSPS (accessed 19/05/2020).

Queensland Government, 2007. Crime Prevention through Environmental Design.

Transport for NSW, 2012. Bridge Aesthetics: Design guidelines to improve the appearance of bridges in NSW

Transport for NSW, 2014. Beyond the Pavement: urban design policy, procedures and design principles.

Transport for NSW, 2018. s170 Heritage and Conservation Register

Transport for NSW, 2018e. EIA-N04 Guideline for Landscape Character and Visual Impact Assessment