7. Assessment of key issues

7.3 Urban design, landscape character and visual amenity

This section describes the project urban design concept, and the landscape character and visual impact that may be generated by construction and operation of the project and presents a proposed approach to the management of these impacts. **Table 7-58** outlines the SEARs that relate to urban design, landscape character and visual impact and identifies where they are addressed in this EIS. The full assessment of urban design, landscape character and visual impact is provided in **Appendix G**.

Table 7-58 SEARs (urban design, landscape character and visual amenity)

Secretary's requirement	Where addressed in this EIS
7. Urban design and Landscaping	
1. The Proponent must: a. identify the urban design and landscaping aspects of the project and its components;	Urban design and landscaping are presented in **Section 7.3.4**
b. assess the impact of the project on the urban, rural and natural fabric;	The existing nature of the landscape character zones are provided in **Section 7.3.3**. Impacts on the landscape character are discussed in **Section 7.3.5**.
c. design elements of the project to be sensitive and responsive to the landscape surrounding the project, particularly the Western Sydney Parklands;	**Section 7.3.4** discusses the design elements of the project **Chapter 5** describes how the preferred route was modified to minimise impacts on Western Sydney Parklands
d. explore the use of Crime Prevention Through Environmental Design (CPTED) principles during the design development process, including natural surveillance, lighting, walkways, signage and landscape; and	CPTED principles are discussed in **Sections 7.3.2**, **7.3.4** and **7.3.8**
e. identify urban design strategies and opportunities to enhance healthy, cohesive and inclusive communities	This is discussed in **Section 7.3.4**.
2. The Proponent must: a. estimate the number of trees (not covered by a biodiversity offset strategy) to be cleared by the project; and	The number of trees to be cleared is identified in **Section 7.3.4**
b. for those trees to be cleared, describe how the project would achieve a net increase in tree canopy as part of the project's landscaping strategy.	Net increase in tree canopy is discussed in **Section 7.3.4**, with a tree management strategy identified in **Section 7.3.8**
8. Visual amenity	
1. The Proponent must assess the visual impact of the project and any ancillary infrastructure on: a. views and vistas;	Visual impacts on views and vistas are assessed in **Section 7.3.6**
b. streetscapes, key sites and buildings	Visual impacts on streetscapes, key sites and buildings are assessed in **Section 7.3.6**
c. heritage items including Aboriginal places and environmental heritage; and	Visual impacts on heritage items are assessed in **Section 7.3.6**

Secretary's requirement	Where addressed in this EIS
d. the local community.	Visual impacts on the local community are assessed in **Section 7.3.6**
2. The Proponent must provide artist impressions and perspective drawings of the project to illustrate how the project has responded to the visual impact through urban design and landscaping.	A landscaping plan and artist's impressions are presented in **Chapter 5** Artist's impressions of operational visual impacts are presented in **Section 7.3.6** Additional visualisations are presented throughout **Appendix G**

7.3.1 Policy and planning setting

The strategic planning and policy framework relevant to the project is detailed in **Section 3.1**. Additional policy documents, guidelines and standards relevant to the urban design, landscape character and visual amenity impact assessment include:

- Western Sydney Parklands Plan of Management 2030 (2018a)
- Western Sydney Parklands Southern Parklands Framework (2018b)
- Western Sydney Infrastructure Plan
- Western Sydney Airport Plan (DPE, 2016)
- Western Sydney Aerotropolis - Land Use and Infrastructure Implementation Plan Stage 1: Initial Precincts (Department of Planning and Environment, 2018)
- The Sydney Green Grid (NSW Government Architect Office, 2017)
- Five Million Trees for Greater Sydney (Department of Planning and Environment, 2018b)
- Beyond the Pavement Urban Design Policy
- Procedures and Design Principles (Roads and Maritime, 2014)
- Landscape Design guideline. Design guidelines to improve the quality, safety and cost effectiveness of green infrastructure in road corridors (Roads and Maritime, 2018b)
- Bridge Aesthetics Design guideline to improve the appearance of bridges in NSW (Roads and Maritime, 2019a)
- Noise Wall Design Guideline Design guideline to improve the appearance of noise walls in NSW (Roads and Maritime, 2016d)
- Water sensitive urban design guideline - Applying water sensitive urban design principles to NSW transport projects (Roads and Maritime, 2017b)
- Guideline for Landscape Character and Visual Impact Assessment - EIA N04 (Roads and Maritime, 2018b)
- NSW Sustainable Design Guidelines Version 4.0 (TfNSW, 2017a)
- Technical guideline for Urban Green Cover in NSW (OEH, 2015)
- Crime Prevention through Environmental Design (CPTED) (Queensland Government, 2007)
- Australian Standard AS1428.1 Design for access and mobility (Australian Standard, 2009)
- NSW Bicycle guidelines (RTA, 2008).

Further detail on the above policy documents, guidelines and standards and how they apply to the project is provided in Chapter 2 of **Appendix G**.

7.3.2 Assessment methodology

The landscape character and visual impact assessment was completed in accordance with Roads and Maritime Practice Note – Environmental Impact Assessment Practice Note: Landscape Character and Visual Assessment EIA-NO4 (Roads and Maritime, 2018d). The following sub-sections describe the approach taken to achieve an integrated urban design outcome through the assessment and mitigation of potential landscape character and visual impacts.

Approach to urban design

The urban design concept for the project was developed based on an overarching vision, design philosophy, urban design principles and objectives, to achieve an integrated project design. These are discussed further in **Section 7.3.4**.

Following review and contextual analysis of the project, the urban design concept identifies a series of proposals that were implemented and integrated with the civil engineering works. Consideration was given to the relationship between the various project elements which include: road pavements, lighting, structures, road furniture, integration of culture, art, and landscape concepts based on the developed civil concept design.

The urban design concept for the project was an iterative process, forming part of a multidisciplinary collaboration with the project team to inform the development of the preferred route and project design. As a result, several potential impacts were minimised or avoided through route option selection and design refinements (see **Chapter 4**).

The urban design concept is discussed further in **Section 7.3.4**.

Landscape character impact assessment

Landscape character refers to the overall character and function of a place. It refers to the combined quality of built, natural and cultural aspects which make up an area and provide its unique sense of place.

A number of landscape character zones (LCZ) were identified during the contextual analysis. They are generally based on the study area's surrounding land use, vegetation cover and topography. The purpose of dividing the study area into character zones is to make the assessment process easier to carry out and understand.

The impact of the project on each LCZ is based on the sensitivity of the zone, and the magnitude of the project's impact in that zone. Consideration was given to future land uses within each LCZ given the strategic context of the project within the future Western Sydney Aerotropolis and the South-west Growth Centre.

Landscape character sensitivity

Landscape character sensitivity refers to the value placed on the overall quality of a LCZ based on a number of characteristics, including those identified through contextual analysis, and in combination with the level of amenity it provides to the community. Landscape character sensitivity was rated against the inherent capability of the LCZ to absorb change as a result of the of the project.

Landscape character magnitude

Magnitude is the measurement of the scale, form and character of a development project and the degree of intrusion when compared to the existing condition. All elements of the project need to be considered. Critical issues include:

- Changes to landform
- Changes to urban structure or vegetation patterns
- The nature, density and scale of existing and proposed works.

Landscape character impact

The impact was calculated using the landscape character and visual impact grading matrix in **Table 7-59**, which provides consistent terminology for the assessment.

Table 7-59 Landscape character and visual impact grading matrix (Roads and Maritime, 2018d)

Sensitivity	Magnitude				
		High	Moderate	Low	Negligible
	High	High Impact	High-Moderate	Moderate	Negligible
	Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
	Low	Moderate	Moderate-Low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Visual impact assessment

Visual impact is the measure of the potential change that new interventions would have on the existing visual environment. Visual impact depends on the following:

- The visual catchment area, or the extent of visibility of the proposed changes
- Visual sensitivity, or the quality of the view and how sensitive it is to the proposed change, related to the direction and composition of the view
- Magnitude, or the nature of the project and its proximity to the view.

The process carried out in this visual impact assessment included the following steps:

- Define an estimated visual catchment
- Ground truth the estimated catchment
- Illustrate the visual catchment in the form of a Visual Envelope Map (VEM)
- Establish viewpoint locations and assess for visual sensitivity to change
- Assess likely impacts at viewpoint locations
- Finalise catchment and visual impacts.

Visual envelope map

The VEM illustrates the visual catchment of the project. The VEM defines areas from which the project can be viewed from a 1.5-metre vantage point which is the typical height of a person at eye level. Areas that are cloaked in dense vegetation, with tree canopies higher than 1.5 metres are generally excluded from the visual catchment area.

The visual catchment was initially determined through desktop analysis using GIS mapping data to review topography and ascertain the theoretical extent from which landform would allow views to the project. Further plan analysis was carried out to ascertain the influence of vegetation, land use and distance to the raw GIS/landform data.

Mapping was then validated via ground truthing to check the extent to which vegetation, land use and distance restrict views to the project. Ground truthing was limited to the extent that some private lands located within the nominated visual catchment area were not able to be accessed. This is a typical limitation of visual analysis, particularly in rural areas where large tracts of land were inaccessible.

The VEM formed the basis for the selection of viewpoint locations. Each viewpoint was then assessed for potential visual impacts based on visual sensitivity and the magnitude of change.

Sensitivity

Visual sensitivity refers the quality of the existing view and how sensitive the view is to the proposed change. Visual sensitivity is related to the direction of view and the composition of the view and may cross more than one landscape character zone.

Magnitude

Magnitude refers to the form (scale, size and character) of the project and its proximity to the viewer. For the purposes of this assessment, magnitude also considered the frequency and duration of the view, and distance at which it is viewed.

This method of better articulating magnitude (which is a departure from the Environmental Impact Assessment Practice Note guideline), considers frequency and duration as follows:

- Frequency – the number of people who might view the project, as follows:
  - Low frequency – Residences where there are few inhabitants and visitors to private properties
  - Medium frequency – Roads, public spaces or parks that have average usage by the general public
  - High frequency – Public spaces and thoroughfares that have high usage
- Duration – the length of the time people would have to view the project, as follows:
  - Short duration – Views from naturally vegetated (forest or woodland) areas or industrial areas that are partially obscured by topography, vegetation or structures
  - Moderate duration – Local views where the duration of the view is short to moderate, and many of the views are by frequent users of the road
  - Long duration – Views are from residential and public recreation areas where people would be exposed to the views for a longer amount of time
- Distance – The greater the distance of the project from the viewpoint, the less detail is observable and the more difficult it is to distinguish changes from their background, which in turn diminishes visual impact. Distance zones were determined around the project within the visual catchment area based on an observer eye height of 1.5 metres above ground level, as follows:
  - Foreground zone – Areas within 0 metres to 250 metres of the viewer. Within this range the observer easily discerns landscape details such as shape, colour and contrast. Viewpoints that fall within the foreground zone are considered to be in the zone of highest visual impact.
  - Middle ground zone – Areas between 250 metres to 1000 metres. Within this range, vegetation textures and land use patterns are visible to the observer. Changes to views in the middle ground are considered important, but less important than in the foreground. This is because the subject site is further from the viewer and would therefore occupy a lower proportion of the total view from the identified viewer location.
  - Distant zone – Areas greater than one kilometre from the project. Within this range, textures and patterns are indistinct to the observer. The viewer is unaware of individual details and discerns broader landscape units as patterns of light and dark. Visual impact or viewer locations within the distant zone is considered of least significance, but still worthy of consideration in terms of colour, texture and pattern.

With these factors in mind, a judgement was made for the amount of change within each view, with a rating of magnitude applied in accordance with **Table 7-59**.

The results of the visual impact assessment are provided in **Section 7.3.5**.

Study area

The urban design, landscape character and visual impact assessment focused on the area directly affected by the project and any additional areas likely to be indirectly affected. The study area comprised the operational footprint and a one-kilometre buffer.

For the purpose of this report, the study area is broadly defined as a one kilometre radius from the operational footprint of the project. The project operational footprint comprises about 285 hectares of mostly rural land lying north of Elizabeth Drive between the M7 Motorway and The Northern Road. It includes the connection to the future Western Sydney Airport.

The study area is considered to be equally broad for the urban design concept and landscape character and visual impact assessment in this report.

7.3.3 Existing environment

This section includes a description of the existing environment and was informed by the desktop investigations and ground truthing carried out for the project.

The project lies within the broader landscape region commonly referred to as the Cumberland Plains of south-western Sydney. It runs from the M7 Motorway at Cecil Hills in the east to The Northern Road at Luddenham and transverses five major creeks and two major rural roads (Luddenham Road and Elizabeth Drive).

Key landscape characteristics, land uses, and conditions of the existing environment are provided in **Figure 7-34**.

Landscape characteristics that were considered as part of the urban design, landscape character and visual impact assessment include:

- Soil landscapes (see **Section 8.1**)
- Topography (see **Section 8.1**)
- Hydrology and flooding (see **Section 7.8** to **Section 7.10)**
- Native vegetation (see **Section 7.1**)
- Existing land use and potential or known future land use (see **Section 7.4**)
- Aboriginal cultural heritage (see **Section 7.5**)
- Non-Aboriginal heritage (see **Section 7.6**).

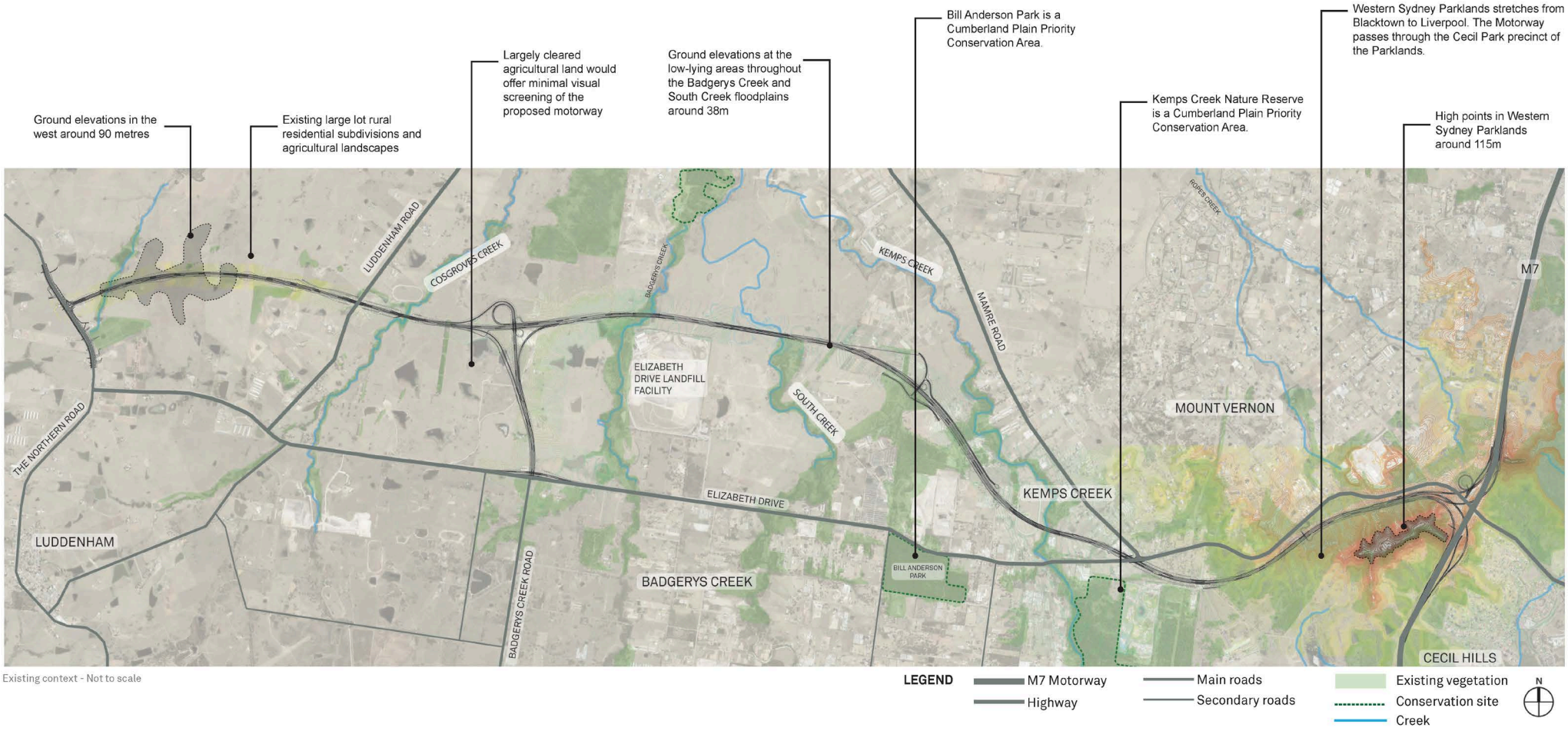


Figure 7-34 Existing landscape characteristics, land uses and conditions

7.3.4Urban design

This section includes a description of the urban design concept for the project including an overarching vision, design philosophy and urban design objectives and principles. The urban design objectives and principles are introduced in **Section 7.9**.

Vision

The urban design concept for the project was developed based on the overarching vision of 'connection to Country', which seeks to create a distinctly unique and memorable piece of infrastructure that establishes the gateway to western Sydney. It is a vision that brings both Aboriginal and non-Aboriginal heritage to the fore, as a means of engaging local communities to create a meaningful and enduring legacy for the Western Parkland City that is embedded within the built fabric of the motorway.

Design philosophy

The project is a rare opportunity to provide a well vegetated motorway that is integrated into both the natural landscape systems and the inherent cultural and historical values of the country. The design team would aim to draw on the project vision of a 'connection to Country' as a methodology for an integrated landscape solution which reflects the complex layers of the regional landscape.

Strategic urban design objectives

These urban design objectives form the basis for an integrated design solution, guiding the resolution of the urban design concept and detailing of project elements. The urban design objectives applied for the project were built upon the work established in the M12 Motorway: Strategic Urban Design Concept (Roads and Maritime/Aurecon, 2016a). The urban design objectives are to:

- Create a unique and distinct identity interpreting the rich sense of place, Aboriginal and cultural heritage and 'connection to Country'
- Utilise structures, bridges and earthworks as expressions of identity, place, values and sustainability
- Provide connectivity and access along and across the study area
- Accentuate natural patterns through revegetation and express the new through contrasting landmark plantings
- Create an enjoyable experience with diverse and distinctive views and sense of journey and arrival
- Design a simple, cohesive and sustainable motorway that offers a flexible and diverse choice of transport modes
- Engage with the community and stakeholders.

Urban design principles

To help the project ensure these objectives are realised, a number of principles and objectives were developed to help guide the decision-making process, provide a platform for engaging with stakeholders, and inform the physical designs proposed. The urban design principles and objectives are split into the following main themes:

- 'Connection to Country', which consists of the following elements:
  - Description of principles
  - Objectives of approach
  - Methodology
  - Design outcomes taken forward into concept design

- Positively influence the structure of the Western Parkland City
- Create a project identity
- Create an active study area and enhance user experience
- Re-establish natural systems.

These are discussed further in the following sections.

Connection to Country

As discussed above, the project vision of ‘connection to Country’ would seek to embed key interpretive themes into the project through the use of integrated art and approaches to plant selection. The Aboriginal cultural interpretative design was informed by an inclusive consultation process with representatives and community members who originate from or live and work in the Aboriginal community, to provide the western Sydney Aboriginal community an opportunity to provide their local story and input.

The following are the main themes that would provide a basis for the design integrations related to a connection to Country:

- Reflecting place – The design responds to the characteristics of Western Sydney as a locale and the biodiversity of the Cumberland Plain. The project is mindful of connection to Country and Aboriginal perspectives on the native landscape. The design reflects on the six-season calendar of the Dharawal people (and similarly for the Darug people) and consideration was given to colour and form used in planting throughout the project footprint.
- Sourcing locally – The design would bring balance to the natural environment by sourcing seed from the region to vegetate the project footprint and propagate local, native and suitable plant life
- Cultural interpretation – Balarinji (an Aboriginal-owned agency) was engaged to manage the Aboriginal cultural interpretation process that informed the project design as set out in this document to create a unique and distinct identity interpreting a rich sense of place, that embraces Aboriginal and cultural heritage across the project.
- Non-Aboriginal heritage – The project design reinforces the identity of the Fleurs Telescope and WWII Aerodrome sites as new tree plantings would align with the runways and maintain key view and vistas. The project presents opportunities to provide a design that takes into consideration and responds sensitively to the existing heritage items. This could include the retention of key views and vistas to individual items reinforced by ordered tree plantings.

Positively influence the structure of the Western Parkland City

Over the coming decades the region of south-western Sydney will experience transformational change in land use from what is mostly a rural and semi-rural landscape towards a 24-hour economy centred around the future Western Sydney Aerotropolis. The design team considered how the project would interact and engage with present and future land uses. Key relationships and strategic drivers that underpin the urban design approach for the project are provided in **Table 7-60**.

Table 7-60 Summary of key landscape considerations underpinning urban design

Landscape considerations	
Topographical variation	Changes in topographical elevations of up to 60 metres define the rolling hills and flats of the valley that are bound to the ridge lines at either end of the project footprint.

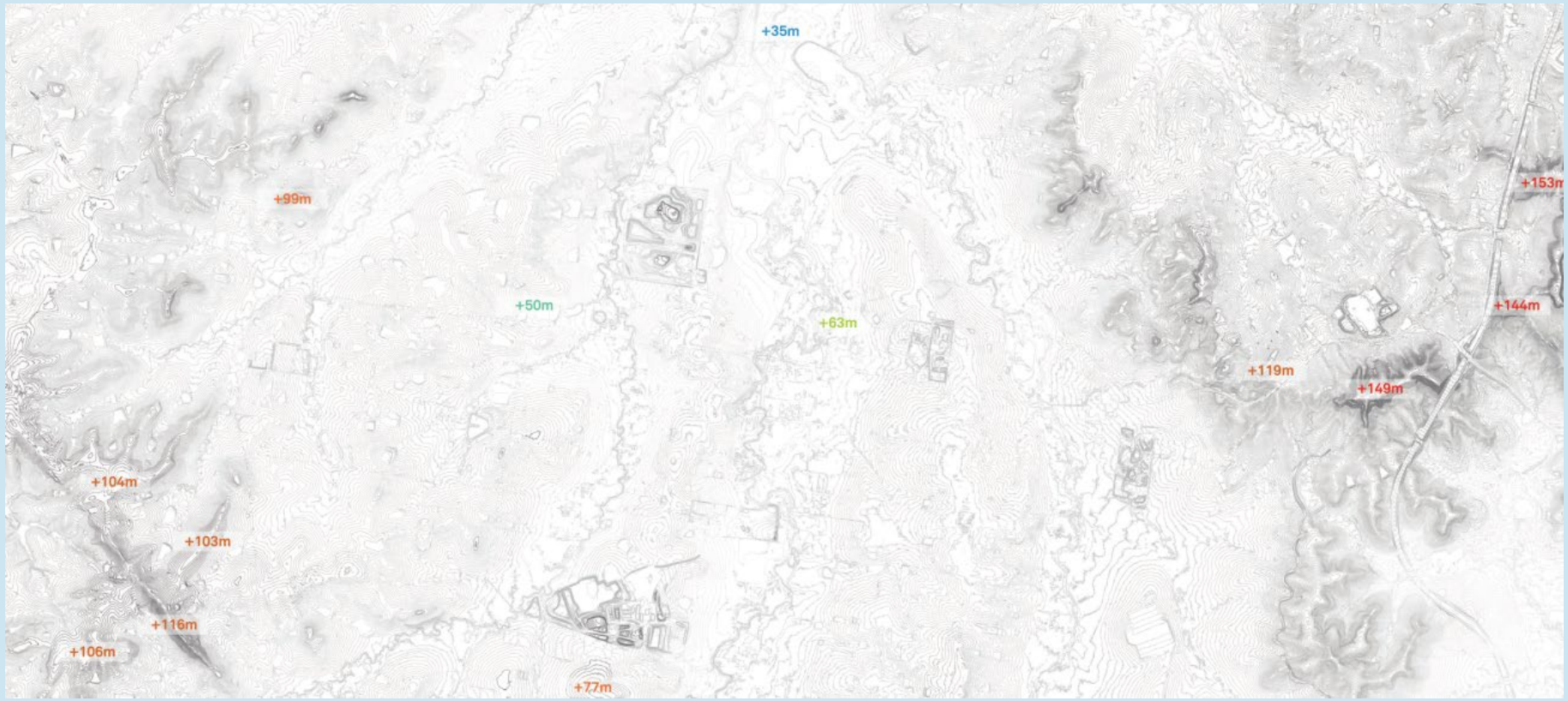


Figure 7-35 Topographical considerations

Landscape considerations	
Creek corridors and flooding regime	The landscape is prone to inundation and flooding across the project, with significant floodplain extents.

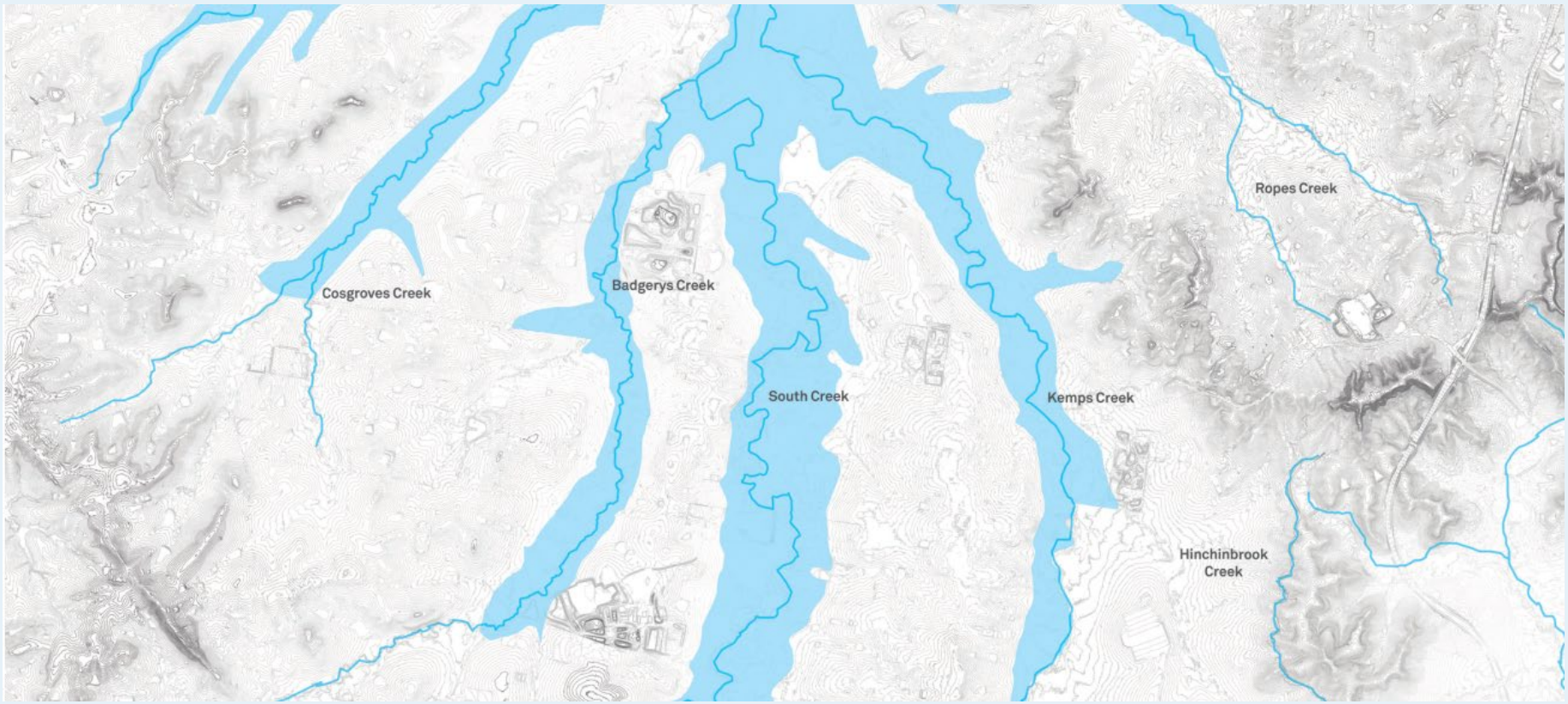


Figure 7-36 Creek corridors and flooding regime

Landscape considerations	
Existing significant parklands	Existing canopy across the study area is generally fragmented, degraded and focused around creek lines, which are not publicly accessible. Existing open space is generally focused around Western Sydney Parklands and nearby nature reserves that consolidate remnant pockets of Cumberland Plain Woodland.

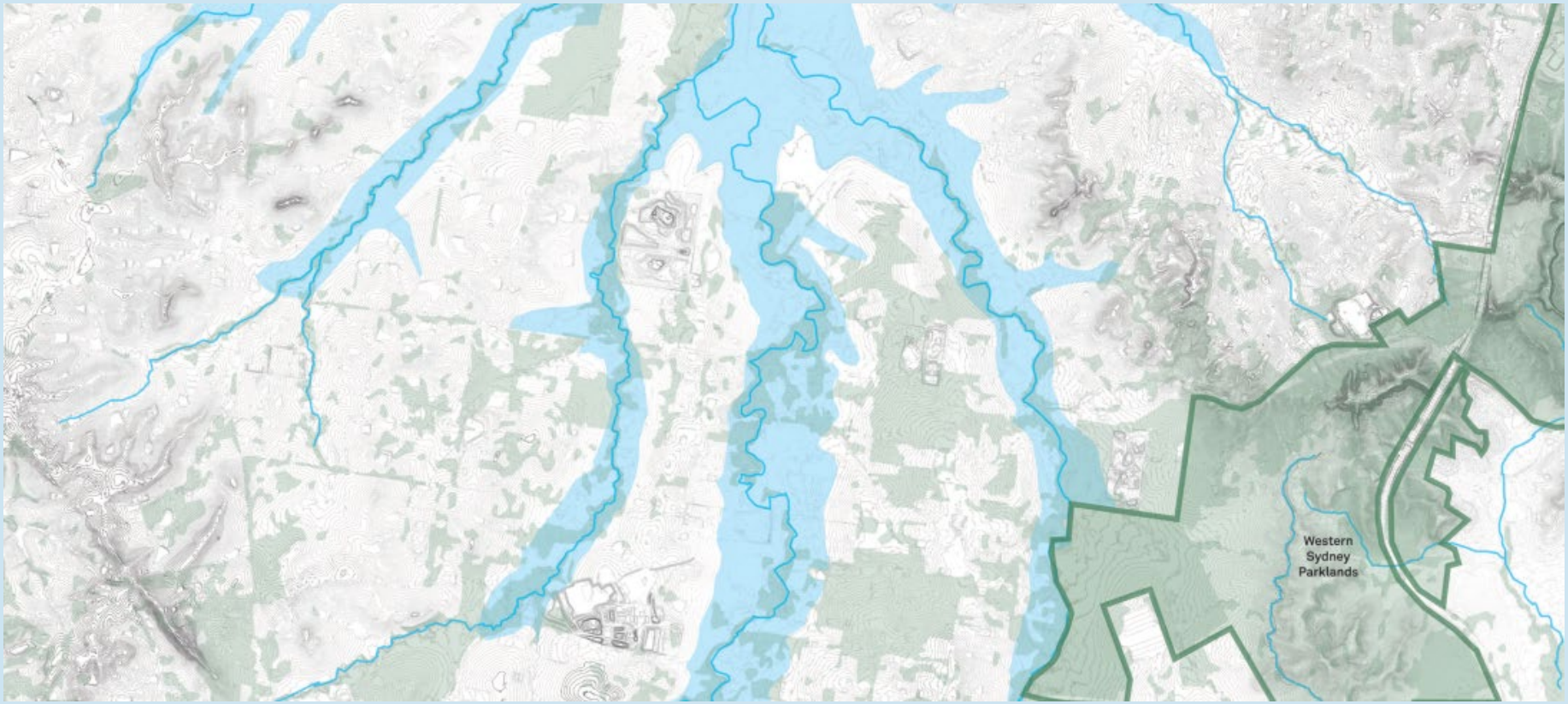


Figure 7-37 Existing significant parklands

Landscape considerations	
Development patterns	As natural barriers, creek lines and floodplains have defined settlement patterns, land use, lot size and road networks. Only Elizabeth Drive traverses the study area, providing a connection from the M7 Motorway to The Northern Road.

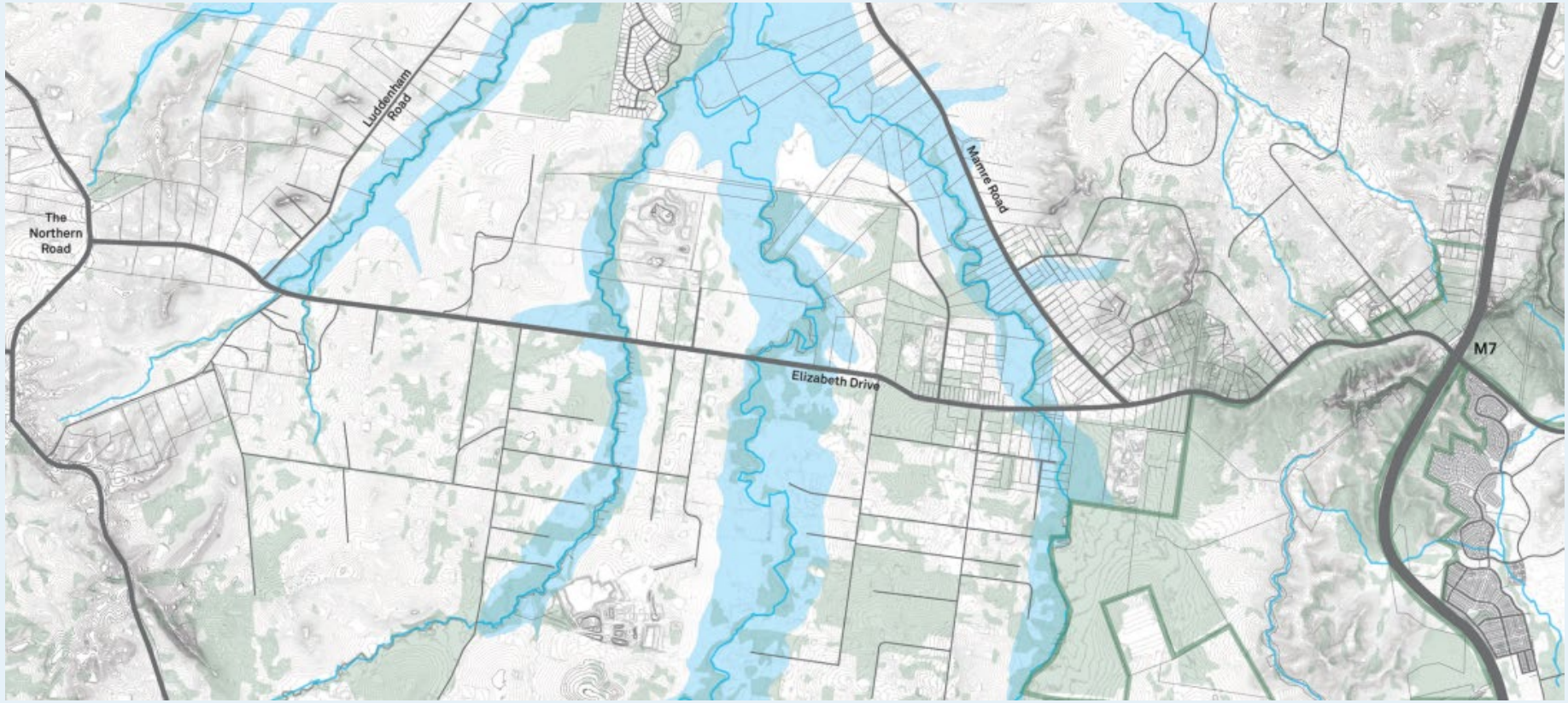


Figure 7-38 Development patterns

Landscape considerations	
Western Sydney Airport	The airport (shown below in an ultimate state) would act as a catalyst for development of the Western Sydney Aerotropolis which would transform the land use and identity of the overall study area.

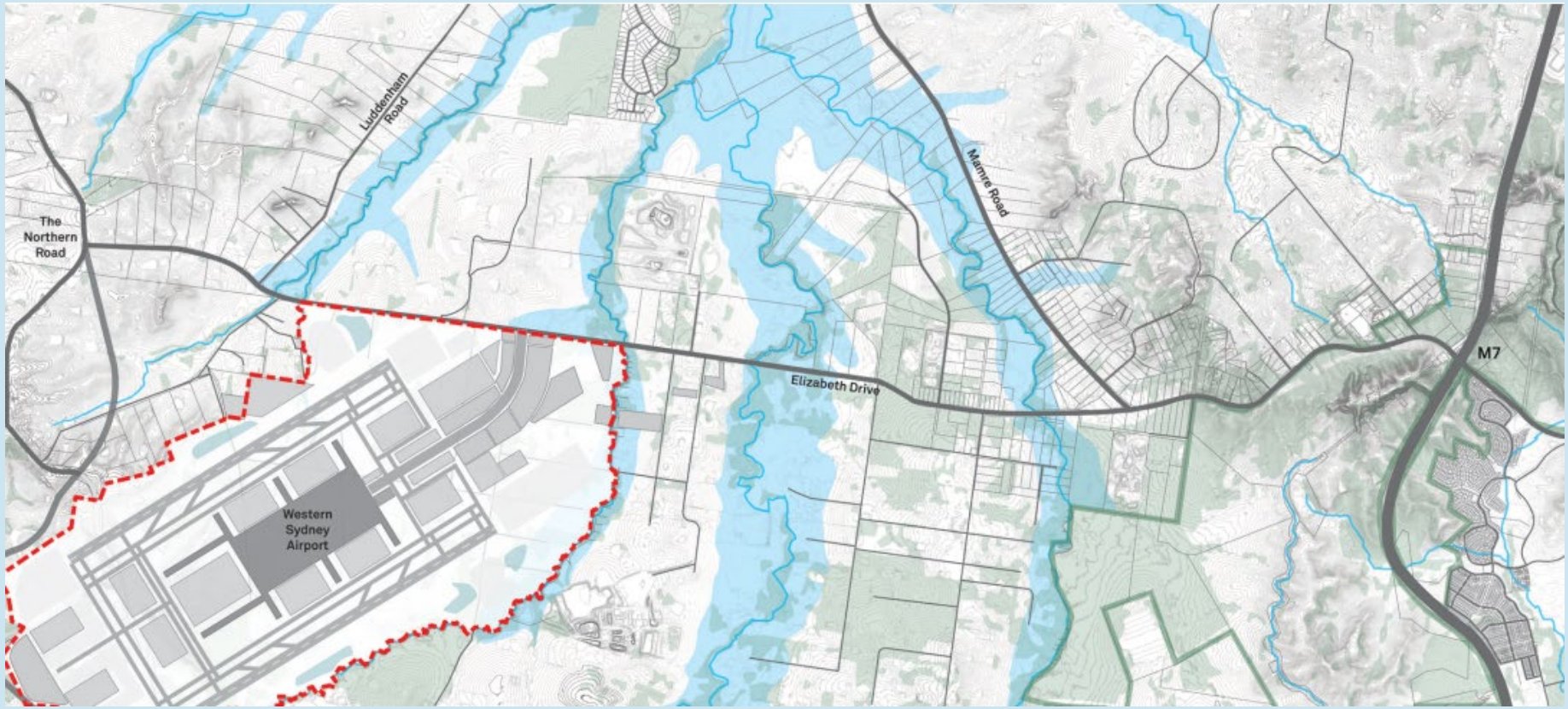


Figure 7-39 Western Sydney Airport

Landscape considerations	
Primary vehicular connection	The project would provide the primary vehicular connection to the Western Sydney Airport and improve east–west connections for the area between the two north–south arterial roads in the M7 Motorway to The Northern Road.

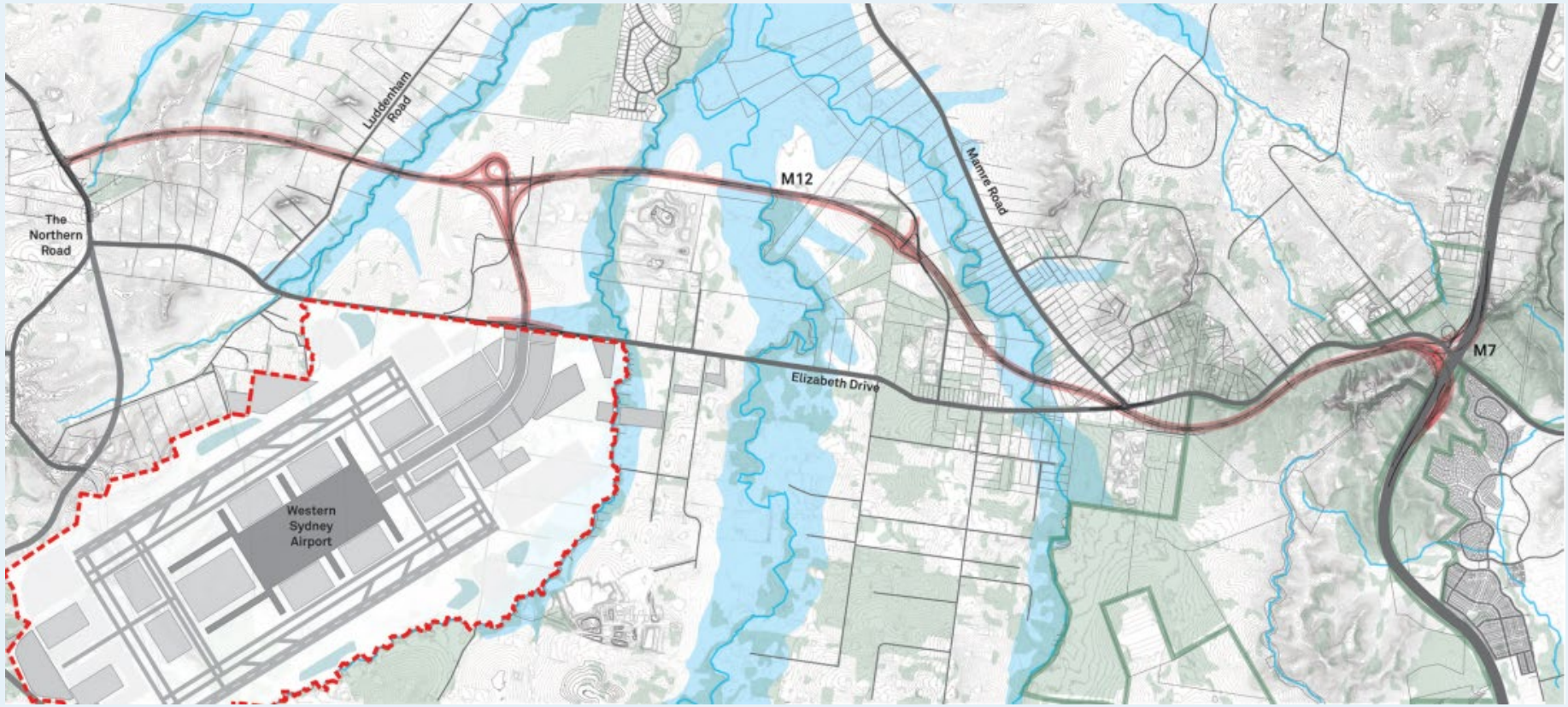


Figure 7-40 Primary vehicular connection

Landscape considerations	
Sydney Metro Greater West	The Sydney Metro Greater West would traverse the project as it connects the airport to Western Sydney, providing for a passenger rail connection between the Main West Line near St Marys and the Main South Line near Macarthur.

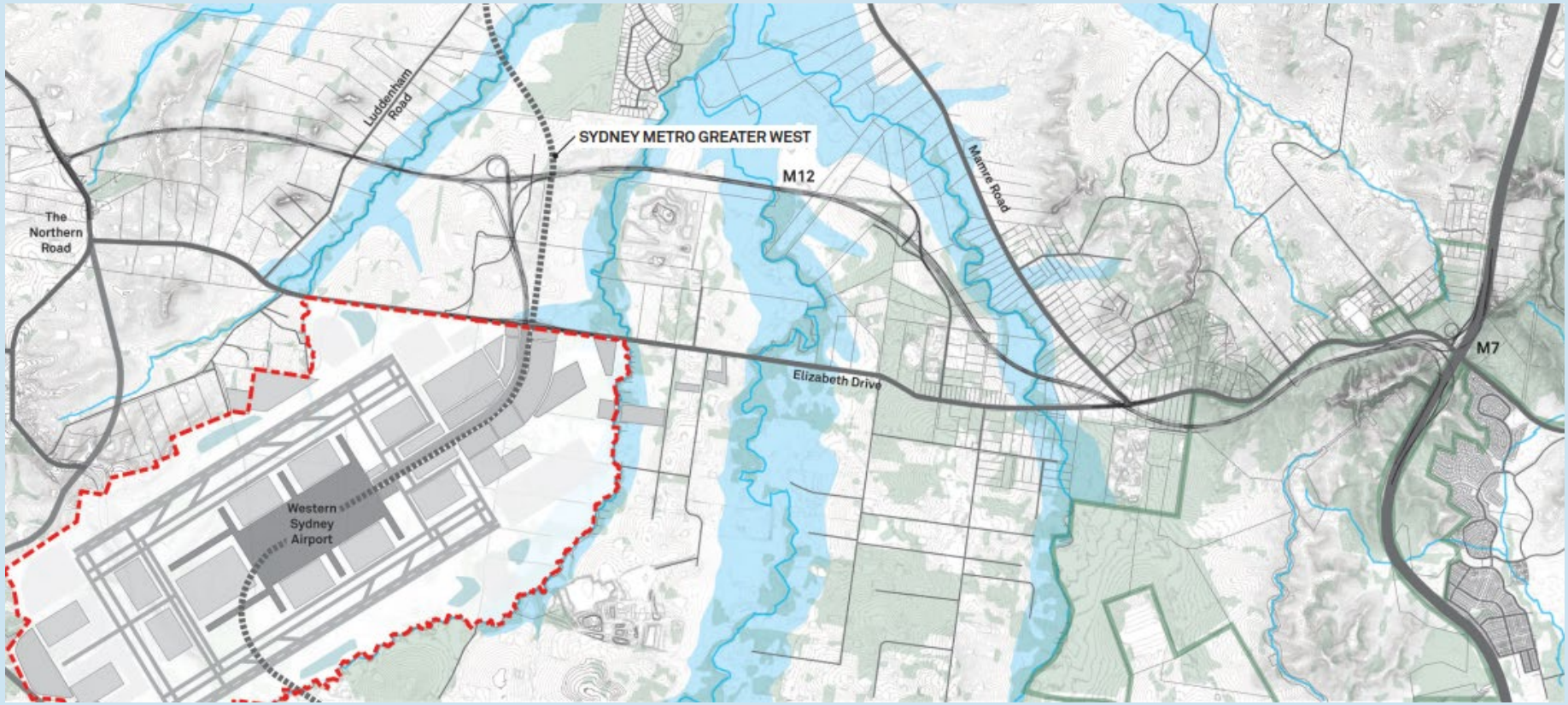


Figure 7-41 Sydney Metro Greater West

Landscape considerations	
Western Sydney Aerotropolis	The LUIIP identifies the re-zoning of rural lands surrounding the proposed airport to mostly ‘flexible employment’. The four main creek corridors are preserved as ‘non-urban land’.

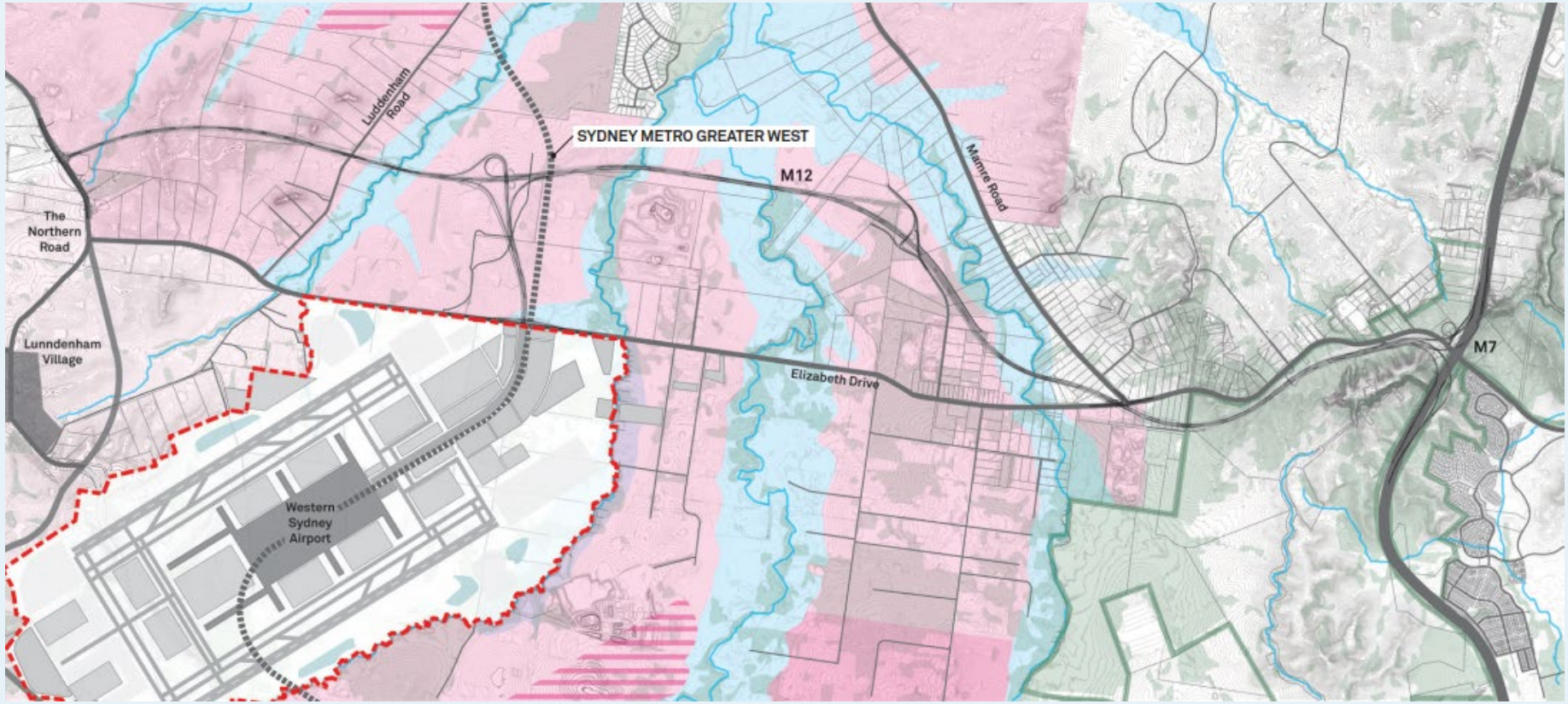


Figure 7-42 Western Sydney Aerotropolis

Landscape considerations	
North south riparian parklands	With flood zones designated as non-urban land in the LUIIP, the project would create an east–west connection across these riparian areas that provides opportunity to restore and connect fragmented riparian corridors in the future and improve public connections to Western Sydney Parklands.

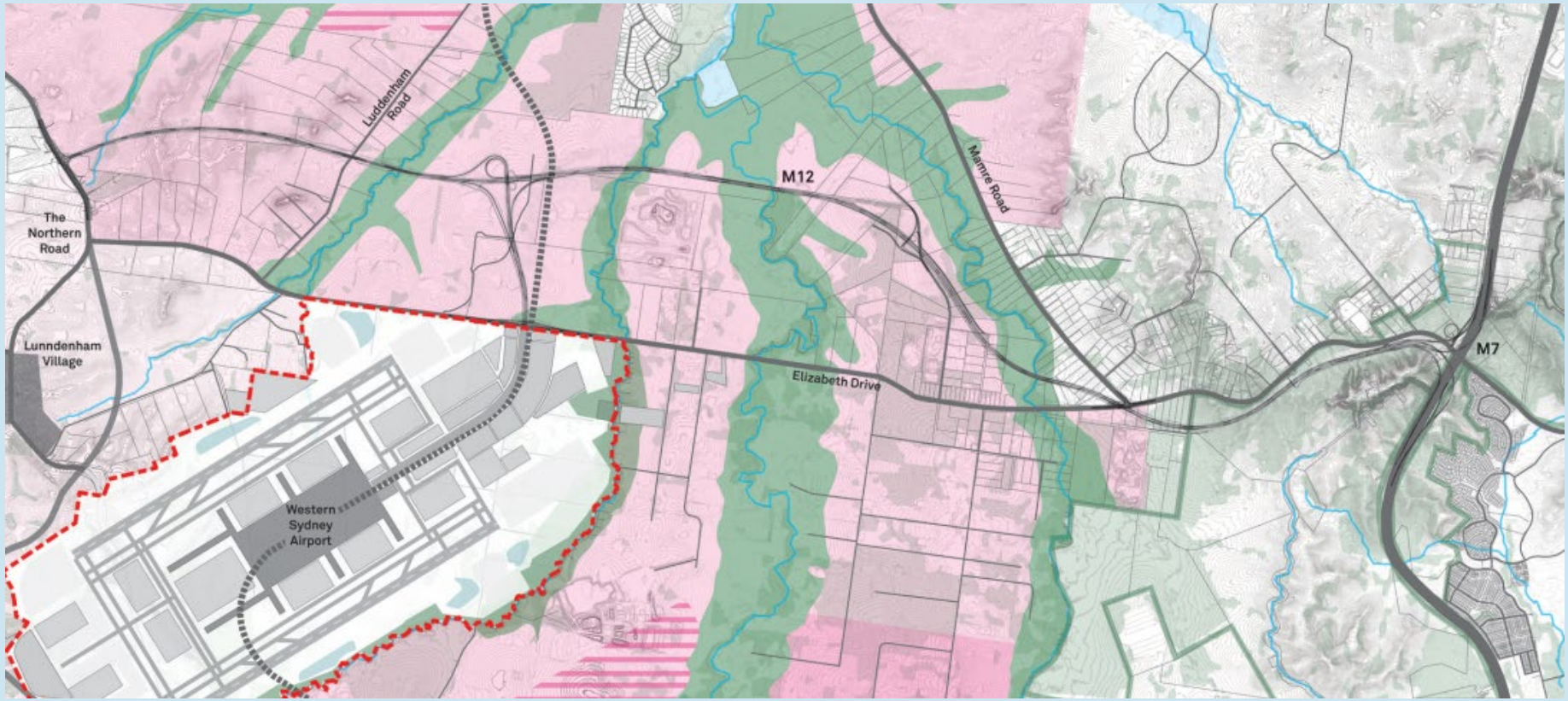


Figure 7-43 North south riparian parklands

Landscape considerations	
Shared pedestrian and cycle connections	The project would enable increased access to the extensive riparian corridors and future open space by providing new pedestrian and cyclist connections, with possibilities to provide access to creeks within the project footprint in the future.

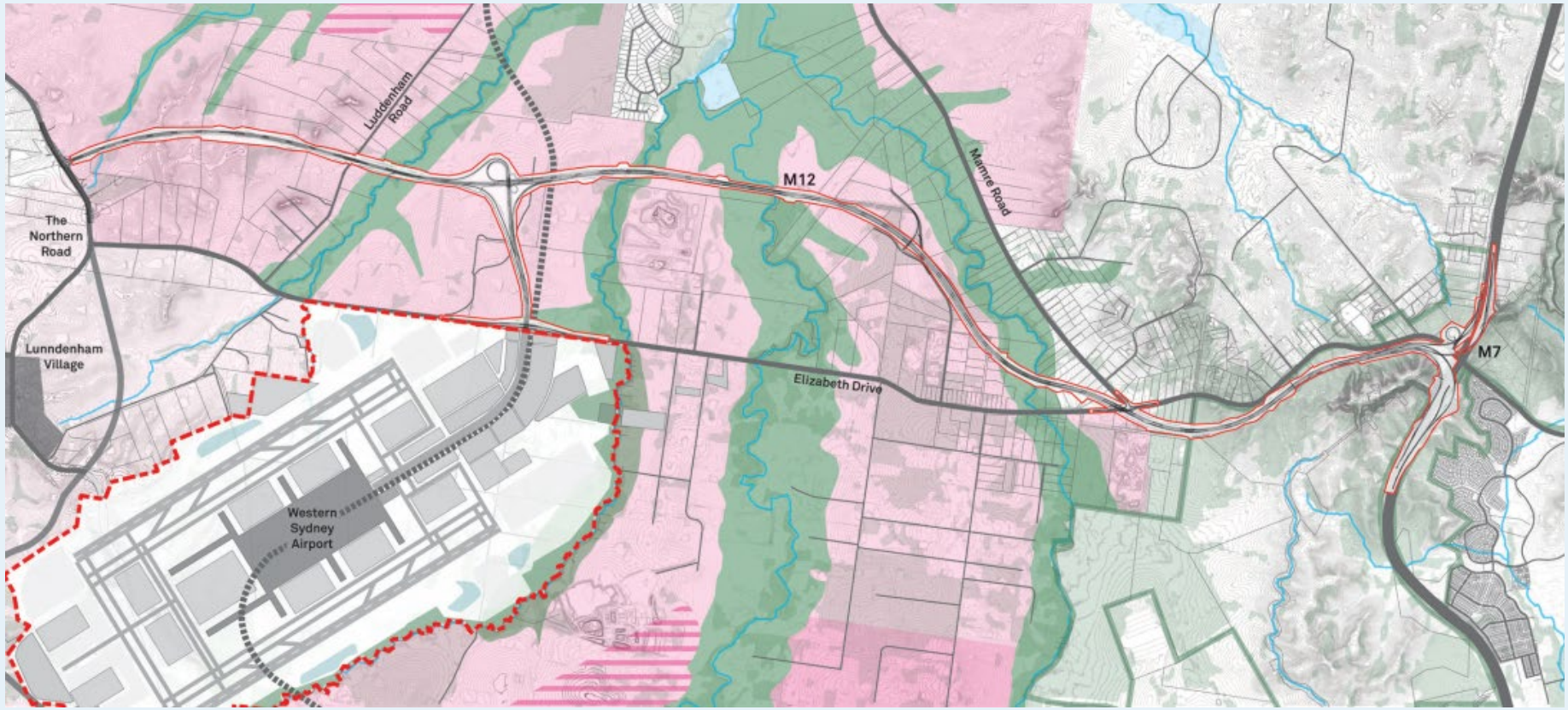


Figure 7-44 Shared pedestrian and cycle connections

Landscape considerations	
Cumberland Plain Woodland restoration	With riparian corridors becoming connectors to potential future open space, the project can revegetate and restore degraded landscape areas using Cumberland Plain Woodlands species to provide and reinforce a landscape identity for the study area.

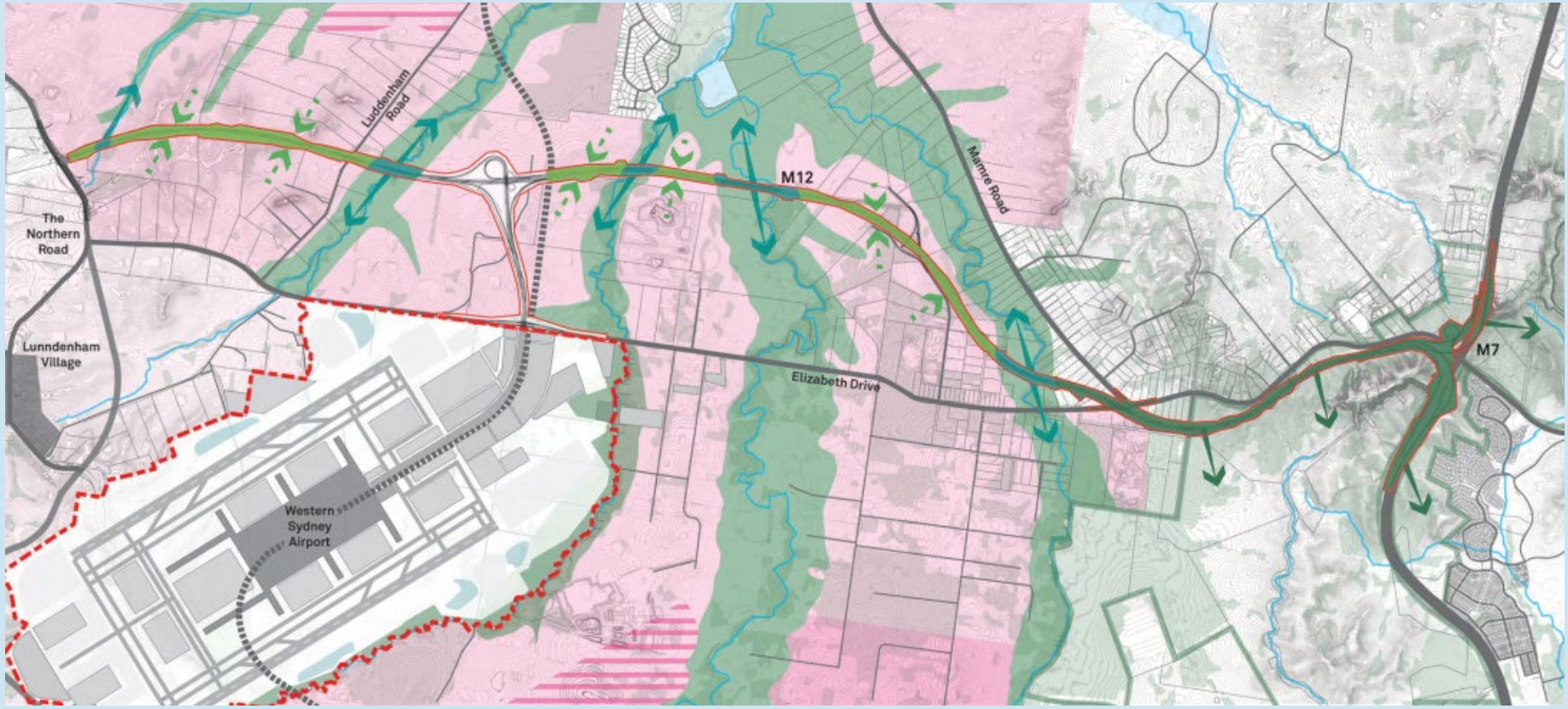


Figure 7-45 Cumberland Plain Woodland restoration

Landscape considerations	
Gateway to the Airport and Western Sydney	In response to the Western Sydney Airport, the landscape and urban design approach seeks to create a visual marker that amplifies the sense of arrival and departure to western Sydney.

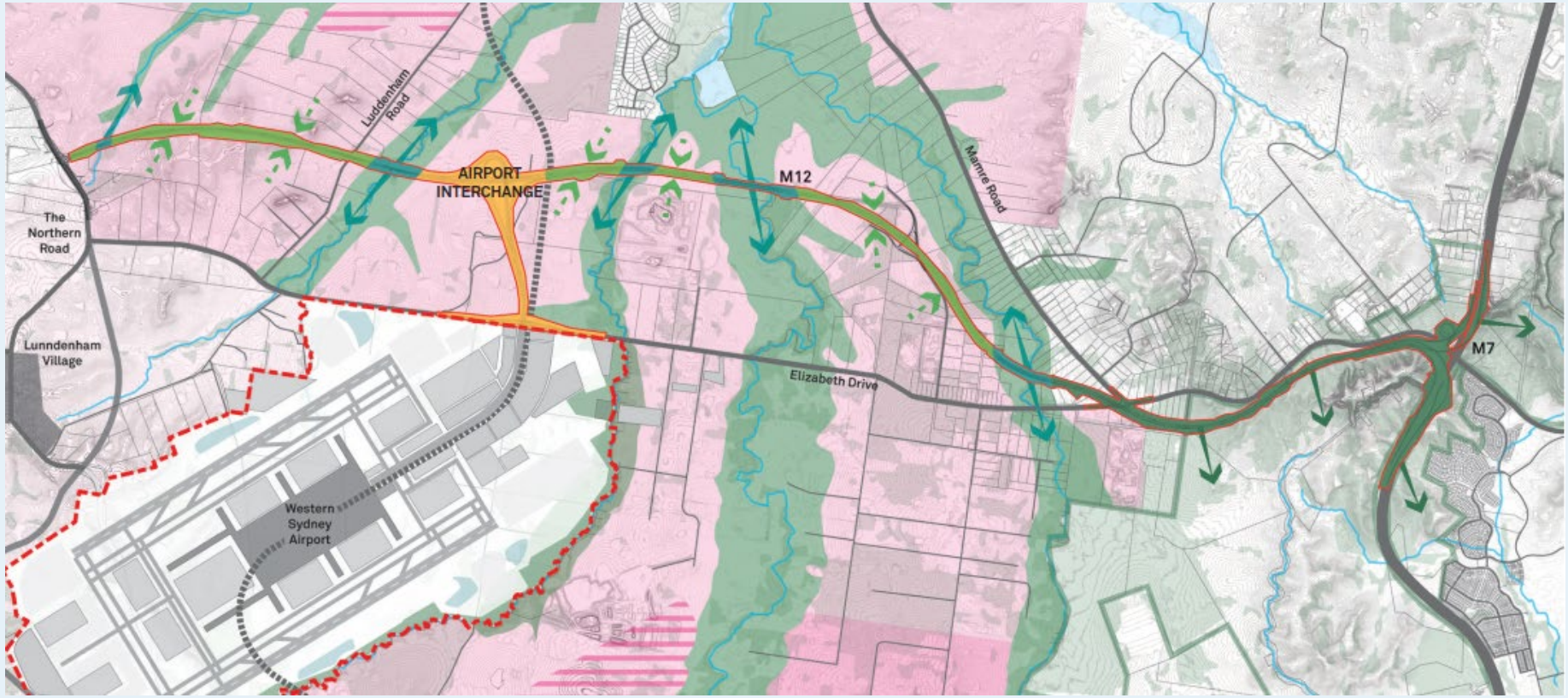


Figure 7-46 Gateway to the Western Sydney Airport and western Sydney

Landscape considerations	
Airport interchange	With consideration of future infrastructure projects such as the Outer Sydney Orbital and the Sydney Metro Greater West, the landscape and urban design approach at the Western Sydney Airport Interchange must be resilient and scalable so it can be extended easily to adjacent projects when they are operational.

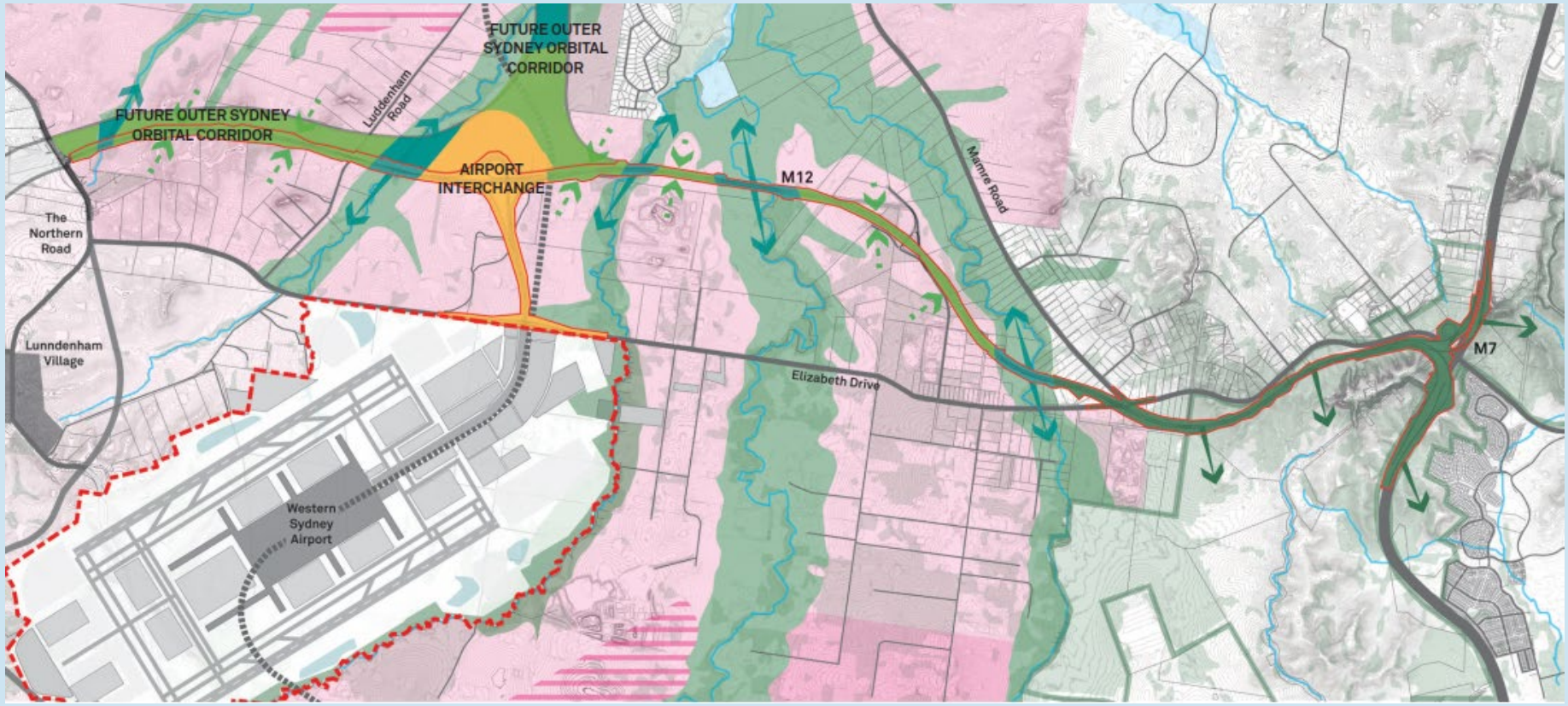


Figure 7-47 Western Sydney Airport interchange

Landscape considerations	
Urban design and landscape	The project would facilitate an urban design and landscape initiative that would be the cornerstone of the future Western Sydney Aerotropolis.

Figure 7-48 Urban design and landscape concept

Create a project identity

A project-wide approach was taken to all design elements to demonstrate a coherent urban design concept for the project. Overall strategies and approach to key elements aim to achieve a memorable motorway identity including the creation of gateways, integrating infrastructure with art, and the creation of naturalistic landforms to provide identity. The project draws on natural features to inform materials and create a material palette based on the earthy tones and natural materials characterised in the study area. Further details are provided in **Appendix G**.

Create an active study area and enhance user experience

The project would deliver a dedicated shared user path along the length of the M12 Motorway west of Western Sydney Parklands, an opportunity to enhance healthy communities. The shared user path would act as a connection for cyclists and pedestrians, stitching together the future parklands that would follow the creek lines. The route would connect future communities and become a commuter, recreation and leisure resource. The urban design considers the use of rest stops, activity nodes, opportunities to enhance user experience, shared user path users, motorists, airline passengers and residents or visitors. If the project determines that rest stops, and activity nodes are not reasonable and feasible, there would be a baseline level of amenity incorporated into the share path route.

User groups would experience the project at contrasting speeds and perspectives. As speed increases, the level of detail that users perceive decreases. The project offers the opportunity for elements along the study area to take advantage of this change in perception and enhance the user experience. Further details are provided in **Appendix G**.

Re-establish natural systems

Extensive vegetation clearing and intensive farming practices have led to the gradual decline in native vegetation and the degradation of waterways. The project has employed the following ecologically based strategies to re-establish a resilient natural environment:

- Species selection – where possible, the use of Cumberland Plain Woodlands and local native species grown from locally sourced seed would be prioritised. Consideration would be given to ensure landscape works are compatible with the relevant guidelines of the *National Airport Safeguarding Framework* with regards to bird strike.
- Water quality – the project incorporates a number of new water quality measures including vegetated swales and water quality control basins and riparian vegetation to help filter water captured along the project before it moves into water courses
- Riparian fingers – the project would act to sustain the catchment of the Hawkesbury River by cleansing and recycling runoff. Natural creek lines would be preserved and improved, with new ribbons of habitat and access
- Green grid – the project would create a motorway and shared user path network that connects existing services and provides for future strategic, district and local centres, public transport hubs, and residential areas.
- Landscape typologies – the project would pass through multiple vegetation communities that form part of the Cumberland Plain Woodlands. This has informed plant selection. The general structure and characters of the proposed vegetation can be categorised into open woodlands, native grasslands, riparian forest, stand of trees, and gateway landscape.

Structural elements

Throughout the project, the structural elements would be a factor which reinforces the projects identity and perceived quality for road users, adjacent residential properties, pedestrians and cyclists. The design of all structures was carried out in consideration of all other elements such as topography, landscape works, local land use and provides a cohesive and unified design outcome, particularly in relation to:

- Earthworks design – including shared user path alignment, experiential pedestrian and cycle journey and excess fill opportunities; the project would address the need for the design of the road and its earthworks to respond sensitively to landform and natural topography
- Landscape design – including at a macro scale, micro scale, with focus on a net increase in trees; the general approach to landscape design across the project is to maximises green volume, preserve important view corridors and create meaningful landscape interventions whenever space permits
- Net increase in trees – by drawing upon existing vegetation patterns and characteristics of vegetation communities to implement new plantings as part of the landscape design and project works, providing tree canopy where space permits within the project boundary
- Landscape typologies – including open grasslands, grassy woodlands, riparian/river flat forests, shrubby woodlands and forest, and gateway landscape; the approach to the provision of vegetation along the project has sought to draw upon existing vegetation patterns and characteristics of vegetation communities that belong to the broader group of the Cumberland Plain Woodlands
- Water quality control ponds – with a focus on shape and revegetation; the objective is to create water quality control basins that are an asset to the visual and ecological amenity
- Road furniture – which would be designed as a suite of architectural elements that are integrated, visually simple and refined
- Fencing, safety handrails and anti-throw screens – designed to minimise the impact on views across the carriageway
- Headlight screen and noise barriers – which are integrated with the ‘connection to Country’
- Retaining walls – which are simple and refined without unnecessary embellishment or decorations
- Crime Prevention Through Environmental Design (CPTED) – principles and project considerations including:
  - Maximising natural surveillance and sightlines for shared user path users and pedestrians under/over bridges and near bridge abutments
  - Preventing access to operational areas through fencing and built edges
  - Providing lighting along all paths (see principles for lighting)
  - Designing clear, predictable routes to avoid entrapment locations supported by wayfinding and signage
- Bridge design – including a focus on unobtrusive appearance, coordinated design of bridges, transparency and integrated art
- Bridge typologies – including a focus on urban design appearance, importance, engineering function, and visibility to the general public and road use. The design of bridges would not preclude accessibility to the creek lines for active transport and potential future north/south pedestrian connectivity.

Further information relating to the key structural elements discussed above are provided in **Chapter 5** and **Appendix G**.

Urban design concept

The urban design concept comprises the following elements:

- Urban and landscape design concept plans highlighting the main project elements and urban design outcomes and opportunities (see **Appendix G** for landscape treatments)
- Typical cross sections illustrating the alignment on fill embankment and in cutting (see **Figure 5-3** and **Figure 5-4**)
- A series of alignment cross sections illustrating the specific indicative treatments, including interfaces with adjoining areas.

The above elements are discussed in **Chapter 5**.

Strategies incorporated into the project design

As a result of the collaborative design process, a number of design features have already been incorporated into the project design to mitigate impacts on landscape character and visual amenity mitigation strategies incorporated into the design. These are provided in **Table 7-61**.

Table 7-61 Mitigation strategies incorporated into the project design

Mitigation strategy	Description
Re-alignment of the M12 Motorway through the Western Sydney Parklands	A series of alignment options through Western Sydney Parklands were considered which resulted in the re-alignment of the project further north. This led to: • Consolidation of impacts and reduction of fragmented areas of Western Sydney Parklands • Avoidance of potential impacts on the Sydney Water Canal (heritage item) and utilities
Bridges and structures (including retaining walls)	• Bridges were designed to span across riparian corridors extending to the 1:100 flood zone, minimising impact on creek lines and existing remnant vegetation • A simple, consistent palette of materials and bridge types was considered to ensure that the form of the structures are robust and of high architectural merit and quality, avoiding visual clutter • Retaining walls were considered with visually recessive finishes and colours, allowing the broader landscape character to remain the visual dominant element
Revegetation	• Landscape restoration promoting the use of local native species belonging to the EEC Cumberland Plain Woodland to offset loss to existing vegetation • Identification of potential unsightly views, such as the SUEZ Resource Recovery Park, with screening vegetation proposed to minimise visual impact • Screening has also been maximised in front of rural residences within close proximity of the alignment particularly along Salisbury Avenue and the southern portion of Mamre Road
Integration of Aboriginal and non-Aboriginal heritage	• Integration of Aboriginal heritage through creating a unique motorway identity and ‘connection to Country’ and ‘inter-connectedness’ through the integration of findings and recommendations from the Aboriginal cultural heritage design process managed by Balarinji (2018a, 2018b) • Integration of Non-Aboriginal heritage interpretation through appropriate use of native vegetation, plantings and views maintained to important heritage items adjacent to the corridor

Mitigation strategy	Description
Access and connectivity	• The project would deliver a dedicated shared user path along the length of the alignment west of Western Sydney Parklands • Where possible, paths were separated from road pavements to provide improved experience for users and moved to north or south of the alignment to best interact with proposed land use • LED path lighting was considered to minimise safety concerns • Initiatives to facilitate connections to creeks by provisioning for pedestrian and cyclist access in the future • In the Western Sydney Parklands, any impacts on existing connections were reinstated • Western Sydney Parklands Trust would be delivering the relocation of the Wylde Mountain Bike Trail routes before construction. Roads and Maritime would continue to work with the Trust to achieve this
Desired future characters and changing land use	• Consideration of the high variability of the future landscape and changing land uses to create a concept that is resilient and can grow/adapt to changing edge conditions and construction of future infrastructure
Lighting	• All shared user paths delivered for the project would be lit • The project would utilise low maintenance LED fittings where possible to reduce vandalism and maintenance requirements
Net increase in trees	• About 960 trees (excluding trees subject to biodiversity offsets) would be removed within the project construction footprint • The project would implement significant new tree planting as part of the landscape design and project works, providing tree canopy where space permits within the operational footprint. This would provide a net increase in trees for the project
Interchanges and Intersections	• The urban design would utilise key interchanges with the Western Sydney Airport and the M7 Motorway to create a series of gateways and entry points to and from western Sydney
Noise barriers (if required)	• Noise barriers would be well designed and detailed with transparent walls and vegetated noise mounds taking precedence over solid walls where possible • Noise barriers would be aligned to provide space for screen planting to benefit both motorists and residences facing the walls • The design of the noise walls would include sections set back from the edge of carriageways, and provide changes of materiality and alignment where possible • Noise walls must also be integrated with the outcomes of the ‘connection to Country’ art process, with a considered palette of design elements, materials and colour • The design of barriers would have simple, uncomplicated and consistent design treatments, with smooth and gradual transitions, consistent alignments with tops generally running parallel with the road alignment, without stepping • Using noise earth mounds and landscape buffers instead of noise structure would also be considered, where reasonable and feasible

7.3.5 Landscape character impact assessment

This section describes the landscape character assessment of the project.

Landscape character zones (LCZ)

The study area was divided into eight LCZs based on areas of landscape with similar properties or strongly defined spatial qualities, distinct from areas immediately adjacent (Roads and Maritime, 2018d). A description of the existing urban, rural and natural fabric of the eight LCZs are provided in **Table 7-62** along with their sensitivity to change. The locations of each LCZ are provided in **Figure 7-49.**

Most of the study area is subject to extensive future rezoning and development as part the Western Sydney Aerotropolis – LUIIP (DPE, 2018a). This is likely to result in broad changes to existing landscape character over time as development occurs. Consequently, consideration of the strategic planning context formed a key part of the assessment of the landscape character sensitivity and impact.

Landscape character impacts during construction

The construction footprint and construction methodology details are provided in **Chapter 5**. Construction of the project would result in substantial changes to the landscape character within the study area for the duration of construction period. The following construction activities would impact the landscape character:

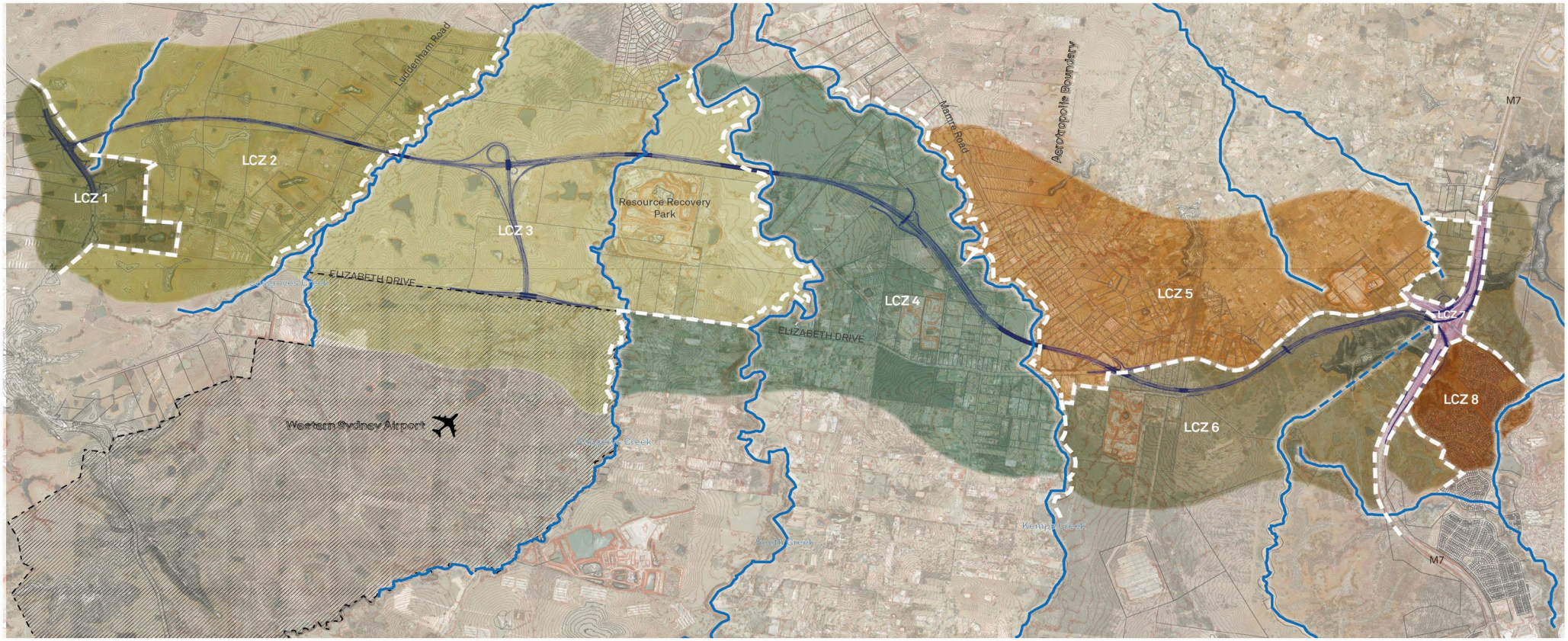
- Major earthworks and dust dispersal
- Vegetation removal
- Building removal
- Stockpiling of materials and storage
- Presence of temporary structures and noise barriers (if required)
- Hoardings
- Ancillary facilities including construction machinery, plant operations and site offices
- Increased vehicle movements and personnel in the area.

In general terms, the potential impacts would vary across the project corridor and would largely depend on the extent and combination of construction activities described above. LCZs that have a high sensitivity to change, would experience the largest reduction in landscape quality during construction. These include:

- LCZ 1 - Northern Road Ridgeline
- LCZ 2 - Luddenham Rolling Hills
- LCZ 3 - Rural Plains
- LCZ 5 - Rural Residential
- LCZ 6 - Ridgetop Woodlands

In addition, most of the ancillary facilities would be located in LCZs with a high sensitivity to change. Due to their scale, function and focus of construction activities, temporary impacts on landscape character would increase in close proximity to ancillary facilities.

When considered in the context of the broader study area and beyond, the construction works present a small portion of the overall footprint of the LCZs. Overall, general landscape character impacts during construction would be relatively low and would be temporary in nature.



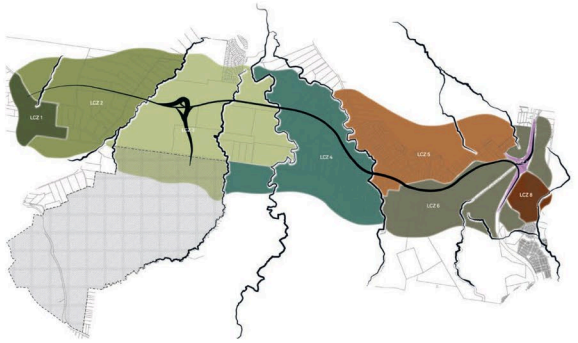
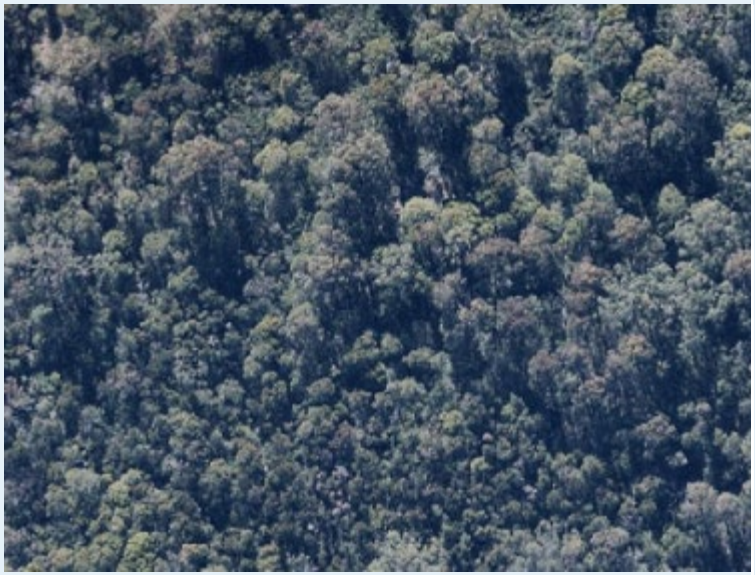


Figure 7-49 Landscape character zones (LCZs)

Table 7-62 LCZ descriptions and sensitivity to change

LCZ	Imagery	Description	Sensitivity
LCZ 1 - Northern Road Ridgeline		Rural residential lands which include commercial and primary production uses following The Northern Road. Generally, follows the dominant local ridgeline across the landscape.	**High** The rural quality is essential to its character and is sensitive to change with limited capacity to absorb any major new motorway infrastructure. The landscape sensitivity would likely decrease over time as re-zoning and development of the 'North Luddenham' and Agribusiness precincts as well as the Outer Sydney Orbital (OSO) are realised.
LCZ 2 - Luddenham Rolling Hills		Low density rural lands, maintaining a strong rural landscape character based on gently undulating hills, where native vegetation was extensively cleared and exotic species were planted along the fence line some properties.	**High** The landscape is largely experienced by local residents, visitors and travellers along Luddenham Road who would have a limited capacity to absorb any new major infrastructure. The landscape sensitivity would likely decrease over time with the rezoning and development of the Northern Gateway precinct and the Outer Sydney Orbital, which would transition the character of the area into an economic hub associated with the Western Sydney Airport.

LCZ	Imagery	Description	Sensitivity
LCZ 3 - Rural plains		Flat rural lands that are prone to flooding and have a strong landscape character. Stands of native Eucalypts and dams are dotted throughout, across generally open pastures. Two non-Aboriginal heritage sites present in this LCZ: • the McGarvie Smith Farm (local and State significance) • McMaster Farm (State significance).	**High** The broad landscape and dense creeks are essential to its character, which would have some ability to absorb any major change in its setting at distance due to the lack of publicly accessible areas in this zone. However, the presence of the McGarvie Smith and McMaster Farms in this zone increase the area's sensitivity to change due to their heritage values.
LCZ 4 - Kemps Creek		Landscape generally between South Creek and Kemps Creek, with flat, low-lying rural lands which include residential, commercial and primary production uses. There are also some education and recreation facilities. There are large areas of remnant woodland in this LCZ, providing high ecological value. Two non-Aboriginal heritage sites are located within this LCZ: • Fleurs Aerodrome (local significance) • Fleurs Radio Telescope Site (State and potentially National significance).	**Moderate** The mix of development in this LCZ has a reasonable ability to absorb major infrastructure, with areas of higher ecological value largely outside of the project footprint. However, the location of Fleurs Aerodrome and Fleurs Radio Telescope Site in this zone increases the area's sensitivity to change.

LCZ	Imagery	Description	Sensitivity
LCZ 5 - Rural Residential		Rural residential lands which include both agricultural and commercial activities that maintain a rural landscape character of the area on the undulating hills. Pockets of native vegetation are mostly confined along fence lines and creeks.	**High** This LCZ is generally a tranquil, scenic, rural-residential suburb largely experienced by local residents and visitors with a low capacity to absorb any new major infrastructure.
LCZ 6 - Ridgetop Woodlands		Established parklands and areas of remnant vegetation and open recreation spaces on elevated, undulating landforms, including the Western Sydney Parklands and the Kemps Creek Nature Reserve.	**High** The existing vegetation (both remnant and revegetated) has high ecological and habitat values. In addition, the importance of these parklands to balance the needs of a growing western Sydney would become increasingly evident as time goes on.

LCZ	Imagery	Description	Sensitivity
LCZ 7 - M7 Motorway		A combination of significant road bridges, retaining walls and underpasses at the intersection of Elizabeth Drive and the M7 Motorway, which are set within the broader Western Sydney Parklands.	**Low** The zone is a transient space, experienced by those passing through, be it motorists, cyclists and/or pedestrians. The environment is generally of poor quality as trees have struggled to establish on steep and unnatural slopes.
LCZ 8 - Cecil Hills Residential		A mostly two-storey residential housing estate with low tree canopy coverage.	**Moderate** The suburban quality and peripheral parkland are essential to the character of the area and is sensitive to change with some capacity to absorb the change.

Potential impacts would be mitigated where possible through appropriate siting of infrastructure, materials and finishes of sheds and hoardings, and management of increased traffic in the study area. An Urban Design and Landscape Plan (UDLP) would be prepared to minimise landscape character and visual impacts, and detail and guide the implementation of landscape features to be installed as part of the project, including re-vegetation requirements (outlined in **Section 7.3.8**). This detailed landscape plan would provide details of measures to be taken to reduce potential adverse impacts on landscape character as a result of construction works.

Landscape character impacts during operation

During operation, there would be an impact on the LCZs within the study area, ranging from Moderate-Low to High impact (see **Table 7-63**).

Table 7-63 Summary of landscape character impacts during project operation

LCZ	Sensitivity	Magnitude	Impact
LCZ 1 - Northern Road Ridgeline	High	Low	Moderate
LCZ 2 - Luddenham Rolling Hills	High	Moderate	High-Moderate
LCZ 3 - Rural plains	High	High	High
LCZ 4 - Kemps Creek	Moderate	High	High-Moderate
LCZ 5 - Rural Residential	High	Moderate	High-Moderate
LCZ 6 - Ridgetop Woodlands	High	High	High
LCZ 7 - M7 Motorway	Low	Moderate	Moderate-Low
LCZ 8 - Cecil Hills Residential	Moderate	Low	Moderate-Low

The urban design concept for the project was an iterative process, forming part of a multidisciplinary collaboration with the project team to inform the development of the preferred route and project design. As a result, several potential impacts were minimised or avoided through the design development (see **Chapter 4**). Design features and approaches integrated into the project to minimise impacts include:

- Realignment of the project through the Western Sydney Parklands
- Provision for continuous shared user paths and future connections
- Integration of Aboriginal and non-Aboriginal heritage interpretation theme of ‘connection to Country’ and ‘inter-connectedness’
- Holistic approaches to revegetation of the project in the context of the Cumberland Plain Woodland vegetation communities
- Initiatives to facilitate connections to creeks by provisioning for pedestrian and cyclist access in the future.

The majority of impact ratings for LCZs were Moderate to High-Moderate due to changes to the existing landscape character and the extent of the project (magnitude), and where the project would traverse through existing, scenic greenfield landscape settings (sensitivity).

LCZs with a High and High-Moderate impacts include:

- LCZ 2 – Luddenham Rolling Hills
- LCZ 3 – Rural Plains
- LCZ 4 – Kemps Creek
- LCZ 5 – Rural residential
- LCZ 6 – Ridgetop Woodlands.

Two locations are considered to have a High impact rating; LCZ 3 and LCZ 6, due to:

- In LCZ 3, the scale of the project and airport gateway interchange bridge over Elizabeth Drive is considered to adversely impact the relatively flat terrain of the plains.
- In LCZ 6, the project would transverse areas of the Western Sydney Parklands populated by ecologically sensitive Cumberland Plain Woodlands, resulting in the residual land between Elizabeth Drive and the project becoming fragmented.

Substantial land use changes are planned as part of the Western Sydney Aerotropolis, which have influenced the impact assessment. This is particularly the case in LCZ 2 and LCZ 3 which fall under the 'Northern Gateway' priority precinct and are anticipated to front the economic transformation of the area.

Three locations are considered to have a High-Moderation impact rating; LCZ 2, LCZ 4 and LCZ 5, due to:

- In LCZ 2, the undulating topography would localise and conceal the motorway somewhat, limiting impact on to the broader landscape and future land use changes will transform this zone.
- In LCZ 4, the majority of the project would be blended into the surrounding context, and the twin bridges proposed over Kemps Creek would be visible but the low-lying topography and distribution of vegetation and buildings in the area would reduce views to the structure, in a zone that will change to flexible employment lands as part of the Kemps Creek precinct of the LUIIP.
- LCZ 5 is a scenic, rural-residential area and the project would introduce some road related infrastructure within a confined location within the zone, reducing the overall impacts which would further reduce over time as plantings mature and the surrounding land use changes.

Management measures to mitigate impacts on landscape character from the project's operation are outlined in **Section 7.3.8**

7.3.6 Visual impact assessment

This section includes an assessment of the project from selected viewpoints, with a rating given for magnitude and sensitivity, and provides the overall visual impact assessment for each viewpoint location.

Visibility of the project

The visual catchment is the extent of the landscape that can be viewed from the study area and, likewise, the extent of locations from which the site can be seen. Visibility tends to be most confined in areas of densely vegetated terrain such as the Western Sydney Parklands or riparian corridors. Conversely, the extent of visibility is greatest in areas where topography is flattest such as the rural plains of LCZ3, or along localised high points such as Luddenham Road.

The visual catchment for the project is shown in **Figure 7-50**. The visual catchment ranges from 100 metres to about one kilometre in some locations, depending on topography.

Substantial land use changes are planned within the study area including the development of employment lands, the Western Sydney Airport and other transport projects. It is therefore expected that future development within the study area would reduce the project's overall visibility. As future development transforms the area, so too would new buildings and infrastructure obstruct views of the project. In cases where there are no major changes to land use, such as the Western Sydney Parklands, Cecil Hills and Mt Vernon, the visibility of the project is unlikely to change in the foreseeable future.

Viewpoint locations

Thirty key viewpoints within the VEM were selected for the visual impact assessment. These are listed in **Table 7-64**, and shown in **Figure 7-50**. Views at each viewpoint are provided in **Table 7-66**. Viewpoints were selected based on the following:

- Address views from public vantage points (streets, lookouts, public places etc)
- Represent homes or views that might be experienced from people's homes or properties
- Address location of high impact and major change (eg bridges, overpass)
- Address areas where there is currently no road infrastructure, or where new infrastructure is introduced in native forest or agricultural areas
- Address places of interest or high perceived cultural value such as heritage conservation items, lookouts, schools or community facilities as well as nearby private residences
- Represent the full 16-kilometre project and nominated catchment area.

Table 7-64 Viewpoint locations

Viewpoint	Location	Viewpoint	Location
1	View east along The Northern Road	16	View north from Elizabeth Drive
2	View east along The Northern Road	17	View east along Elizabeth Drive
3	View north near Luddenham Raceway	18	View south from Mamre Road
4	View north along Luddenham Road	19	View south from Elizabeth Drive
5	View north–west along Luddenham Road	20	View north from Range Road
6	View south along Luddenham Road	21	View north–west from Sydney International Shooting Centre (SISC)
7	View east along Elizabeth Drive	22	View south from Duff Road
8	View north from Badgerys Creek Road	23	View from Western Sydney Parklands (beauty spot)
9	View south from Twin Creeks Golf and Country Club	24	View south from Cecil Road
10	View west along South Creek (Sydney University Lands)	25	View north–west toward M7 - M12 Interchange
11	View south along Clifton Avenue	26	View north along M7 Motorway
12	View west from Mamre Road	27	View west from Anjou Circuit
13	View west from Mamre Road	28	View west from Jaquetta Close
14	View east from Clifton Avenue	29	View west along Elizabeth Drive
15	View south from Salisbury Avenue	30	View south along shared user path and M7 Motorway

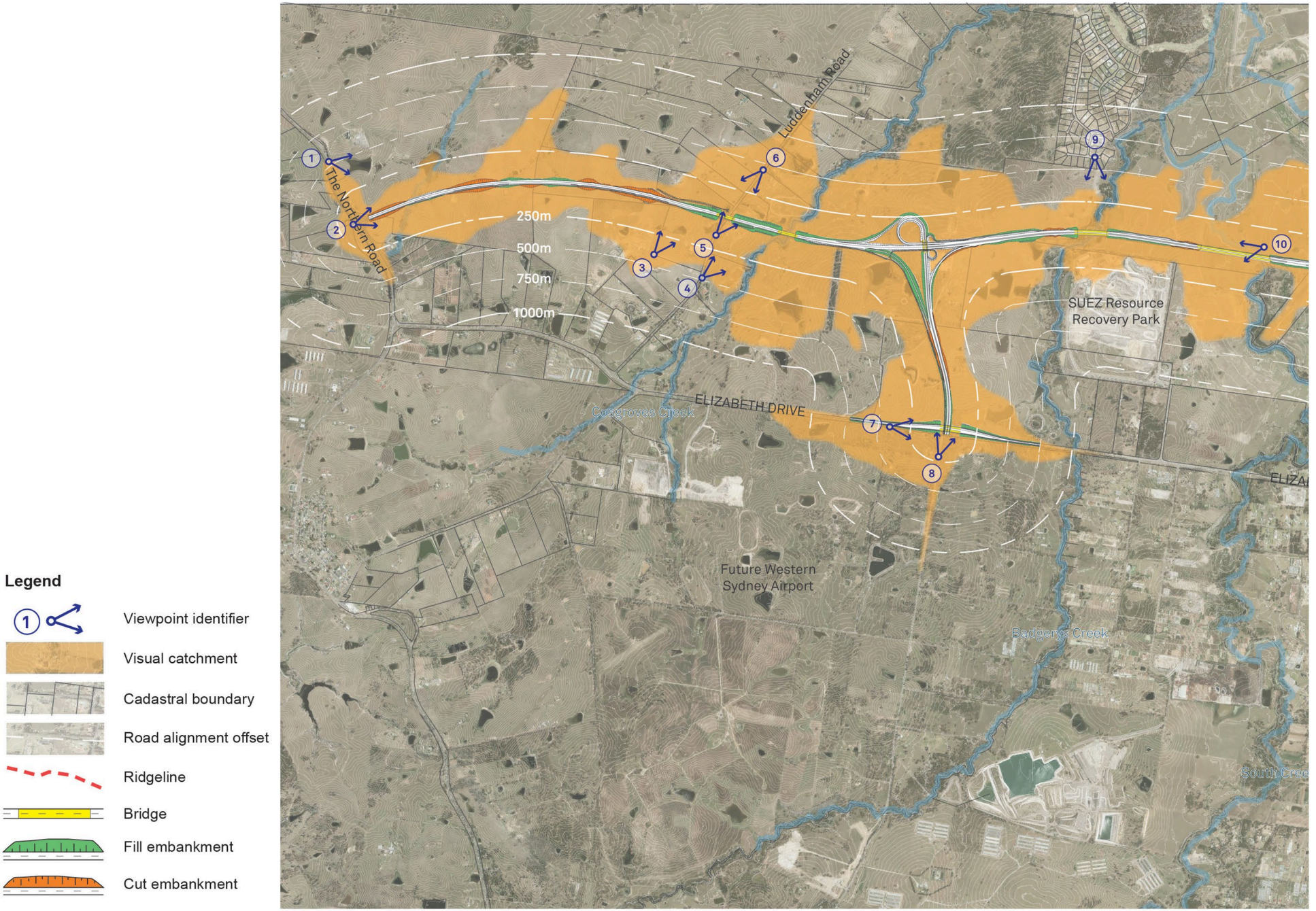


Figure 7-50 Visibility Envelope Mapping for the project and key viewpoints Page 1 of 2

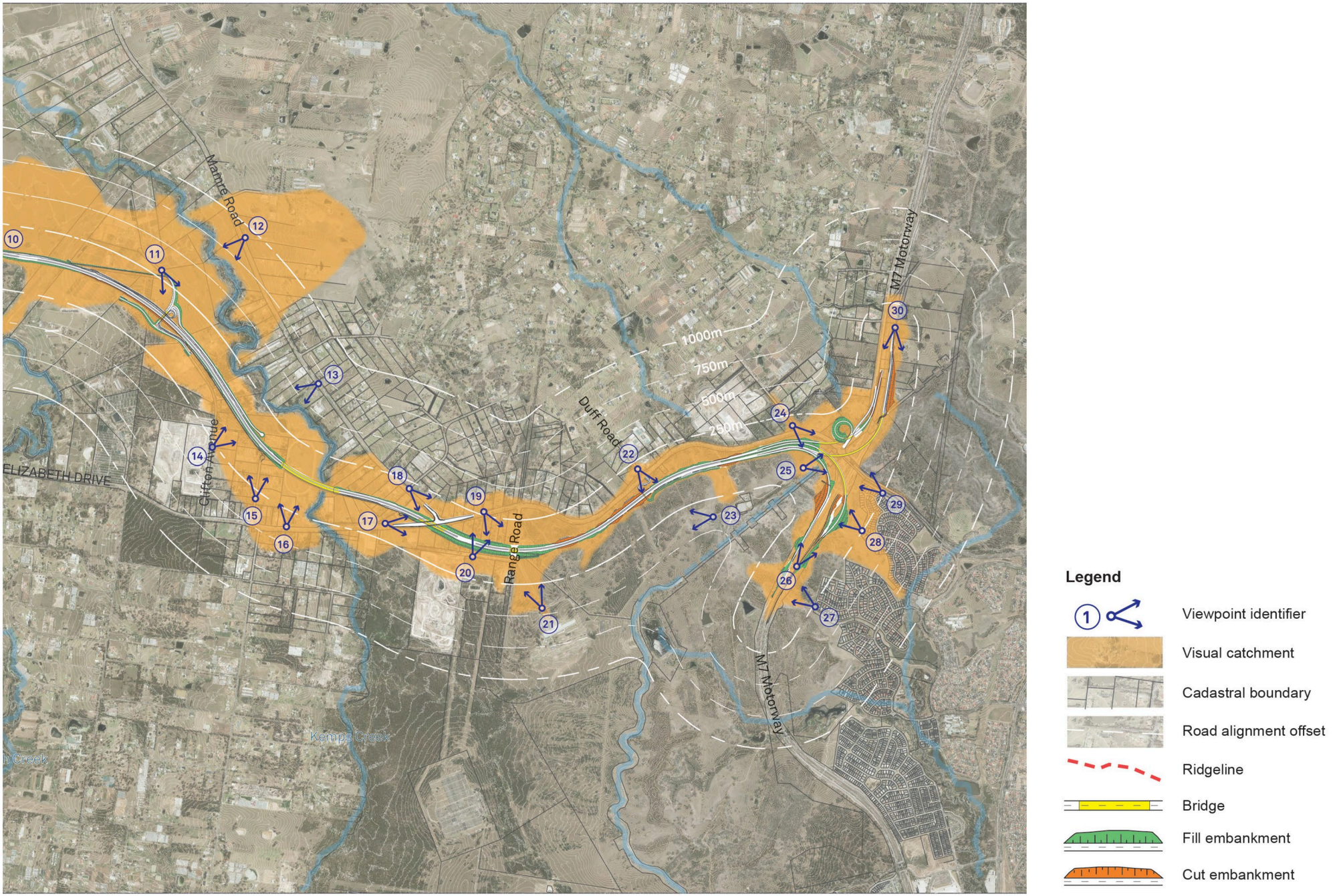


Figure 7 50 Visibility Envelope Mapping for the project and key viewpoints

Visual impacts during construction

Construction activities and construction ancillary facilities may result in temporary visual impacts on the existing landscape. The location of the ancillary facilities is discussed in **Section 5.24.3**.

Key potential visual impacts during construction would primarily relate to residential receivers that would experience the longest duration of views of construction activities. The following construction activities have the potential to have a visual impact on receivers:

- Building removal
- Tree removal
- Visibility or overshadowing of temporary structures
- Temporary noise barriers
- Hoardings
- Visibility of ancillary facilities, including construction machinery, plant operations and site offices
- Temporary lighting
- Increased vehicle movements and personnel in the area.

Based on the visual catchment (see **Figure 7-50**), most of the project would traverse rural properties or parklands resulting in only a few residential receivers near construction activities.

The closest receivers vary along the length of the construction footprint. In rural areas along The Northern Road and Luddenham Road, residential receivers are located about 250 metres from the construction footprint. In more developed areas between Clifton Avenue and Mamre Road, residential receivers are located between 50 metres and 500 metres from the construction footprint. As such, the general visual impacts during construction are considered relatively low, except where viewer numbers are highest within the visual catchment, particularly near viewpoints 15, 16 and 18.

Similarly, in terms of ancillary facilities, visual impacts are considered moderate due to their scale and function. The location of AF5 would have in the highest proportion of receivers and result in a higher impact during construction. This could be evident near viewpoints 17 and 18.

Construction would require some works at night and these areas would be subject to artificial lighting, essentially creating ‘daylight’ conditions for the duration of the construction period. If unmanaged, light spill from construction activities (along with other construction issues such as noise and dust) may impact on the health and wellbeing of nearby residents and occupants nearest to construction works and ancillary facilities.

All night-time work and lighting would be carried out in accordance with statutory requirements and guidelines so that there are no unacceptable lighting impacts, particularly on nearby residents. All procedures and management measures taken would form part of the CEMP, which may include measures such as lighting levels, projection angles and direction and length of frequency of exposure.

Ecological light pollution may also potentially affect nocturnal fauna by interrupting their life cycle or impacting on species that are more vulnerable to predation (eg some small mammals), particularly through Western Sydney Parklands. However, fauna within the study area would already be accustomed to light pollution from the existing lighting on Elizabeth Drive and the M7 Motorway and the increased artificial lighting associated with the project is unlikely to have a significant effect. This is discussed further in **Section 7.1**.

Overall, impacts during construction would be temporary in nature and would be mitigated where possible through appropriate siting of infrastructure, materials and finishes of sheds and hoardings, and management of light spill. A CEMP would be prepared for the project that would provide details and measures to be taken to reduce potential adverse visual impacts due to construction activities. These management measures are outlined in **Section 7.3.8**.

Visual impacts during operation

Visual impact assessment helps to define the day-to-day visual effect of development on people's views.

Viewpoint locations were focused around areas of the highest anticipated magnitude and the areas where there are the most people in the most sensitive settings. A total of 30 viewpoints were selected for the project. The locations of the viewpoints are shown in **Figure 7-50**. A visual representation of the visual impact anticipated at each viewpoint during project operation is also provided in **Table 7-66.**

A range of visual impacts across the study area are anticipated during project operation. A summary of the visual impacts during operation for each of the 30 viewpoints is provided in **Table 7-65**. Visual impact ratings for the project are generally characterised as follows:

- High impacts would occur in areas where existing, high quality rural views are relatively undisturbed and within close proximity to residential receivers or where the scale of the project significantly impact the integrity of the view
- High-Moderate impacts would occur in areas where high quality views would generally not be as affected by the project
- Moderate impacts would occur where either magnitude or sensitivity ratings are high or both sensitivity and magnitude are considered moderate
- Moderate-Low impacts would occur in less sensitive areas where low quality views would be reasonably affected by the project
- Low impacts generally would occur in less sensitive agricultural areas where the views of the project would be at a distance.

Visual impacts associated with project operation are summarised as follows:

- Four viewpoints would experience a High impact
- Nine viewpoints would experience a High-Moderate impact
- Five viewpoints would experience a Moderate impact
- Four viewpoints would experience a Moderate-Low impact
- Three viewpoints would experience a Low impact
- Five viewpoints would experience a Negligible impact.

The visual impact of potential noise barriers was assessed. Out of the thirty viewpoints, the viewpoints where the visual impact increased when potential noise barriers were included on the project were as follows:

- Viewpoints 15 and 18 – the impact would increase from Moderate-Low to Moderate
- Viewpoint 19 – the impact would increase from High-Moderate to High

The noise barriers identified as potentially reasonable would be considered in conjunction with other mitigation measures for their feasibility and reasonability during the detailed design stage of the project.

During operation, permanent road lighting would only be provided at the following locations:

- Entry and exit ramp merge and diverge areas at the Western Sydney Airport Interchange
- Entry and exit ramp merge and diverge areas at the M7 Motorway
- For 500 metres in advance of The Northern Road intersection
- The Elizabeth Drive realignment over the airport access road
- Complete length of shared user paths.

Lighting would be designed to adhere to relevant guidelines, including relevant CASA regulations, such as the National Airports Safeguarding Framework (see **Section 5.5**). Where permanent operational lighting is provided, increased traffic and light spill from the roadway would add to a changed visual environment, notably in rural areas with limited existing lighting. Increased night time light spill may impact on the visual amenity of rural properties, particularly residential receptors near the sections of the project where permanent lighting is proposed.

Changes to night time amenity may be a concern for some property owners. However, it is expected that illuminance and light spill would be mostly confined within the operational footprint. Impacts associated with light spill are considered to be minor in the context of the project as a whole. Impacts would also decrease over time, as the project assimilates into an increasingly urban environment as part of the planned land use changes defined in the LUIIP.

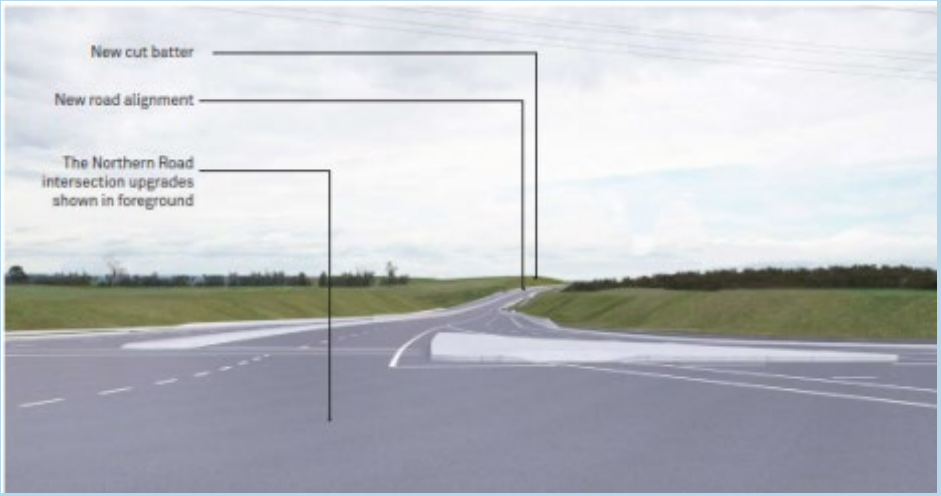
Specific mitigation measures provided in **Section 7.3.8** focuses on areas assessed at have high potential for visual impacts during project operation. These areas would be properly and appropriately considered at design and implementation stages. As such, the identified visual impacts would be minimised and addressed to the greatest possible extent.

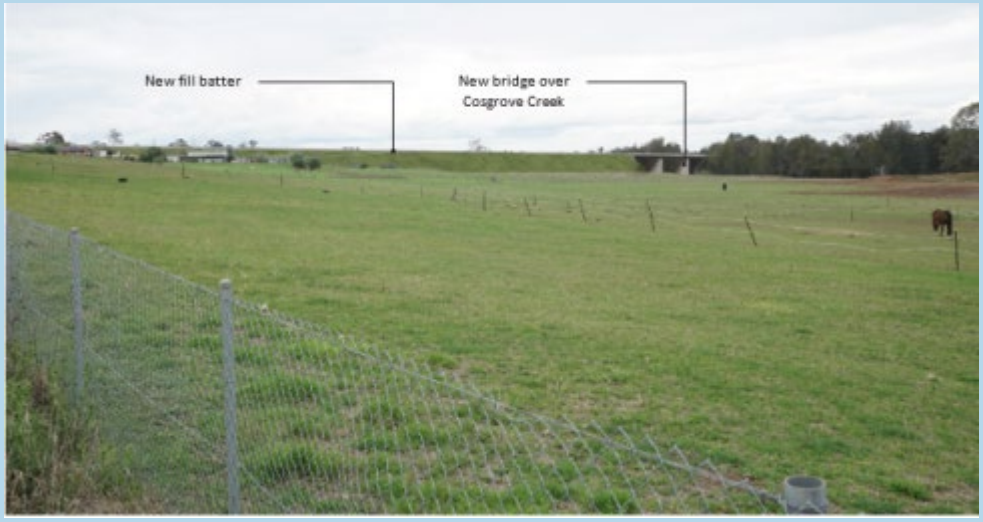
Table 7-65 Summary of visual impacts during project operation

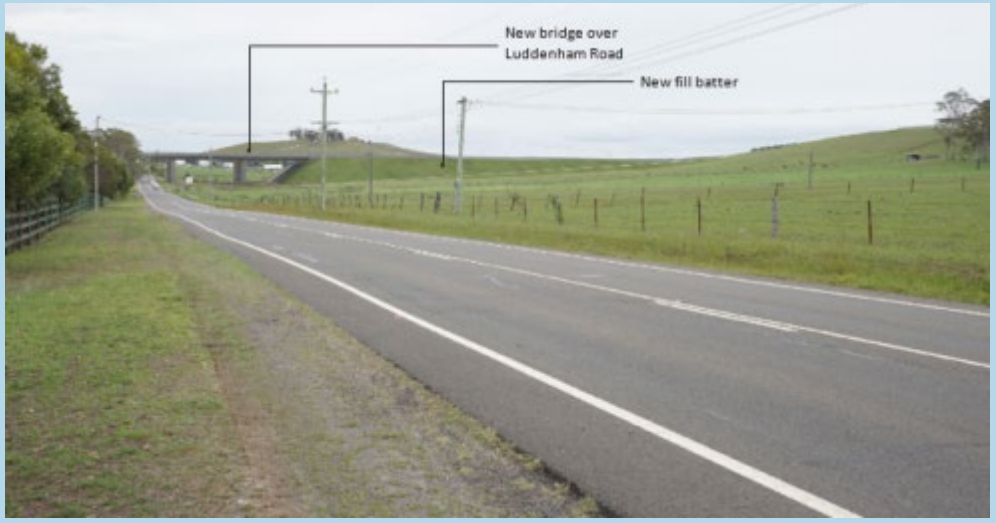
Viewpoint		Sensitivity	Magnitude	Impact
1	View east along The Northern Road	High	Negligible	Moderate
2	View east along The Northern Road	High	High	High
3	View north near Luddenham Raceway	High	High	High-Moderate
4	View north along Luddenham Road	High	Moderate	High-Moderate
5	View north–west along Luddenham Road	Moderate	High	High-Moderate
6	View south along Luddenham Road	High	High	High
7	View east along Elizabeth Drive	Moderate	Moderate	Moderate
8	View north from Badgerys Creek Road	Low	Moderate	Moderate-Low
9	View south from Twin Creeks Golf and Country Club	Moderate	None	Negligible
10	View west along South Creek (Sydney University Lands)	High	High	High
11	View south along Clifton Avenue	Low	Moderate	Moderate-Low
12	View west from Mamre Road	Low	Negligible	Negligible
13	View west from Mamre Road	Low	None	Negligible
14	View east from Clifton Avenue	Moderate	None	Negligible
15	View south from Salisbury Avenue	Moderate	Low	Moderate-Low

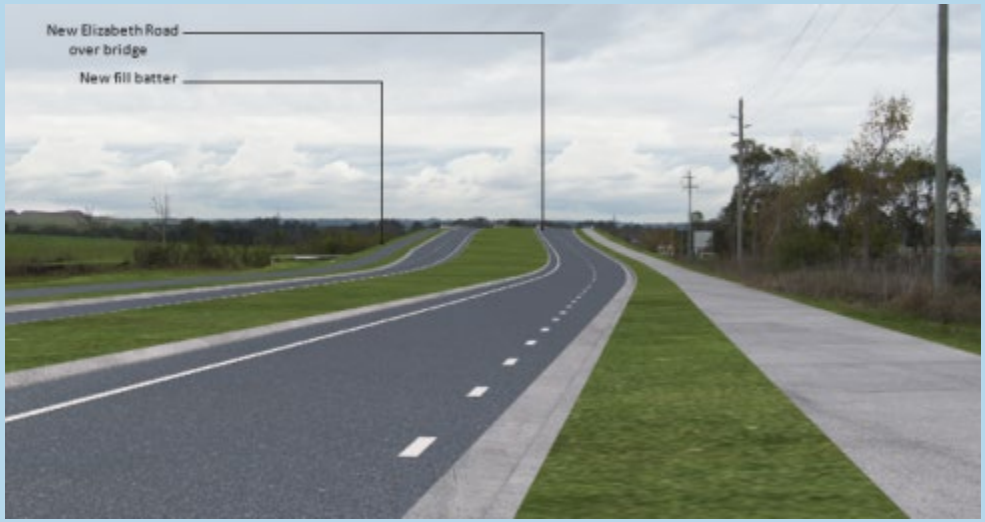
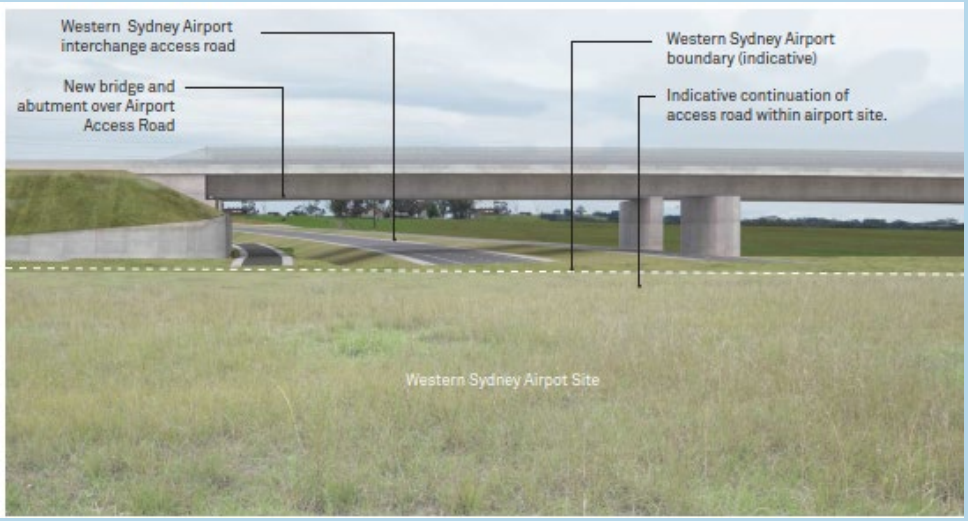
Viewpoint		Sensitivity	Magnitude	Impact
16	View north from Elizabeth Drive	Moderate	High	High-Moderate
17	View east along Elizabeth Drive	Moderate	High	High-Moderate
18	View south from Mamre Road	Moderate	Low	Moderate-Low
19	View south from Elizabeth Drive	High	Moderate	High-Moderate
20	View north from Range Road	Moderate	High	High-Moderate
21	View north–west from Sydney International Shooting Centre (SISC)	High	High	High
22	View south from Duff Road	Moderate	Moderate	Moderate
23	View from WSP (beauty spot)	High	Low	Moderate
24	View south from Cecil Road	Low	Moderate	Moderate
25	View north–west toward M7 - M12 Interchange	Moderate	High	High-Moderate
26	View north along M7 Motorway	Low	Low	Low
27	View west from Anjou Circuit	Moderate	Negligible	Negligible
28	View west from Jaquetta Close	High	Low	High-Moderate
29	View west along Elizabeth Drive	Low	Low	Low
30	View south along shared user path and M7 Motorway	Low	Low	Low

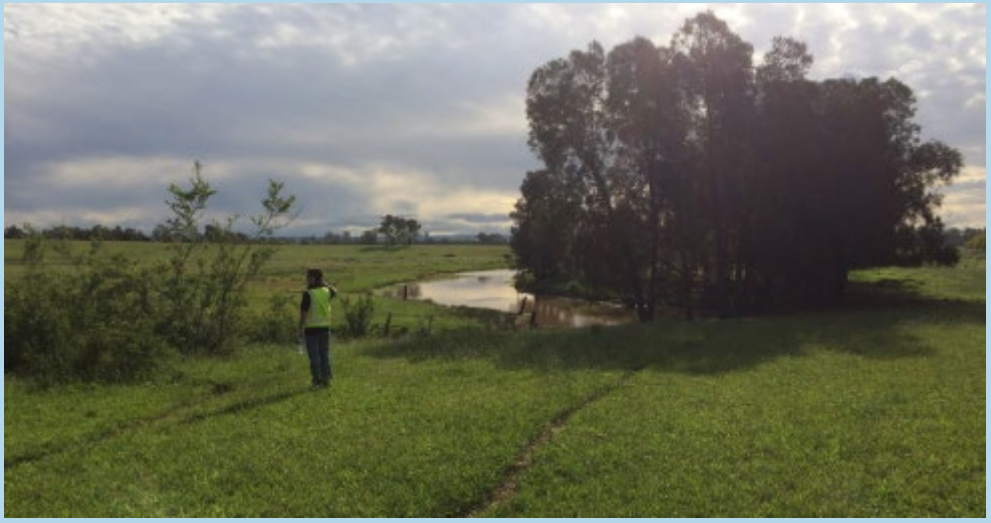
Table 7-66 Operational visual impacts at each viewpoint

Existing viewpoint	Viewpoint during project operation (artist impression)
Viewpoint 1: View east from The Northern Road	
	
Viewpoint 2: View east from The Northern Road	
	

Existing viewpoint	Viewpoint during project operation (artist impression)
Viewpoint 3: View north near Luddenham Raceway	
	
Viewpoint 4: View north along Luddenham Road	
	

Existing viewpoint	Viewpoint during project operation (artist impression)
Viewpoint 5: View north–west along Luddenham Road	
	
Viewpoint 6: View south along Luddenham Road	
	

Existing viewpoint	Viewpoint during project operation (artist impression)
Viewpoint 7: View east along Elizabeth Drive	
	
Viewpoint 8: View north from Badgerys Creek Road	
	

Existing viewpoint	Viewpoint during project operation (artist impression)
Viewpoint 9: View south from Twin Creeks Golf and Country Club	
	No change
Viewpoint 10: View west along South Creek (Sydney University Lands)	
	

Existing viewpoint	Viewpoint during project operation (artist impression)
Viewpoint 11: View south along Clifton Avenue	
	
Viewpoint 12: View west from Mamre Road	
	

Existing viewpoint	Viewpoint during project operation (artist impression)
Viewpoint 13: View west from Mamre Road	
	No change.
Viewpoint 14: View east from Clifton Avenue	
	No change

Existing viewpoint	Viewpoint during project operation (artist impression)
Viewpoint 15: View north from Salisbury Avenue	
	
Viewpoint 16: View north from Elizabeth Drive	
	

Existing viewpoint	Viewpoint during project operation (artist impression)
Viewpoint 17: View east along Elizabeth Drive	
	
Viewpoint 18: View south from Mamre Road	
	

Existing viewpoint	Viewpoint during project operation (artist impression)
Viewpoint 19: View south from Elizabeth Drive	
	
Viewpoint 20: View north from Range Road	
	

Existing viewpoint	Viewpoint during project operation (artist impression)
Viewpoint 21: View north–west from Sydney International Shooting Centre (SISC)	
	
Viewpoint 22: View south from Duff Road	
	

Existing viewpoint	Viewpoint during project operation (artist impression)
Viewpoint 23: View from Western Sydney Parklands (beauty spot)	
	
Viewpoint 24: View south from Cecil Road	
	

Existing viewpoint	Viewpoint during project operation (artist impression)
Viewpoint 25: View north–west toward M7 - M12 Interchange	
	
Viewpoint 26: View north along M7 Motorway	
	

Existing viewpoint	Viewpoint during project operation (artist impression)
Viewpoint 27: View west from Anjou Circuit	
	No change
Viewpoint 28: View west from Jaquetta Close	
	

Existing viewpoint	Viewpoint during project operation (artist impression)
Viewpoint 29: View west along Elizabeth Drive	
	
Viewpoint 30: View south along shared user path and the M7 Motorway	
	

7.3.7 Cumulative impacts

Over the coming decades, the region of south-western Sydney will experience transformational change in land use. This will be from what is mostly a rural and semi-rural landscape towards a 24-hour economy centred around the future Western Sydney Aerotropolis. The design team has considered how the project would interact and engage with present and future land uses.

Cumulative urban design, landscape and visual impacts may arise from the interaction of construction and operation activities of the project and other approved or proposed projects in the area. When considered in isolation, specific project impacts may be considered minor. However, the cumulative effect of multiple projects may decrease or intensify the landscape character and visual impacts on a particular receiver or area.

The project is important for Sydney in terms of scale and its contribution to connecting the broader city to the Western Sydney Airport and new growth areas. Numerous projects in varying stages of delivery and planning are also currently underway or proposed in the vicinity of the project. **Table 7-3** identifies projects that are relevant both temporally and spatially to the M12 Motorway, as they would be located within the vicinity of the project and construction and/or operation may have overlapping timeframes.

While the projects identified in **Table 7-3** and assessed in **Table 7-67** are transformative, such extensive change is likely to generate major cumulative landscape character and visual impacts associated the substantial modification of the landscape. The contribution of the M12 Motorway project to cumulative landscape character and visual impacts in the area would be moderate to high (during both operation and construction). A number of mitigation measures are presented in **Section 7.3.8**.Through the implementation of the urban design concept and objectives such as ‘connection to Country’, creating an active study area, enhancing user experience, creating a project identity and re-establishing natural systems, the project would provide a positive contribution by communicating the history of the area to users of the motorway, including visitors to the Western Sydney Airport.

Additional details of each of the projects considered is provided in **Appendix G**.

Table 7-67 Cumulative urban design, landscape character and visual amenity impacts

Project and status	Cumulative impacts
Western Sydney Airport Approved. Under construction	The airport size, scale and character is significantly larger than the project, and would involve substantial modification of the landscape and existing rural visual quality to a more urbanised and commercial landscape character. The existing visual character of LCZ 3 would be subject to the most immediate change, resulting in high cumulative visual impact during construction due to the continued presence of construction facilities and construction activities occurring over this period. Once both projects are complete and operational, they would result in a high cumulative impact as the rapidly changing character of the area would be strongly influenced by the new airport and project infrastructure. The cumulative impact would be most evident in viewpoints 07 and 08.
Sydney Metro Greater West Not yet approved	Sydney Metro Greater West is currently under strategic development. Depending on the final design outcomes, this project may intensify the urban character of the area and have a visual impact.

Project and status	Cumulative impacts
The Northern Road upgrade Approved. Construction has begun	The upgrade of The Northern Road would result in high landscape and visual character impacts, altering the existing 'rural road' character north of Elizabeth Drive (defined as LCZ 1). The project would only result in a minor increase in cumulative impacts on landscape character in LCZ 1 given the small section of the project footprint located within this zone. Additionally, the existing character of this zone would already have begun to change as a result of The Northern Road. Cumulative impacts on the visual amenity of viewpoints 01 and 02 would increase as two new roads would be visible at these locations. However, the project would be a small contributor. The overlapping footprints of The Northern Road and the project may result in increased cumulative impacts for nearby residents as a result of prolonged construction periods. Compensatory mitigation could be considered for residents, subject to sustained cumulative impacts such as provision of streetscape treatments to be carried out in conjunction with upgrades to The Northern Road.
Other existing road network upgrades and potential road projects, including: • Elizabeth Drive upgrade • Mamre Road upgrade • Outer Sydney Orbital Not yet approved	Other major transport projects such as the Outer Sydney Orbital, Elizabeth Drive upgrade and Mamre Road upgrade are currently under strategic development. Depending on the final design outcomes, these projects may intensify the urban character of the area and have a visual impact. These projects would also change the local character of the roads in the area.
Major land releases, including: • Western Sydney Aerotropolis • South West Growth Area • Western Sydney Employment Area. Future strategic government project	The airport would be a catalyst for the development of future residential, commercial and industrial uses throughout Western Sydney, including surrounding areas designated as future employment zones as part of the LUIIP. Future development of surrounding areas as a result of infrastructure investment in the region would lead to increased urbanisation over time. In general, this would reduce the impact of the project as it becomes part of the changing urban visual character of the area.
Future development of Western Sydney Parklands Future strategic government project	The Western Sydney Parklands Plan of Management 2030 (WSPT, 2018) provides a framework for future planning for the development of the Parklands. It seeks to intensify the existing character and recreational uses within LCZ 6 (referred to as Cecil Park) to become a major regional recreation park. To facilitate the project, relocation of existing recreation facilities such as the Wylde Mountain Bike Trail in LCZ 6 would be required. The relocation of the Wylde Mountain Bike Trail (dependent on timing and location), would result in a high cumulative impact during construction, due to the continued presence of construction facilities and activities, which may include additional loss of vegetation. Once complete and operational, the cumulative impacts of the project would decrease over time as new vegetation matures, and new cycle connections (as part of the project) improve connectivity to new recreational facilities. Any further (future) development of the Parklands, would seek to realise the desired future character of the southern parklands. This would generally increase the amenity and conservation values of LCZ 6, resulting in a positive impact in the long-term, as an integral part of the Western Parkland City.

7.3.8 Environmental management measures

The environmental management measures that will be implemented to minimise urban design, landscape character and visual amenity impacts of the project, along with the responsibility and timing for those measures, are presented in **Table 7-68**.

Table 7-68 Environmental management measures (urban design, landscape character and visual amenity)

Impact	Reference	Environmental management measure	Responsibility	Timing
Impacts on views and landscape character from construction and operation of the project	LVIA01	An Urban Design and Landscape Plan (UDLP) will be prepared to minimise landscape character and visual impacts, and detail and guide the implementation of landscape features to be installed as part of the project, including re-vegetation requirements. This will include requirements for the provision of vegetative screening to soften the appearance of structural elements of the project such as noise walls and provide screening of sensitive views. The UDLP will also consider the requirements of the heritage interpretation framework that will be prepared for the project (NAH02). The UDLP will be prepared in accordance with applicable guidelines, be consistent with the concept project identity in the EIS and relevant urban design objectives and principles for the project including consideration of implementation of Crime Prevention Through Environmental Design (CPTED) principles, and in consultation with relevant councils.	Contractor / Roads and Maritime	Detailed design
	LVIA02	A detailed Landscape Plan will be prepared for the project and implemented throughout construction. The plan will guide the implementation of measures to minimise landscape character and visual impacts, including revegetation requirements.	Contractor	Detailed design, prior to construction and during construction
	LVIA03	Existing vegetation within the construction footprint will be retained and protected where possible. This includes densely vegetated areas such as remnant riparian forests and Cumberland Woodlands in Western Sydney Parkland.	Contractor	Detailed design and during construction
	LVIA04	Site levels and grades for the project will integrate with the surrounding terrain to help the visual assimilation of the project into the surrounding landscape where practicable. Engineer slopes with gradients no steeper than 3H:1V where possible to maximise the establishment of vegetation on these batters and allow for appropriate maintenance.	Contractor	Detailed design

Impact	Reference	Environmental management measure	Responsibility	Timing
	LVIA05	Project elements such as ancillary facility hoardings will be designed and maintained to minimise impacts on landscape character and visual amenity. This will include selecting colours and materials that are visually recessive and blend into the surrounding landscape where practicable, and the prompt removal of graffiti.	Contractor	Detailed design, prior to construction and during construction
	LVIA06	Where noise mitigation such as noise barriers are required, they will be designed with the aim of minimising visual impacts.	Contractor	Detailed design
	LVIA07	Temporary and permanent lighting will be designed and implemented with consideration of: • The need to orientate lighting to minimise light spill and glare impacts on nearby receivers • The need to minimise vandalism and maintenance requirements • Requirements of the National Airports Safeguarding Framework (NASF) (National Airports Safeguarding Advisory Group, n.d.) for operational lighting • Opportunities to implement sustainability initiatives in design such as energy efficient or solar lighting.	Contractor	Detailed design, prior to construction and during construction
Urban design elements	LVIA08	The findings and recommendation of the Aboriginal cultural heritage design process managed by Balarinji will be incorporated into the urban design and implemented as part of the project, including interpretive initiatives.	Roads and Maritime / Contractor	Detailed design, prior to construction and during construction
	LVIA09	Shared user paths to be delivered as part of the project will not preclude connections to future open space corridors and land use as identified in the Western Sydney Land Use and Infrastructure Implementation Plan (LUIIP) (DPE 2018). Where further design of adjacent open space corridors is undertaken, shared user paths will be provided to connect at an appropriate location. Shared user paths will be designed to be located away from road-side edges to provide an immersive landscape experience for pedestrians and cyclists, where possible.	Roads and Maritime / Contractor	Detailed design
	LVIA10	Establish an Urban Design Review Panel to provide advice and input into the development of the UDLP.	Roads and Maritime	Detailed design

Impact	Reference	Environmental management measure	Responsibility	Timing
	LVIA11	Highly visible elements of the project including potential noise barriers, retaining walls, bridge structures and urban design material selection will be designed to satisfy functional requirements and adopt the design principles detailed in the M12 EIS Landscape Character, Visual Impact Assessment and Urban Design Report. The proposed designs will be documented in the relevant UDLP for the project.	Contractor	Detailed design
	LVIA12	Consider a standard design for retaining walls and major structures across the project, to present a coordinated 'suite of elements'.	Contractor	Detailed design
Safety in design	LVIA13	The project must consider CPTED principles during detailed design to minimise safety risks to all users. The project must carry out periodic CPTED reviews by a qualified professional and implement any additional recommendations where reasonable and feasible.	Contractor	Detailed design
Revegetation and landscaping	LVIA14	A tree management strategy will be prepared for the project, outlining: • Measures to minimise tree removal to retain and protect as many trees within the construction footprint as reasonable and feasible • Measures to avoid damage to trees that are to be retained within the construction footprint to ensure the maintenance of health and stability of the trees in accordance with AS4970-2009 Protection of trees on development sites • Requirements for the pruning of trees to be carried out by a suitably qualified person in accordance with AS 4373-2007 Pruning of amenity trees • Consideration of maintenance requirements and safety standards • Requirements for the replacement trees where removal cannot be avoided including: – Net increase in the number of trees (not identified as within an EEC) – Where it is not practicable to plant trees in the operational footprint an alternative location will be identified in consultation with relevant councils and in consideration of future development in the local area – Minimum pot size in accordance with part 3.2.1 (Rural road reserves) in the Roads and Maritime Landscape Guideline (2018b) subject to long-term viability of the plant.	Contractor	Detailed design and prior to construction

Impact	Reference	Environmental management measure	Responsibility	Timing
	LVIA15	Revegetation for the project will consider the land use requirements of the National Airports Safeguarding Framework (NASF) (National Airports Safeguarding Advisory Group, n.d.) to minimise the risk of wildlife strikes at the Western Sydney Airport.	Contractor	Detailed design
	LVIA16	Carry out appropriate soil analysis and identify soil preparation requirements for landscaping treatments to inform the Urban Design and Landscaping Plan and vegetation management in accordance with Roads and Maritime's Batter Surface Stabilisation Guideline (2015b).	Contractor	Detailed design and during construction