



Australian Government



**Sydney Metro –
Western Sydney Airport**

Appendix K - EPBC Act Draft Environmental Impact Assessment of off-airport proposed action (EPBC 2020/8687)

Certification page

Names, roles and qualifications (where relevant) of all persons involved in preparing the preliminary documentation are provided below.



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1 Introduction

1.1 Overview

Sydney Metro – Western Sydney Airport (the project) is identified in the *Greater Sydney Region Plan* (Greater Sydney Commission, 2018) as a key element to delivering an integrated transport system for the Western Parkland City. The new railway line would become the city's transport spine, connecting communities and travellers with the rest of Sydney's public transport system with a fast, safe and easy metro service. The project would enable the realisation of the vision for Western Sydney and the Western Sydney Aerotropolis, by connecting people to employment, education, shops, services and recreation facilities. The project would also provide important access to Western Sydney International (Nancy-Bird Walton) Airport (referred to as Western Sydney International) for airport workers and aviation travellers.

The project would provide a connection between the existing Sydney Trains suburban rail network at St Marys and six new metro stations, including two at Western Sydney International and one at the Aerotropolis. The stations would play a key role in the development of future precincts in the Western Parkland City.

The project is being delivered under the *Western Sydney City Deal* (NSW Government, 2018), a partnership between the Australian Government, NSW Government and eight Western Sydney local governments that aims to deliver the vision for the Western Parkland City. The Australian and NSW Governments are partners in funding the project and have a shared objective to connect rail to Western Sydney International when the airport opens for passenger services.

Sydney Metro (the Proponent) submitted a Referral (EPBC 2020/8687) for the component of the project located to the north of Western Sydney International being the off-airport proposed action from St Marys to Elizabeth Drive under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), hereafter referred to as the proposed action. In July 2020, Sydney Metro was advised that the proposed action is a controlled action and will require assessment in the form of preliminary documentation. The relevant controlling provisions for the controlled action relate to Commonwealth land and listed threatened species and communities.

This appendix (Appendix K), in conjunction with Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement, has been prepared to provide the assessment information as requested in the Preliminary Documentation Guidelines issued on 21 July 2020 in order to allow the Commonwealth Environment Minister to determine whether to grant approval for the controlled action under the EPBC Act. Further information regarding the project as a whole can be found in the Project Environmental Impact Statement.

1.2 Key features of the project

The project involves the construction and operation of a metro rail line around 23 kilometres in length, between St Marys in the north and the Aerotropolis Core precinct in the south, via Western Sydney International (see Figure 1-1). Station locations for the project would include:

- a new metro station connecting to, and providing interchange with, the existing Sydney Trains suburban rail network at St Marys, north of Western Sydney International – part of the proposed action
- two new metro stations between the existing Sydney Trains suburban rail network and Western Sydney International; one at Orchard Hills and one at Luddenham within the Northern Gateway precinct – part of the proposed action
- two new metro stations within the Western Sydney International site; one at the airport terminal and one at the airport business park – not part of the proposed action
- a new metro station within the Aerotropolis Core precinct, south of Western Sydney International – not part of the proposed action.

The alignment of the new metro railway line would include a combination of tunnel, surface and viaduct sections. The project includes works required to support its construction and operation, including all operational systems and infrastructure, including a stabling and maintenance facility and up to two services facilities (the Bringelly services facility does not form part of the proposed action).

A more detailed description of the project, as it relates to the proposed action, is provided in Chapter 2.

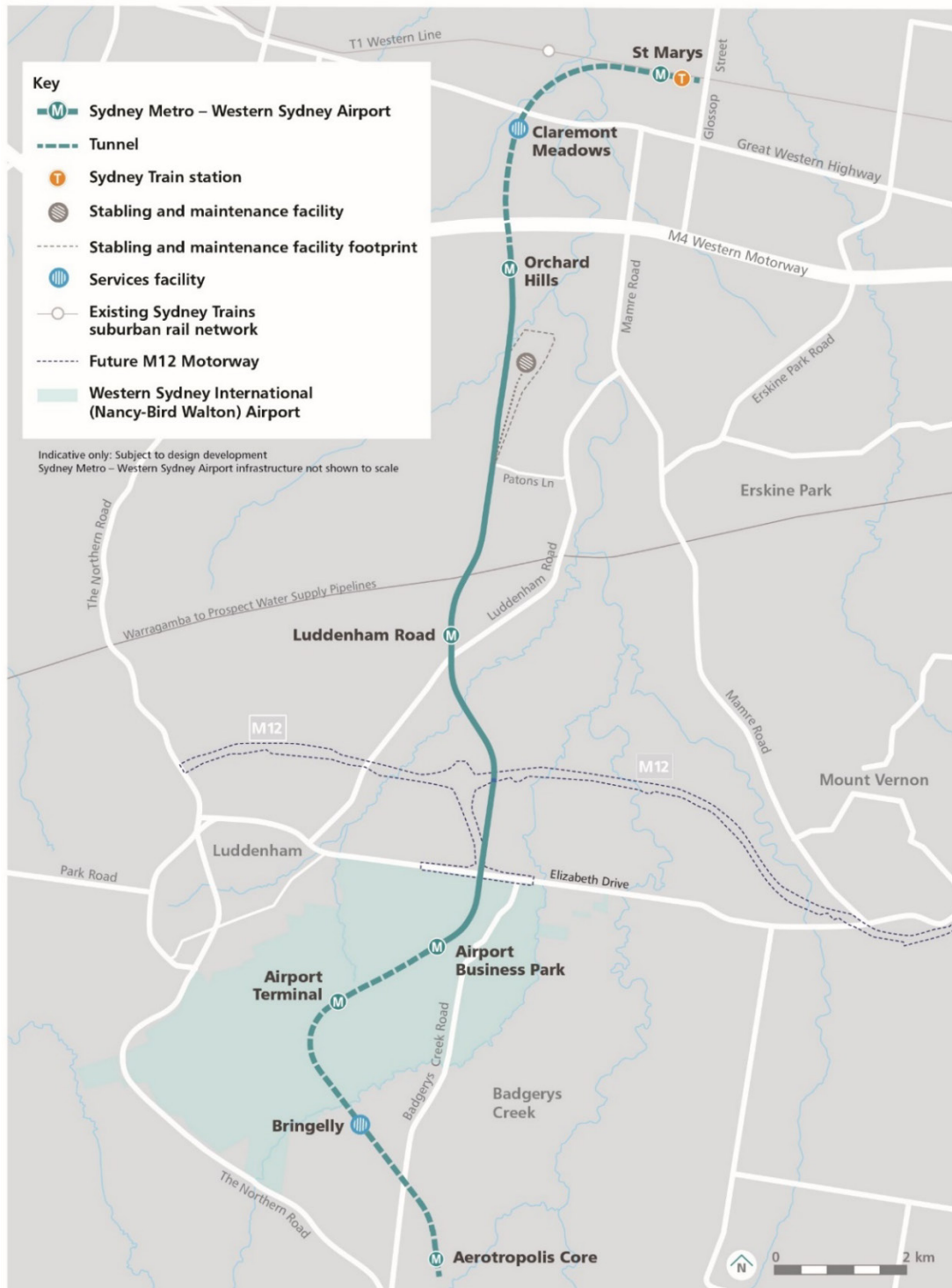


Figure 1-1 Overview of the project

1.3 Project need

The project is needed to:

- service a growing population in the Western Parkland City
- provide rail access to Western Sydney International and the Aerotropolis
- deliver an efficient connection to the T1 Western Line (to provide a link to the Central River and Eastern Harbour cities)
- open access to jobs and increase the potential for jobs growth in the Western Economic Corridor (including Western Sydney International and the Aerotropolis precincts) and in the Greater Penrith to Eastern Creek Growth Area
- facilitate the movement of workers and airline passengers westwards, helping to rebalance demand and supply across Greater Sydney
- support and shape the sustainable growth of the Western Parkland City by optimising land use around station precincts
- create opportunities for precinct planning that would improve liveability in and around station precincts.

1.4 Project objectives

A robust set of objectives has been developed to represent the outcomes to be achieved by the project (see Figure 1-2). The objectives have underpinned the options evaluation process and guided decision-making during design development. The objectives will also be used to guide decision-making during future design development for the project.



	1 Safe and customer focused transport service	Deliver easy, safe and accessible transport services that meet the needs of our customers
	2 Successful airport and Western Parkland City	Support the long-term success of Western Sydney International and the Western Parkland City by optimising land use and development, transport and green infrastructure
	3 Attracting knowledge and internationally competitive jobs	Support Western Sydney's International competitiveness and productivity by supporting employment precincts and attracting knowledge-intensive jobs
	4 Realising the 30-minute city	Connect Western Sydney communities with an integrated transport network to maximise the 30-minute city catchment of the Western Parkland City and adjoining cities and regions
	5 Great places with an increased housing supply	Facilitate the development of the Western Parkland City to create liveable, vibrant and environmentally sustainable precincts and places with a diverse mix of new dwellings
	6 Delivering a value for money solution	Ensure a value for money, sustainable and deliverable solution to support long-term growth of the Western Parkland City

Figure 1-2 Project objectives

1.5 Planning approvals

There are three principal statutory schemes that govern the planning and assessment process for the project:

- *NSW Environmental Planning and Assessment Act 1979* (EP&A Act) applies to works located on land outside the footprint of Western Sydney International (off-airport), to be assessed under Division 5.2 as State significant infrastructure
- *Commonwealth Airports Act 1996* (Airports Act) applies to works located within the footprint of Western Sydney International (on-airport) and requires a variation to the existing Airport Plan
- *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act):
 - for works located on State land to the north of Western Sydney International (off-airport), assessment and approval is required under Part 8 and 9 of the EPBC Act to address impacts on listed threatened species and communities, and Commonwealth land
 - for works located south of Western Sydney International (off-airport), impacts of the project on matters of national environmental significance and Commonwealth land have already been assessed and approved under a strategic assessment in accordance with Part 10 of the EPBC Act.

This appendix, in conjunction with Technical Paper 3 (Biodiversity Development Assessment Report), provides the assessment required under Part 8 of the EPBC Act for works located off-airport and to the north of Western Sydney International.

1.6 Proponent

The proponent for the project is Sydney Metro, a NSW Government agency which has the responsibility for developing and delivering metro railways and managing their operation.

The Preliminary Documentation Guidelines require details of the environmental history of the person proposing to take the proposed action. There has been no change to the environmental record of Sydney Metro (the Proponent for the proposed action) from the history described in Section 6 of the Referral (EPBC 2020/8687). There are no proceedings under a Commonwealth, State or territory law for the protection of the environment, or the conservation and sustainable use of natural resources, against Sydney Metro.

1.7 Purpose and structure of this document

The purpose of this document is to set out the information requested for the assessment of the relevant impacts of the proposed action. The information aims to enable interested stakeholders and the Minister to understand the environmental consequences of the proposed development in relation to the matters controlled by the EPBC Act.

This appendix, in conjunction with Technical Paper 3 (Biodiversity Development Assessment Report), addresses information requested in the Preliminary Documentation Guidelines. This document is structured to:

- form part of the overall Project Environmental Impact Statement for the off-airport components of the project which is to be assessed under the EP&A Act and is included as Appendix K of the Project Environmental Impact Statement
- build on information provided in Referral EPBC 2020/8687 (the Referral) published on the Department of Agriculture Water and Environment website
- identify where information listed in the Preliminary Documentation Guidelines is addressed. The section headings in this document follow and adopt those set out in the Preliminary Documentation Guidelines.

Table 1-1 Request for Further Information (Preliminary Documentation Guidelines)

Issue	Requirement	Where addressed in Appendix K
Description of the metro rail link	A broad description of the environment and any surrounding areas that may be affected	Section 2.1
	Detailed description of the different components of the proposed off-airport rail works and the scope of works to be carried out	Section 2.2
	Maps to show the size and location of the construction footprint, and planned facilities	Figures 2-1, 2-2a to 2-2c, 2-3, and 2-4a to 2-4c
Description of listed threatened species & communities (sections 18 & 18A)	A description of the ecological characteristics of the species and ecological communities	Section 3.1
	A description of the survey effort and methodology	Section 3.1
	Results of surveys relating to listed threatened species and ecological communities	Section 3.1
	For the Grey-headed Flying-fox, description of the extent of suitable habitat on site and in the region, any important populations, and populations of camps within a distance relevant to the species	Section 3.1
	For Coastal Swamp Oak Forest (CSOF) and Cumberland Plain Woodland (CPW), identification of habitat connectivity in the landscape	Section 3.1
Description of Commonwealth land (s26 & 27A)	Vegetation	Section 4.2
	Animal species	Section 4.3
Impact Assessment	Analysis of relevant impacts, including: <ul style="list-style-type: none"> • detailed assessment of the nature, timing, extent and consequences of likely impacts; • a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible; • any technical data and other information used or needed to make a detailed assessment of the relevant impacts; and • details of the methodology and data sources used in informing the assessment. 	Section 5.1
	In relation to species and communities that may be impacted by the proposed action: <ul style="list-style-type: none"> • its occurrence at the site of the proposed action; • the listing status; • the size and placement of impacts relative to the area of occurrence, or in the context of landscape connectivity; • the ecological context; • the total area (hectares) of habitat or vegetation that will be impacted; and • the area impacted (habitat for Grey-headed Flying Fox, CPW & CSOF) occurring on Commonwealth lands. 	Section 5.1

Issue	Requirement	Where addressed in Appendix K
	In relation to relevant nationally listed threatened species and ecological communities: <ul style="list-style-type: none"> how the proposed action is not inconsistent with the Australia's international obligations, specifically the Biodiversity Convention, the Apia Convention and CITES; implications of the proposed action with respect to relevant conservation advices; the actions set out in relevant recovery plans and threat abatement plans in relation to the proposed action that support recovery of each species or community. 	Section 5.2
	Identify cumulative impacts from Stage 1 development of the airport and this proposed action, and cumulative impacts from the whole north-south rail corridor and this proposed action.	Section 5.3
Avoidance and mitigation measures	A description of the environmental outcomes	Section 6.1
	A description of proposed safeguards and mitigation measures	Section 6.2, Table 6-1 and Table 6-2
	Assessment of the expected or predicted effectiveness	Section 6.3
	Any statutory or policy basis for the mitigation measures	Section 6.4
	A description of contingency or adaptive management measures	Section 6.5
Offsets	Quantify the offsets required in compensation for residual impacts	Chapter 7
Consultation	Any consultation about the proposed action	Chapter 8
Environmental history of the person proposing to take the action	Details of any proceedings under a Commonwealth, state or territory law for the protection of the environment, or the conservation and sustainable use of natural resources, against the person proposing to take the action	Section 1.6
Economic and social matters	The economic and social impacts of the proposed action, both positive and negative	Chapter 9
Conclusion	Summarise key environmental impacts, avoidance and mitigation measures, as well as offsets	Section 10.1
	Provide an overall conclusion on the environmental acceptability of the proposed action, include discussion on whether proposed mitigation measures are sufficient to manage the additional impacts to the environment arising from the proposed action	Sections 10.2 and 10.3
	Discuss compliance with principles of ecologically sustainable development	Section 10.4

This document is draft only and is subject to exhibition requirements under section 95A of the EPBC Act. Following exhibition, this document would be updated to reflect the finalisation of the environmental assessment components for the off-airport proposed action.

2 Description of metro rail link

2.1 Broad description of the environment

The proposed action is located within the Penrith Local Government Area, between St Marys in the north and the northern boundary of Western Sydney International. The topography of St Marys is relatively flat, with higher ground towards Claremont Meadows. Elevations are generally flat towards Orchard Hills, with the topography to the east and west of the proposed action more elevated. The area to the north of the M4 Western Motorway is characterised by low-density residential dwellings in St Marys and Claremont Meadows, with some medium density residential development around the edges of St Marys Town Centre.

The landscape to the south of the M4 Western Motorway is a mix of rural residential development and farmland, as well as a largely undeveloped area of Commonwealth land incorporating the Defence Establishment Orchard Hills (DEOH) site. The suburbs of Orchard Hills and Luddenham are likely to be subject to significant land use and development change in the future.

Further details of the environment in which the proposed action is located is described in Chapter 4 (Landscape Context) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement.

2.2 Description of the proposed action

2.2.1 Operational components

Overview

The proposed action comprises the following operational features (see Figure 2-1):

- around 4.3 kilometres of twin rail tunnels (generally located side by side) between St Marys (the northern extent of the proposed action) 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 (the southern extent of the proposed action), consisting of a combination of viaduct and surface rail alignment
- three new metro stations:
 - St Marys (providing interchange with the T1 Western Line)
 - Orchard Hills
 - Luddenham Road
- 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 (the pipelines), Luddenham Road, the future M12 Motorway and Elizabeth Drive
 - crossings of Blaxland Creek and Cosgroves 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 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 and east of the proposed metro track
- an integrated tunnel ventilation system including a potential service facility at Claremont Meadows (the need for this facility is subject to ongoing investigation)

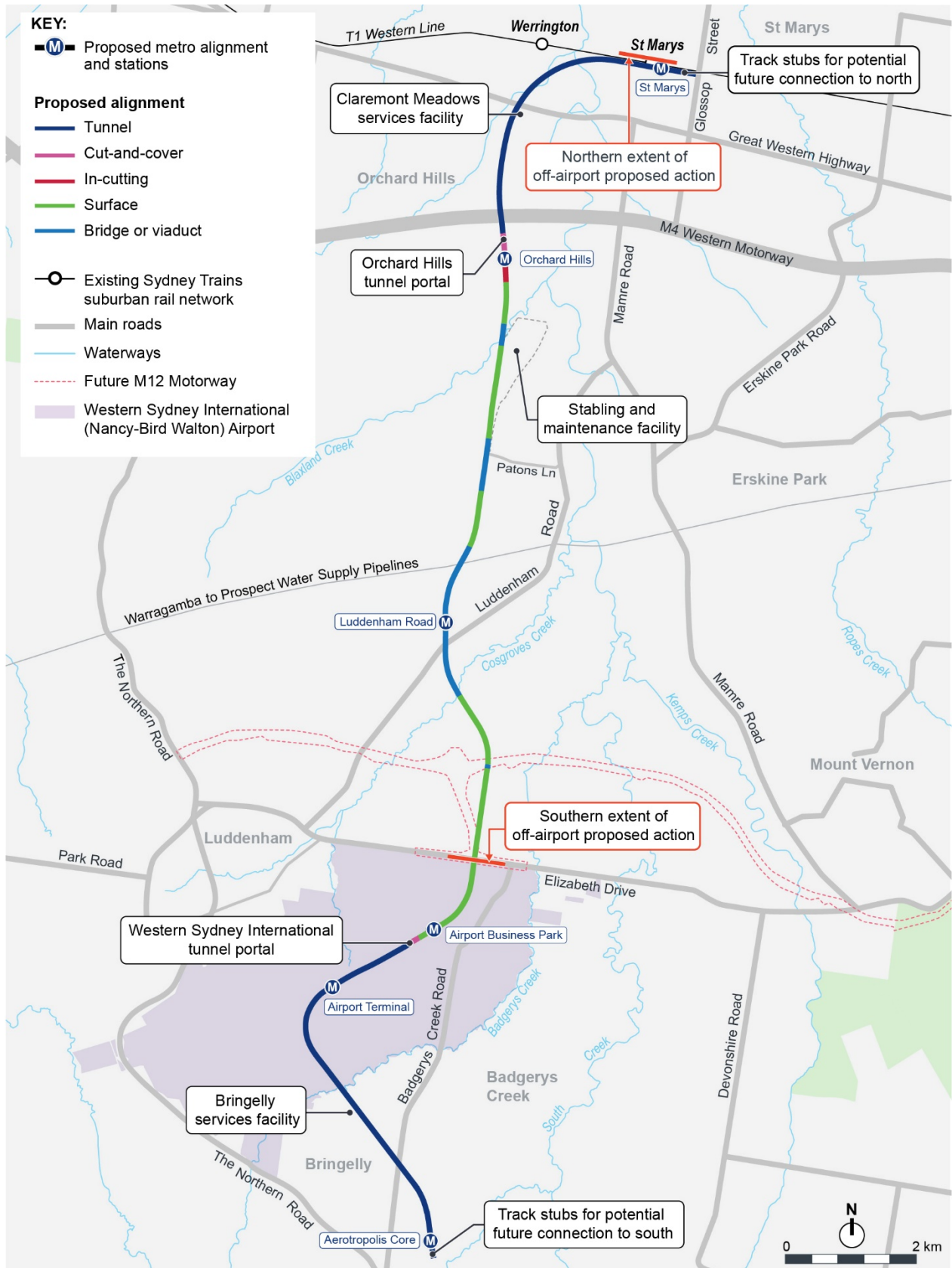


Figure 2-1 Overview of the proposed action off-airport

- 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.

The proposed action would be located within a dedicated and restricted access rail corridor. The track alignment for the project would involve:

- track designed with fit-for-purpose horizontal and vertical alignment that consists of a combination of twin rail tunnels, viaduct, surface and in-cutting track types, including connection to the stabling and maintenance facility
- twin standard gauge tracks to allow two-way rail movements, with turnouts and one or more intermediate crossovers at various locations along the alignment
- turnbacks at the northern and southern ends of the project
- additional tunnel stubs to the east of St Marys Station and south of Aerotropolis Core Station to safeguard potential future extensions
- rail sidings to the north of Elizabeth Drive to allow for the temporary storage of trains during operation.

Metro alignment and track infrastructure

The alignment has been designed to meet the functional requirements of a metro system including the need to:

- provide a maximum vertical grade of 4.5 per cent
- locate station platforms along a straight and level (i.e. a zero per cent grade) section of track
- provide appropriate curvature to accommodate proposed train operating speeds. Tighter radius curves may be adopted at some locations for a variety of reasons, including avoiding surface or subsurface constraints such as areas of ecological sensitivity, flood prone land and other existing or proposed infrastructure
- consider integration with, or crossing of, existing and proposed future transport and other infrastructure.

The alignment has also aimed to:

- avoid existing development including existing buildings, utilities and infrastructure (including other rail and road infrastructure)
- minimise, as far as practicable, direct impacts on private property
- minimise impacts on environmental features such as ecologically sensitive areas, heritage items, areas of contamination and areas of flood prone land
- minimise impacts on sensitive residential receivers and recreational land uses
- provide future land use and movement connectivity across the corridor, particularly in areas planned for future development, such as the Northern Gateway precinct of the Western Sydney Aerotropolis.

The proposed horizontal and vertical alignment is shown in Figure 2-2a to 2-2c and would continue to be refined as part of ongoing design development.

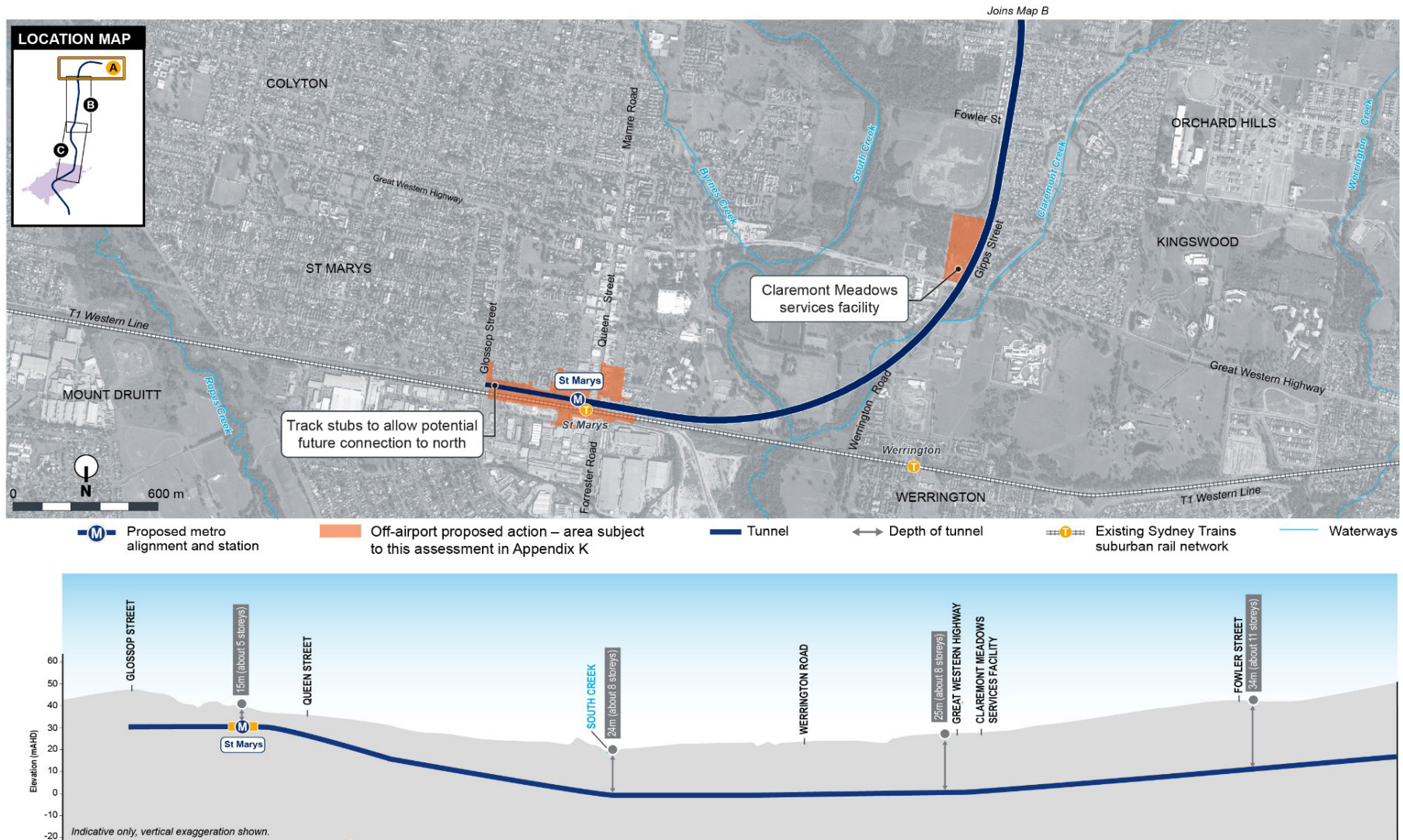
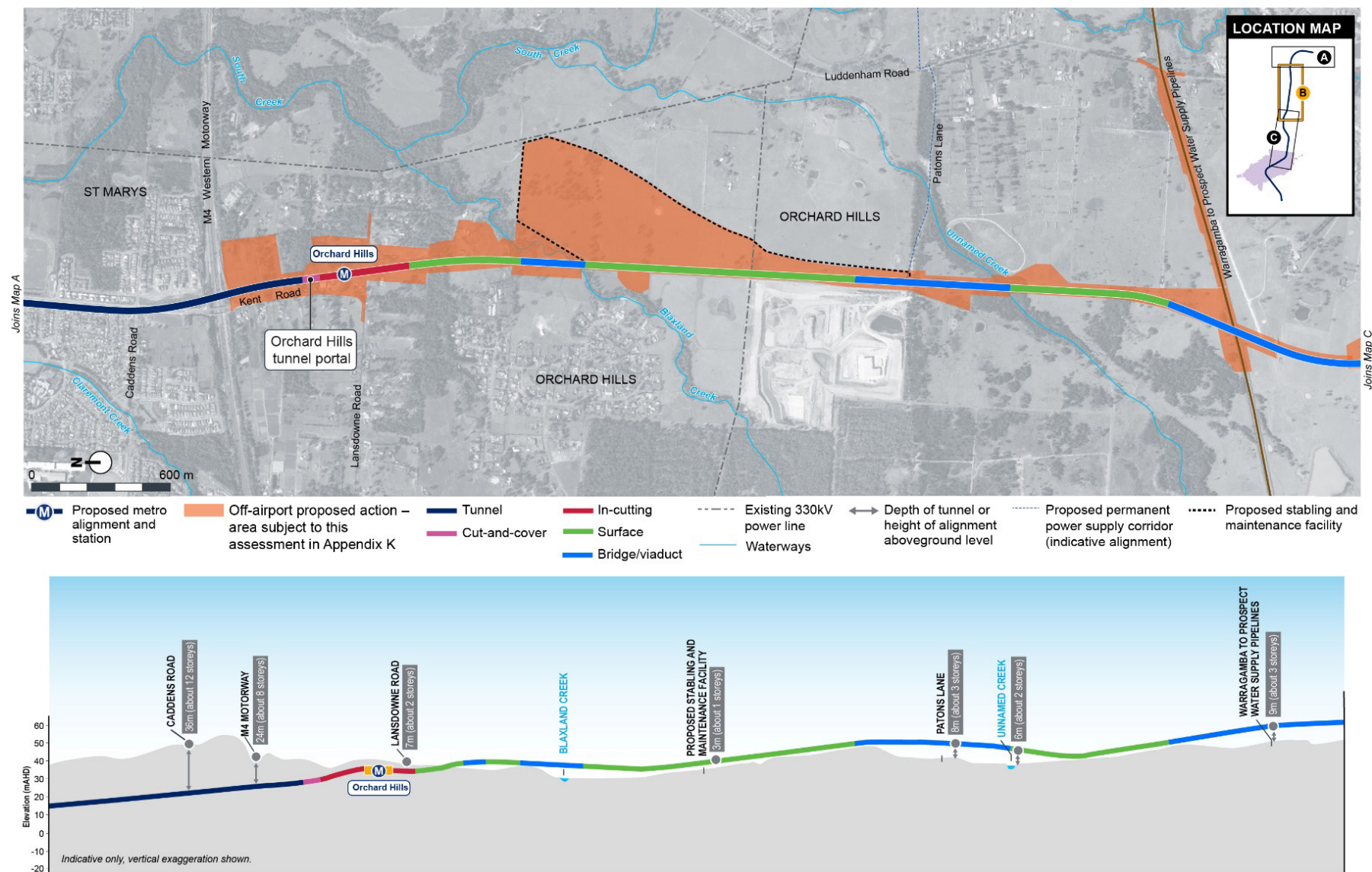


Figure 2-2a Project infrastructure and key features



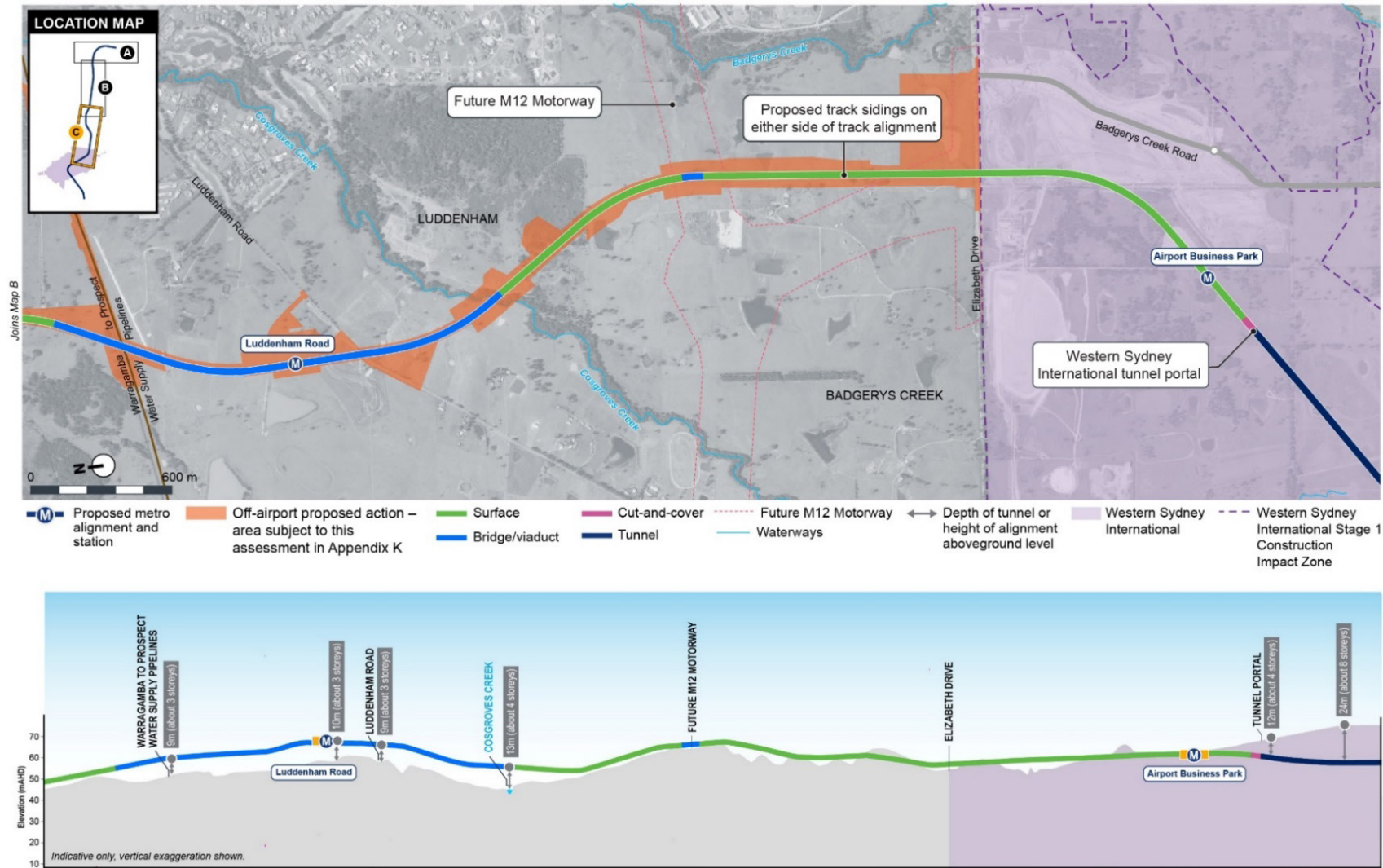


Figure 2-2c Project infrastructure and key features

A tunnel portal is the transition point for the rail track from below ground to surface. A tunnel portal would be required at Orchard Hills, around 450 metres south of the M4 Western Motorway. Tunnel services buildings, including ventilation facilities, to support operations would also be provided. The proposed tunnels and tunnel portal would be designed to minimise water ingress. Appropriate drainage systems would collect runoff from the open sections of the tunnel portal and groundwater seepage into the tunnel, and direct it to the tunnel low points. The water would be treated to a standard suitable for discharge into the surrounding drainage network.

In addition to the ventilation services provided at the tunnel portal, a services facility is also proposed at Claremont Meadows. If required, it would be located in a cleared area near the south-east corner of the intersection of Gipps Street and the Great Western Highway.

Surface tracks refer to the components of the project alignment that are generally at the same level as the existing ground surface, in addition to sections in cuttings or located on embankments. The surface sections of track would generally consist of a slab or ballast track construction with concrete sleepers.

A series of fill embankments and cuttings would be required along the length of the project due to the varying terrain and locational setting of the project within the existing landscape. Batters for cuts and embankments would be designed to minimise property impacts, maintenance requirements and reduce urban design impacts. The batters would typically be designed to have slopes of around 2:1 (horizontal: vertical). Where required, benches (flatter areas between vertical slopes) would be provided to limit the height of each slope section. All earthworks would be designed to fit the surrounding context, providing a 'natural fit' within their landscape setting wherever possible. Retaining walls may be required in the vicinity of stations or along the alignment to suit the new metro tracks or to support new infrastructure as a result of local topography.

The alignment would intersect with infrastructure (such as roads and the Warragamba to Prospect Water Supply Pipelines corridor), a number of watercourses and areas of flood prone land which would require a series of viaduct and bridge structures to cross, as identified in Table 2-1. The viaduct and bridge sections would generally consist of a slab track construction with concrete sleepers.

Table 2-1 Proposed bridge and viaduct structures

Location	Indicative length	Description
Lansdowne Road	30 metres	At Lansdowne Road, the track alignment would be in-cutting and perpendicular to the existing Lansdowne Road. At this location, a new road-over-rail bridge would be provided to maintain the existing alignment of Lansdowne Road over the rail track.
Blaxland Creek	360 metres	The proposed viaduct to cross Blaxland Creek would potentially consist of a series of spanning structures that would have an overall length of around 360 metres to clear the potential flood zone at this location. The viaduct structure would typically consist of an elevated concrete structure supported on reinforced concrete piers.
Patons Lane	830 metres	The proposed viaduct to cross Patons Lane and an unnamed tributary of South Creek to the south of Patons Lane would consist of a series of spanning structures and would have an overall length of around 830 metres to clear all existing infrastructure, the potential flood zone and vegetation in this location.
Warragamba to Prospect Water Supply Pipelines, Luddenham Road and Cosgroves Creek	2,500 metres	The proposed viaduct to cross the Warragamba to Prospect Water Supply Pipelines, Luddenham Road and Cosgroves Creek would consist of a series of spanning structures and would have an overall length of around 2.5 kilometres to clear all infrastructure and the potential flood zone in this location. Luddenham Road Station would be located on this viaduct structure.

Location	Indicative length	Description
Future M12 Motorway	95 metres	The project would cross the proposed alignment of the future M12 Motorway to the north of Elizabeth Drive, before entering Western Sydney International. The project would be grade separated on a new rail-over-road bridge with the future M12 Motorway located in a cutting under the metro rail line. The bridge would be designed to provide the required clearance to the future M12 Motorway.

Note

The design of the proposed bridge and viaduct structures is indicative and subject to ongoing design development.

Wildlife connectivity

The design of the proposed action considers wildlife connectivity requirements across the project corridor where security fencing is not required. This has included appropriate design of bridge and drainage structures which would allow for ongoing fauna movements. Locations at which fauna connectivity has been considered and incorporated includes:

- the proposed bridge structures in the vicinity of Blaxland Creek and Cosgroves Creek
- the proposed viaduct structure crossing two existing vegetation corridors at Patons Lane and the unnamed watercourse to the south of Patons Lane
- a culvert measuring around 1.5 metres in diameter providing connectivity for wildlife at Blaxland Creek to the east of Orchard Hills
- a culvert measuring around 1.5 metres in diameter providing connectivity for the wildlife link around 600 metres north of the Warragamba to Prospect Water Supply Pipelines.

Fauna connectivity measures would be refined as part of the ongoing design development of the project.

Metro stations

Each metro station would have a number of common elements or design features. These would include:

- station concourses (both paid and unpaid), including elements such as ticket vending machines, ticket barriers and access to and from the platform and toilets
- emergency stairwell access (typically at the ends of each station)
- platforms with elements such as seating, help points to enable customers to obtain emergency assistance, real-time customer information display screens and public address systems
- vertical transport, including a combination of escalators, lifts and stairs
- cross-corridor connections which provide access across rail lines to ensure permeability
- station service and utilities buildings/facilities
- signage and wayfinding within the station and the surrounding public domain
- awnings for shade and shelter at station entries as well as along station platforms
- provision of space for potential retail and other uses to activate the stations and station precincts
- enhancements to and/or provision of footpaths in the immediate vicinity of the station entries
- landscaping and street furniture to maintain high quality urban design outcomes.

Further information on the operational features of the three stations within the proposed action can be provided if required.

Stabling and maintenance facility

The proposed stabling and maintenance facility would be located in Orchard Hills, to the south of Blaxland Creek and east of the proposed metro track (see Figure 2-3). Trains would be stabled and

maintained at this dedicated facility. This would be an integrated facility incorporating most operational functions including the operations control centre and all infrastructure required to maintain the train fleet.

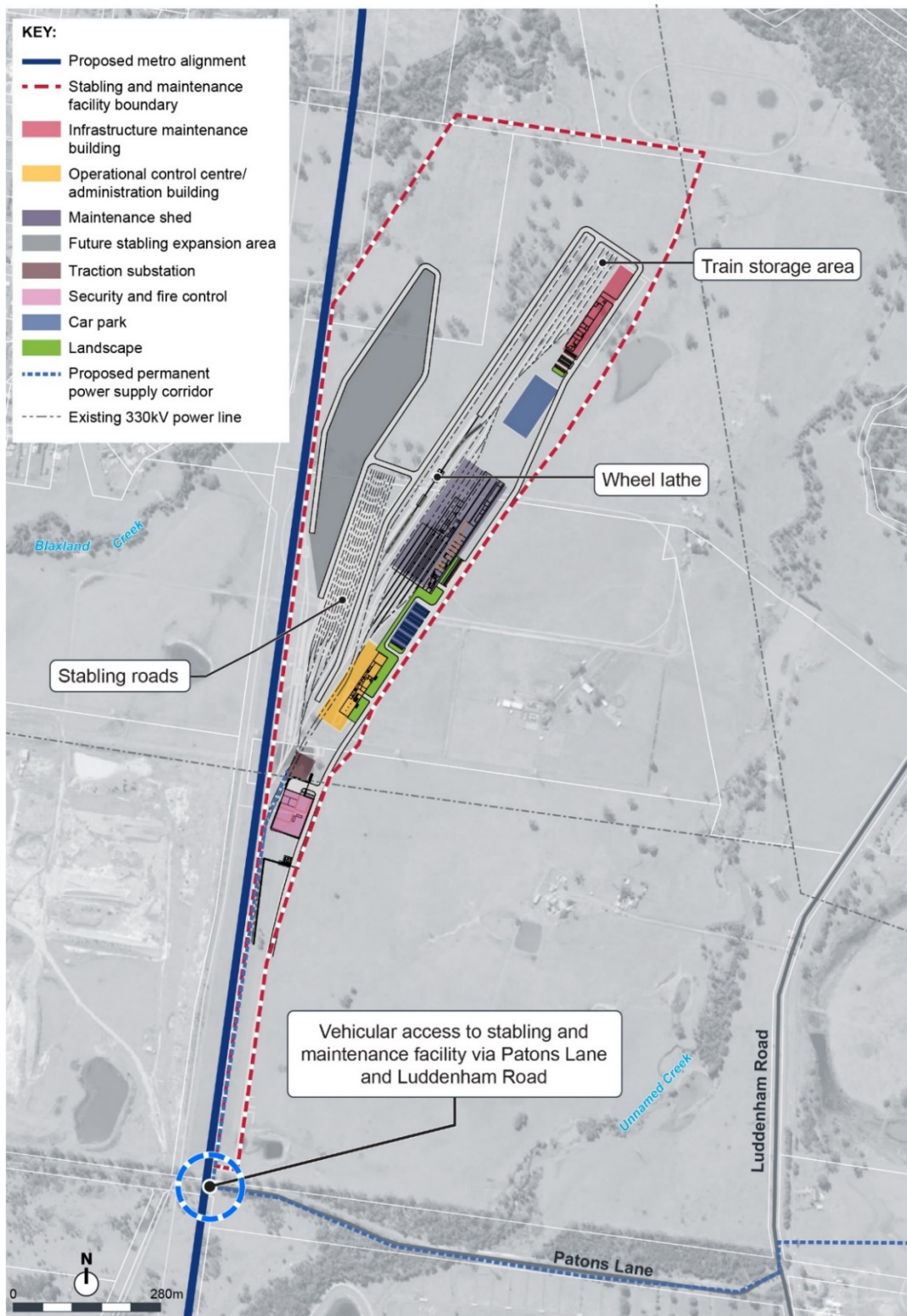


Figure 2-3 Stabling and maintenance facility

The stabling and maintenance facility layout has been configured to allow for access/egress to the main track alignment at both the northern and southern ends of the stabling and maintenance facility. Vehicular access would be provided via separate access/egress points on Luddenham Road and Patons Lane (for general staff access as well as delivery and large vehicle access). An internal access road network would provide for general circulation while appropriately separated from train movements and with limited crossing points. The site would also be fenced from general public access and lighting would be used at night for safety and security of the site.

The stabling and maintenance facility would include:

- a vehicle equipment measurement system which would provide an automated inspection of the train cars as they enter the stabling and maintenance facility to determine their serviceability and safety
- up to 10 stabling roads to store trains, and test tracks to undertake train testing and commissioning
- an infrastructure maintenance shed
- a train monitoring system to allow for monitoring of vehicle integrity, brake systems, wheels, pantographs and other vehicle equipment
- train wash facilities and wheel lathe
- operations control centre, administration building and driver training facility
- a traction substation and a bulk power supply point
- area for site security personnel
- offices and general storage areas
- staff car parking and internal access roads
- fire control systems including the provision of fire hydrants, hoses and other firefighting equipment within the facility
- on-site water detention, water quality treatment basins and site landscaping.

A detailed description of the operations of the project as a whole is provided in Chapter 7 (Project description – operation) of the Project Environmental Impact Statement.

2.2.2 Construction elements

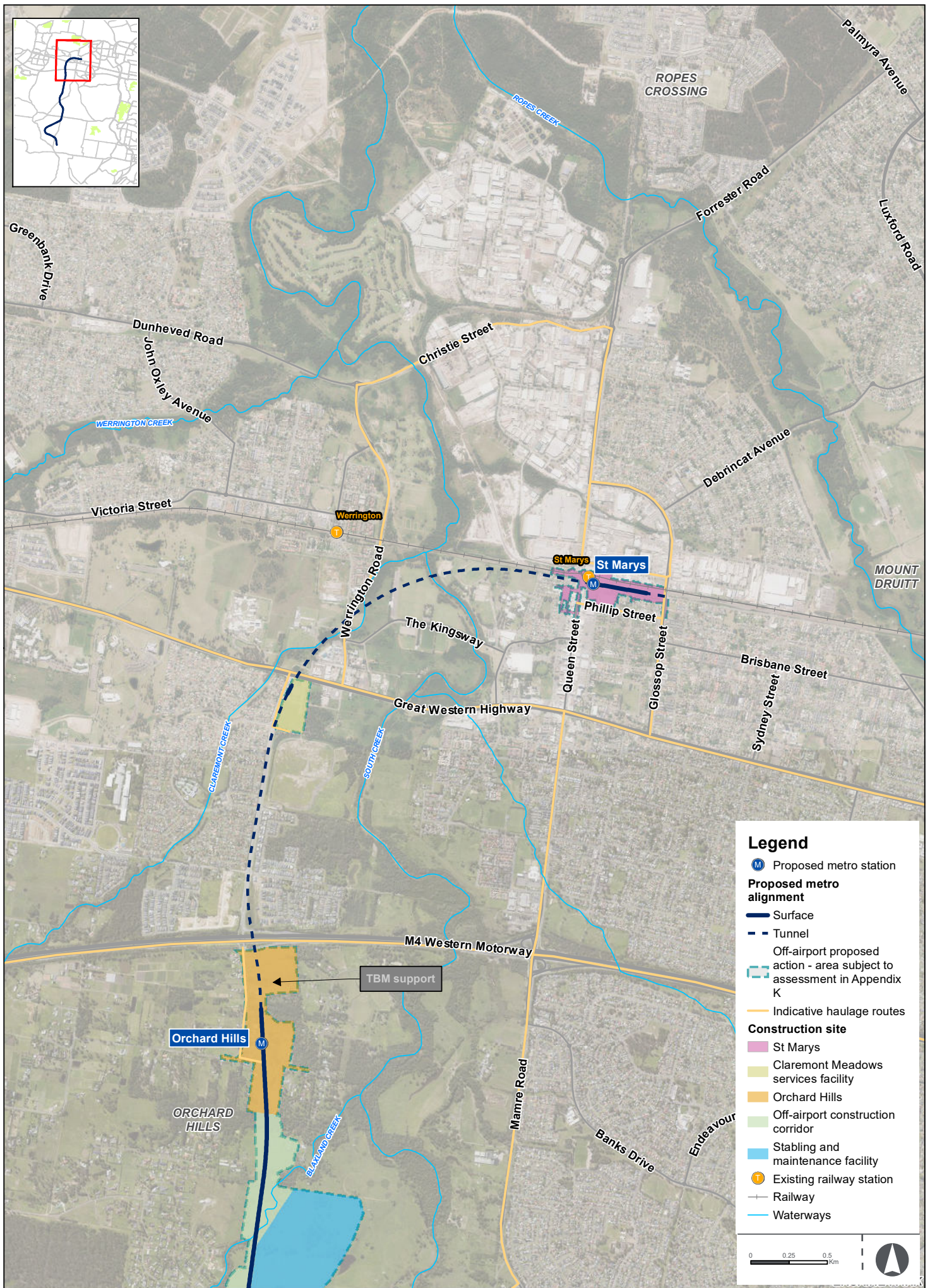
The proposed construction activities that would be undertaken for the proposed action include:

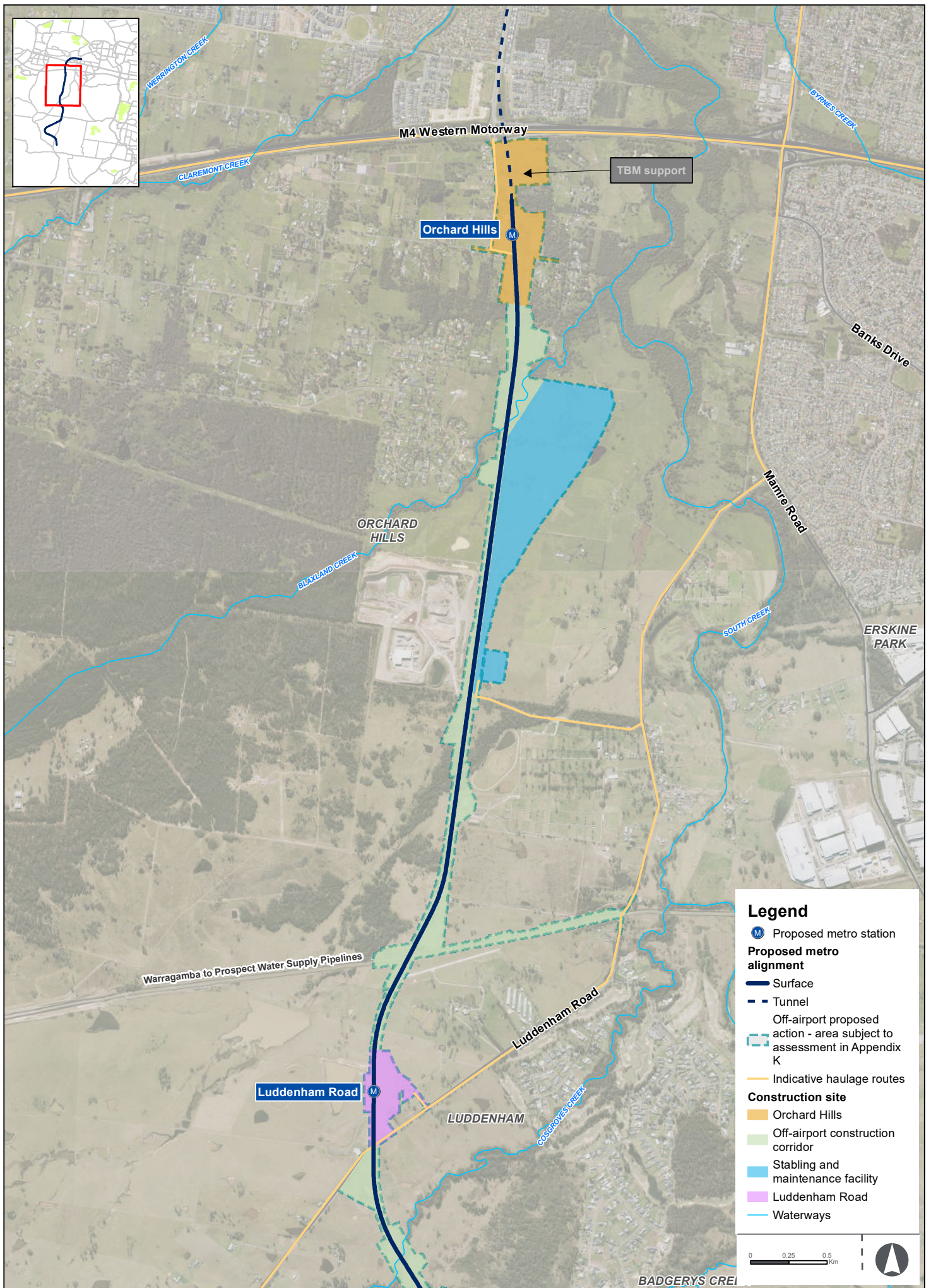
- enabling works
- main construction works including:
 - tunnelling and associated works
 - corridor and associated works
 - stations and associated works
 - ancillary facilities and associated works
- rail systems fitout
- finishing works and testing and commissioning.

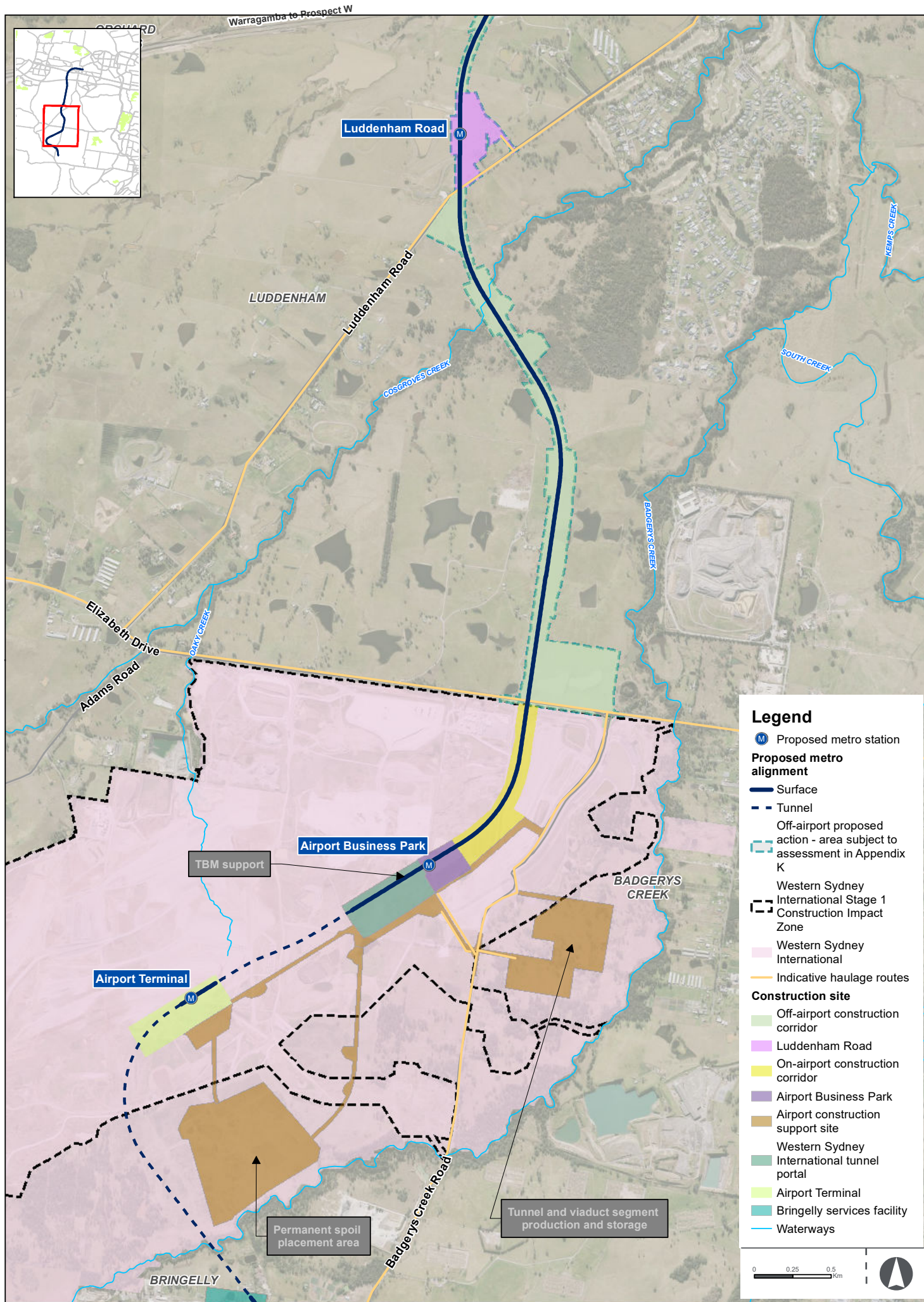
The proposed action construction footprint and key construction sites proposed for use during construction of the proposed action are shown in Figure 2-4a to 2-4c.

A detailed description of the construction of the project as a whole is provided in Chapter 8 (Project description – construction) of the Project Environmental Impact Statement.

Construction of the proposed action is expected to commence in 2021, subject to approvals. The project is anticipated to take around five years to complete.







3 Description of listed threatened species and communities

3.1 Description of ecological characteristics

A description of the ecological characteristics of the listed threatened species and ecological communities is provided in Chapter 5 (Native vegetation and threatened ecological communities) and Chapter 7 (Commonwealth Matters of National Environmental Significance) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement.

The description of the survey effort and methodology is provided in Chapter 3 (Methodology) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement. Figure 3-3 of Technical Paper 3 (Biodiversity Development Assessment Report) illustrates the survey effort in relation to the alignment of the project. The results of surveys relating to listed threatened species and ecological communities, as well as a description of the distribution and abundance of the species or community are provided in Chapter 7 (Commonwealth Matters of National Environmental Significance) and Appendix B (Threatened fauna habitat suitability assessment) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement.

The location of vegetation types and threatened ecological communities is shown in Figure 5-1 (Vegetation types and zones) and Figure 5-2 (Threatened ecological communities) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement. Figure 6-1 (Threatened flora species polygons) and Figure 6-2 (Threatened fauna species polygons) of Technical Paper 3 (Biodiversity Development Assessment Report) illustrate the location of threatened species.

For the Grey-headed Flying-fox, information on habitat and populations is provided in Section 7.2.4 (Commonwealth threatened fauna) and Appendix B (Threatened fauna habitat suitability assessment) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement. Section 7.2.4 (Commonwealth threatened fauna) of Technical Paper 3 (Biodiversity Development Assessment Report) also includes a discussion on the effects of the 2019-2020 bushfires on this species.

Information regarding Coastal Swamp Oak Forest (CSOF) and Cumberland Plain Woodland (CPW) is provided in Chapter 7 (Commonwealth Matters of National Environmental Significance) in Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement. Additionally, Section 7.2.2 (Provisional list of EPBC Act listed species and vegetation communities following 2019-2020 bushfires) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement includes a discussion of the effects of the 2019-2020 bushfires on these communities.

These referenced sections of Technical Paper 3 (Biodiversity Development Assessment Report) address the requirements set out in the Preliminary Documentation guidelines.

4 Description of Commonwealth land

4.1 Overview

The proposed action would adjoin the eastern boundary of the DEOH site between Patons Lane and the Warragamba to Prospect Water Supply Pipelines as shown in Figure 4-1. It is proposed to be partially constructed on a portion of Commonwealth land within the DEOH site, adjacent to Stockdale Road, Orchard Hills, comprising:

- Lot 1 DP242968
- Lot 2 DP242968
- Lot 3 DP242968
- Lot 1 DP629326.

This Commonwealth land is described in Section 2.7.2 of the Referral (EPBC 2020/8687) and comprises primarily cleared land with areas of remnant vegetation. With the exception of Stockdale Road, there is currently no permanent built infrastructure located within the Commonwealth land. The DEOH site is also shown on Figures 2-3, 2-4 and 2-5 of the Referral.

An area of around 10 hectares (of the 1,600 hectares site area) would be permanently affected and some additional seven hectares would be temporarily affected through construction activities. It is anticipated that the operational footprint of the proposed action within the DEOH site would be acquired by Sydney Metro and would therefore cease to be Commonwealth land.

Biodiversity offset obligations associated with the approved works for Western Sydney International are to be met through a number of mechanisms, with the majority of offsets to be delivered through the establishment of the Defence Orchard Hills biodiversity offset areas on the western part of the DEOH site. The Defence Orchard Hills biodiversity offset areas are located a considerable distance from the proposed action construction footprint (approximately 800 metres from the northern offset area and at least 1.7 kilometres from the southern offset area), as shown in Figure 4-4. As such, neither direct nor indirect impacts are anticipated on these areas from the proposed action.

A description of the existing environment of the DEOH site is provided in Table 4-1, excluding biodiversity matters which are discussed in Section 4.1 (Vegetation) and Section 4.2 (Animal species).

Table 4-1 Existing environment on DEOH site

Environmental Issue	Existing Environment
Traffic and transport	Transport infrastructure within the vicinity of Commonwealth land includes Stockdale Road (internal Defence road) and Patons Lane. Stockdale Road connects with Patons Lane to provide access to Luddenham Road in the east. No other public or active transport services or infrastructure are located within this area.
Noise and vibration	The existing noise environment of the Commonwealth land is generally representative of a semi-rural environment. The use of the DEOH site would influence existing noise levels as a result of activities including the use of firing ranges and fire training areas, however this influence would not substantially alter the low-noise character of the land. The nearest noise sensitive receivers are located around one kilometre to the east on Luddenham Road.
Non-Aboriginal heritage	There are no local, State or Commonwealth non-Aboriginal heritage items located within or adjacent to the Commonwealth land. The nearest heritage item is the Orchard Hills Cumberland Plain Woodland (Commonwealth heritage item) which is located over 500 metres to the west (see Figure 5-1 and refer to Figure 2-4 of the Referral).

Environmental Issue	Existing Environment
Aboriginal heritage	A search of the Aboriginal Heritage Information Management System (AHIMS) identified one artefact site within the Commonwealth land (refer to Figure 2-4 of the Referral). The Aboriginal heritage assessment report (Technical Paper 5 (Aboriginal heritage) of the Project Environmental Impact Statement) has identified areas of Aboriginal archaeological sensitivity along the proposed alignment within Commonwealth land.
Land use and property	The site covers an area of around 1,600 hectares. The primary function of the site is munitions storage and distribution however a range of activities are carried out at the site including the use of weapons ranges, firing ranges, fire training areas and fuel storage.
Flooding, hydrology and water quality	There is one unnamed watercourse located north of the Warragamba to Prospect Water Supply Pipelines/south of Patons Lane within the Commonwealth land. The land is partially located within the Probable Maximum Flood (PMF) extent for South Creek. The unnamed watercourse forms part of the South Creek catchment which is recognised as having water quality issues resulting from high nutrient concentrations derived from both point and diffuse pollution sources. Water quality in the unnamed watercourse is similarly influenced by diffuse pollution sources associated with historical activities such as vegetation clearing and land uses.
Landscape and visual	The existing visual environment consists of areas of cleared rural land and remnant vegetation. The nearest visual sensitive receivers are located around one kilometre to the east on Luddenham Road. The viewshed of the proposed action is considered to be limited and obscured by vegetation and the natural topography in this location.
Air quality	Air quality within the surrounding area is generally within air quality criteria however where exceedances have occurred these are generally due to exceptional events related to bushfires, hazard reduction burns and dust storms.
Soils and contamination	There is no risk of acid sulphate soils within or adjacent to the Commonwealth land according to acid sulphate soils risk mapping (OEH, 2019). There are no identified contaminated lands regulated under the <i>Contaminated Lands Management Act 1997</i> (NSW) within or adjacent to the Commonwealth land. There is the potential for soil contamination based on the historical use of the land as a Commonwealth Department of Defence base including unexploded ordnance, however this is considered to be unlikely within the area of the Commonwealth land impacted by the proposed action (i.e. the eastern-most boundary).

4.2 Vegetation

The Commonwealth land at the DEOH site has been subject to detailed biodiversity field survey for the proposed action. This information supersedes the desktop information provided in the Referral.

The majority of the Commonwealth land that would be impacted by the proposed action is dominated by exotic vegetation associated with historically cleared land. Fragmented remnant native vegetation is generally restricted to riparian areas containing three vegetation communities (PCTs), all of which are listed as threatened ecological communities (TECs) under the NSW *Biodiversity Conservation Act 2016* (BC Act):

- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (PCT 724 and 849)
- River-flat Eucalypt Forest (PCT 835)
- Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland (PCT 1800).

Vegetation communities are discussed in Chapter 5 (Native vegetation and threatened ecological communities), Chapter 6 (Threatened species) and Chapter 7 (Commonwealth Matters of National Environmental Significance) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement and the extent of vegetation types is shown in Figure 4-2. These vegetation communities provide terrestrial fauna habitat resources and potential habitat for threatened plants.

There are two TECs listed under the EPBC Act that occurs within the Commonwealth land to be impacted by the proposed action:

- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
- Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland.

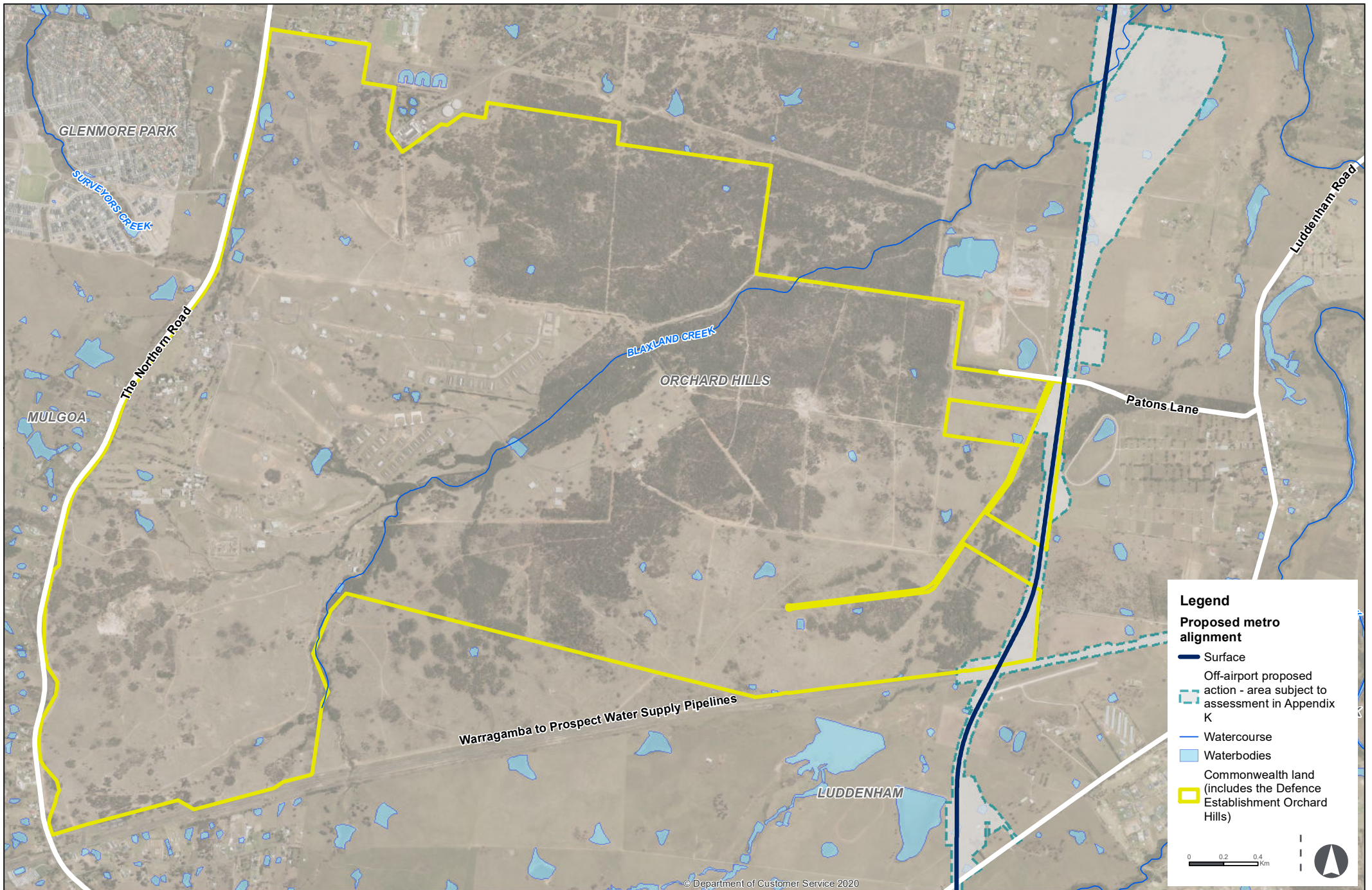
The River-flat Eucalypt Forest community which occurs on Commonwealth land south of Patons Lane is also currently under assessment for listing as a TEC under the EPBC Act.

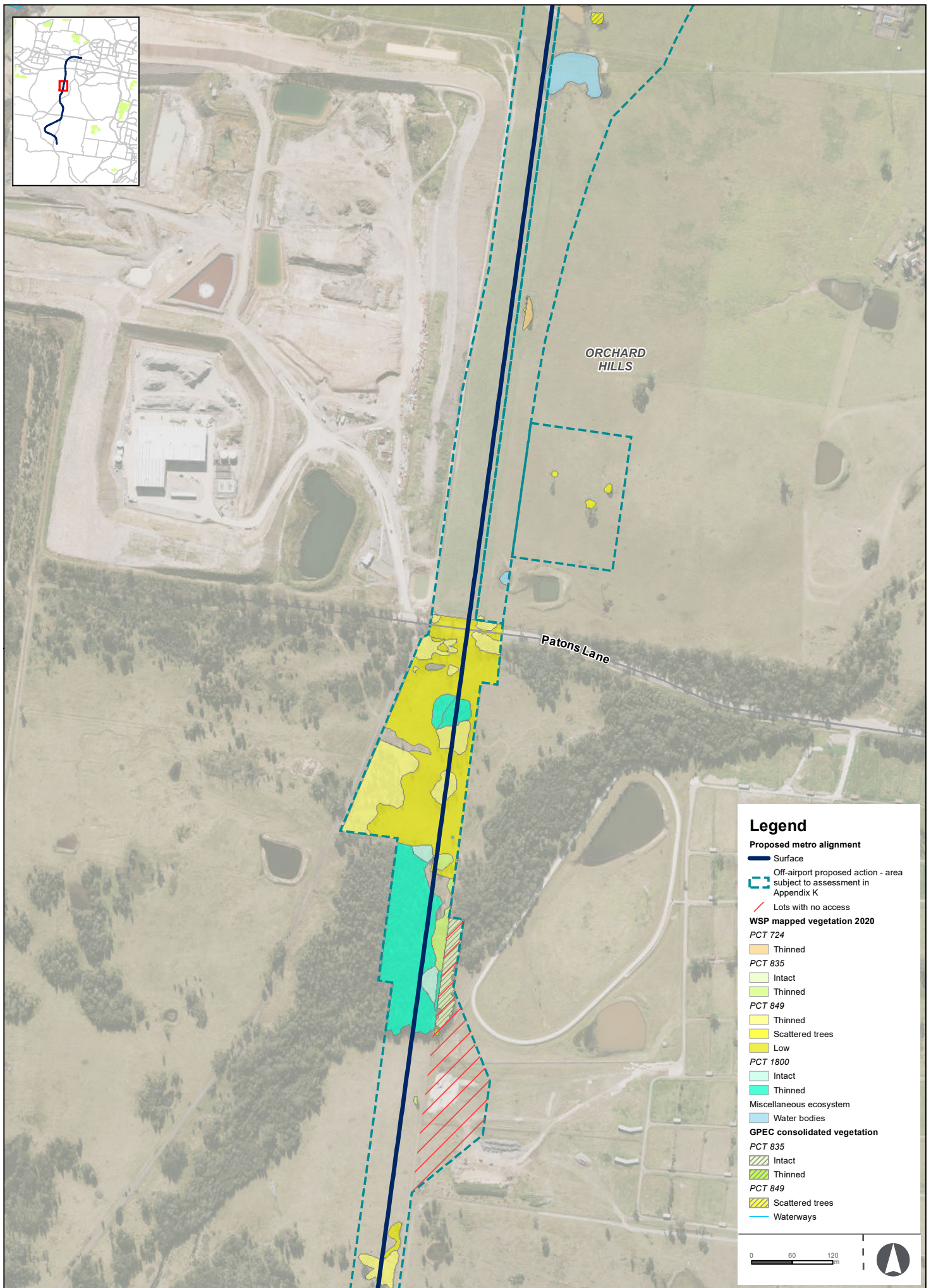
One threatened flora species, *Grevillea juniperina* subsp. *juniperina*, listed as vulnerable under the BC Act was recorded within the Commonwealth land. This species is not listed as threatened under the EPBC Act. Targeted seasonal surveys were conducted within optimal survey months for all species of flora with potential habitat.

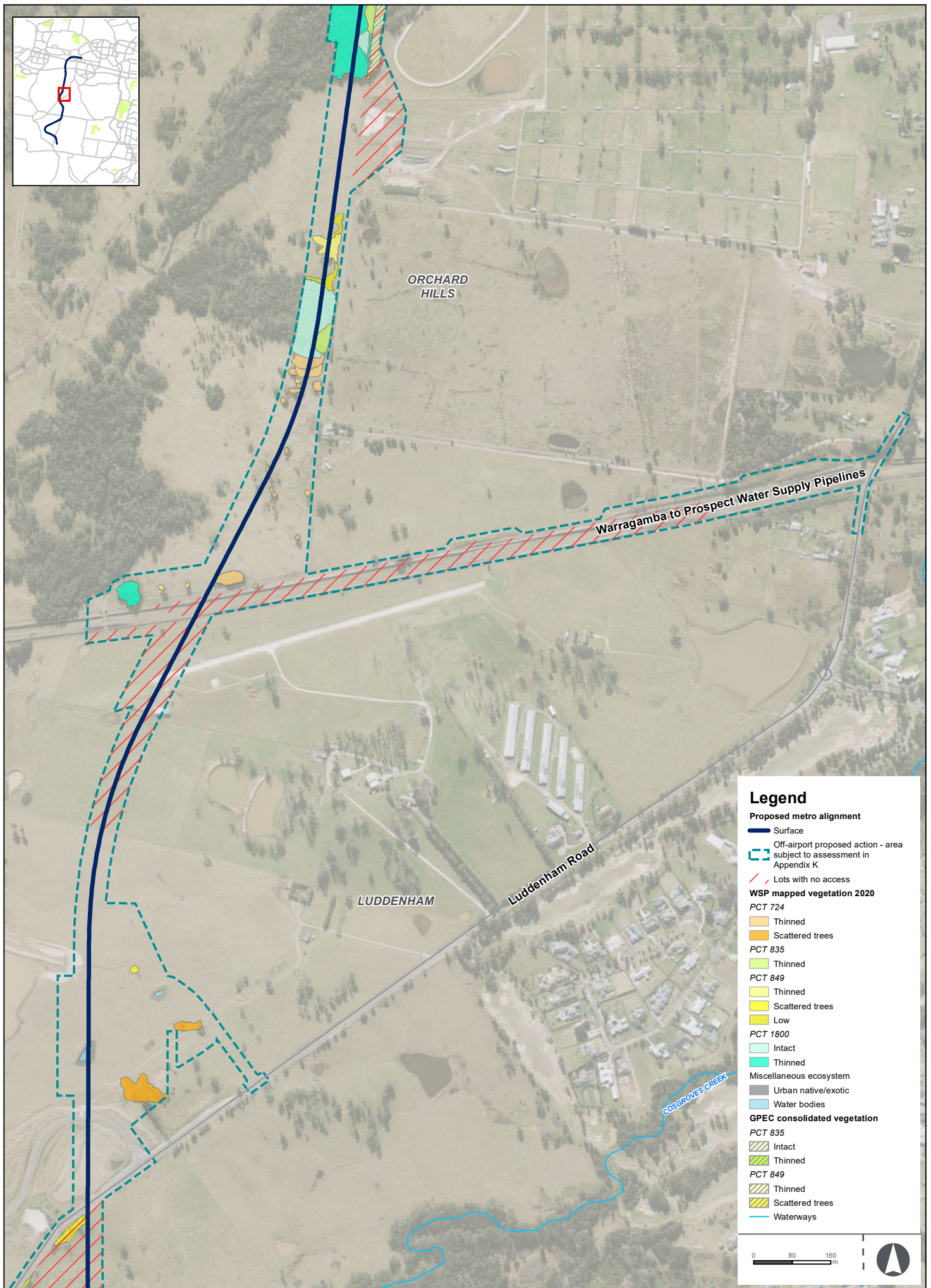
The *Grevillea juniperina* subsp. *juniperina* recorded within the Commonwealth land was located in two separate patch areas (see Figure 4-3):

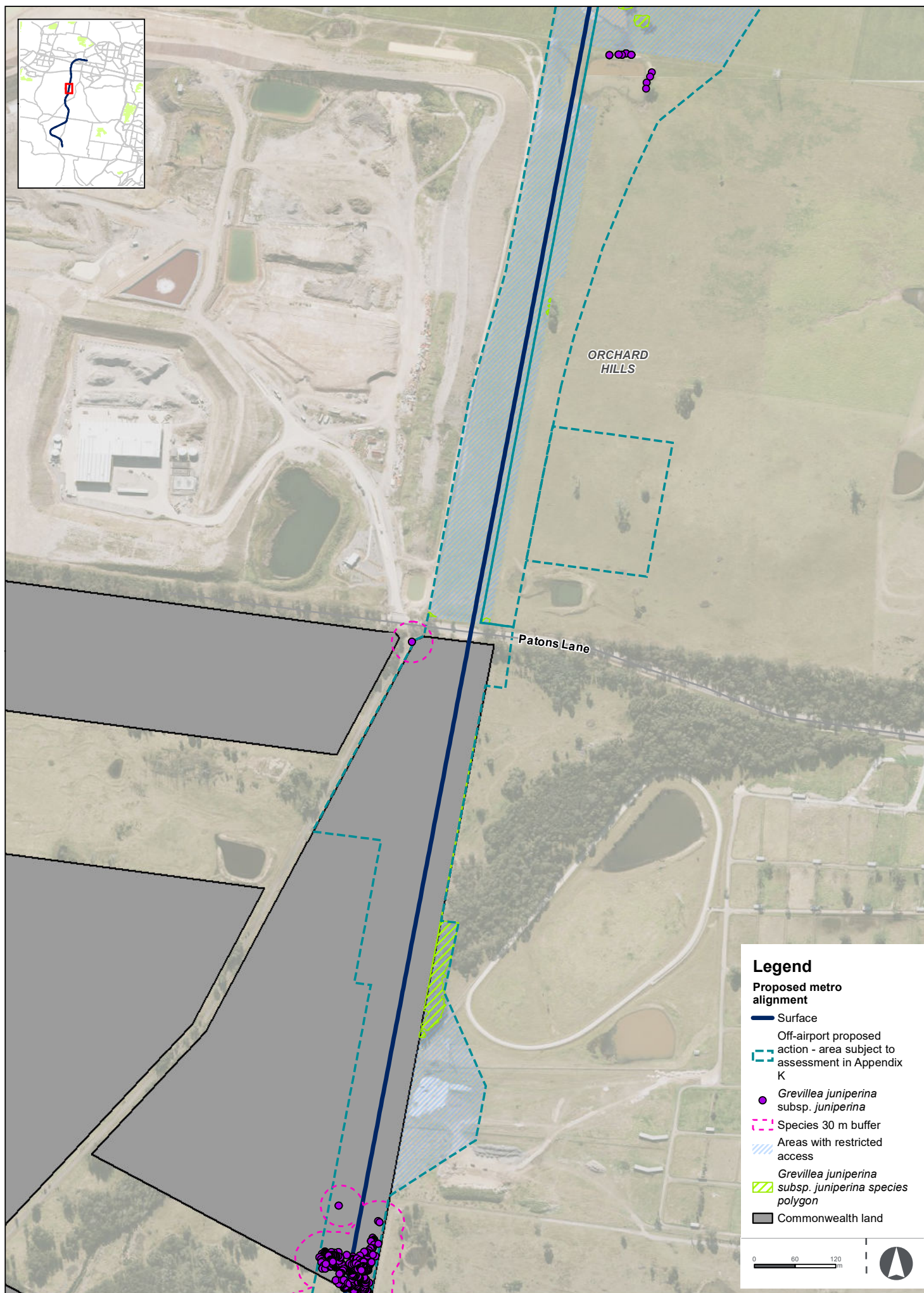
- corner of Patons Lane and Stockdale Road (entrance gate area to the DEOH site)
- the central eastern portion of the DEOH site.

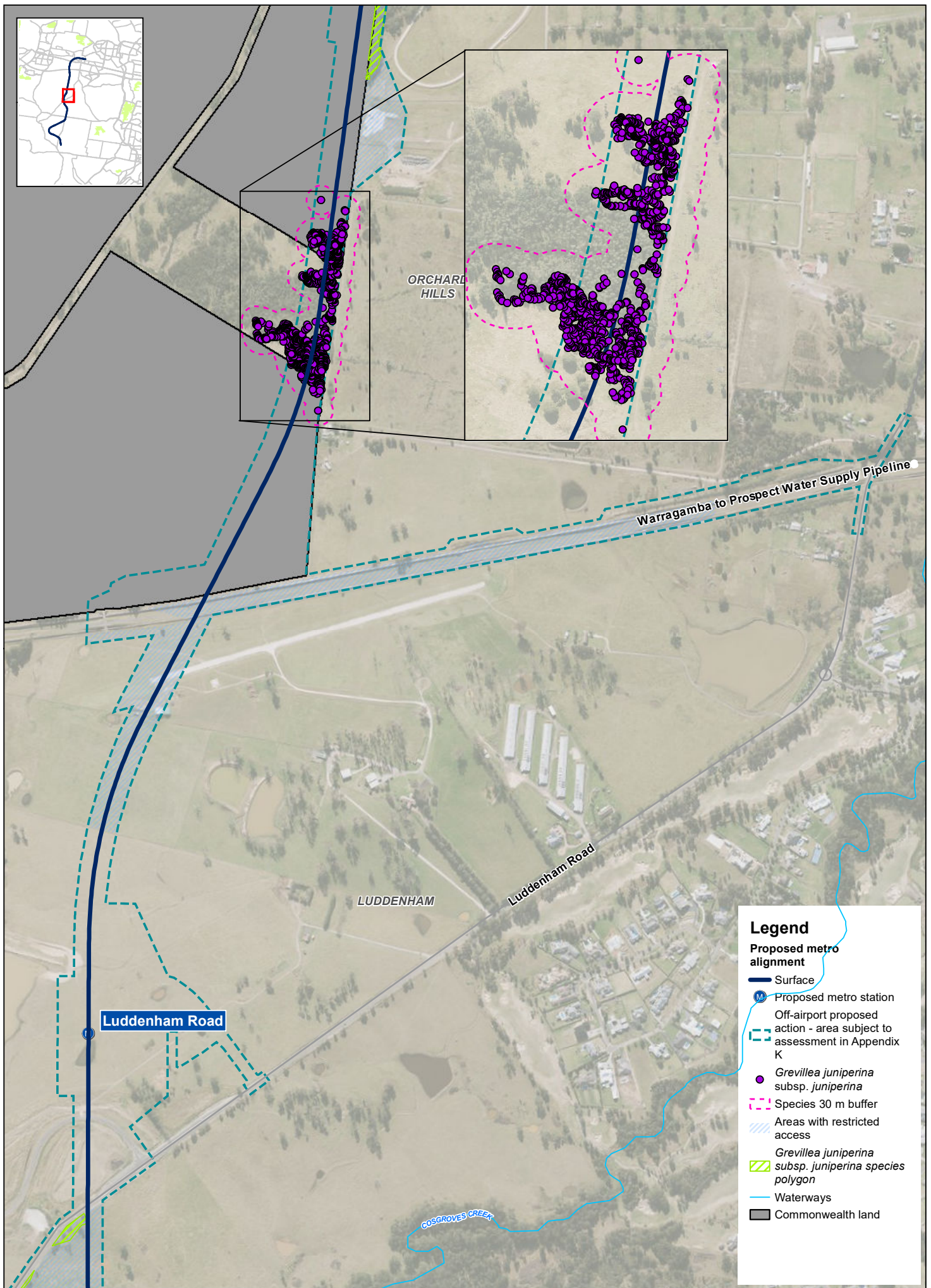
The DEOH site has connectivity to a large bushland patch to the west. This large patch (about 700 hectares) is isolated in the locality and is known to contain a large population of *Grevillea juniperina* subsp. *Juniperina* that is securely conserved within Defence Orchard Hills biodiversity offset areas, located approximately 800 metres and 1.7 kilometres to the west (see Figure 4-4).











4.3 Animal species

Fauna is discussed in Chapter 6 (Threatened species) and Chapter 7 (Commonwealth Matters of National Environmental Significance) in Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement.

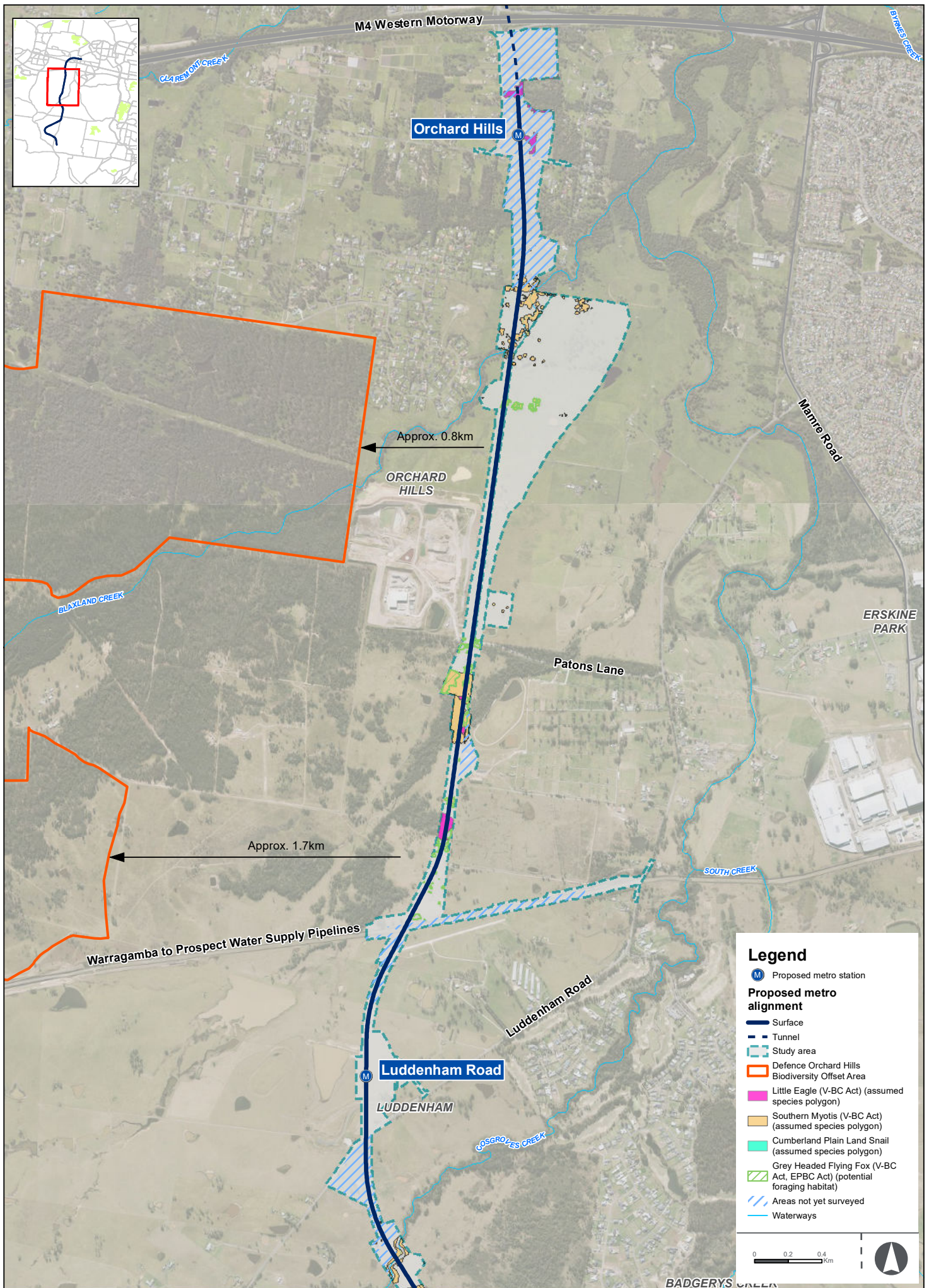
Three threatened fauna species, including the EPBC listed vulnerable Grey-headed Flying-fox and BC Act listed vulnerable *Myotis macropus* (Southern Myotis) and *Hieraaetus morphnoides* (Little Eagle), have been recorded or assumed present within the Commonwealth land. These species are also known to occur and considered to be securely conserved within the Defence Orchard Hills biodiversity offset areas.

Identified habitat for the Grey-headed Flying-fox is shown on Figure 4-4 together with identified habitat for the Little Eagle and the Southern Myotis.

It is noted that the Referral identified the potential for one migratory species in the study area; the white-throated Needletail. Following the field investigations on the DEOH site, an additional three migratory species were either recorded and/or considered to have suitable foraging habitat within the study area. As a result, the potential migratory species within the study area include:

- Latham's Snipe
- White-bellied Sea-eagle
- White-throated Needletail
- Satin Fly-catcher.

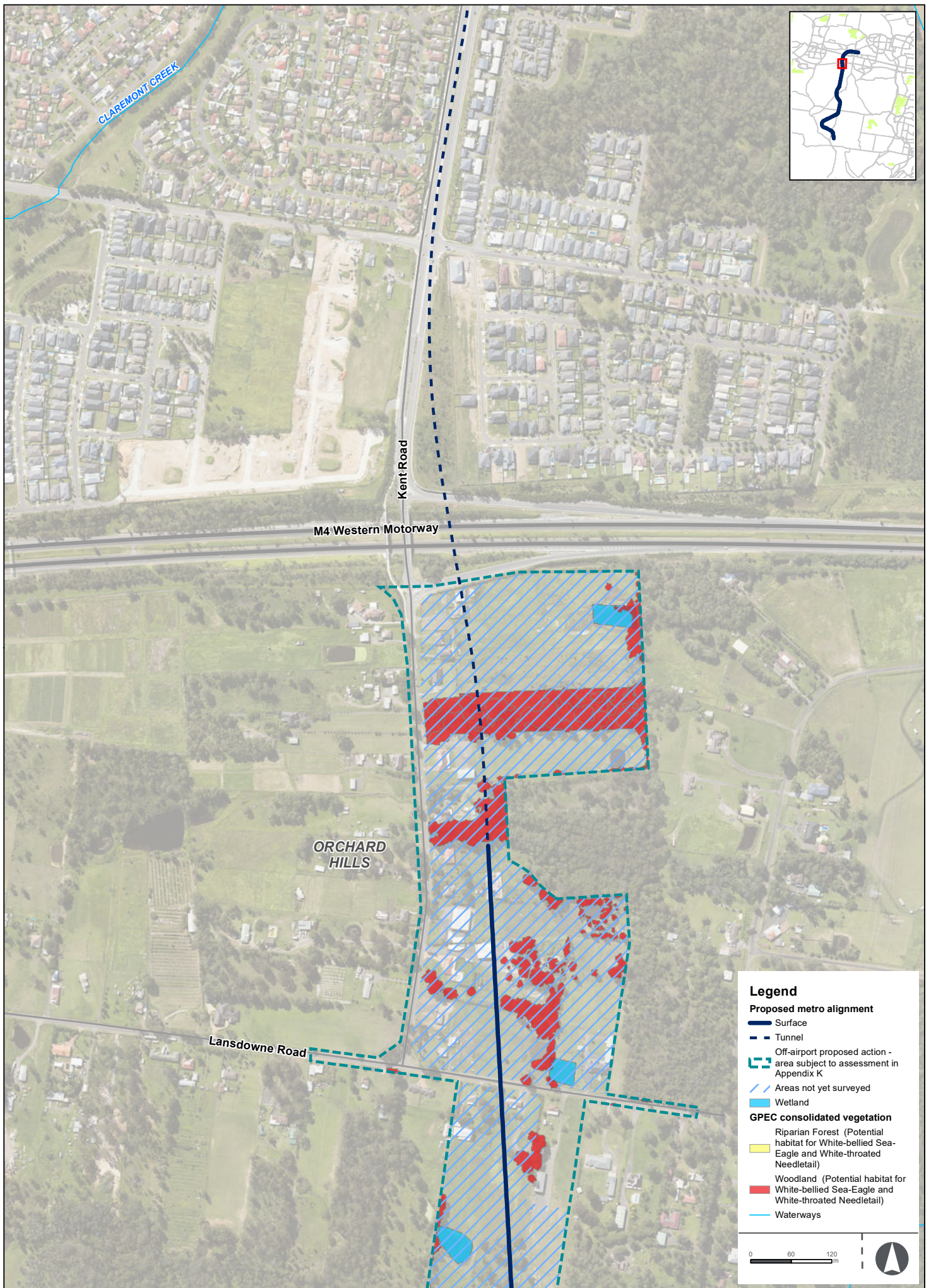
The habitat use of each of these species is likely to be restricted to intermittent foraging habitat only and is shown on Figure 4-5.



Threatened fauna species polygons

Figure 4-4

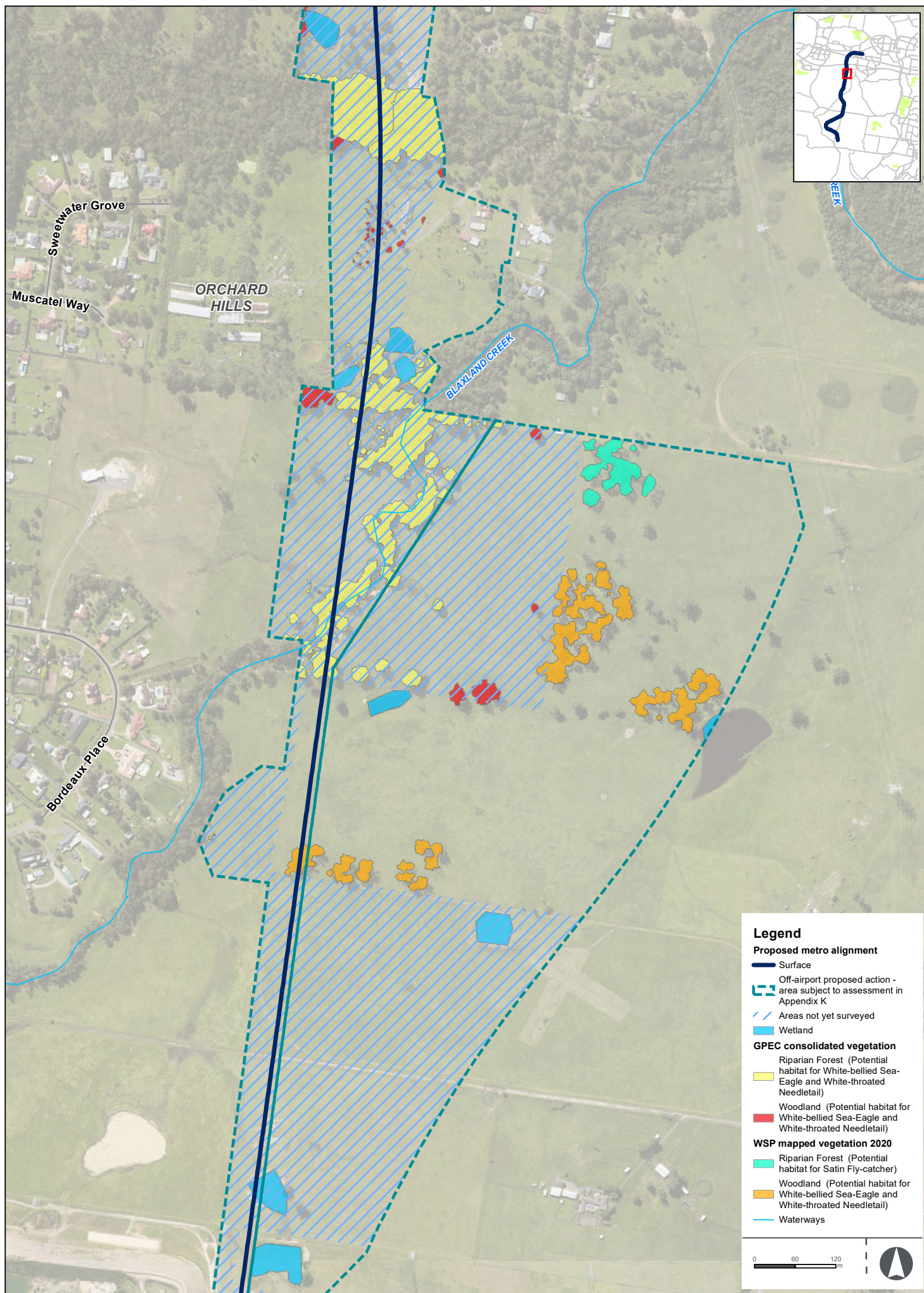


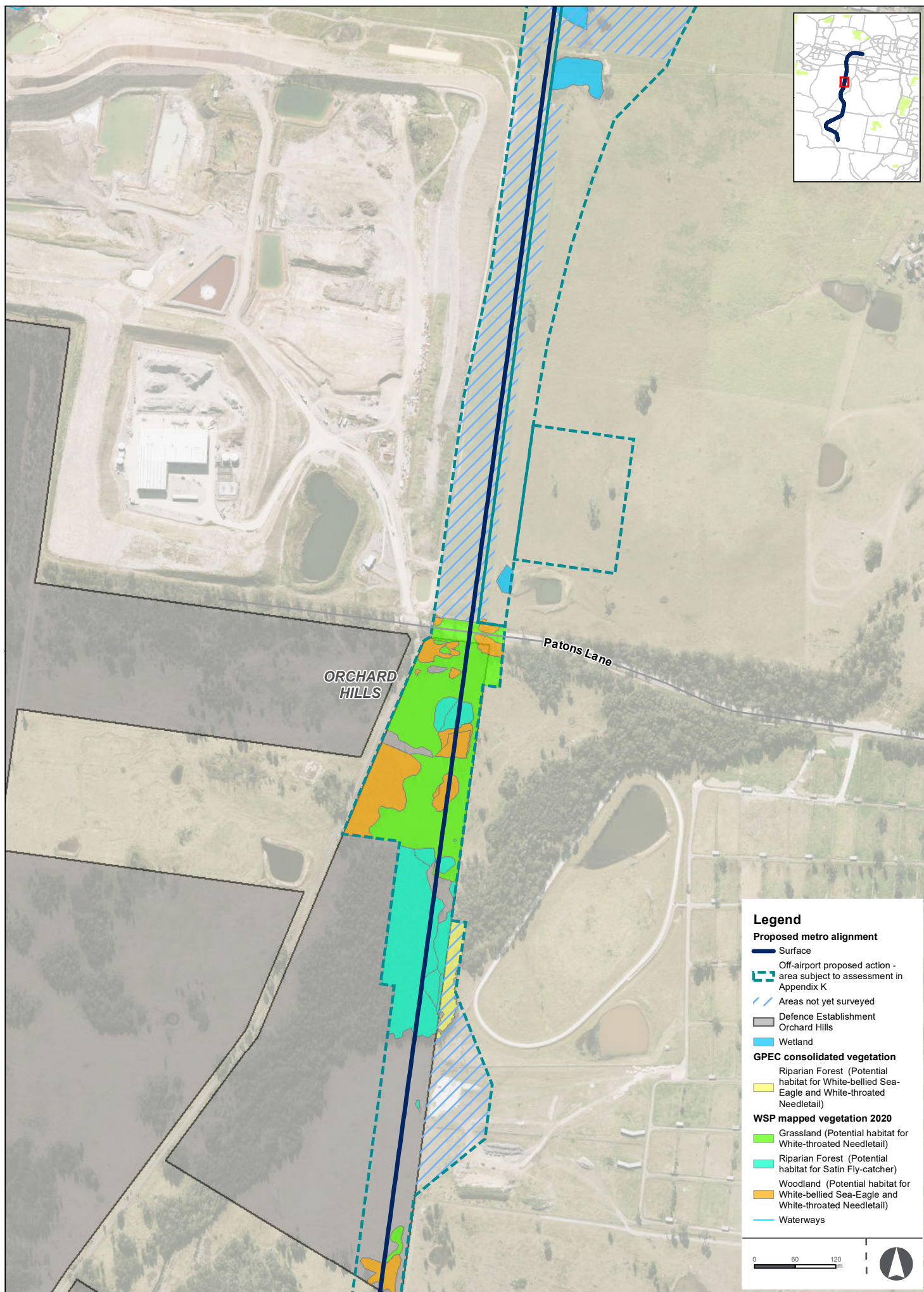


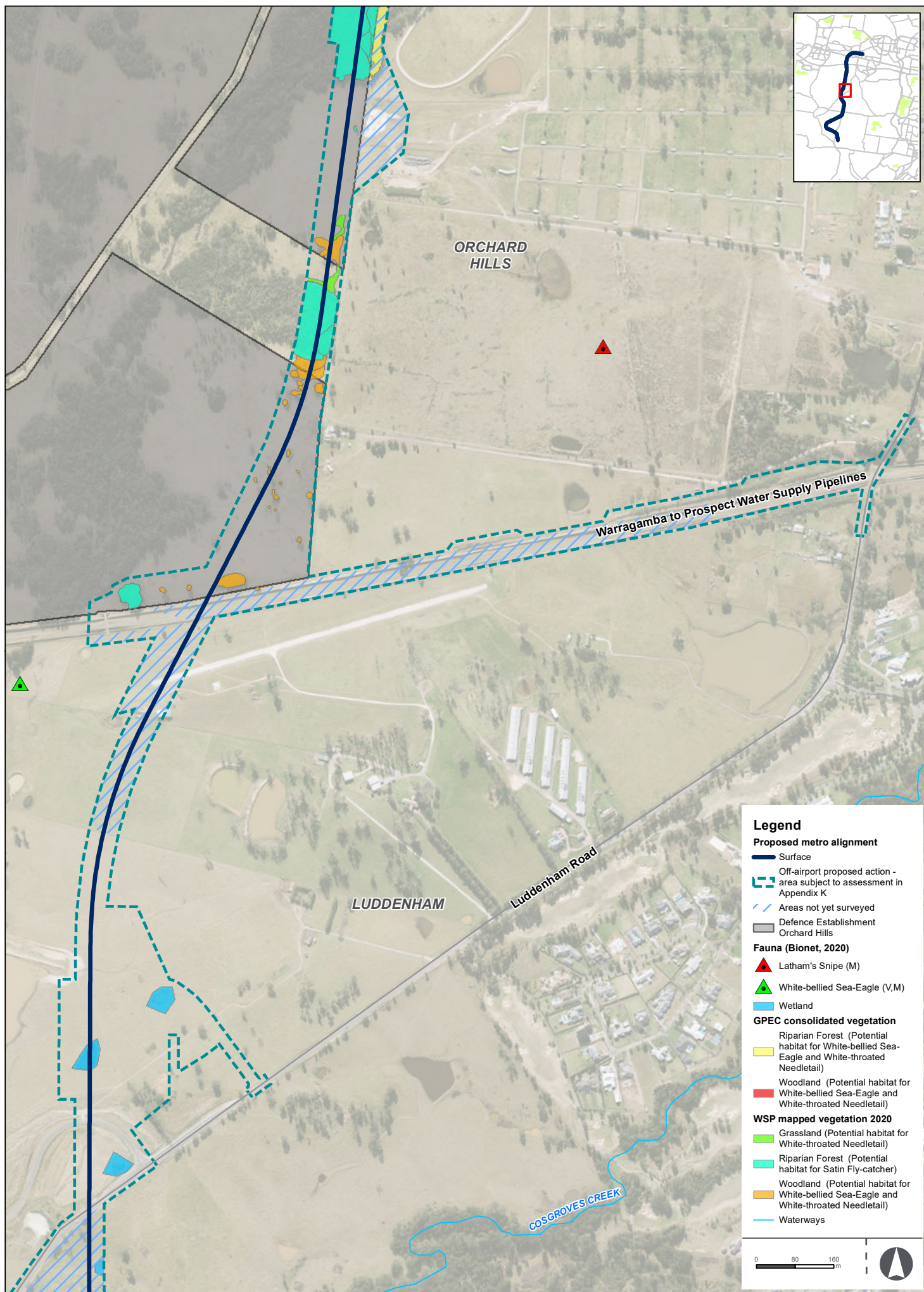
MNES Migratory fauna species potential habitat within the study area

Figure 4-5b

Indicative only, subject to design development





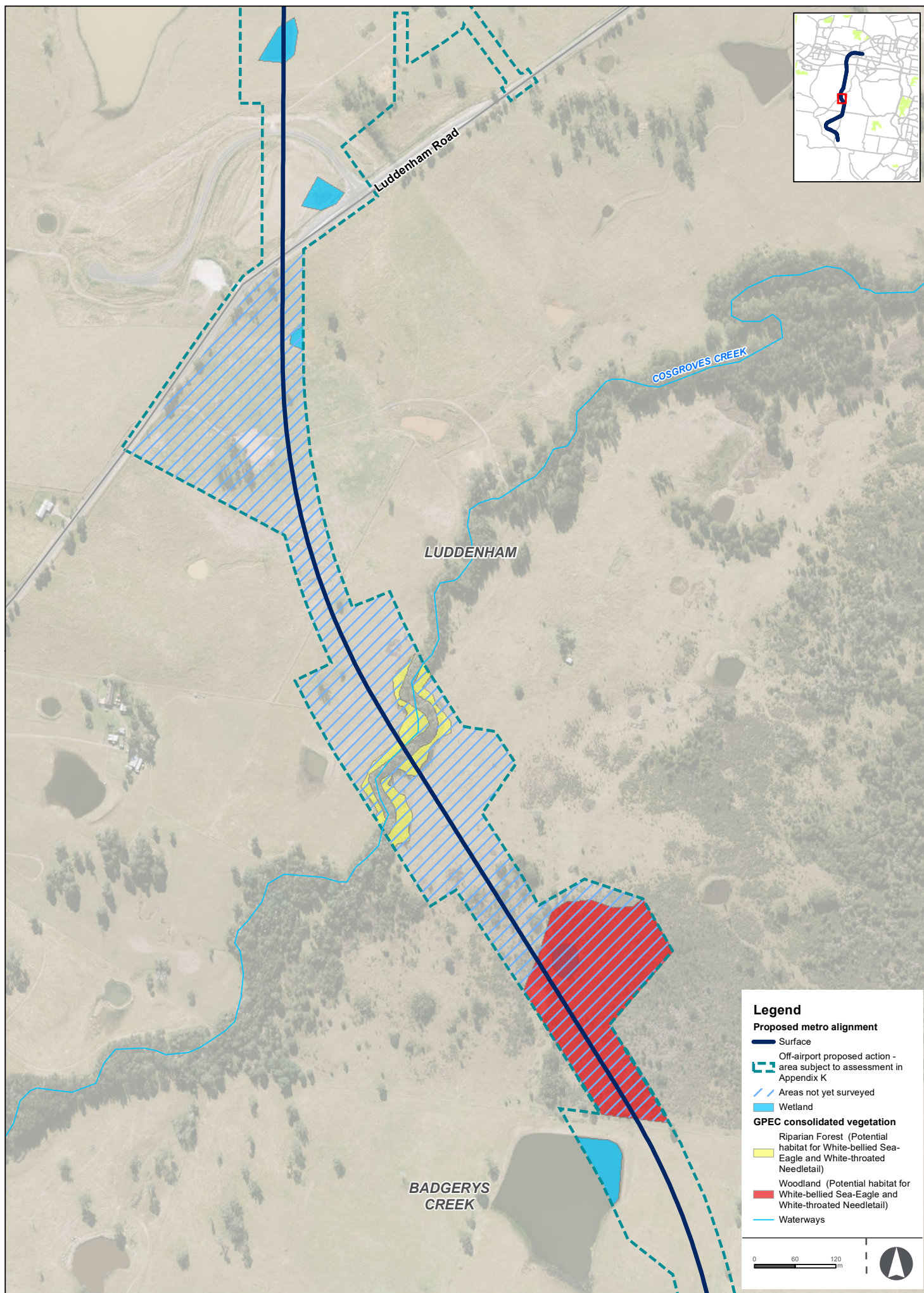


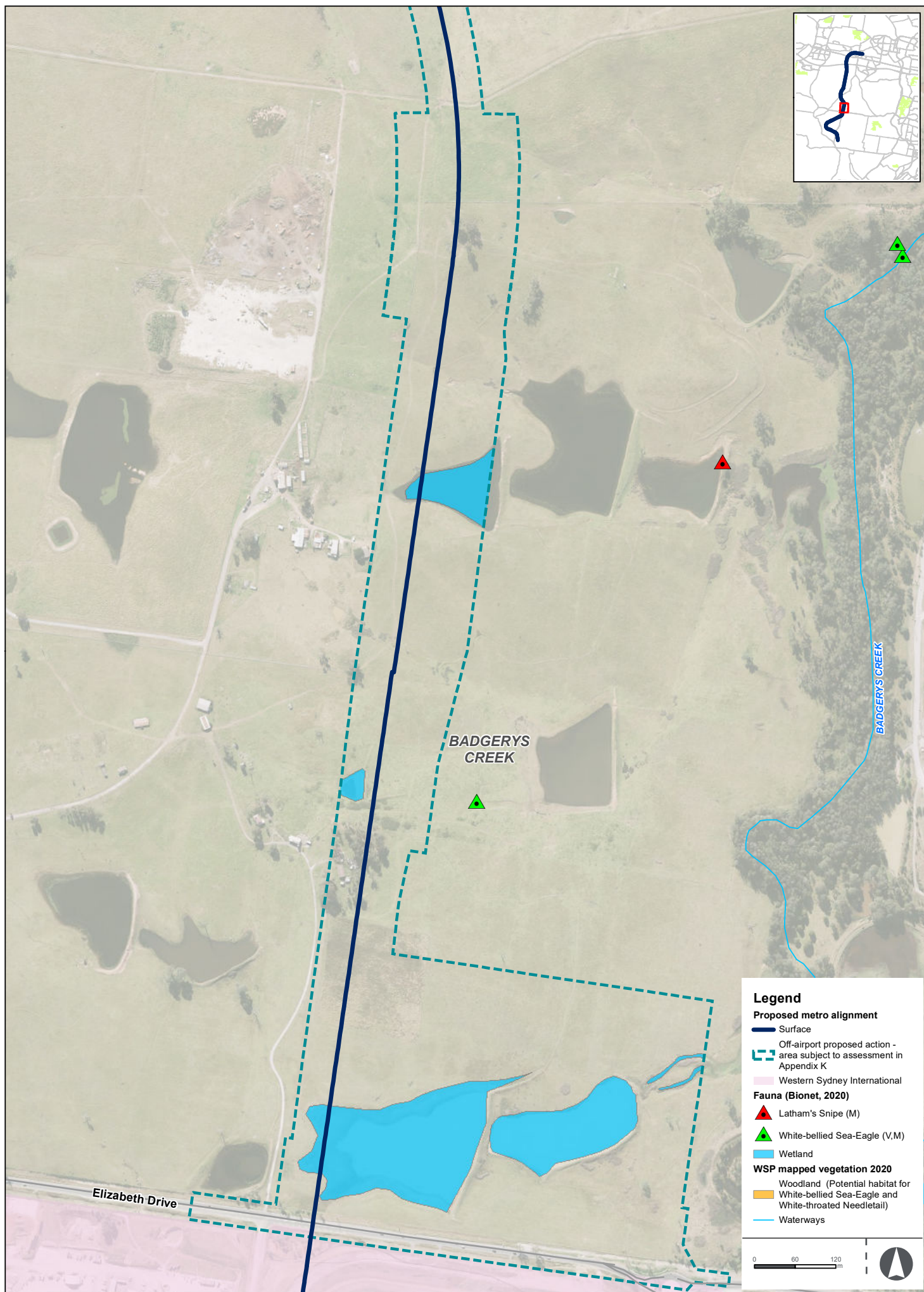
Notes:
V = Vulnerable (BC Act)
M = Marine/Migratory (EPBC Act)

MNES Migratory fauna species potential habitat within the study area

Figure 4-5e

Indicative only, subject to design development





Notes:
V = Vulnerable (BC Act)
M = Marine/Migratory (EPBC Act)

MNES Migratory fauna species potential habitat within the study area

Figure 4-5g

Indicative only, subject to design development

5 Impact assessment

5.1 Analysis of relevant impacts

An analysis of relevant impacts on listed threatened species and ecological communities is provided in Chapter 8 (Assessment of construction impacts), Chapter 9 (Assessment of operational impacts) and Appendix F (EPBC Act Assessments of Significance) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement.

The proposed action would have a residual impact on 33.27 hectares of native vegetation (31.57 hectares of direct impact and 1.70 hectares of indirect impact), including:

- 5.71 hectares of the critically endangered Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
- 3.67 hectares of the endangered Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland.

Buffers have been incorporated into the construction footprint and the area of vegetation covered by these buffers is included in the calculations of impacted vegetation. The construction footprint used to calculate impact is therefore larger than the direct impact of the project. Accordingly, edge effects such as trampling, weed invasion and soil compaction are considered unlikely to extend beyond the project's construction footprint and/or would be avoided through mitigation and management measures. The mitigation measures outlined in Chapter 11 (Management and mitigation measures) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement would ensure the spread of invasive flora and fauna species is not increased because of the project or extended beyond the construction footprint.

The proposed action would have potential impacts on groundwater dependent ecosystems (around 1.7 hectares of Broad-leaved Ironbark - Grey Box - *Melaleuca decora* grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion) resulting from changes to groundwater level or flow in the vicinity of Orchard Hills Station.

One threatened fauna species, Grey-headed Flying-fox listed under the EPBC Act, was recorded within the study area.

Section 7.2.4 (Commonwealth threatened fauna) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement, provides an analysis of potential impacts on the Grey-headed Flying-fox, as well as the extent of Grey-headed Flying-fox habitat impacted by the 2019/2020 bushfires.

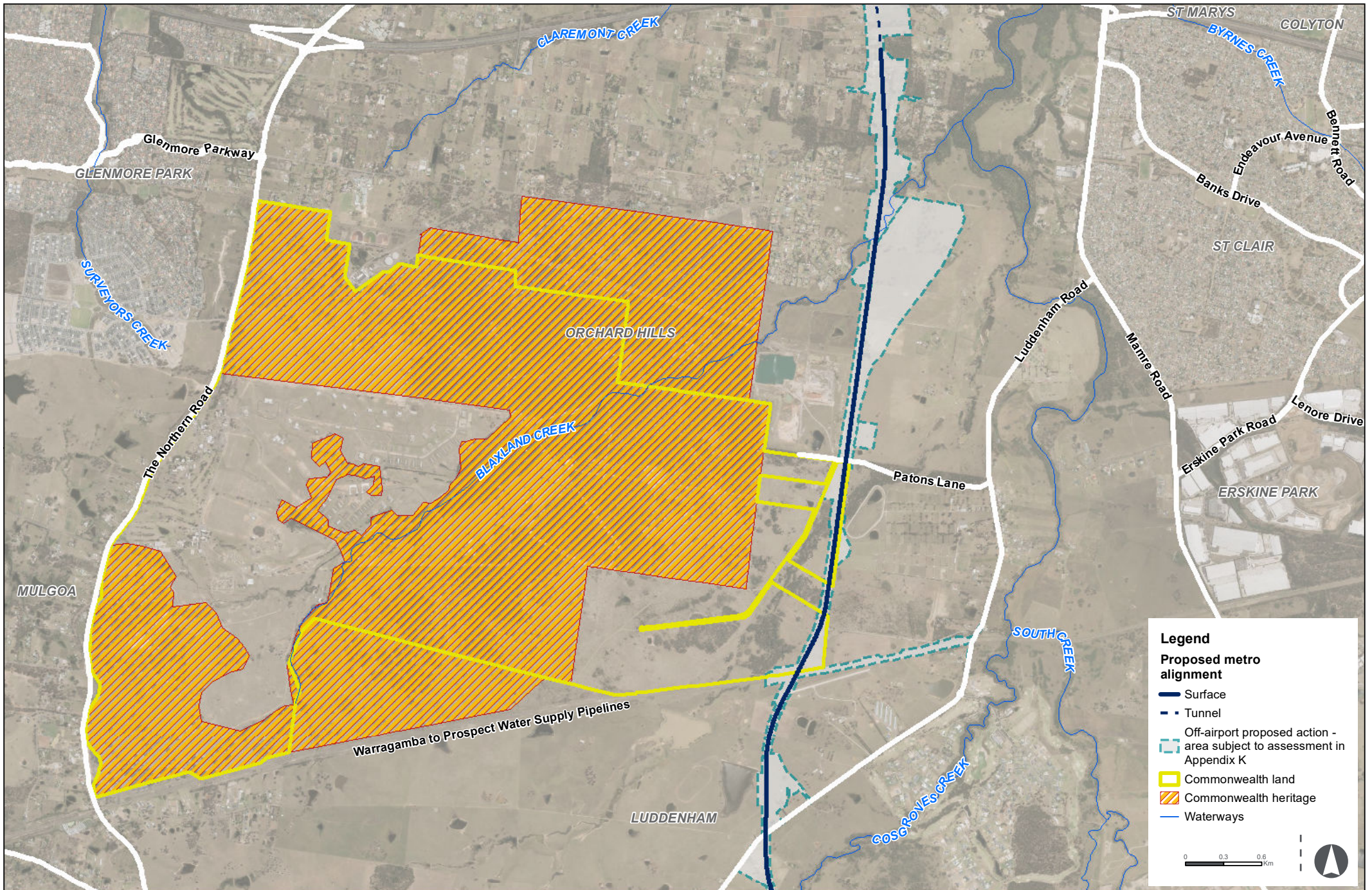
The extent of Grey-headed Flying-fox habitat impacted by bushfire has been limited to a relatively small proportion of the available foraging habitat, none of which is located within 10 kilometres of the proposed action. The proposed action would result in the potential removal of some 1.5 per cent of available foraging habitat for this species within 10 kilometres which is unlikely to significantly impact this species, given the abundance of higher quality myrtaceous foraging habitat within the locality.

The proposed action may also have a direct impact or affect the potential habitat of up to nine threatened flora species and two additional fauna species listed under the EPBC Act. No threatened fish species listed under the EPBC Act were recorded or considered likely to occur within the study area and as such the proposed action is unlikely to significantly impact any threatened aquatic species, or their habitats.

The Commonwealth heritage area is shown in Figure 5-1. Given the distance to the nearest heritage item from the project, there would be no impacts to known non-Aboriginal heritage within Commonwealth land.

A field survey was carried out on the DEOH site within the referred action construction footprint to investigate the presence of any potential heritage items, however none were identified.

There is the potential to uncover previously unidentified non-Aboriginal heritage items during ground disturbance activities during construction. An unexpected finds protocol would be developed and implemented during construction.



5.1.1 Impacted area Commonwealth land located off-airport (DEOH site)

Vegetation

The majority of the Commonwealth land (i.e. at the DEOH site) to be impacted by the proposed action is dominated by exotic vegetation associated with historically cleared land. Fragmented patches of remnant vegetation are generally restricted to riparian areas. In relation to the specific impacts to vegetation on Commonwealth land (i.e. at the DEOH site), the proposed action would remove approximately 7.3 hectares of native vegetation communities providing habitat for matters of national environmental significance including:

- 4.79 hectares of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (CPW) (PCT 724 and 849) as listed under the BC Act and incorporating 1.21 hectares of TEC under the EPBC Act.
- 0.22 hectares of River-flat Eucalypt Forest as listed under the BC Act.
- 2.29 hectares Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland (CSOF) (PCT 1800) as listed under the BC Act and incorporating 1.85 hectares of TEC under the EPBC Act.

The removal of vegetation outlined above would be a worst-case impact and opportunities throughout design development and construction management would aim to minimise these impacts.

The construction footprint used to calculate impact is larger than the direct impact of the proposed action. As such, edge effects such as trampling, weed invasion and soil compaction are considered unlikely to extend beyond the construction footprint of the proposed action and/or would be avoided through the mitigation and management measures outlined in Chapter 11 (Management and mitigation measures) of the Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement.

The majority of impacts on vegetation from the proposed action, are associated with small fragmented areas of disturbed condition and/or fringing edges of intact condition areas.

The proposed action would not create new areas of fragmentation to the CPW and only relatively small areas of additional fragmentation to the CSOF associated with the crossing of the unnamed riparian corridors already subject to disturbances and edge effects.

The proposed action is considered unlikely to cause a substantial change in the species composition of TECs or exacerbate invasive species such that it would substantially reduce the quality or integrity of occurrence of these TECs.

Threatened flora and fauna

The Commonwealth land (i.e. at the DEOH site) to be impacted by the proposed action provides known habitat for one threatened flora species, *Grevillea juniperina subsp. Juniperina* listed under the BC Act. There are no threatened flora species listed under the EPBC Act within the Commonwealth land (i.e. at the DEOH site) to be impacted by the proposed action.

The recorded individuals of *Grevillea juniperina subsp. Juniperina* on Commonwealth land and within the construction footprint would be directly impacted as a result of the proposed action. These impacts will be restricted to two small separate patches (see Figure 4-3), located:

- at the corner of Patons Lane and Stockdale Road (entrance gate area to the DEOH site)
- within the central eastern portion of the DEOH site, being Lot 4 DP242968.

The proposed action would not affect the proportion of the population of *Grevillea juniperina subsp. Juniperina* securely conserved within the Defence Orchard Hills biodiversity offset areas, located approximately 800 metres and 1.7 kilometres to the west of the proposed action as shown on Figure 4-4.

Animals

No threatened fish species listed under the BC Act or the EPBC Act were recorded or considered likely to occur within the Commonwealth land and as such the proposed action is unlikely to significantly impact any threatened aquatic species or their habitats.

The proposed action would have a direct impact on a relatively small proportion (5.01 hectares) of the available foraging habitat area of the EPBC Act listed Grey-headed Flying-fox and BC Act listed *Myotis macropus* (Southern Myotis) and *Hieraaetus morphnoides* (Little Eagle) within the locality (see Figure 4-5). These species and their habitats are also known to occur within the locally conserved areas of the Defence Orchard Hills biodiversity offset areas.

The proposed action is not considered to fragment any locally occurring populations, disrupt their breeding cycles, introduce disease that may cause the species to decline, or interfere with the recovery of these species. The proposed action is therefore considered unlikely to have a significant impact on these species.

It is also therefore unlikely that the area of the proposed action contains an ecologically significant proportion of the population of migratory species and the proposed action area is unlikely to contain an Important Habitat, as determined by the EPBC Act, as it is not:

- considered to be of critical importance to the species at particular life-cycle stages
- at the limit of the species range
- known to be within an area where the species is declining.

On this basis, it is considered unlikely that the proposed action would have a significant impact on any migratory species.

5.2 Consistency with Conventions, conservation advice and recovery plans

The assessment of the proposed action under the Biodiversity Assessment Method (BAM) is consistent with Australia's international obligations (specifically the Convention on Biological Diversity, the Apia Convention and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)), conservation advices and recovery and threat abatement plans.

5.2.1 Convention on Biological Diversity

The Convention on Biological Diversity is dedicated to promoting sustainable development. It provides a framework for Australia's integration of natural resources and environment and biodiversity management policies.

A key philosophy of sustainable development and the Convention on Biological Diversity is the principal of 'avoid and minimise impacts to biodiversity', which the project has adopted during the planning and design phase. Avoiding and minimising impacts on biodiversity values is a desired performance outcome for the project and is a mandatory key consideration for biodiversity impact assessment under the BAM.

The project's adherence to this is demonstrated throughout Section 8.1 (Avoid and minimise impacts) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement.

The biodiversity assessment for the proposed action has been based on the BAM methodology which addresses the ecologically sustainable development hierarchy of avoid, minimise and offset. This has led to the project being designed for avoidance of impacts on biodiversity and where residual impacts are unavoidable, identifying offsets and a strategy to minimise impacts against Commonwealth requirements.

5.2.2 Apia Convention

The Convention on Conservation of Nature in the South Pacific (the Apia Convention) obliges States (in general terms) to create protected areas to safeguard representative samples of ecosystems, and places of scenic, geological, aesthetic, historical, cultural or scientific importance. The Convention also prohibits the taking or killing of fauna (including eggs and shells) unless the taking is controlled by the competent authorities of the State concerned, or unless in pursuance of 'duly authorised' scientific investigations.

The biodiversity assessment for the proposed action has been based on the BAM methodology which addresses the ecologically sustainable development hierarchy of avoid, minimise and offset. This has led to the project being designed for avoidance of impacts on biodiversity and where residual impacts are unavoidable, identifying offsets and a strategy to minimise impacts against Commonwealth requirements.

5.2.3 CITES

The CITES is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

The project would not contribute to or result in an increase in the international trade in specimens of wild animals and plants.

5.2.4 Conservation advices

The relevant conservation advices for matters of national environmental significance species and communities to be impacted by the proposed action were referenced and considered throughout the preparation of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement including in Chapter 3, Chapter 7, Appendix A (Threatened flora habitat suitability assessment), Appendix B (Threatened fauna habitat suitability assessment) and Appendix F (EPBC Act Assessments of Significance).

5.2.5 Recovery and threat abatement plans

The relevant recovery and threat abatement plans are considered throughout the preparation of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement, including in Chapter 3, Chapter 7, Table 8.15 and Appendix F (EPBC Act Assessments of Significance).

There is no recovery plan for *Acacia bynoeana* under the EPBC Act. The proposed action would not interfere with any Regional/Local priority actions outlined in the Approved Conservation Advice (Department of the Environment, 2013).

There is currently no recovery plan for *Allocasuarina glareicola*. The proposed action is unlikely to lead to a decline outlined in the Approved Conservation Advice (Department of the Environment, Water, Heritage and the Arts, 2008a).

There is currently no recovery plan for *Cynanchum elegans*. The proposed action is unlikely to lead to a decline outlined in the Approved Conservation Advice (Department of the Environment, Water, Heritage and the Arts, 2008b).

Currently there is no recovery plan for *Grevillea parviflora subsp. parviflora* under the EPBC Act. The Approved Conservation Advice outlines Regional and Local Priority Actions, none of which would be interfered with by the proposed action (Department of the Environment, Water, Heritage and the Arts, 2008c).

Currently there is no recovery plan for *Micromyrtus minutiflora* under the EPBC Act. The Approved Conservation Advice outlines Regional and Local Priority Actions, none of which would be interfered with by the proposed action (Department of the Environment, Water, Heritage and the Arts, 2008d).

There is currently no recovery plan for *Pimelea curviflora var. curviflora* under the EPBC Act. The Approved Conservation Advice outlines Regional and Local Priority Actions, none of which would be interfered with by the proposed action (Department of the Environment, Water, Heritage and the Arts, 2008e).

There is no recovery plan for *Pultenaea parviflora* under the EPBC Act. The proposed action would not interfere with any Regional/Local priority actions outlined in the Approved Conservation Advice (Department of the Environment, Water, Heritage and the Arts, 2008f).

The Recovery Plan for *Acacia pubescens* (NSW National Parks and Wildlife Service, 2003) outlines 13 recovery actions. The proposed action would not interfere with any of these recovery actions.

The Recovery Plan for *Pimelea spicata* outlines six specific recovery objectives which focus on conserving known populations of *Pimelea spicata* (s 9) (Threatened Species Scientific Committee, 2016b). Given this species has not been recorded within the study area, the proposed action is not likely to interfere with any recovery objectives for *Pimelea spicata*.

The Recovery Plan for the Large-eared Pied Bat identifies sandstone escarpments as critical to this species' recovery. It is unlikely that any Large-eared Pied Bat foraging in the study area would be part of an important population or impact on critical habitats listed within the Recovery Plan.

The Action Plan for Australian Birds (Garnett and Crowley 2000) notes pressure on Swift Parrot breeding areas from forestry and firewood collection in Tasmania. On the mainland though, pressures relate to the loss of foraging habitats due to clearing for agriculture and residential development (Garnett and Crowley 2000). A National Recovery Plan for the Swift Parrot (*Lathamus discolor*) was prepared in 2011 (Saunders 2011). Recovery actions outlined in this plan include:

- identify the extent and quality of habitat
- manage and protect Swift Parrot habitat at the landscape scale
- monitor and manage the impact of collisions, competition and disease
- monitor population and habitat.

The impacts of the proposed action on the marginal potential foraging habitat for the Swift Parrot is likely to be in conflict with the second recovery action listed above - to manage and protect Swift Parrot habitat at the landscape scale. However, the extent of native vegetation clearing, and potential foraging habitat associated with the proposed action is considered to be small in terms of available habitat for the species within the Region (<1% in 10 km²).

The NSW Draft Recovery Plan (DECCW 2009) for the Grey-headed Flying-fox outlines criteria for foraging habitat that can be considered critical to survival of the Grey-headed Flying-fox, being:

- productive during winter and spring
- known to support populations of > 30,000 individuals within an area of 50 km radius.

With reference to Department of Agriculture, Water and the Environment's (DAWE) National Flying-fox monitoring viewer, there are no recorded Flying-fox camps within the study area (DoEE 2020). The closest existing camp to the study area is located at Ropes Creek, approximately 5 km to the northeast of the study area, with anywhere from 500 to 10,000 individuals counted during surveys between 2013 and 2019. Based on a review of the National Flying-fox monitoring viewer, there are therefore likely to be >30,000 individuals of the species within a 50 km radius of the study area.

Occurrences of this species within the study area are not at the limits of the species' distribution, nor are any maternity camps present. As such, the study area can only be considered to represent a part of the foraging range of widely occurring individuals.

An abundance of similar or high quality foraging habitat occurs in the wider locality (>1,700 hectares of mapped native vegetation (Tozer, Turner et al. 2010)). Approximately 1,700 hectares of potential foraging habitat in the form of native vegetation has been mapped within 10 km of the study area which is accessible to this species. The removal of 25 hectares would represent 1.5% of available foraging habitat for this species.

The proposed action is unlikely to substantially interfere with the recovery of the White-throated Needletail due to the lack of hollow bearing trees that the species may roost in, and it would not exacerbate other threats to the species (collision with wind farm turbines, secondary poisoning).

The Cumberland Plain Recovery Plan (Department of Environment Climate Change and Water, 2010) lists activities to assist the community's recovery. The proposed action is likely to interfere with one activity OEH has listed, being *protect habitat by minimising further clearing*.

Currently there is no recovery plan for CSOF. The Approved Conservation Advice outlined four priority conservation actions (Section 6.2, Department of the Environment and Energy, 2018). The proposed action is likely to interfere with one priority conservation action being *conserve remaining patches*.

5.3 Identification of cumulative impacts

An assessment of cumulative impacts of the project (including the proposed action) is provided in Chapter 10 (Cumulative impacts) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement. Projects considered in the cumulative impact assessment include:

- Western Sydney International
- M12 Motorway
- The Northern Road
- St Mary's Intermodal Facility.

In addition, a number of potential infrastructure upgrade projects in the vicinity of the proposed action have been identified. These potential upgrade projects include:

- Elizabeth Drive upgrade
- Mamre Road upgrade
- Outer Sydney Orbital
- Upper South Creek Advanced Water Recycling Centre.

The Draft Cumberland Plain Conservation Plan (CPCP) (Department of Planning, Industry and Environment, 2020) is a strategic conservation plan, prepared by the NSW Department of Planning, Industry and Environment, and was placed on public exhibition on 26 August 2020. The CPCP will provide biodiversity approvals for new housing and infrastructure corridors to support the delivery of the Western Parkland City. The proposed action, and the project as a whole, are not included in the CPCP. Technical Paper 3 (Biodiversity Development Assessment Report) has been prepared having regard to the findings and the proposals presented in the CPCP, notwithstanding that the project is not subject to, nor will it have the benefit of the CPCP.

6 Avoidance and mitigation measures

The construction footprint has been refined to avoid direct impacts on vegetation and watercourses. A viaduct is proposed over Patons Lane and the unnamed watercourse tributary of South Creek and the Warragamba to Prospect Water Supply Pipelines, reducing impacts to riparian vegetation in this location. Design development has required the maintenance of wildlife linkages including allowances for fauna crossing structures.

Vertical alignment optimisation has enabled increased fauna connectivity, due to improved clearances under bridge and viaduct structures that improve light penetration and encourage fauna movement.

The full range of measures to avoid and minimise impacts on biodiversity values is discussed in more detail in Section 8.2 (Avoid and minimise impacts) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement.

A range of measures for the management of potential impacts which have not been avoided from construction are included in the Construction Environmental Management Framework (refer to Appendix F of the Project Environmental Impact Statement), Overarching Community Communications Strategy (refer to Appendix C of the Project Environmental Impact Statement), Construction Noise and Vibration Standard (refer to Appendix H of the Project Environmental Impact Statement) and Construction Traffic Management Framework (refer to Appendix G of the Project Environmental Impact Statement). Additional mitigation measures have been identified throughout the Project Environmental Impact Statement to manage project-specific impacts.

Mitigation measures for the project relating to biodiversity are identified in Chapter 27 (Synthesis) of the Project Environmental Impact Statement and those relevant to the off-airport proposed action are shown in Table 6-1.

The mitigation measures for the off-airport proposed action, outlined in Table 6-1 and Table 6-2, correspond to the mitigation measures applicable to the broader Sydney Metro – Western Sydney Airport project, as documented in the Project Environmental Impact Statement. To maintain consistency (including numbering of individual mitigation measures) between the project and the off-airport proposed action, the reference numbers associated with measures from the Project Environmental Impact Statement that are not applicable to the proposed action have been included but with the following text: “*Not required/applicable*”.

In addition, there are several mitigation measures that are only partially applicable to this assessment. In this case, the entire wording of the measure has been retained, however where there are elements of the mitigation measure that are not applicable to the off-airport proposed action, those elements are displayed as strikethrough text.

Table 6-1 Biodiversity mitigation measures

ID	Identified mitigation measure	Applicable location/s
Construction		
FF1	<p>The Biodiversity Construction Environmental Management Plan (on-airport) Flora and Fauna Management Plan (off-airport) would minimise and manage the clearing of native vegetation and habitat by:</p> <ul style="list-style-type: none"> seeking to locate site offices, site compounds and ancillary facilities in areas where there are limited biodiversity values (e.g. cleared land) delaying the removal of vegetation until absolutely necessary avoiding the removal of hollow-bearing trees, where possible using a qualified surveyor and suitably qualified ecologist to mark out exclusion zones and clearing/project boundaries prior to construction 	<p>Orchard Hills construction site</p> <p>Off-airport construction corridor</p> <p>Stabling and maintenance facility</p> <p>Luddenham Road construction site</p>

ID	Identified mitigation measure	Applicable location/s
	<ul style="list-style-type: none"> providing contractors with regularly updated sensitive area maps (showing clearing boundaries and exclusion zones). 	
FF2	<p>A Nest Box Strategy would be prepared to minimise habitat loss to hollow-dependent fauna in accordance with the Flora and Fauna Management Plan and would include the following requirements:</p> <ul style="list-style-type: none"> hollow-bearing trees would be marked/tagged and mapped prior to their removal. The size, type, number and location of nest boxes required would be based on the results of the pre-clearing survey about 70 per cent of nest boxes would be installed about one month prior to any vegetation removal to provide alternate habitat for hollow-dependent fauna displaced during clearing. 	<p>Claremont Meadows services facility</p> <p>Off-airport construction corridor</p>
FF3	Not required/applicable.	
FF4	<p>A targeted microbat survey (Eastern Coastal Free-tailed Bat or Eastern False Pipistrelle) of dwellings and structures proposed for demolition, removal or modification would be undertaken in accordance with 'Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method (OEH, 2018) prior to disturbance.</p> <p>Human-made structures such as culverts and other under-road structures within the construction footprint would be surveyed for threatened microbats (e.g. particularly the Southern Myotis) in accordance with the Biodiversity Assessment Method (OEH, 2018). If threatened microbats are detected, a Microbat Management Plan would be developed as part of the Biodiversity Construction Management Plan and implemented by a suitably qualified bat specialist.</p>	<p>Claremont Meadows services facility</p> <p>Off-airport construction corridor</p>
FF5	Not required/applicable.	
FF6	During construction, shading and artificial light impacts would be minimised in areas adjoining remnant bushland in intact condition.	<p>Claremont Meadows services facility</p> <p>Orchard Hills construction site</p> <p>Off-airport construction corridor</p>
FF7	Fish passage and fish habitat associated with Cosgrove Creek and Blaxland Creek would be protected in accordance with the <i>Policy and Guidelines for Fish Habitat Conservation and Management</i> (DPI (Fisheries NSW) 2013).	Off-airport construction corridor
Operation		
FF8	<p>Wildlife connectivity would be maintained (where possible) through the installation of viaduct/bridge structures designed in accordance with the following:</p> <ul style="list-style-type: none"> height and width of the area under a bridge to be maximised for all species, noting a minimum height of approximately 3 metres of dry passage will provide 	Off-airport

ID	Identified mitigation measure	Applicable location/s
	<p>connectivity for most terrestrial species</p> <ul style="list-style-type: none"> • bridges wide enough to encompass water flow, stream bank and riparian vegetation, preferably on both sides of the water course • for small and medium sized mammals, provide fauna furniture as shelter (e.g. vegetation, logs, rocks, leaf-litter, refuge pipes, escape poles, roofing tiles, and roofing iron) • height and carriageway separation designed to allow sufficient light and moisture to enhance growth of vegetation under the structure • if used for multiple purposes (e.g. pathways or access roads) aim to provide the 3 metre of natural passage for fauna • relocation or adjustment of the stream bed avoided where possible • the structure to tie in with the natural hydrology of the surrounding habitat such that the width, depth and gradient of the watercourse are maintained in the structure • consistent with the <i>Policy and Guidelines for Fish Friendly Waterway Crossings</i> (DPI (Fisheries NSW) 2013). 	

Mitigation measures for the project relating to heritage, hydrology and water quality are identified in Section 27.4.3 (Environmental management measures) of the Project Environmental Impact Statement and are shown in Table 6-2.

Table 6-2 Heritage, hydrology and water quality mitigation measures

ID	Mitigation measures	Applicable location(s)
Non-Aboriginal heritage - construction		
NAH1	Potential moveable heritage items would be identified and assessed, and a significant fabric salvage schedule would be prepared by an appropriately qualified and experienced heritage specialist for St Marys Railway Station, Bringelly RAAF Base , McGarvie-Smith Farm, McMasters Farm and Kennett's Airfield. Significant fabric would only be salvaged if it can be salvaged in such a way that it can be reused and is likely to be able to be reused.	St Marys construction site Off-airport construction corridor
NAH2	Heritage advice would be sought to develop solutions to manage potential ground movement impacts to the St Marys Goods Shed.	St Marys construction site
NAH3	Archival recording of heritage items which would be impacted or that would have their setting altered, would be carried out in accordance with the NSW Heritage Office's <i>Photographic Recording of Heritage Items Using Film or Digital Capture</i> (2006). The following items would be archivally recorded: <ul style="list-style-type: none"> • St Marys Railway Station • Kennett's Airfield • Luddenham Road Alignment • McMaster Farm • McGarvie-Smith Farm • Kelvin Park Group • Bringelly RAAF Base 	St Marys construction site Off-airport construction corridor Luddenham Road construction site

ID	Mitigation measures	Applicable location(s)
NAH4	Kennett's Airfield will be physically investigated during later investigation phases of the project to confirm heritage significance through an assessment of significance. Appropriate management and mitigation measures would then be determined.	Off-airport construction corridor
NAH5	Archaeological investigation would be conducted for archaeological sites which would be impacted by the project. A non-Aboriginal Archaeological Research Design would be prepared for the project which would outline further archaeological investigation required for the project.	St Marys construction site
NAH6	The following heritage items would be monitored for potential vibration impacts during works: <ul style="list-style-type: none"> St Marys Railway Station Group Queen Street Post-War Commercial Building St Marys Munitions Workers Housing McGarvie-Smith Farm McMaster Farm. 	St Marys construction site Off-airport construction corridor
NAH7	The St Marys Station jib crane would be temporarily relocated prior to construction commencing in the vicinity of this item, safely stored and appropriately maintained and reinstated. A detailed methodology for the removal and reinstatement of the jib crane would be prepared in consultation with an appropriately qualified heritage advisor.	St Marys construction site
NAH8	A dilapidation survey of the Warragamba to Prospect Water Supply Pipelines would be undertaken prior to construction commencing in the vicinity of this item.	Off-airport construction corridor
NAH9	Not required/applicable	
Non-Aboriginal heritage - operation		
NAH10	Design development for the project would endeavour to minimise adverse impacts to heritage buildings, elements, fabric, and heritage significant settings and view lines that contribute to the overall heritage significance of heritage items.	Off-airport
NAH11	The architectural design for the project would take account of local heritage context and be sympathetic to local heritage character. This would include using sympathetic building materials, colours and finishes. Design should aim to minimise visual impacts by ensuring that significant elements are not obstructed or overshadowed. Design should adhere to the Sydney Metro – Western Sydney Airport Design Guidelines. The Design Review Panel and Heritage Working Group would be consulted in regard to the design, form and material of new built structures that may impact heritage items.	Off-airport
NAH12	Consultation with the Heritage Council would occur for the design of works that have the potential to impact State significant items including for St Marys Railway Station and Kelvin / Kelvin Park Group.	St Marys Station

ID	Mitigation measures	Applicable location(s)
NAH13	A heritage interpretation strategy would be prepared for the project identifying key stories and interpretive opportunities related to non-Aboriginal heritage. The strategy would address historic and contemporary heritage and community values and would identify innovative and engaging opportunities for interpretation.	Off-airport
NAH14	A conservation management plan would be prepared for St Marys Railway Station, in accordance with NSW Heritage Council guidelines. The plan would address any changes to the station, including updated assessment of significance of elements and recommendations on curtilage changes. It would also provide site specific exemptions and management policies.	St Marys Station
NAH15	Heritage inventory registers for heritage items modified by the project would be updated to document their change in condition following the completion of construction works for the project.	All
Aboriginal heritage - construction		
AH1	Aboriginal stakeholder consultation would continue to be carried out in accordance with the <i>Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010</i> (NSW Office of Environment and Heritage, 2010). Registered Aboriginal Parties would participate in future site inspections and test excavations. Measures to manage and protect the identified cultural values would be developed collaboratively through this consultation process to inform design development and heritage interpretation.	Off-airport
AH2	Survey would be undertaken, with Registered Aboriginal Parties, in the areas of archaeological sensitivity where field investigations have not already been completed or where ground surface visibility limited the effectiveness of past inspections. The surface areas above the tunnel alignment would also be ground-truthed to ensure there are no site types directly above the tunnel that would be damaged by subsidence, with site-specific mitigation measures to be developed where any are found to be present.	Off-airport
AH3	Test excavation would be undertaken in ground-truthed areas of confirmed archaeological sensitivity, to determine the presence or absence of subsurface archaeological deposits, where project impacts are anticipated.	Off-airport
AH4	Following the test excavation program, an Aboriginal Cultural Heritage Management Plan would be prepared. The Aboriginal Cultural Heritage Management Plan would identify management actions including conservation, protection and mitigation, and would authorise harm where appropriate and provide further detail in relation to salvage excavation program if required.	Off-airport
AH5	The temporary repository of any retrieved artefacts would be appropriately secured and under the care of the archaeological consultant. If retrieved, further consultation with Registered Aboriginal Parties would be required to determine the preferred long-term care and management of any retrieved Aboriginal artefacts.	Off-airport

ID	Mitigation measures	Applicable location(s)
AH6	Aboriginal Heritage Information Management System site cards would be produced for newly identified sites and submitted to the Aboriginal Heritage Information Management System Registrar as soon as practicable.	Off-airport
AH7	Aboriginal Site Impact Recording forms would be submitted to the Aboriginal Heritage Information Management System register for all Aboriginal Heritage Information Management System registered Aboriginal sites that are impacted by the project.	Off--airport
AH8	Not required/applicable	
Flooding, hydrology and water quality - construction		
HYD1	Construction planning would consider flood related mitigation, including: <ul style="list-style-type: none"> staging construction works to reduce the duration of works within the floodplain daily and continuous monitoring of weather forecasts and storm events, rainfall levels and water levels in key watercourses to identify potential flooding events and related flood emergency response consultation with NSW State Emergency Services and relevant local councils to ensure consistent approaches to the management of flood events (off-airport only) provide flood-proofing to excavations at risk of flooding during construction, where reasonable and feasible, such as raised entry into shafts and/or pump-out facilities to minimise ingress of floodwaters into shafts and the dive structure review of site layout and staging of construction works to avoid or minimise obstruction of overland flow paths and limit the extent of flow diversion required. 	Orchard Hills construction site Off-airport construction corridor
HYD2	Minimise works in the main creek channels (at Blaxland Creek, unnamed watercourse south of Patons Lane and Cosgroves Creek) where possible and avoid works in the channel during rainfall events.	Off-airport construction corridor
WQ1	A surface water quality monitoring program would be implemented to monitor water quality during construction. The program would be developed in consultation with (as relevant) Western Sydney Airport, NSW Environment Protection Authority, relevant sections of Department of Planning, Industry and Environment and relevant local councils. The program would consider monitoring being undertaken as part of other infrastructure projects such as the M12 Motorway and Western Sydney International. On-airport, the monitoring program would consider the Airports (Environmental Protection) Regulations 1997 limits for water quality pollution. The program would monitor all construction discharge locations including South Creek at St Marys, South Creek at the M4 Western Motorway, Cosgroves Creek at Twin Creeks Drive, South Creek at Longleys Road, Thompsons Creek and Badgerys Creek at Elizabeth Drive.	Claremont Meadows services facility construction site Orchard Hills construction site Off-airport construction corridor

ID	Mitigation measures	Applicable location(s)
Flooding, hydrology and water quality - operation		
HYD3	The flood model for the project would be updated with regard to flood modelling undertaken for the South Creek Sector Review (anticipated to be released in 2020). The updated flood modelling would be used to inform design development.	All
HYD4	Develop localised stormwater management plans at St Marys Station and Aerotropolis Core Station to ensure these stations are protected from localised flooding.	St Marys Station
HYD5	Not required/applicable.	
WQ2	Design batter slope gradients and surface treatments to minimise erosion risk.	All
WQ3	Drainage and water treatment design to be undertaken in accordance with Water Sensitive Urban Design requirements specified in local council, Transport for NSW and on-airport standards.	All
WQ4	Suitably designed scour and erosion controls should be included at drainage and sedimentation basin outlet discharge points.	All
WQ5	Detailed design of viaducts across waterways would aim to minimise infrastructure within the bed and banks of existing waterways and minimise changes to flood behaviour across the floodplain.	All
WQ6	Where feasible, on-site detention of stormwater would be introduced where stormwater runoff rates are increased. Where there is insufficient space for the provision of on-site detention, the upgrade of downstream infrastructure would be implemented where feasible and reasonable.	All
WQ7	At all locations where stormwater is discharged, water quality measures such as gross pollutant traps, bio-retention swales and Water Sensitive Urban Design features would be investigated and implemented where feasible and reasonable.	All
WQ8	Water quality monitoring of all discharges from water quality treatment plants to be undertaken to contribute towards achievement of the ANZECC guideline water quality trigger values.	St Marys Station

These measures will address the impacts of the controlled action discussed in this Appendix K in respect of both sets of controlling provisions.

6.1 Environmental outcomes

The full suite of performance outcomes for the project are provided in Chapter 27 (Synthesis) of the Project Environmental Impact Statement.

Performance outcomes for the project as they relate to biodiversity matters are provided in Section 11.2 (Performance outcomes) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement. Those outcomes relevant to the proposed action are shown in Table 6-3.

Performance outcomes for the project relating to heritage are identified in Section 27.4.2 (Performance outcomes) of the Project Environmental Impact Statement and are shown in Table 6-4.

Table 6-3 Biodiversity performance outcomes

Desired performance outcome	Project performance outcome	Timing
The project design considers all feasible measures to avoid and minimise impacts on terrestrial and aquatic biodiversity	Minimise or where possible avoid impacts on threatened flora and fauna species, and ecological communities listed under the <i>Biodiversity Conservation Act 2016</i> (NSW) and <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth).	Construction
	Manage groundwater drawdown at Orchard Hills to avoid or minimise impacts on groundwater dependent ecosystems.	Construction
	Culverts and bridges would be appropriately sized to maintain fauna habitat connectivity	Operation
	Maintain integrity and functionality of rail corridor fencing to minimise wildlife-train collision	Operation
	Re-establish native vegetation in accordance with the <i>National Airports Safeguarding Framework</i> principles and guidelines including Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports (Australian Government, 2014)	Operation
Offsets and/or supplementary measures are assured which are equivalent to any residual impacts of project construction and operation	Impacts on threatened ecological communities and threatened species are offset in accordance with the requirements of the NSW Biodiversity Assessment Method (NSW Office of Environment and Heritage, 2018).	Construction

Table 6-4 Heritage performance outcomes

Desired performance outcome	Project performance outcome	Timing
Non-Aboriginal heritage		
The design, construction and operation of the project facilitates, to the greatest extent possible, the long-term protection, conservation and management of the heritage significance of items of environmental heritage	Impacts on the State heritage significant St Marys Railway Station Group are avoided or minimised so that the overall heritage value of the item is maintained.	Construction
	Impacts on non-Aboriginal heritage items and archaeology are minimised or where possible avoided.	Construction
	The design of St Marys Station is sympathetic to retained and adjacent heritage items.	Operation
	An appropriately qualified and suitably experienced heritage architect and relevant stakeholders are consulted during design development.	Operation
	The design of the project incorporates non-Aboriginal heritage interpretation.	Operation
The design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of environmental heritage		

Desired performance outcome	Project performance outcome	Timing
Aboriginal heritage		
The design, construction and operation of the project facilitates, to the greatest extent possible, the long- term protection, conservation and management of the heritage significance of items of Aboriginal objects and places The design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of Aboriginal objects and places	The heritage significance of Aboriginal objects and places are protected, conserved and/or managed in order to ensure the project does not diminish the story and cultural understanding of Aboriginal people in New South Wales.	Construction
	Impacts on areas of archaeological potential and significance are avoided or minimised, where practical.	Construction
	The design of the project incorporates Aboriginal heritage interpretation and Aboriginal cultural design principles in consultation with Aboriginal stakeholders.	Operation

6.2 Proposed safeguards

In addition to all practicable steps to avoid or minimise impacts that have been and will continue to occur during design development, mitigation and management measures would be implemented to further reduce potential impacts on biodiversity values. These measures are identified in Table 11.2 (Mitigation measures) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement.

Mitigation measures to be implemented during construction for biodiversity matters would be outlined in a Flora and Fauna Management Plan. Additionally, performance outcomes for the project commit to minimising or where possible avoiding impacts to threatened flora and fauna species, and ecological communities listed under the EPBC Act.

6.3 Effectiveness of mitigation measures

The proposed approach to environmental management is to prepare an overarching, integrated environmental management strategy for the whole of the project that addresses both the off-airport and on-airport environmental management regimes. The implementation of these mitigation and management measures has been shown to be proven and effective on previous construction projects.

6.4 Basis for mitigation measures

Mitigation measures have been developed to mitigate and manage the potential impacts of the project and achieve the performance outcomes. The measures have been identified to manage both construction and operational impacts and some measures have been identified to manage impacts in a site-specific location.

6.5 Contingency measures

The Construction Environmental Management Framework (CEMF) for the project sets out minimum requirements to be addressed in each Construction Environmental Management Plan (CEMP) that will be prepared for the project. The CEMF is provided at Appendix F of the Project Environmental Impact Statement.

Requirements include strategies for compliance with environmental management measures and continuous improvement through review of the performance of environmental controls. Augmented with a requirement for environmental inspections and monitoring, auditing and review, and reporting on environmental performance and compliance tracking, these procedures provide a robust, proven mechanism for dealing with contingencies.

7 Offsets

A detailed discussion on offsets is provided in Chapter 12 (Biodiversity offsetting and credit report) of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement.

Offset requirements relating to residual impacts to Commonwealth matters of national environmental significance that are not able to be managed through mitigation would be offset in accordance with the Biodiversity Assessment Method (BAM) based on the Biodiversity Assessment Method Calculator (BAMC) calculations for both ecosystem and species credits. The BAM is an endorsed framework under the EPBC Act.

7.1 Quantification

The BAM provides a prescribed method to robustly quantify and deliver offsets that provide appropriate environmental gains targeted at the biodiversity values to be impacted. The proponent for the proposed action – Sydney Metro, is committed to delivering an offset strategy that meets the quantum of the offset requirements in accordance with the BAM. The offset requirements will be delivered where possible through the retirement of available credits and/or payment into the Biodiversity Conservation Fund.

The quantification of offset requirements for the project has been undertaken in accordance with the BAM and is provided in Table 12.7 and Table 12.9 of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement.

7.2 Implementation

The biodiversity offset strategy for the project, that would enable the credit obligations to be met, comprises two options. These options are:

- the purchase and retirement of existing biodiversity credits currently available on the biodiversity credit register
- through making a payment into the Biodiversity Conservation Fund.

The offset strategy does not include the establishment of biodiversity stewardship sites.

Credits are currently being sourced and it is anticipated that any NSW approval conditions for the project will specify a timeframe for the securing and retirement of those credits in relation to the commencement of construction activities.

The purchase and retirement of existing biodiversity credits is required to be undertaken based on like for like trading rules as outlined under the NSW *Biodiversity Conservation Regulation 2017* and as identified by the BAMC output. The like for like ecosystem credit class options for each biodiversity offset credit obligation are summarised in Table 12.12 of Technical Paper 3 (Biodiversity Development Assessment Report) of the Project Environmental Impact Statement.

8 Consultation

Information on consultation activities was provided as part of the Referral (EPBC 2020/8687). In addition, a detailed description of the consultation undertaken to date for the project is provided in Chapter 5 (Stakeholder and community engagement) of the Project Environmental Impact Statement.

In summary, Sydney Metro has developed a comprehensive stakeholder and community engagement program to proactively engage with local communities, key stakeholders and government agencies during and following exhibition of the Project Environmental Impact Statement.

Consultation for the project has generally been undertaken since June 2015 as part of the Western Sydney corridors and *Western Sydney Rail Needs Scoping Study* (Transport for NSW and Australian Government, 2018), with the project being formally announced in June 2020. Consultation has been undertaken with Commonwealth and NSW State Government departments and agencies, local government, peak organisations, the community and industry. This has involved:

- project briefing forums and meetings with key stakeholders, local councils and government agencies
- project flyer – letterbox drop to around 16,000 residents and businesses
- proactive media strategy, which resulted in broad coverage across Sydney metropolitan and local print, radio and television outlets
- email alerts to registered community members and stakeholders
- social media via the Sydney Metro Facebook page
- online surveys – ‘Have your say’ on the Sydney Metro website
- newsletters - delivered via letterbox drop and placed on the project website.

Aboriginal community consultation has been undertaken in accordance with the requirements of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (NSW Office of Environment and Heritage, 2010). This has included identification, notification and registration of Aboriginal Parties who hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and places in the study area.

A total of 68 Registered Aboriginal Parties (RAPs) have been provided with project information to date, along with the draft assessment methodology, for comment and feedback and an invitation to participate in field survey work.

Inspections of accessible areas was undertaken with a representative from the relevant Local Aboriginal Land Councils (LALC); Gandangara LALC and Deerubbin LALC. Feedback from the Gandangara and Deerubbin LALC representatives during the inspections indicated that the waterways within and in proximity to the construction footprint have cultural significance as pathways and focal resource areas for Aboriginal people in the past. Consultation with Registered Aboriginal Parties helped to determine areas of archaeological potential which were largely focussed on areas of low disturbance near waterways.

An Aboriginal Cultural Heritage Assessment Report (ACHAR) for the project has been prepared (refer to Technical Paper 5 (Aboriginal heritage) of the Project Environmental Impact Statement). During preparation of the draft ACHAR the following feedback has been received from the Aboriginal community regarding Aboriginal cultural heritage values:

- the entire study area would have been once occupied and inhabited by Aboriginal people in the past, and is still culturally significant to the Aboriginal community of today
- in the past Aboriginal people in this area walked the land, participated in ceremonies and dance, had camp sites and used fire for cooking in the hot coals, undertook burials in soft ground, marked trees to indicate culturally significant areas, and fished in waterways and used them as a source of drinking water. The waterways and their tributaries that traverse the construction footprint hold

cultural significance, and were used in the past for their abundant natural resources and as natural landform boundary markers

- landscape features such as waterways provide connections between known sites, and connections of continuity from the past landscape to the present environment for the contemporary Aboriginal community
- the waterways that cross the construction footprint have cultural significance as they were used as pathways and resource areas for Aboriginal people in the past
- previously identified Aboriginal sites are markers of the past providing direct links for the contemporary Aboriginal community to their ancestors
- there is the potential for further, as yet unidentified, sites to occur. Any such sites would have associated cultural values
- there are some cultural sites as yet unregistered on the Aboriginal Heritage Information Management System (AHIMS) known by the Aboriginal community to occur in the area surrounding the construction footprint. At this stage no known cultural sites as yet unregistered on AHIMS have been identified within the construction footprint
- all Aboriginal sites are considered to be of high cultural value to the Aboriginal community as they provide a tangible link to ancestors and are a physical marker in the landscape attesting to the long-term presence of Aboriginal people in this area
- cultural values identified thus far rest in the identified sites, potential sites and landscape features such as waterways
- evidence of past Aboriginal activity does not form bounded 'sites' for the Aboriginal community but rather is seen as one connected cultural landscape
- the cumulative impact of this project with other development proposed in the region (such as the Aerotropolis) is seen by the Aboriginal community as removing/destroying the remnant Aboriginal sites and associated cultural values across a larger area
- recommendations to undertake further investigations (survey and test excavation), including the proposed methodology for these investigations, are supported prior to impacts occurring.

Further details of Aboriginal stakeholder consultation undertaken as part of the Aboriginal heritage assessment is provided in Technical Paper 5 (Aboriginal heritage) of the Project Environmental Impact Statement.

A number of channels have also been established to provide information and invite feedback, which are available to the public and are advertised on all external communication materials. These channels have been used throughout the project development phase and will remain available during exhibition of the Project Environmental Impact Statement.

9 Economic and social matters

A detailed discussion of the economic and social impacts of the project is provided at Chapter 21 (Social and economic) of the Project Environmental Impact Statement.

In summary, the project (including the proposed action) would have positive local, regional and national economic and employment impacts through the provision of around 14,000 construction jobs. Potential temporary social impacts during construction would generally be managed through appropriate mitigation of other environmental amenity aspects such as noise, traffic, visual and air quality.

The main social and economic impacts off-airport during construction are:

- temporary disruption to 'way of life', amenity and access of residents, community groups and businesses surrounding construction sites from construction noise, dust, vibration and traffic
- changes to community composition, cohesion, character, function and sense of place through the influx of construction workers, relocation of residents and businesses due to property acquisition, and reduction in availability of cultural meeting places and hubs
- changes to access to and operation of social infrastructure, services and facilities
- potential loss of cultural values due to construction works including Aboriginal and non-Aboriginal heritage values and connection to land
- potential impacts to community health and well-being through property acquisitions and nuisance from construction activities such as noise, vibration, dust
- impacts to the economic livelihoods of people and businesses through construction disruptions and property acquisitions.

The main social and economic impacts off-airport during operation are:

- enhanced accessibility and connectivity within the Western Parkland City and Greater Sydney for social, economic/employment, education, recreational and health purposes
- high quality rail stations and improved community spaces and facilities in the new station precincts including improved access infrastructure
- potential severance of properties, communities and access due to permanent at-surface rail infrastructure
- amenity changes through the operation of rail services.

The operation of the project would provide access to Western Sydney International for workers, commuters and travellers and support the operation and economic benefits of the airport and supporting activities.

The project would have positive regional, and national, economic and employment impacts through facilitating increased trade catchments, efficient freight movements and providing employment connectivity. It would also directly employ people to operate and maintain the trains and stations.

10 Conclusion

10.1 Summary of impacts, avoidance and mitigation measures, and offsets

Residual impacts of the off-airport components of the project include:

- impact to around 33 hectares of native vegetation off-airport
- clearing of around 5.71 hectares of Cumberland Plain Woodlands and Shale-Gravel Transition Forest and 3.67 hectares of Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland as listed under the EPBC Act
- removal of threatened species and/or their habitat, including:
 - direct removal of one threatened species of flora, *Grevillea juniperina* subsp. *juniperina*, and three threatened fauna species (Cumberland Plain Land Snail, Southern Myotis and Little Eagle) listed as vulnerable under the BC Act
 - direct removal of foraging habitat for one fauna species, the Grey-headed Flying-fox listed as vulnerable under the EPBC Act
 - potential habitat for a further eleven threatened flora species listed under the BC Act and nine species under the EPBC Act based on a precautionary approach to assumed presence
 - potential habitat for a further two threatened fauna species listed under the EPBC Act based on a precautionary approach to assumed presence
- potential indirect impacts to threatened species and/or their habitat such as reduced viability of adjacent habitat due to edge effects, noise, dust or light spill
- potential impacts on groundwater dependent ecosystems (around 1.7 hectares of Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion) resulting from changes to groundwater level or flow
- impacts on a relatively small proportion (5.01 hectares) of the available foraging habitat area of the EPBC Act listed Grey-headed Flying-fox and BC Act listed *Myotis macropus* (Southern Myotis) and *Hieraaetus morphnoides* (Little Eagle) within the locality
- impacts on Commonwealth land (i.e. DEOH site) through the removal of approximately 7.3 hectares of native vegetation communities providing habitat for matters of national environmental significance, including:
 - 4.79 hectares of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest as listed under the BC Act and incorporating 1.21 hectares of TEC under the EPBC Act
 - 0.22 hectares of River-flat Eucalypt Forest as listed under the BC Act
 - 2.29 hectares Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland (PCT 1800) as listed under the BC Act and incorporating 1.85 hectares of Threatened Ecological Community under the EPBC Act
- potential impacts on up to 5.01 hectares of the available potential foraging habitat area of the Grey-headed Flying-fox as listed under the EPBC Act, and the BC Act listed *Myotis macropus* (Southern Myotis) and *Hieraaetus morphnoides* (Little Eagle).

Many potential impacts have been avoided through the project development process. Residual environmental and social impacts of the project have been minimised through the specific design and the construction methods chosen. In addition, the application of comprehensive mitigation and management measures would be implemented, and these measures have been shown to be proven and effective on previous construction projects. Design development and refinements would continue to further minimise any residual impacts.

Specific mitigation measures for residual potential impacts to biodiversity include:

- a targeted microbat survey (Eastern Coastal Free-tailed Bat or Eastern False Pipistrelle) of dwellings and structures proposed for demolition
- during construction, shading and artificial light impacts would be minimised in areas adjoining remnant bushland in intact condition
- fish passage and fish habitat associated with Cosgrove Creek and Blaxland Creek would be protected in accordance with the *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI (Fisheries NSW) 2013)
- wildlife connectivity would be maintained (where possible) through the installation of viaduct/bridge structures designed in accordance with the Draft Wildlife Connectivity Guidelines (Transport for NSW, 2014).

Residual impacts that are not able to be managed through mitigation would be offset in accordance with BAM as an endorsed offset framework under the EPBC Act. Based on Biodiversity Assessment Method Calculator (BAMC) calculations for both ecosystem and species credits, the project offset obligation of off-airport impacts has been calculated to require the following biodiversity credits:

- 895 ecosystem credits
- 2,998 species credits.

10.2 Environmental acceptability of proposed action

The potential residual impacts identified would not result in unacceptable impacts and further mitigation would be explored during design development including the decision on appropriate construction methodologies and the implementation of environmental management practices.

10.3 Efficacy of mitigation measures

Comprehensive mitigation measures have been developed to mitigate and manage potential impacts of the project (including the proposed action) on the environment and achieve the identified performance outcomes. The implementation of these mitigation and management measures has been shown to be proven and effective on previous construction projects.

10.4 Ecologically sustainable development principles

Biophysical, economic and social considerations have been assessed for the project in the context of the principles of ecologically sustainable development.

Ecologically sustainable development principles for the proposed action are the same as those for the project which are discussed in Chapter 27 (Synthesis) and Chapter 28 (Conclusion) of the Project Environmental Impact Statement and are summarised as:

- **Precautionary principle:** The environmental risk analysis, together with the detailed assessment carried out in preparing the Project Environmental Impact Statement, indicates that there would be no threat of serious or irreversible damage to the environment.
- **Intergenerational equity:** The objectives of the project are essentially around connecting the Western Parkland City and ensuring an efficient and reliable public transport network to connect to Western Sydney International. This would benefit current and future generations. Once operational, the project would leave a positive legacy for future generations. It would provide long term benefits by providing a new transport linkage to the Western Parkland City and connection to Western Sydney International.

- Conservation of biological diversity and ecological integrity: Conservation of biological diversity and ecological integrity has been considered throughout project and design development. The construction footprint has been developed to avoid or minimise impact to areas of high ecological value. Detailed assessments have been carried out to identify flora and fauna impacts and a range of mitigation measures identified for implementation. Impacts on biological diversity and ecological integrity have been assessed as moderate.
- Improved valuation and pricing of environmental resources: The value placed on the environment was inherent in the development of the design. In addition, the costs associated with the planning and design of measures to avoid/minimise adverse environmental impacts and the costs to implement them have been built into the overall project costs. Ongoing design development together with specific issue-based management plans would represent further commitment to the recognition of the value of protecting environmental resources.

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