

Appendix C

Biodiversity likelihood of occurrence table

Threatened Biota Habitat Table

Databases Searched

Office of Environment and Heritage (OEH) (2015a) Threatened species profiles- threatened ecological communities known or predicted to occur within the Hunter CMA subregion.

Department of the Environment (DoE) (2015a) EPBC PMST Online Search including a 10 km buffer.

Department of Primary Industries (DPI) (2014) Records viewer search for threatened and protected aquatic species - Hunter/Central Rivers CMA.

Office of Environment and Heritage (OEH) (2015b) NSW Wildlife Atlas Search - threatened species results within a 10 km buffer

Note: Marine species which are restricted to marine environments only (such as whales, dolphins, sharks and seabirds) are excluded from the Likelihood of Occurrence Table as there is no marine habitat in the proposal site.

Likelihood of Occurrence

Matters considered in determining the likelihood of occurrence include:

- Known natural distributions including prior records (database searches) and site survey results.
- Geological/ soil preferences.
- Specific habitat requirements (e.g. aquatic environs, seasonal nectar resources, tree hollows etc).
- Climatic considerations (e.g. wet summers; snow fall).
- Home range size and habitat dependence.
- Topographical preferences (e.g. coastal headlands, ridgetops, midslopes, gilgai, wetlands).

The likelihood of occurrence scale is defined in the following table.

Likelihood of occurrence scale

Scale	Description
Known	Species known to occur within the site (e.g. breeding and foraging habitat; foraging habitat; movement corridors). Detected on or immediately adjacent to the site.
High	Presence of high value suitable habitat (e.g. breeding and foraging habitat; important movement corridors). Not detected.
Moderate	Presence of medium value suitable habitat (e.g. disturbed breeding conditions; constrained foraging habitat; movement corridors). Not detected.
Low/Unlikely	Presence of low value suitable habitat (e.g. disturbed conditions; isolated small habitat area; fragmented movement corridors). Not detected.
None	No suitable habitat or corridors linking suitable habitat present. Not detected.

Endangered ecological communities (EEC) known or predicted to occur in the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Likelihood of occurrence at proposal site
EECs					
Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	-	EEC	-	Central Hunter Grey Box – Ironbark Woodland typically forms a woodland dominated by <i>Eucalyptus crebra</i> (Narrow-leaved Ironbark), <i>Brachychiton populneus</i> subsp. <i>populneus</i> (Kurrajong) and <i>Eucalyptus moluccana</i> (Grey Box). It generally occurs on Permian sediments in the Hunter Valley.	Absent from the proposal site.
Central Hunter Valley eucalypt forest and woodland	-	-	CEEC	This community comprises eucalypt woodlands and open forest; typically with a shrub layer of variable density and/or a grassy ground layer. It generally occurs on soils derived from Permian sedimentary bedrock found on the valley floors and on lower hillslopes and low ridges. The canopy of the EEC is dominated by one or more of the following eucalypt species: <i>Eucalyptus crebra</i> (Narrow Leaved Iron-bark), <i>Corymbia maculata</i> (Spotted Gum) <i>E. dawsonii</i> (Slaty Gum) and <i>E. moluccana</i> (Grey Box). <i>Allocasuarina luehmannii</i> (Bullocka) may also be part of the mix of dominants. Derived grasslands and shrublands are not included as part of this community. Vegetation with <i>Eucalyptus fibrosa</i> , <i>Eucalyptus acmenoides</i> and /or <i>Allocasuarina torulosa</i> amongst its canopy species are excluded from this CEEC.	Absent from the proposal site.

Endangered ecological communities (EEC) known or predicted to occur in the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Likelihood of occurrence at proposal site
Coolibah –Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	-	EEC	EEC	<p>The Coolibah – Black Box Woodlands represents occurrences of one type of semi-arid to humid subtropical woodland where <i>Eucalyptus coolabah subsp. coolabah</i> (Coolibah) and/or <i>Eucalyptus largiflorens</i> (Black Box) are the dominant canopy species and where the understorey tends to be grassy</p> <p>The Coolibah – Black Box Woodlands are found on the grey, self-mulching clays of periodically waterlogged floodplains, swamp margins, ephemeral wetlands, and stream levees The ecological community occurs on a landscape of flat to low relief where small changes in slope and height can influence the species composition. Parts of the ecological community associated with drainage depressions and gilgai, or areas of lower floodplain, remain inundated for longer periods than parts of the ecological community associated with higher floodplain areas of the distribution</p>	Absent from the proposal site.
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived native Grassland of South-eastern Australia	-	-	EEC	<p>Grey box woodlands includes those woodlands in which the most characteristic tree species, <i>Eucalyptus microcarpa</i> (Inland Grey Box), is often found in association with <i>E. populnea subsp. bimbil</i> (Bimble or Poplar Box), <i>Callitris glaucophylla</i> (White Cypress Pine), <i>Brachychiton populneus</i> (Kurrajong), <i>Allocasuarina luehmannii</i> (Bulloak) or <i>E. melliodora</i> (Yellow Box), and sometimes with <i>E. albens</i> (White Box). The community occurs on fertile soils of the western slopes and plains of NSW. The community generally occurs where average rainfall is 375-800 mm pa and the mean maximum annual temperature is 22- 26°C.</p>	Absent from the proposal site.

Endangered ecological communities (EEC) known or predicted to occur in the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Likelihood of occurrence at proposal site
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	-	-	CEEC	This ecological community occurs from the Darling Downs in Queensland to Dubbo in NSW and incorporates the Liverpool and Moree Plains. This ecological community occurs within the Brigalow Belt South Bioregion and Border Rivers-Gwydir, Central West, Namoi, Condamine, Burnett Mary and Fitzroy Basin Natural Resource Management Regions. Native grasslands typically composed of perennial native grasses. They are found on soils that are fine textured (often cracking clays) derived from either basalt or alluvium on flat to low slopes (< 1 degree). A tree canopy is usually absent, but when present, comprises ≤10% projective foliage cover (DotE 2014b).	Absent from the proposal site. Derived grasslands within study areas do not contain at least three of the indicator species and study area is not within Liverpool Plains, Moree Plains or Darling Downs.
Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions	-	EEC	-	Central Hunter Ironbark - Spotted Gum - Grey Box Forest typically forms an open forest to woodland dominated by <i>Eucalyptus crebra</i> (Narrow-leaved Ironbark), <i>Corymbia maculata</i> (Spotted Gum) and <i>Eucalyptus moluccana</i> (Grey Box). It generally occurs on Permian sediments in the Hunter Valley.	Absent from the proposal site.
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	-	EEC	-	Occurs in coastal areas subject to periodic flooding with standing fresh water for at least part of the year. Typically on silts, muds or humic loams below 20 m elevation in low-lying parts of floodplains, alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes. Structure and composition varies spatially and temporally depending on the water regime, though is usually dominated by herbaceous plants and has few woody species.	Absent from the proposal site.

Endangered ecological communities (EEC) known or predicted to occur in the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Likelihood of occurrence at proposal site
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	-	EEC	VEC	Coastal Saltmarsh occurs in the intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea. It is frequently found as a zone on the landward side of mangrove stands. Characteristic plants include <i>Baumea juncea</i> , Sea Rush (<i>Juncus kraussii</i> subsp. <i>australiensis</i>), Samphire (<i>Sarcocornia quinqueflora</i> subsp. <i>quinqueflora</i>), Marine Couch (<i>Sporobolus virginicus</i>), Streaked Arrowgrass (<i>Triglochin striata</i>), Knobby Club-rush (<i>Ficinia nodosa</i>), Creeping Brookweed (<i>Samolus repens</i>), Swamp Weed (<i>Selliera radicans</i>), Seablite (<i>Suaeda australis</i>) and Prickly Couch (<i>Zoysia macrantha</i>).	Absent from the proposal site.
Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion	-	EEC	-	Hunter Valley Footslopes Slaty Gum Woodland typically forms a woodland, or occasionally forest, comprising a sparse to moderately dense tree stratum, occasional low tree stratum, and moderately dense to dense shrub stratum. The tree canopy is typically dominated by <i>Eucalyptus dawsonii</i> (Slaty Gum) and/or <i>Eucalyptus moluccana</i> (Grey Box). <i>Acacia salicina</i> (Cooba) and <i>Allocasuarina luehmannii</i> (Buloke) may form a low tree stratum, or may be part of the upper-most canopy. This community generally occurs at the interface of Narrabeen Sandstone and Permian sediments in the Hunter Valley	Absent from the proposal site.
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions	-	EEC	-	Hunter Floodplain Red Gum Woodland typically forms a tall to very tall (18-35 m) woodland. Stands on major floodplains are generally dominated by <i>Eucalyptus camaldulensis</i> (River Red Gum) in combinations with <i>Eucalyptus tereticornis</i> (Forest Red Gum), <i>Eucalyptus melliodora</i> (Yellow Box) and <i>Angophora floribunda</i> (Rough-barked Apple). This community generally occurs on floodplains and associated floodplain rises along the Hunter River.	Absent from the proposal site.

Endangered ecological communities (EEC) known or predicted to occur in the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Likelihood of occurrence at proposal site
Lower Hunter Spotted-Gum Ironbark Forest in the Sydney Basin Bioregion	-	EEC	-	<p>Restricted to a range of approximately 65 km by 35 km centred on the Cessnock - Beresfield area in the Central and Lower Hunter Valley. Remnants occur within the Local Government Areas of Cessnock, Maitland, Singleton, Lake Macquarie, Newcastle and Port Stephens but may also occur elsewhere within the bioregion. Outliers are also present on the eastern escarpment of Pokolbin and Corrabare State Forests on Narrabeen Sandstone.</p> <p>Occurs principally on Permian geology in the central to lower Hunter Valley. The community is strongly associated with, though not restricted to, the yellow podsollic and solodic soils of the Lower Hunter soil landscapes of Aberdare, Branxton and Neath.</p>	Absent from the proposal site.
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	-	EEC	-	<p>The Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions is generally an open forest with most common canopy trees species being <i>Eucalyptus tereticornis</i> and <i>Eucalyptus punctata</i> although other frequently occurring canopy species are <i>Angophora costata</i>, <i>Corymbia maculata</i>, <i>Eucalyptus crebra</i> and <i>Eucalyptus moluccana</i>, with a number of other eucalypts being less frequently recorded. It is generally found on gentle slopes arising from depressions and drainage flats on permian sediments of the Hunter Valley floor</p>	Absent from the proposal site.
River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions	-	EEC	-	<p>Occurs on flats, drainage lines and river terraces of coastal floodplains where flooding is periodic and soils generally rich in silt, lack deep humic layers and have little or no saline (salt) influence. Occurs south from Port Stephens in the NSW North Coast, Sydney Basin and South East Corner bioregions. Characterised by a tall open canopy layer of eucalypts with variable species composition.</p>	Absent from the proposal site.

Endangered ecological communities (EEC) known or predicted to occur in the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Likelihood of occurrence at proposal site
Swamp Oak Floodplain forest of the NSW North Coast, Sydney basin and South East Corner Bioregions	-	EEC	-	Typically occurs below 20 metres above sea level on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes on coastal floodplains of NSW. Associated with grey-black clay-loams and sandy loams, saline or sub-saline groundwater. Structure variable from open forests to scrubs or reedlands with scattered trees. Canopy dominated by <i>Casuarina glauca</i> (north of Bermagui) or <i>Melaleuca ericifolia</i> (south of Bermagui). Understorey characterised by frequent occurrences of vines, a sparse cover of shrubs, and a continuous groundcover of forbs, sedges, grasses and leaf litter.	Absent from the proposal site.
Swamp Sclerophyll forest on Coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions	-	EEC	-	Usually occurs below 20 metres above sea level (sometimes up to 50 metres). Associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains. Characterised by open to dense tree layer of eucalypts and paperbarks, with trees up to or higher than 25 m. Includes areas of fern land and tall reed or sedge land, where trees are sparse or absent.	Absent from the proposal site.
Sydney Freshwater Wetlands in the Sydney Basin Bioregion	-	EEC	-	Sydney Freshwater Wetlands are a complex of vegetation types largely restricted to freshwater swamps in coastal areas, occurring on sand dunes and low-nutrient sandplains along coastal areas in the Sydney Basin bioregion, varying considerably with fluctuating water levels and seasonal conditions. Characteristic species include sedges and aquatic plants such as <i>Baumea</i> species, <i>Eleocharis sphacelata</i> , <i>Gahnia</i> species, <i>Ludwigia peploides</i> ssp. <i>montevicensis</i> and <i>Persicaria</i> species. Areas of open water may occur where drainage conditions have been altered, with patches of emergent trees and shrubs also occurring. This community group has been extensively cleared and filled, with remaining remnants often small and disturbed (OEH 2010).	Absent from the proposal site.

Endangered ecological communities (EEC) known or predicted to occur in the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Likelihood of occurrence at proposal site
Lower Hunter Valley Dry Rainforest in the Sydney Basin and NSW North Coast Bioregions	-	EEC	-	Lower Hunter Valley Dry Rainforest typically has a canopy of 15-25 metres high with 40-80% cover. The most common trees include <i>Elaeocarpus obovatus</i> (Hard Quandong), <i>Alectryon subcinereus</i> (Wild Quince), <i>Baloghia inophylla</i> (Brush Bloodwood), <i>Melia azedarach</i> (White Cedar), <i>Melicope micrococca</i> (Hairy-leaved Doughwood), <i>Scolopia braunii</i> (Flintwood), <i>Streblus brunonianus</i> (Whalebone Tree), <i>Mallotus philippensis</i> (Red Kamala), <i>Capparis arborea</i> (Brush Caper Berry), <i>Olea paniculata</i> (Native Olive), <i>Guioa semiglauca</i> (Guioa), <i>Alectryon tomentosus</i> , <i>Claoxylon australe</i> (Brittlewood), <i>Elaeodendron australe</i> var. <i>australis</i> (Red Olive Plum), <i>Diospyros australis</i> (Black Plum), and <i>Pararchidendron pruinosum</i> var. <i>pruinosum</i> (Snow Wood). The community usually forms a closed forest 15-20 metres high with emergent trees 20-30 metres high. Vines are abundant and there is a dense shrub and ground layer.	Absent from the proposal site.
Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions	-	EEC	-	This community mainly occurring on Carboniferous sediments on rocky slopes. Hunter Valley Vine Thicket typically forms a low forest, usually less than 10 m tall, with a closed canopy dominated by trees, with shrubs and vines. The canopy may include the two varieties of <i>Elaeodendron australe</i> (Red Olive Plum), <i>Geijera parviflora</i> (Wilga), <i>Notelaea microcarpa</i> var. <i>microcarpa</i> (Native Olive) and <i>Alectryon oleifolius</i> subsp. <i>elongatus</i> (Western Rosewood).	Absent from the proposal site.
Hunter Valley Weeping Myall Woodland of the Sydney Basin Bioregion	-	EEC	CEEC	Hunter Valley Weeping Myall Woodland of the Sydney Basin bioregion typically has a dense to open tree canopy up to about 15 m tall, depending on disturbance and regrowth history (Peake 2005). The most common tree is <i>Acacia pendula</i> (Weeping Myall), which may occur with <i>Eucalyptus crebra</i> (Narrow-leaved Ironbark), <i>A. salicina</i> (Cooba) and/or trees within the <i>A. homalophylla</i> - <i>A. melvillei</i> complex. It is associated with heavy clay soils on depositional landforms in the south-western part of the Hunter River valley floor.	Absent from the proposal site.

Endangered ecological communities (EEC) known or predicted to occur in the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Likelihood of occurrence at proposal site
Kurri Sand Swamp Woodland in the Sydney Basin Bioregion	-	EEC	-	Kurri Sand Swamp Woodland is or has been known to occur in the Kurri Kurri - Cessnock area in the lower Hunter Valley, in the local government area of Cessnock, but may occur elsewhere. Kurri Sand Swamp Woodland generally ranges from low open-woodland to low woodland and open scrub. There is generally a low open canopy rarely exceeding 15 metres in height, with <i>Eucalyptus parramattensis subsp. decadens</i> , <i>Angophora bakeri</i> and occasionally <i>Eucalyptus signata</i> and <i>Eucalyptus sparsifolia</i> .	Absent from the proposal site.
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	-	EEC	CEEC	Littoral Rainforest is generally a closed forest, the structure and composition of which is strongly influenced by its proximity to the ocean. The plant species of this community are predominantly rainforest species. Several species have compound leaves, and vines may be a major component of the canopy. These features differentiate littoral rainforest from forest or scrub, but while the canopy is dominated by rainforest species, scattered emergent individuals of sclerophyll species, such as <i>Angophora costata</i> , <i>Banksia integrifolia</i> , <i>Eucalyptus botryoides</i> and <i>Eucalyptus tereticornis</i> occur in many stands. The community occurs only on the coast. Occurs on sand dunes and on soil derived from underlying rocks.	Absent from the proposal site.

Endangered ecological communities (EEC) known or predicted to occur in the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Likelihood of occurrence at proposal site
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	-	EEC	CEEC	Lowland Rainforest may be associated with a range of high-nutrient geological substrates, notably basalts and fine-grained sedimentary rocks, on coastal plains and plateaux, footslopes and foothills. Lowland Rainforest, in a relatively undisturbed state, has a closed canopy, characterised by a high diversity of trees whose leaves may be mesophyllous and encompass a wide variety of shapes and sizes. Typically, the trees form three major strata: emergents, canopy and sub-canopy which, combined with variations in crown shapes and sizes, give the canopy an irregular appearance (Floyd 1990). The trees are taxonomically diverse at the genus and family levels, and some may have buttressed roots. A range of plant growth forms are present in Lowland Rainforest, including palms, vines and vascular epiphytes. Scattered eucalypt emergents (e.g. <i>Eucalyptus grandis</i> , <i>E. saligna</i>) may occasionally be present. In disturbed stands of this community the canopy continuity may be broken, or the canopy may be smothered by exotic vines.	Absent from the proposal site.
Warkworth Sands Woodland in the Sydney Basin Bioregion	-	EEC		Warkworth Sands Woodland is generally of woodland to low woodland structure with trees of <i>Angophora floribunda</i> and <i>Banksia integrifolia</i> , and shrubs and ground species including <i>Acacia filicifolia</i> , <i>Pteridium esculentum</i> , <i>Imperata cylindrica</i> , <i>Brachyloma daphnoides</i> and <i>Melaleuca thymifolia</i> . The community occurs on aeolian sand deposits south east of Singleton in the Hunter Valley. This ecological community is currently known to occur in the local government area of Singleton but may occur elsewhere in the Bioregion.	Absent from the proposal site.

Endangered ecological communities (EEC) known or predicted to occur in the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Likelihood of occurrence at proposal site
White Box Yellow Box Blakely's Red Gum Woodland	-	EEC	CEEC	White Box Yellow Box Blakely's Red Gum Woodland (commonly referred to as Box-Gum Woodland) is an open woodland community (sometimes occurring as a forest formation), in which the most obvious species are one or more of the following: White Box <i>Eucalyptus albens</i> , Yellow Box <i>E. melliodora</i> and Blakely's Red Gum <i>E. blakelyi</i> . Box-Gum Woodland is found from the Queensland border in the north, to the Victorian border in the south. It occurs in the tablelands and western slopes of NSW.	Absent from the proposal site.

Threatened flora known or predicted from the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence in the proposal site
FLORA						
<i>Cymbidium canaliculatum</i> - endangered population	-	EP	-	The Hunter population is known to occur naturally as far south as Weston and Pokolbin in the Lower Hunter, which represents its south-eastern geographic limit, but appears to be more centred in the Upper Hunter, predominantly north of Singleton. In this area it is chiefly known from an area bounded by Ravensworth, Muswellbrook, Denman and Sandy Hollow, but extends northwards to the Aberdeen – Scone – Wingen districts. Isolated occurrences are also known from the Merriwa plateau, Bylong valley and the Gungah area near Goulburn River (including the Goulburn River National Park). An epiphytic orchid (with sympodial growth) which grows in the hollows and forks of eucalypts and wattles, usually occurring singly or as a single clump, typically between two and six metres above the ground.	Previously recorded in locality (OEH 2014b).	Unlikely. Targeted searches for this species were undertaken in all trees within the study area.
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E	E	Occurs from Gerroa (Illawarra) to Brunswick Heads and west to Merriwa in the upper Hunter. Most common near Kempsey. Usually occurs on the edge of dry rainforest or littoral rainforest, but also occurs in Coastal Banksia Scrub, open forest and woodland, and Melaleuca scrub. Soil and geology types are not limiting.	Predicted to occur in locality (DotE 2015).	Unlikely – No suitable habitat for this species is present within the study area.

Threatened flora known or predicted from the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence in the proposal site
<i>Eucalyptus camaldulensis</i>	River Red Gum	EP	-	<p>The Hunter population occurs from the west at Bylong, south of Merriwa, to the east at Hinton, on the bank of the Hunter River, in the Port Stephens local government area. It has been recorded in the local government areas of Lithgow, Maitland, Mid-Western Regional, Muswellbrook, Port Stephens, Singleton and Upper Hunter.</p> <p>Prior to European settlement, between 10,000 and 20,000 ha of habitat suitable for the River Red Gum occurred in the Hunter catchment. Today only 19 stands are known, occupying at most c. 100 ha, the largest remnant being 15 - 20 ha in extent. Smaller remnants contain only one to several trees. The total number of individuals is estimated to be between 600 - 1000 mature or semi mature trees</p> <p>May occur with <i>Eucalyptus tereticornis</i>, <i>Eucalyptus melliodora</i>, <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> and <i>Angophora floribunda</i></p>	<p>Previously recorded in locality (OEH 2014b).</p>	<p>Present – One remnant <i>Eucalyptus camaldulensis</i> recorded in the south of the proposal site. A number of planted <i>Eucalyptus camaldulensis</i> are also present within Scone golf course, however the provenance of these individuals is unknown.</p>

Threatened flora known or predicted from the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence in the proposal site
<i>Eucalyptus camfieldii</i>	Camfield's Stringybark	V	V	Occurs from Raymond Terrace to Waterfall, with populations known from Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai and the Royal NP. Occurs in exposed situations on sandstone plateaus, ridges and slopes near the coast, often on the boundary of tall coastal heaths or low open woodland. It grows in shallow sandy soils overlying Hawkesbury sandstone.	Previously recorded in locality (OEH 2014b).	Unlikely. No suitable habitat for this species is present within the study area.
<i>Euphrasia arguta</i>	-	CE	CE	<i>Euphrasia arguta</i> is an erect annual herb ranging in height from 20-35 cm. Historic records of the species noted the following habitats: 'in the open forest country around Bathurst in sub humid places', 'on the grassy country near Bathurst', and 'in meadows near rivers'. Plants from the Nundle area have been reported from eucalypt forest with a mixed grass and shrub understorey; here, plants were most dense in an open disturbed area and along the roadside, indicating the species had regenerated following disturbance.	Predicted to occur in locality (DotE 2015).	Unlikely – Has not been previously recorded in locality and only marginal habitat for this species is present within the study area.
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	-	E	Occurs at 4 sites in NSW (Captains Flat Cemetery, Ilford Cemetery, Steves TSR at Delegate and Tarengo TSR near Boorowa). Also at Hall in ACT. Grows on relatively fertile soils in grassy woodland or natural grassland. Occurs in relatively moist, poorly drained areas.	Predicted to occur in locality (DotE 2015).	Unlikely – Has not been previously recorded in locality and only marginal habitat for this species is present within the study area.

Threatened flora known or predicted from the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence in the proposal site
<i>Prasophyllum</i> sp. Wybong (C.Phelps ORG 5269)	-	-	CE	<i>Prasophyllum</i> sp. Wybong occurs within the Border Rivers (Gwydir, Namoi, Hunter), Central Rivers and Central West Natural Resource Management Regions. <i>Prasophyllum</i> sp. Wybong is known to occur in open eucalypt woodland and grassland	Predicted to occur in locality (DotE 2015).	Unlikely – Has not been previously recorded in locality and only marginal habitat for this species is present within the study area.
<i>Thesium austral</i>	Austral Toadflax	V	V	Found in small, scattered populations along the east coast, northern and southern tablelands. Occurs in grassland or grassy woodland, and is often found in association with Kangaroo Grass (<i>Themeda australis</i>).	Predicted to occur in locality (DotE 2015).	Unlikely. Has not been previously recorded within locality and no suitable habitat for this species is present within the study area.
<i>Tylophora linearis</i>	-	-	E	<i>Tylophora linearis</i> has rarely been collected and is known from eight localities in the Dubbo area and Mt Crow near Barraba in NSW, and “Myall Park” near Glenmorgan in Queensland. <i>Tylophora linearis</i> grows in dry scrub, open forest and woodlands associated with <i>Melaleuca uncinata</i> , <i>Eucalyptus fibrosa</i> , <i>E. sideroxylon</i> , <i>E. albens</i> , <i>Callitris endlicheri</i> , <i>C. glaucophylla</i> , <i>Allocasuarina luehmannii</i> , <i>Acacia hakeoides</i> , <i>A. lineata</i> , <i>Myoporum</i> spp., and <i>Casuarina</i> spp.	Predicted to occur in locality (DotE 2015).	Unlikely. Has not been previously recorded within locality and no suitable habitat for this species is present within the study area.

Threatened fauna known or predicted from the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence in the proposal site
Birds						
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	E	In NSW confined to two known breeding areas: the Capertee Valley and Bundarra-Barraba region. Non-breeding flocks occasionally seen in coastal areas foraging in flowering Spotted Gum and Swamp Mahogany forests, presumably in response to drought. Inhabits dry open forest and woodlands, particularly Box-Ironbark woodland and riparian forests of River Sheoak, with an abundance of mature trees, high canopy cover and abundance of mistletoes.	Predicted to occur in locality (DotE 2015).	Unlikely. No suitable habitat for this species exists within the study area.
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	Widespread but uncommon over most NSW except the northwest. Favours permanent freshwater wetlands with tall dense reedbeds particularly <i>Typha</i> spp. and <i>Eleocharis</i> spp., with adjacent shallow, open water for foraging. Roosts during the day amongst dense reeds or rushes and feeds mainly at night on frogs, fish, yabbies, spiders, insects and snails.	Predicted to occur in locality (DotE 2015).	Low. No suitable habitat for this species exists within the study area.
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V	-	Widespread but uncommon from coast to southern tablelands and central western plains. Feeds almost exclusively on the seeds of <i>Allocasuarina</i> species. Prefers woodland and open forests, rarely away from <i>Allocasuarina</i> . Roost in leafy canopy trees, preferably eucalypts, usually <1 km from feeding site. Nests in large (approx. 20 cm) hollows in trees, stumps or limbs, usually in Eucalypts (Higgins 1999).	Previously recorded in locality (OEH 2014b).	Unlikely. No suitable habitat for this species exists within the study area.

Threatened fauna known or predicted from the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence in the proposal site
<i>Chthonicola sagittata</i>	Speckled Warbler	V	-	The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. The Speckled Warbler lives in a wide range of <i>Eucalyptus</i> dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area.	Previously recorded in locality (OEH 2014b).	Unlikely. No suitable habitat for this species exists within the study area.
<i>Grantiella picta</i>	Painted Honeyeater	V	V	Nomadic, occurring in low densities across most of NSW. Highest concentrations and almost all breeding occur on inland slopes of the Great Dividing Range. Inhabits Boree, Brigalow and Box Gum woodlands and Box-Ironbark forests. Specialist forager on the fruits of mistletoes, preferably of the <i>Amyema</i> genus. Nests in outer tree canopy.	Predicted to occur in locality (DotE 2015).	Unlikely. No suitable habitat for this species exists within the study area.
<i>Lathamus discolor</i>	Swift Parrot	E	E,M	Migratory, travelling to the mainland from March to October. Breeds in Tasmania from September to January. On the mainland, it mostly occurs in the southeast foraging on winter flowering eucalypts and lerps, with records of the species between Adelaide and Brisbane. Principal over-winter habitat is box-ironbark communities on the inland slopes and plains. <i>Eucalyptus robusta</i> , <i>Corymbia maculata</i> and <i>C. gummifera</i> dominated coastal forests are also important habitat.	Predicted to occur in locality (DotE 2015). Previously recorded in locality (OEH 2014b).	Unlikely. No suitable habitat for this species exists within the study area.

Threatened fauna known or predicted from the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence in the proposal site
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V	-	In NSW, the eastern sub-species occurs on the western slopes of the Great Dividing Range, and on the western plains reaching as far as Louth and Balranald. It also occurs in woodlands in the Hunter Valley and in several locations on the north coast of NSW (OEH 2012). It may be extinct in the southern, central and New England tablelands. Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains (OEH 2012).	Previously recorded in locality (OEH 2014b).	Unlikely. No suitable habitat for this species exists within the study area.
<i>Rostratula australis</i>	Australian Painted Snipe	E	E	In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	Predicted to occur in locality (DotE 2015).	Low. No suitable habitat for this species exists within the study area.

Threatened fauna known or predicted from the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence in the proposal site
Mammals						
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Occurs from the coast to the western slopes of the divide. Largest numbers of records from sandstone escarpment country in the Sydney Basin and Hunter Valley (Hoye and Schulz 2008). Roosts in caves and mines and most commonly recorded from dry sclerophyll forests and woodlands. An insectivorous species that flies over the canopy or along creek beds (Churchill 2008). In southern Sydney appears to be largely restricted to the interface between sandstone escarpments and fertile valleys.	Predicted to occur in locality (DotE 2015).	Low. No suitable habitat for this species exists within the study area.
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	Inhabits a range of environments including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Den subject sites are in hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces. Females occupy home ranges of up to 750 ha and males up to 3,500 ha, which are usually traversed along densely vegetated creek lines.	Predicted to occur in locality (DotE 2015). Previously recorded in locality (OEH 2014b).	Unlikely. No suitable habitat for this species exists within the study area.

Threatened fauna known or predicted from the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence in the proposal site
<i>Nyctophilus corbeni</i>	South-eastern Long-eared Bat	V	V	The South-eastern Long-eared Bat has a limited distribution that is restricted around the Murray-Darling Basin in south-eastern Australia. Even in this region its distribution is scattered and it is rarely recorded (Turbill & Ellis 2006). It is distributed throughout inland NSW except in the north-west area which is dominated by treeless plains. It can be found in the Hunter Valley, extending from central NSW to the eastern Hunter Valley coast. Occurs in a range of vegetation types including mallee, bulloke <i>Allocasuarina leuhmanni</i> and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland... Roosts in tree hollows, crevices, and under loose bark	Predicted to occur in locality (DotE 2015).	Low. Marginal habitat present within study area.
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E	V	Occurs from the Shoalhaven north to the Queensland border. Now mostly extinct west of the Great Dividing Range, except in the Warrumbungles and Mt Kaputar. Occurs on rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north. Diet consists of vegetation in adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees.	Predicted to occur in locality (DotE 2015).	Unlikely. No suitable habitat for this species exists within the study area.
<i>Phascolarctos cinereus</i>	Koala	V	V	Occurs from coast to inland slopes and plains. Restricted to areas of preferred feed trees in eucalypt woodlands and forests. Home range varies depending on habitat quality, from < 2 to several hundred hectares.	Predicted to occur in locality (DotE 2015).	Unlikely. No suitable habitat for this species exists within the study area.

Threatened fauna known or predicted from the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence in the proposal site
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Roosts in camps within 20 km of a regular food source, typically in gullies, close to water and in vegetation with a dense canopy. Forages in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths, swamps and street trees, particularly in eucalypts, melaleucas and banksias. Highly mobile with movements largely determined by food availability (Eby and Law 2008). Will also forage in urban gardens and cultivated fruit crops.	Predicted to occur in locality (DotE 2015).	Moderate. May forage within study area but is no suitable roost habitat available. Closest record just over 10 km away.
<i>Vespadelus trougtoni</i>	Eastern Cave Bat	V	-	The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. Very little is known about the biology of this uncommon species. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. Occasionally found along cliff-lines in wet eucalypt forest and rainforest. Little is understood of its feeding or breeding requirements or behaviour.	Previously recorded in locality (OEH 2014b).	Unlikely. No suitable habitat for this species exists within the study area.

Threatened fauna known or predicted from the locality						
Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence in the proposal site
Frogs						
<i>Litoria booroolongensis</i>	Booroolong Frog	E	E	The Booroolong Frog is restricted to NSW and north-eastern Victoria, predominantly along the western-flowing streams of the Great Dividing Range. The species lives along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins and shelter under rocks or amongst vegetation near the ground on the stream edge.	Predicted to occur in locality (DotE 2015).	Unlikely. No suitable habitat for this species exists within the study area.
Reptiles						
<i>Aprasia parapulchella</i>	Pink-tailed Worm Lizard	V	V	Populations occur in the Queanbeyan/Canberra district, Cooma, Yass, Bathurst, Albury and West Wyalong areas. Inhabits grassland and open woodland with substantial embedded rock cover in sunny situations. Recorded in both native and non-native grasslands. Usually recorded under small rocks (150 - 600 mm basal area) shallowly embedded in the soil (2 - 5 cm, and use ant burrows under these rocks.	Predicted to occur in locality (DotE 2015).	Unlikely. No suitable habitat for this species exists within the study area.

All information in this table is taken from NSW OEH and Commonwealth DoE Threatened Species profiles (OEH 2015a, DotE 2015a) unless otherwise stated. The codes used in this table are: CE – critically endangered; E – endangered; V – vulnerable; EP – endangered population; CEEC – critically endangered ecological community; EEC – endangered ecological community

EPBC Act-listed migratory fauna known or predicted from the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence in the proposal site
Wetland species						
<i>Apus pacificus</i>	Fork-tailed Swift	-	M	Recorded in all regions of NSW. Non- breeding, and almost exclusively aerial while in Australia. Occurs over urban and rural areas as well as areas of native vegetation.	Predicted to occur in locality (DotE 2015).	May occasionally fly over site
<i>Ardea alba</i>	Great Egret	-	M	Occurs across NSW. Within NSW there are breeding colonies within the Darling Riverine Plains and Riverina regions and minor colonies across its range including the north and north-east of the state. Reported from a wide range of wetland habitats (for example inland and coastal, freshwater and saline, permanent and ephemeral, open and vegetated, large and small, natural and artificial).	Predicted to occur in locality (DotE 2015).	Possible. Suitable habitat present along creek although has not been previously recorded in locality.
<i>Ardea ibis</i>	Cattle Egret	-	M	Occurs across NSW. Principal breeding sites are the central east coast from Newcastle to Bundaberg. Also breeds in major inland wetlands in north NSW (notably the Macquarie Marshes). Occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. Uses predominately shallow, open and fresh wetlands with low emergent vegetation and abundant aquatic flora. Sometimes observed in swamps with tall emergent vegetation and commonly use areas of tall pasture in moist, low-lying areas.	Predicted to occur in locality (DotE 2015).	Possible. Suitable habitat present along creek although has not been previously recorded in locality.

EPBC Act-listed migratory fauna known or predicted from the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence in the proposal site
<i>Gallinago hardwickii</i>	Latham's Snipe		M	Occurs along the coast and west of the great dividing range. Non breeding visitor to Australia. Inhabit permanent and ephemeral wetlands up to 2000 metres above sea level. Typically in open, freshwater wetlands with low, dense vegetation (incl. swamps, flooded grasslands and heathlands). Can also occur in saline/brackish habitats and in modified or artificial habitats close to human activity.	Predicted to occur in locality (DotE 2015).	Low. Minimal suitable habitat present along creek and has not been previously recorded in locality.
<i>Rostratula benghalensis</i>	Painted Snipe		M	Most common in eastern Australia, it has been recorded at scattered locations throughout much of Queensland, NSW, Victoria and south-eastern South Australia. The species inhabits many different types of shallow, brackish or freshwater terrestrial wetlands, especially temporary ones which have muddy margins and small, low-lying islands. Suitable wetlands usually support a mosaic of low, patchy vegetation, as well as lignum and canegrass.	Predicted to occur in locality (DotE 2015).	Low. Minimal suitable habitat present along creek and has not been previously recorded in locality.
Terrestrial species						
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle		M	Primarily coastal but may extend inland over major river systems. Breeds close to water, mainly in tall open forest/woodland but also in dense forest, rainforest, closed scrub or remnant trees. Usually forages over large expanses of open water, but also over open terrestrial habitats (e.g. grasslands).	Predicted to occur in locality (DotE 2015).	Unlikely. No suitable habitat for this species exists within the study

EPBC Act-listed migratory fauna known or predicted from the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence in the proposal site
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	M	Recorded along NSW coast to the western slopes and occasionally from the inland plains. Breeds in northern hemisphere. Almost exclusively aerial while in Australia. Occur above most habitat types, but are more frequently recorded above more densely vegetated habitats (rainforest, open forest and heathland) than over woodland or treeless areas.	Predicted to occur in locality (DotE 2015).	Unlikely. No suitable habitat for this species exists within the study
<i>Merops ornatus</i>	Rainbow Bee-eater	-	M	Widespread across mainland Australia. Mainly inhabits open forests and woodlands and shrublands, often in proximity to permanent water. Also occurs in cleared/semi-cleared habitats including farmland and residential areas. Excavates a nest burrow in flat/sloping ground in banks of waterways, dams, roadside cuttings, gravel pits or cliff faces. Southern populations migrate north for winter after breeding.	Predicted to occur in locality (DotE 2015).	Possible. May occur in study area during migration however have not been previously recorded in locality.-
<i>Monarcha melanopsis</i>	Black-faced Monarch		M	Summer breeding migrant to south-east. Occurs along the coast of NSW. Inhabits rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating (Birds Australia 2005).	Predicted to occur in locality (DotE 2015).	Unlikely. No suitable habitat for this species exists within the study

EPBC Act-listed migratory fauna known or predicted from the locality

Scientific name	Common name	TSC/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence in the proposal site
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	-	M	In NSW widespread on and east of the Great Divide, sparsely scattered on the western slopes, very occasional records on the western plains. Inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, often near wetlands and watercourses. On migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests. Generally not in rainforests.	Predicted to occur in locality (DotE 2015).	Unlikely. No suitable habitat for this species exists within the study
<i>Rhipidura rufifrons</i>	Rufous Fantail	-	M	Found along NSW coast and ranges. Inhabits rainforest, dense wet forests, swamp woodlands and mangroves. During migration, it may be found in more open habitats or urban areas (Birds Australia 2008).	Predicted to occur in locality (DotE 2015).	Low. May occur in study area during migration however have not been previously recorded in locality.

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