

3.6 Flora and fauna

This Section summarises the existing biodiversity in the study area, based on the findings of Technical Paper 5 — *Biodiversity Assessment* (Volume 2). The flora and fauna impacts associated with the Project are discussed in Section 8.6.

3.6.1 Assessment approach

The flora and fauna survey and assessment undertaken for the Project comprised a desktop review of databases and historical records, as well as field surveys in the study area. The study area is defined as the Project area (or 'Project footprint') and any additional areas that are likely to be affected by the Project, either directly or indirectly. The Project locality was defined as the area within a 10 kilometre radius of the study area.

Surveys of the study area were undertaken on 19 September 2007, 6 February 2008, 8 April 2008, 7 May 2008, 2-3 September 2008 and 11 March 2009. The surveys assessed the extent and condition of vegetation communities, and flora and fauna habitat (refer Table 3-22). Where the survey was undertaken outside the optimal time for detecting some species, a precautionary approach was taken that involved the assumption that species were present if suitable habitat was identified.

Targeted surveys for threatened species of plant and Endangered Ecological Communities (EEC) were undertaken in the rail corridor and private properties (6 February 2008, 8 April 2008, 7 May 2008 and 2-3 September 2008). Surveys targeted threatened species likely to occur within the study area including *Pimelea spicata* (surveys coincided with the flowering time of this cryptic species), *Pultenaea parviflora*, *Acacia pubescens*, *Grevillea juniperina* and *Dillwynia tenuifolia*.

Targeted surveys were also undertaken within areas of Cumberland Plain Woodland and Shale Gravel Transition Forest that provide potential habitat for the Cumberland Plain Land Snail (including the proposed car park at Vineyard).

The fauna assessment of the study area was based primarily on the habitats present. By the nature of their rarity, threatened species are often difficult to detect; as such, suitable habitat is the most important factor to consider when determining the potential presence of threatened species. Fauna habitats were generally assessed by examining characteristics such as the structure and floristics of the canopy, understorey and ground vegetation, the structure and composition of the litter layer, and other habitat attributes important for feeding, roosting and breeding. Table 3-22 summarises the criteria used to evaluate habitat values.

Conservation significance classes were assigned to each remnant based on the *Final Native Vegetation Mapping of the Cumberland Plain, Western Sydney* (NSW National Parks and Wildlife Service 2002a, 2002b). These conservation significance classes are summarised in Table 3-22.

Table 3-22 Classification of vegetation community and fauna habitat condition and conservation significance of Cumberland Plain vegetation

Item	Description
Vegetation community condition	<ul style="list-style-type: none"> ▪ <i>Good</i> — vegetation retains the species complement and structural characteristics of the pre-European equivalent. Such vegetation has usually changed very little over time and displays resilience to weed invasion due to intact groundcover, shrub and canopy layers. ▪ <i>Medium</i> — vegetation generally retains its structural integrity, but has been disturbed and has lost some component of its original species complement. Weed invasion can be significant in such remnants. ▪ <i>Poor</i> — vegetation that has lost most of its species and is significantly modified structurally. Often, such areas have a discontinuous canopy of the original tree cover, with very few shrubs. Exotic species, such as introduced pasture grasses or weeds, replace much of the Indigenous ground cover. Environmental weeds are often co-dominant with the original Indigenous species.
Fauna habitat condition	<ul style="list-style-type: none"> ▪ <i>Good</i> — a full range of fauna habitat components are usually present (e.g. old-growth trees, fallen timber, feeding and roosting resources) and habitat linkages to other remnant ecosystems in the landscape are intact. ▪ <i>Moderate</i> — some fauna habitat components are missing (e.g. old-growth trees and fallen timber), although linkages with other remnant habitats in the landscape are usually intact, but sometimes degraded. ▪ <i>Poor</i> — many fauna habitat elements in low quality remnants have been lost, including old growth trees (e.g. due to past timber harvesting or land clearing) and fallen timber. Tree canopies are often highly fragmented. Habitat linkages with other remnant ecosystems in the landscape have usually been severely compromised by extensive past clearing.
Conservation significance of Cumberland Plain vegetation ¹	<ul style="list-style-type: none"> ▪ <i>Core habitat</i> — areas that constitute the backbone of a viable conservation and include all remnants of 10 hectares or more of the mapped vegetation category with canopy cover greater than 10%. ▪ <i>Support for core habitat</i> — these are areas that provide a range of support values to the core habitat, including increasing remnant size, buffering from edge effects, and providing corridor connections. The focus is to identify priority areas for conservation and restoration in order to enhance the biodiversity values in the region. ▪ <i>Urban remnant trees (Critically Endangered Communities)</i> — this category contains areas of the critically endangered ecological communities that remain as remnant trees in an urban landscape (mapped as Canopy Cover less than 10% (Urban Areas)). ▪ <i>Other remnant vegetation</i> — this category contains all native vegetation that does not fall within the above conservation significance classes (NSW National Parks and Wildlife Service 2002b).

Note: 1: Conservation significance classes have been assigned to each remnant of Cumberland Plain vegetation by the *Final Native Vegetation Mapping of the Cumberland Plain, Western Sydney* (NSW National Parks and Wildlife Service 2002a, 2002b).

3.6.2 Existing environment

Vegetation communities

Vegetation within and adjacent to the rail corridor in the study area has been previously mapped as part of the *Native Vegetation Maps of the Cumberland Plain* NSW National Parks and Wildlife Service 2002a, 2002b). While the majority of the study area is not mapped as containing native vegetation, three communities are mapped as occurring within the study area, with a fourth mapped as occurring in adjacent areas (refer Figure 3-19). All of these communities are listed as EECs (refer Table 3-23).

Table 3-23 Vegetation communities within and adjacent to the study area

Vegetation mapping unit ¹	Threatened community	TSC Act ²	EPBC Act ³	Mapping within study area ¹	Location and extent within study area
Shale Plains Woodland	Cumberland Plain Woodland	E ⁴	E ⁵	Two patches of this community are mapped within the study area: <ul style="list-style-type: none"> between Riverstone and Schofields stations north of Quakers Hill Station. It also occurs adjacent to the study area.	Seven small patches of this community occur within the subject site: <ul style="list-style-type: none"> three small patches to the south of Schofields Station four patches to the north of Quakers Hill Station. It also occurs adjacent to the study area.
Alluvial Woodland	River-Flat Eucalypt Forest on Coastal Floodplains	E	-	One narrow strip is mapped within the rail corridor, to the north of Quakers Hill Station. This community also occurs in adjacent areas.	Five patches were recorded within the subject site, to the north of Quakers Hill Station. This community also occurs in adjacent areas.
Shale Gravel Transition Forest	Shale Gravel Transition Forest	E	-	Mapped as occurring extensively in the vicinity of Vineyard and to the north of Riverstone.	Occurs within the study area south from Bandon Road, including within the proposed new Vineyard Station site, bus interchange and car park.
Cooks River Castlereagh Ironbark Forest	Cooks River Castlereagh Ironbark Forest	E	-	Mapped as occurring near the study area, to the north east of Vineyard.	Outside the study area.

Notes:

1: Cumberland Plain vegetation mapping (NSW National Parks and Wildlife Service 2002d)

2: Listed under the *Threatened Species Conservation Act 1995* as Endangered (E)

3: Listed under the EPBC Act as Endangered (E)

4: On the 21 November 2008, the Scientific Committee, established under the *Threatened Species Conservation Act 1995*, made a preliminary determination to propose to list the Cumberland Plain Woodland in the Sydney Basin Bioregion as a Critically Endangered Ecological Community under the *Threatened Species Conservation Act 1995*. This preliminary determination was on public exhibition until 23 January 2009; a final determination has yet to be made by the Scientific Committee.

5: On the 1 October 2008, the Threatened Species Scientific Committee, established under the EPBC Act, nominated Cumberland Plain Woodland on the Finalised Priority Assessment List. This preliminary determination proposes to list this endangered ecological community as critically endangered under the EPBC Act. This proposed change in listing under the Act is yet to be determined.

The three vegetation communities identified in the study area are mapped in Figure 3-19 and described in the following sections.



0 100
metres

Existing railway line
Proposed railway line

Cumberland vegetation*: Alluvial Woodland Shale Plains Woodland
* Source: NSW National Parks and Wildlife Service, 2002a

Field verified communities: Alluvial Woodland Shale Plains Woodland

Figure 3-19a Vegetation communities within the vicinity of the project area
Note: Project detail shown is indicative only, subject to detailed design.



0 100
metres

Existing railway line
Proposed railway line

Cumberland vegetation*:

Alluvial Woodland
Shale Plains Woodland
* Source: NSW National Parks and Wildlife Service, 2002a

Field verified communities:

Shale Plains Woodland
Alluvial Woodland

Grevillea juniperina subsp juniperina

Figure 3-19b Vegetation communities within the vicinity of the project area

Note: Project detail shown is indicative only, subject to detailed design.

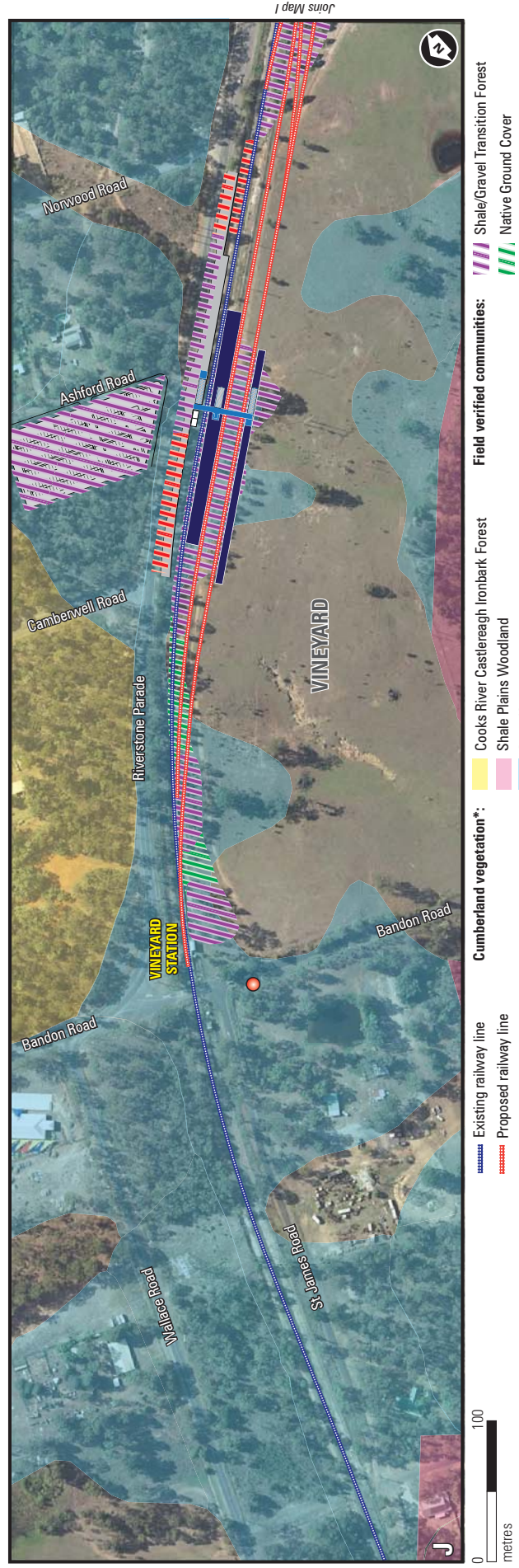


Figure 3-19c Vegetation communities within the vicinity of the project area
 Note: Project detail shown is indicative only, subject to detailed design.



Figure 3-19d Vegetation communities within the vicinity of the project area

Note: Project detail shown is indicative only, subject to detailed design.



* Source: NSW National Parks and Wildlife Service, 2002a

Figure 3-19e Vegetation communities within the vicinity of the project area

Note: Project detail shown is indicative only, subject to detailed design.

Shale Plains Woodland

Shale Plains Woodland is a widely distributed community on the Cumberland Plain, occurring predominantly on soils derived from Wianamatta Shale and is a form of Cumberland Plain Woodland (NSW Scientific Committee 2008). Cumberland Plain Woodland is currently listed as Endangered under the EPBC ACT and the *Threatened Species Conservation Act 1995* (TSC Act), however, there are preliminary determinations to list this community as Critically Endangered under both the TSC Act and the EPBC Act (Department of the Environment, Water, Heritage and the Arts 2008; NSW Scientific Committee 2008). This proposed change in listing under the TSC Act and EPBC Acts is yet to be determined.

Most of the remnants of Shale Plains Woodland that are mapped in the study area are classified as 'other remnant vegetation' (refer Table 3-22). One area of Shale Plains Woodland mapped as occurring north of Schofields Station is classified as 'support for core habitat' (refer Table 3-22); however, the vegetation in the rail corridor in this area was highly degraded and did not support this community.

Alluvial Woodland

Alluvial Woodland occurs exclusively in association with drainage lines (NSW National Parks and Wildlife Service 2002a) and was restricted to two unnamed tributaries of Eastern Creek, north of Quakers Hill and Schofields stations (refer Figure 3-19). Both remnant patches of this community are classed as 'other remnant vegetation' (refer Table 3-22). Patches of this community were also identified along the rail alignment. These patches were small, fragmented, edge-affected and ranged in condition from medium to poor.

Alluvial Woodland is a diverse vegetation community that can be dominated by a range of different species depending on the adjacent vegetation community (NSW National Parks and Wildlife Service 2002a). Due to the species composition, with dominance of eucalypts, this community within the site is consistent with the EEC River-Flat Eucalypt Forest on Coastal Floodplains (DECC 2007a).

Shale Gravel Transition Forest and derived grassland

Shale Gravel Transition Forest occurs primarily in association with Shale Plains Woodland. Fragments of Shale Gravel Transition Forest were identified to the south of Bandon Road, along the proposed new rail line, within part of the proposed new Vineyard Station site, and within the proposed bus interchange and car park (refer Figure 3-19). These community fragments are summarised in Table 3-24.

Derived grassland occurred in the vicinity of the proposed Vineyard Station. This area consisted of native groundcover species, and regenerating shrub and canopy species characteristic of Shale Gravel Transition Forest. The native groundcover was largely restricted to within a few metres of the rail corridor fence and in the understorey of regrowth woodland patches. The vegetation in this area generally had little weed invasion, and given time, is likely to regenerate.

Table 3-24 Shale Gravel Transition Forest fragments in the study area

Fragment location	Description
New Vineyard Station car park	<p>Occurs as a tall forest dominated by <i>Eucalyptus tereticornis</i> and <i>E. fibrosa</i>.</p> <p>Although the margins (approximately 5 metres wide) of this remnant patch are dominated by the introduced <i>Eragrostis curvula</i>, beyond the influence of edge effects this patch has a high diversity of native groundcover species and few weeds.</p> <p>This area had a high diversity of native species. Recruitment of native species was evident, with eucalypts of a range of ages recorded. The soil appeared undisturbed, with extensive lichen and moss cover.</p> <p>This area was in good condition and has been classed as 'core habitat' (refer Table 3-22).</p>
New Vineyard Station bus interchange	<p>The proposed bus interchange site consists of a narrow (up to 3 metres wide) strip of regrowth Shale Gravel Transition Forest occurring between Riverstone Parade and the existing rail corridor.</p> <p>This area displays a high level of disturbance including past clearing, weed invasion and roadside litter. The ground cover in this area is patchy and consists of a mix of native ground cover species as well as the introduced <i>E. curvula</i>.</p> <p>Although disturbed, this area was in moderate condition and supported the threatened <i>Pultenaea parviflora</i> (54 plants).</p>
New Vineyard Station and associated track	<p>To the west of the existing rail line, within the area of the proposed new Vineyard Station and associated track, this community occurred as young regrowth vegetation with eucalypts generally to 6 metres tall within a cleared and grazed landscape. Grazing of this area appeared to have ceased recently and although regeneration of eucalypts was evident, including within the grassland area (up to 1 metre tall), no regeneration of shrubs was evident.</p> <p>Derived grassland also occurred in this area and consisted of native species characteristic of Shale Gravel Transition Forest. The native ground cover was largely restricted to within a few metres of the rail corridor fence and in the understorey of regrowth woodland patches.</p> <p>The vegetation in this area generally had low levels of weed invasion and, given time, is likely to regenerate.</p>

Flora

A total of 239 species of plant were recorded within the study area. Of these, 135 (56%) were native species. The site was dominated by *Poaceae*, *Fabaceae* and *Asteraceae* species. A full list of species recorded is provided in Appendix A of Technical Paper 5. Two threatened plant species, *Pultenaea parviflora* and *Grevillea juniperina* subspecies *juniperina*, were recorded within the study area (refer Figure 3-19). Other threatened species and populations recorded previously, or those that are predicted to occur, within the study area are considered in Section 3.6.3.

Weeds

Ninety-nine species of weed were recorded, corresponding to 44% of the species recorded in the study area (refer Appendix A of Technical Paper 5). This included 17 species listed as noxious weeds in the Hawkesbury River County Council noxious weed control area (includes Blacktown LGA). Of these, three are also listed as weeds of national significance (refer Table 3-25). A full list of weeds is provided in Appendix A of Technical Paper 5.

Table 3-25 Noxious weeds recorded in the study area

Scientific name	Common name	Noxious weed ¹	WONS ²
<i>Bryophyllum delagoense</i>	Mother of Millions	3	–
<i>Brassica rapa</i>	–	3	–
<i>Cestrum parqui</i>	Green Cestrum	3	–
<i>Cortaderia selloana</i>	Pampas Grass	3	–
<i>Ageratina adenophora</i>	Crofton Weed	4	–
<i>Echinochloa frumentacea</i>	Siberian Millet	4	–
<i>Echium plantagineum</i>	–	4	–
<i>Hypericum perforatum</i>	St. Johns Wort	4	–
<i>Ligustrum lucidum</i>	Large-leaved Privet	4	–
<i>Ligustrum sinense</i>	Small-leaved Privet	4	–
<i>Lycium ferocissimum</i>	African Boxthorn	4	–
<i>Opuntia stricta</i>	Prickly Pear	4	–
<i>Rubus fruticosus</i>	Blackberry complex	4	Y
<i>Asparagus asparagoides</i>	Bridal Creeper	5	Y
<i>Lantana camara</i>	Lantana	5	Y
<i>Oxalis corniculata</i>	Creeping Oxalis	5	–
<i>Oxalis latifolia</i>	Fishtail Oxalis	5	–

Notes: 1: *Noxious Weeds Act 1993*: Class 3: The plant must be fully and continuously suppressed and destroyed. Class 4: The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority. Class 5: The requirements in the *Noxious Weeds Act 1993* for a notifiable weed must be complied with.

2: Weeds of National Significance (Thorp and Lynch 2000).

Fauna habitats

The suitability, size and configuration of fauna habitats correlates broadly with the structure, floristics, connectivity and quality of the local and regional vegetation types as described above. Habitat features along the rail corridor generally include those associated with cleared areas, disturbed regrowth vegetation and riparian habitats. The habitats and species associations within the site are discussed below.

Maintained rail corridor

There are limited fauna habitat features within the rail corridor, as the vegetation has been cleared and/or maintained (mown or slashed) in most areas. Areas that have not been maintained, including steeper areas adjacent to the rail track, provide foraging habitat and refuge for common reptiles including the Grass Sun Skink (*Lampropholis delicata*) and Blue Tongue Lizard (*Tiliqua scincoides*), as well as foraging and nesting habitats for small birds, including fairywrens, finches and the Willie Wagtail (*Rhipidura leucophrys*). Other generalist species of bird, including the Australian Magpie (*Gymnorhina tibicen*), Laughing Kookaburra (*Dacelo novaeguineae*) and Australian Raven (*Corvus coronoides*) forage in open and cleared areas.

Isolated eucalypt trees occur along the rail corridor and road reserve including both locally Indigenous species and non-endemic plantings. The majority of these were *Eucalyptus tereticornis*, with *Angophora floribunda* also common. Trees were generally young and none were observed to have hollows. Species such as *Eucalyptus tereticornis* and *E. viminalis* were noted to have suitable temporary roost sites for microbats. These trees would provide roosting and nesting habitats for generalist species of bird.

The numerous *Angophora floribunda* specimens that were scattered within the landscape should be also noted to be a secondary food resource for the Threatened Glossy Black-cockatoo listed as Vulnerable under TSC Act.

The majority of the site is dominated by cleared areas, and consequently, offers limited habitat features for native species of animal. Fauna habitats within the rail corridor are generally in poor condition.

Remnant vegetation

Remnant vegetation in the study area occurs as fragments or isolated trees. Remnant forest and woodland is largely restricted to the proposed new bus interchange and car park site at Vineyard. These sites contain Shale Gravel Transition Forest as described above.

The remnant forest and woodland contained older trees, and provided greater habitat complexity for fauna in the form of fallen trees and dense understorey vegetation. These attributes were being used by the Yellow Thornbill (*Acanthiza nana*) and White-plume Honeyeater (*Lichenostomus ornatus*), while the Sulphur Crested Cockatoo (*Cacatua galerita*) and Black-faced Cuckoo Shrike (*Coracina novaehollandiae*) were observed flying over the canopy.

Forest areas in the proposed Vineyard car park area consisted of intact forest canopy with moderate leaf litter, fallen trees, rocks and a patchy shrub layer. This area was observed being used by species of bird including the Superb Fairy Wren (*Malurus cyaneus*), Yellow Thornbill, Willie Wagtail and species of reptile including the Grass Sun Skink. Older trees may provide nesting opportunities for open country and generalist species of bird and roosting habitat for microchiropteran bats.

Regrowth vegetation and cleared areas

Regrowth and cleared areas occur in the site of the proposed new Vineyard Station and associated track. These areas provide limited resources for fauna, consisting of low, open groundcover and scattered remnant trees or young regrowth with little structural complexity. These areas would support generalist species of bird and reptile.

Older trees may provide nesting opportunities for open country and generalist species of bird, and roosting habitat for microchiropteran bats. Two mature *Eucalyptus fibrosa* trees were recorded within the proposed new Vineyard Station area; these trees had small hollows (10 centimetres in diameter) as well as deep vertical fissures within the stem and branches.

Aquatic habitats

Aquatic habitats occur as small, open drainage ditches generally within track-side gullies, other temporarily inundated depressions and stormwater channels. These habitats did not contain significant riparian vegetation and/or were overgrown with introduced weed species such as *Salix babylonica*, *Sida rhombifolia*, *Galium aparine*. *Typha* species were also common. In general, these areas are highly modified through weed invasion, rubbish dumping and drainage control works — including concreting — and are invaded by introduced vegetation. However, common species of amphibian such as the Common Eastern Froglet (*Crinia signifera*) and Spotted Grass Frog (*Limnodynastes tasmaniensis*) occur in ephemeral drainage ditches and drainage lines.

These habitats would not provide significant habitat for aquatic species as they would be classed as minimal fish habitat (class 3 (Fairfull and Witheridge 2003). Based on the classification of the *Riparian Corridor Management Study* (Department of Infrastructure Planning and Natural Resources 2004), one of the drainage lines crossing the rail corridor (near Princess Street, Riverstone) has been classified as a Category 2 riparian corridor (GCC 2008) meaning that it provides basic habitat and preserves the natural features of a watercourse (not necessarily linking key destinations).

3.6.3 Species, populations and communities of conservation concern

Threatened ecological communities

Thirteen threatened ecological communities (including Endangered and Critically Endangered Communities) listed under the TSC Act and/or the EPBC Act have been recorded and/or are predicted to occur in the locality and along the rail alignment (refer Table 3-26); three of these communities were recorded as occurring in the study area.

Table 3-26 Threatened ecological communities known or predicted to occur in the Project locality

Threatened ecological community	Legislative status		Occurrence within the study area	Occurs within non-certified areas
	TSC Act ¹	EPBC Act ²		
Agnes Banks Woodland	E	-	No — characteristic species not recorded.	No — not present within the study area
Blue Gum High Forest	E	CE	No — characteristic species not recorded.	No — not present within the study area
Castlereagh Swamp Woodland	E	-	No — characteristic species not recorded.	No — not present within the study area
Cooks River Castlereagh Ironbark Forest	E	-	No — occurs adjacent to the site, north-east of Vineyard Station.	No — not present within the study area
Cumberland Plain Woodland	E ³	E ⁴	Yes — present along the rail alignment, occurring in seven small patches close to Quakers Hill and Schofields stations.	No — restricted to certified areas of the north west growth centre

Threatened ecological community	Legislative status		Occurrence within the study area	Occurs within non-certified areas
	TSC Act ¹	EPBC Act ²		
Elderslie Banksia Scrub Forest	E	-	No — characteristic species not recorded.	No — not present within the study area
River-flat Eucalypt Forest on Coastal Floodplains	E		Yes — occurs in five patches in the rail corridor and adjoining lands, where it is restricted to an unnamed tributary of Eastern Creek north of Quakers Hill Station.	No — restricted to certified areas of the NWGC
Shale Gravel Transition Forest	E	-	Yes — occurs in the northern part of the alignment close to Riverstone.	No — restricted to certified areas of the NWGC
Shale/Sandstone Transition Forest	E	E	No — characteristic tree species not recorded.	No — not present within the study area
Swamp Oak Floodplain Forest	E	-	No — characteristic species not recorded.	No — not present within the study area
Swamp Sclerophyll Forest on Coastal Floodplains	E	-	No — characteristic species not recorded.	No — not present within the study area
Sydney Turpentine-Ironbark Forest	E	CE	No — characteristic tree species not recorded.	No — not present within the study area
Western Sydney Dry Rainforest	E	-	No — characteristic species not recorded.	No — not present within the study area

Notes: 1: Listed as Endangered (E) under the TSC Act

2: Listed as Endangered (E), or Critically Endangered (CE) under the EPBC Act.

3: On the 21 November 2008, the Scientific Committee, established under the TSC Act, made a preliminary determination to propose to list the Cumberland Plain Woodland in the Sydney Basin Bioregion as a Critically Endangered Ecological Community under the TSC Act. This preliminary determination was on public exhibition until 23 January 2009; a final determination has yet to be made by the Scientific Committee

4: On the 1 October 2008, the Threatened Species Scientific Committee, established under the EPBC Act, nominated Cumberland Plain Woodland on the Finalised Priority Assessment List. This preliminary determination proposes to list this Endangered Ecological Community as critically endangered under the EPBC Act. This proposed change in listing under the Act is yet to be determined.

Threatened populations

Endangered populations are listed under Schedule 1 Part 2 of the TSC Act. One endangered population, *Marsdenia viridiflora* subspecies *viridiflora*, is listed as occurring in the Blacktown LGA. This species occurs in vine thicket and Open Shale Woodland. It was not recorded within the site, and is unlikely to occur based on the small area of potential habitat, the poor condition of these areas and the lack of individuals, despite the level of survey undertaken (refer Appendix B of Technical Paper 5 for habitat requirements).

Threatened flora

A total of 41 threatened species of plant listed under the TSC Act and/or the EPBC Act have been previously recorded, or are predicted to occur, within the local area (refer Appendix B in Technical Paper 5 for habitat requirements and likelihood of occurrence).

One threatened species, *Pultenaea parviflora*, listed as Endangered under the TSC Act and Vulnerable under the EPBC Act, was recorded within the site (refer Figure 3-19). A total of 66 *P. parviflora* plants have been recorded in the study area comprising:

- 12 mature plants within the existing rail corridor easement, to the west of the existing rail line and south of the proposed new Vineyard Station
- 54 plants (17 seedlings and 37 mature) between the rail corridor and Riverstone Parade (between Norwood Road and Camberwell Road).

One threatened species, *Grevillea juniperina* subspecies *juniperina*, listed as Vulnerable under the TSC Act was also recorded at the site (refer Figure 3-19). A total of two *G. juniperina* subspecies *juniperina* plants have been recorded within the study area comprising:

- one mature plant within a cleared paddock approximately 10 metres west of the rail corridor south of the new Schofields Station
- one mature plant to the north of Bandon Road outside of the proposed subject site.

Although not recorded, the site also provides potential habitat for a further three threatened species of plant (refer Appendix B of Technical Paper 5):

- *Dillwynia tenuifolia* — listed as Vulnerable under both the TSC Act and the EPBC Act.
- *Micromyrtus minutiflora* — listed as Endangered under the TSC Act and as vulnerable under the EPBC Act.
- *Pimelea spicata* — listed as Endangered under both the TSC Act and the EPBC Act.

Threatened fauna

A total of 46 threatened species of animal have been recorded previously, or have the potential to occur, within the project locality. All are listed under the TSC Act and 15 are listed also under the EPBC Act (refer Table 3-27).

Table 3-27 Threatened species recorded or predicted to occur in the project area

Group	TSC Act ¹	EPBC Act ²	Total threatened species
Invertebrates	2	-	2
Frogs	6	5	6
Birds	21	3	21
Mammals	15	6	15
Reptiles	2	1	2
TOTAL	46	15	46

Notes: 1: Listed under the *Threatened Species Conservation Act 1995*

2: Listed under the *Environment Protection and Biodiversity Conservation Act 1999*

Details of species requirements and their likelihood of occurrence are provided in Appendix C of Technical Paper 5. No threatened species of animal was recorded in the study area. However, the study area may provide potential habitat for the following 13 threatened species of animal:

- Cumberland Plain Land Snail (*Meridolum corneovirens*)
- Glossy Black-cockatoo (*Calyptorhynchus lathamii*)
- Painted Honeyeater (*Grantiella picta*)
- Square-tailed Kite (*Lophoictinia isura*)
- Speckled Warbler (*Pyrrholaemus sagittatus*)
- Diamond Firetail (*Stagonopleura guttata*)
- Black Chinned Honeyeater (*Melithreptus gularis gulari*)
- Powerful Owl (*Ninox strenua*)
- Eastern Freetail Bat (*Mormopterus norfolkensis*)
- Yellow Sheath-tail Bat (*Saccolaimus flaviventris*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Grey-headed Flying Fox (*Pteropus poliocephalus*).

Migratory species

Migratory species are protected under international agreements to which Australia is a signatory, including the *Japan Australia Migratory Bird Agreement*, the *China Australia Migratory Bird Agreement*, the *Republic of Korea Australia Migratory Bird Agreement* and the Bonn Convention on the Conservation of Migratory Species of Wild Animals. Migratory species are considered to be matters of National Environmental Significance and are protected under the EPBC Act.

Thirteen migratory bird species have been predicted to occur within the Project locality, based on the Department of the Environment, Water, Heritage and the Arts' (2008c) *EPBC Act Protected Matters Search Tool* (refer Appendix C of Technical Paper 5); however, none were recorded within the study area.

Although migratory species may use habitats within the study area (such as farm dams or drainage lines) or be present in the area on a temporary basis, the study area is not considered important habitat for any migratory species because it does not contain:

- habitat used by a migratory species occasionally or periodically within a region that also supports an ecologically significant proportion of the population of the species
- habitat used by a migratory species that is at the limit of the species' range
- habitat within an area where the species is declining.

As such, impacts of the Project on migratory species are not considered further.

Critical habitat

Critical habitat is listed under both the TSC Act and EPBC Act, and a register is maintained at both the State and Federal level. Critical habitat is the whole or any part, or parts, of an area or areas of land comprising the habitat of an endangered species, population or ecological community that is critical to the survival of the species, population or ecological community as listed in the schedules of the Acts.

No critical habitats are listed at either State or Federal level as occurring in the study area or local area.

Certified areas

The majority of the Project occurs within areas of the NWGC where biodiversity certification has been granted under Section 126G of the TSC Act (refer Section 2.3). As discussed in Section 2.3, certified areas are those that are likely to be of lower conservation value. Non-certified areas generally correspond with areas of higher conservation value (such as known locations of threatened species habitat), and flood prone and transitional land (transitional areas between urban capable land and land not suitable for development). Biodiversity certification switches off the need to undertake further significance assessments for threatened species (under Section 5A of the EP&A Act, the 'Seven Part Test'). As such, for those areas subject to biodiversity certification under the Growth Centres SEPP the environmental assessment and proposed mitigation measures have been undertaken to be consistent with the biodiversity certification as conferred on the *State Environment Planning Policy (Sydney Region Growth Centres) 2006* (the Growth Centres SEPP) and specified in the Director-General's environmental assessment requirements (DGRs). Both the biodiversity certification and the Draft Guidelines have the objective to 'improve or maintain' biodiversity values.

A precautionary approach was taken for this biodiversity assessment. Notwithstanding the provisions conveyed by biodiversity certification, significance assessments were considered in accordance with the draft *Guidelines for Threatened Species Assessment* for threatened species that had a moderate or greater likelihood of occurring within the study area (refer Section 8.6.6).

Figure 3-20 shows certified areas within the vicinity of the Project.



Figure 3-20a Certified areas within the vicinity of the project
 Note: Project detail shown is indicative only, subject to detailed design.

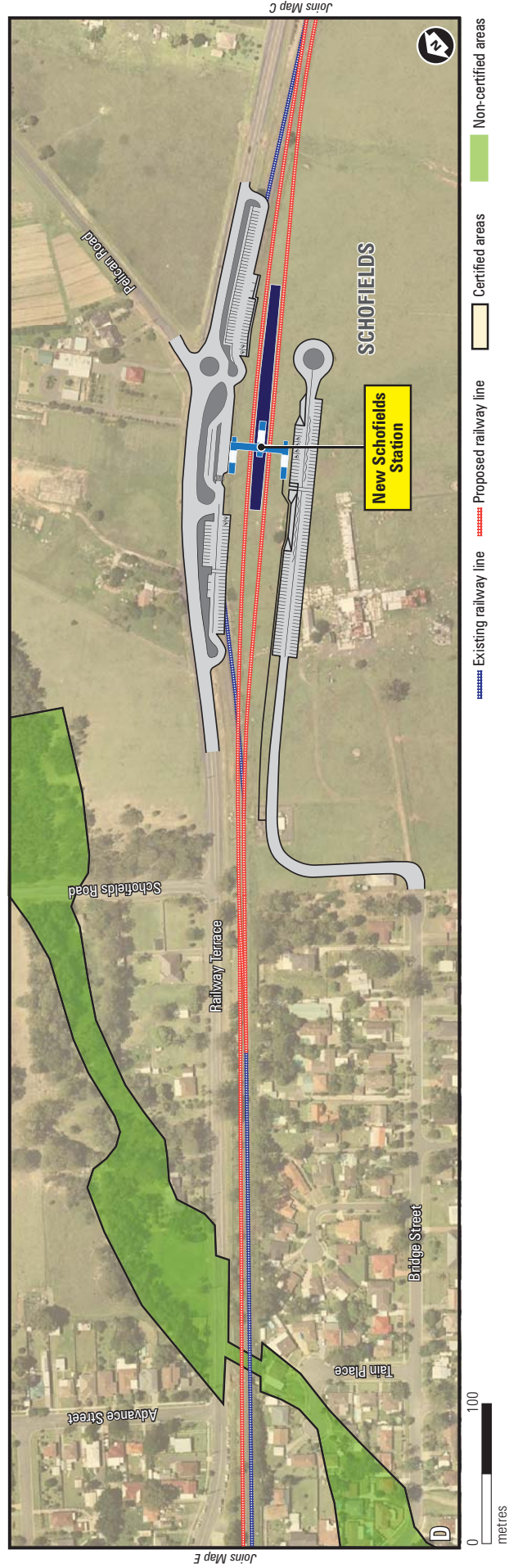


Figure 3-20b Certified areas within the vicinity of the project
 Note: Project detail shown is indicative only, subject to detailed design.

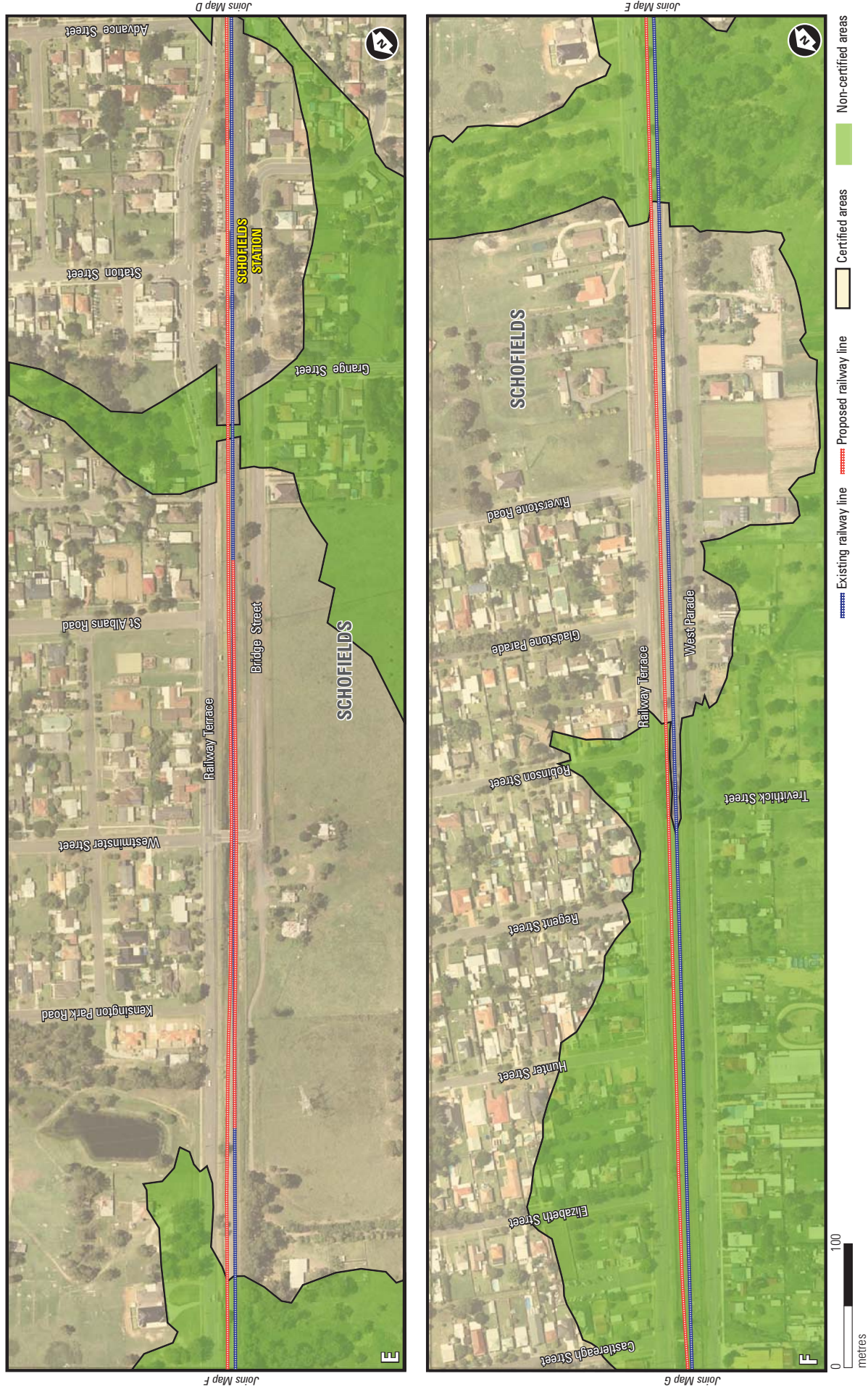


Figure 3-20c Certified areas within the vicinity of the project

Note: Project detail shown is indicative only, subject to detailed design.

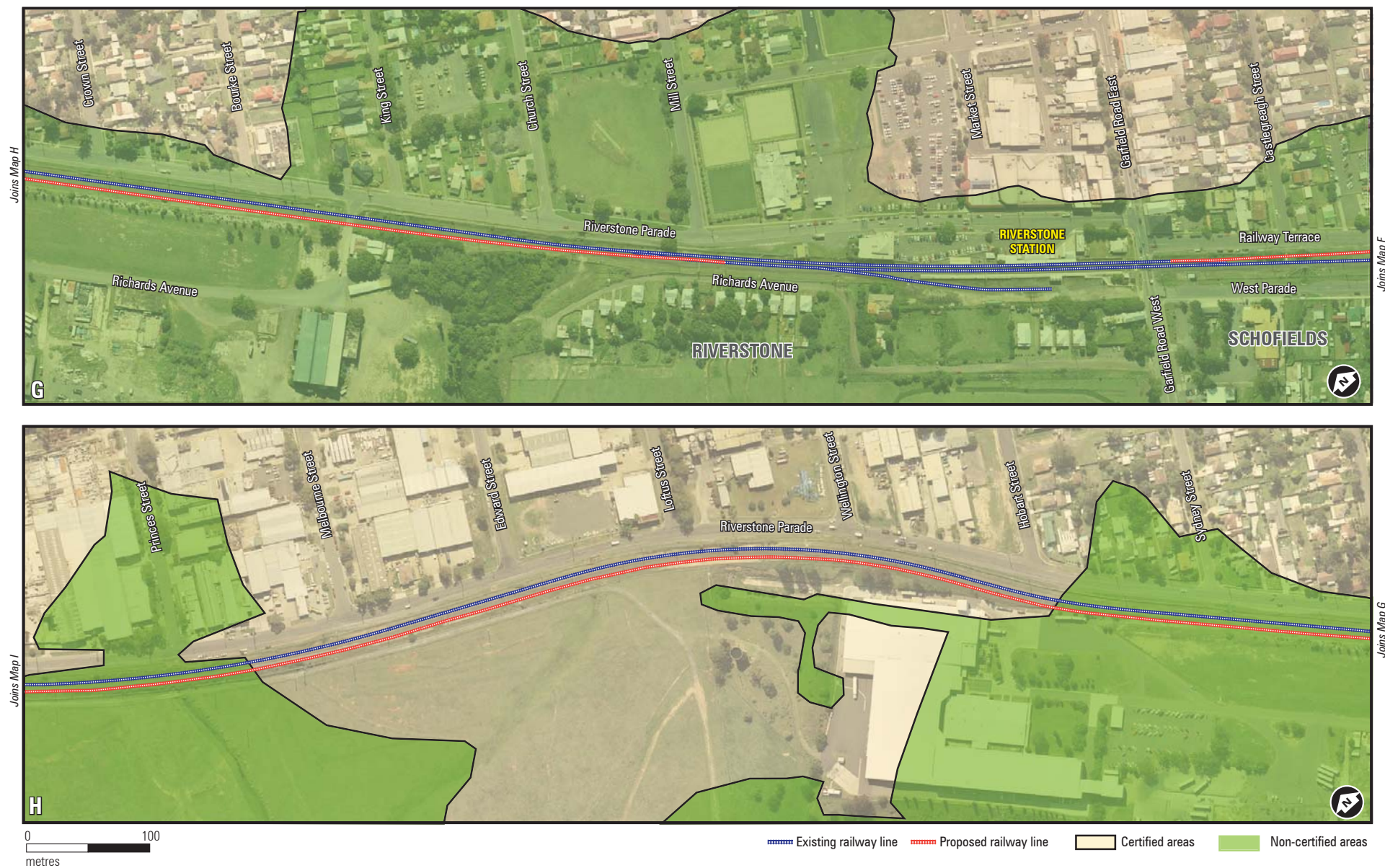


Figure 3-20d Certified areas within the vicinity of the project
 Note: Project detail shown is indicative only, subject to detailed design.

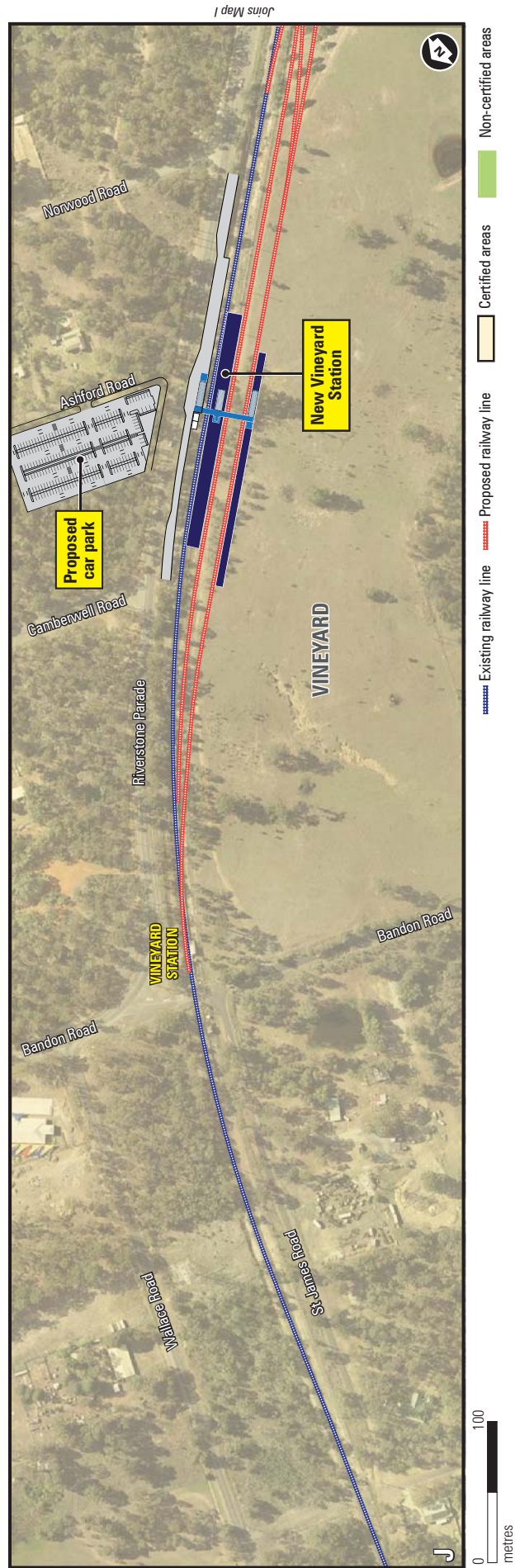
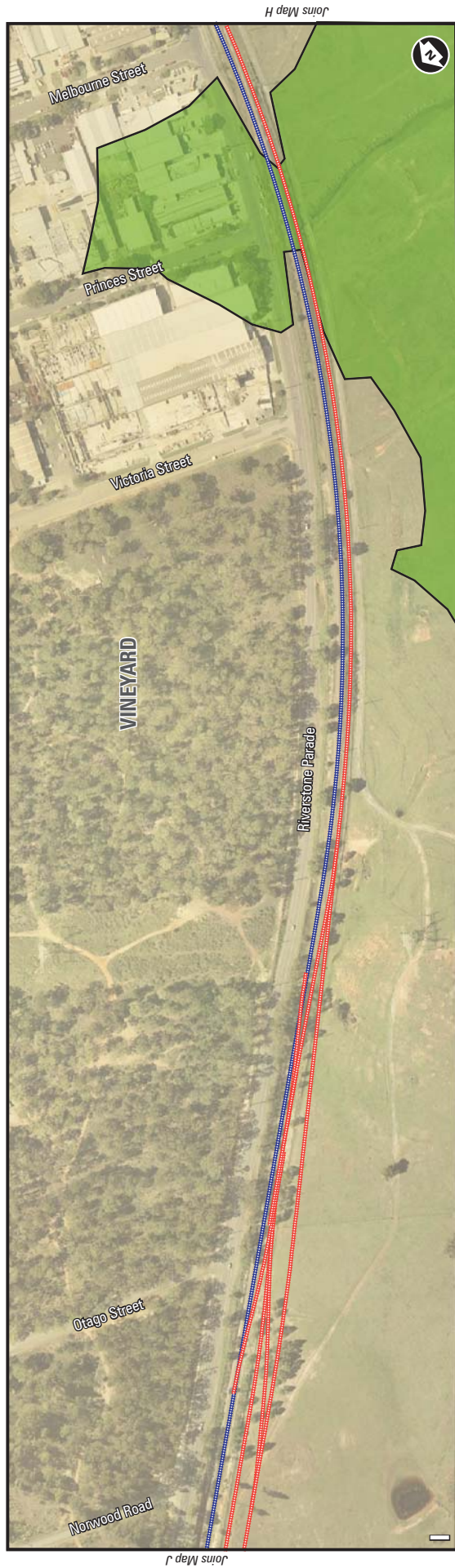


Figure 3-20e Certified areas within the vicinity of the project
 Note: Project detail shown is indicative only, subject to detailed design.