Appendix I

Likelihood of Occurrence and Assessment of Significance

1. Introduction

The likelihood of occurrence and assessment of significance was prepared for the Sydney Park Junctionby Julia Bayada (ecologist) and reviewed by Chris Thomson (Principal ecologist) from Jacobs (North Sydney) on 3 June 2020.

2. Likelihood of occurrence

Likelihood of occurrence criteria

Likelihood	Criteria
Recorded	The species was observed in the study area during the current survey
High	It is highly likely that a species inhabits the study area and is dependent on identified suitable habitat (ie. for breeding or important life cycle periods such as winter flowering resources), has been recorded recently in the locality (10 kilometres) and is known or likely to maintain resident populations in the study area. Also includes species known or likely to visit the study area during regular seasonal movements or migration.
Moderate	Potential habitat is present in the study area. Species unlikely to maintain sedentary populations, however may seasonally use resources within the study area opportunistically or during migration. The species is unlikely to be dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area, or habitat is in a modified or degraded state. Includes cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded.
Low	It is unlikely that the species inhabits the study area and has not been recorded recently in the locality (10 kilometres). It may be an occasional visitor, but habitat similar to the study area is widely distributed in the local area, meaning that the species is not dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on available habitat. Specific habitat is not present in the study area or the species are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded.
None	Suitable habitat is absent from the study area.

Habitat assessment table – Threatened Flora

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Acacia bynoeana	Bynoe's Wattle	E	V	Occurs south of Dora Creek-Morisset area to Berrima and the Illawarra region and west to the Blue Mountains. It grows mainly in heath and dry sclerophyll forest on sandy soils (Harden, 2002). Seems to prefer open, sometimes disturbed sites such as trail margins and recently burnt areas. Typically occurs in association with Corymbia gummifera, Eucalyptus haemastoma, E. gummifera, E. parramattensis, E. sclerophylla, Banksia serrata and Angophora bakeri (NSW National Parks and Wildlife Service, 1999a).	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Acacia pubescens	Downy Wattle	V	V	Concentrated around the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/ Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravely soils, often with ironstone.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Acacia terminalis subsp. terminalis	Sunshine Wattle	E	E	Very limited distribution between Botany Bay to the northern foreshore of Port Jackson. Recent collections have only been made from the Quarantine Station, Clifton Gardens, Dover Heights, Parsely Bay, Nielson Park, Cooper Park, Chifley and Watsons Bays. Coastal scrub and dry sclerophyll woodland on sandy soils. Habitat is generally sparse and scattered. Most areas of habitat or potential habitat are small and isolated.	9 –BioNet, PMST	Low – nearest records located farthest south of the study area in Botany Bay. This species has not been recorded in the study area and no suitable habitat is present.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Allocasuarina glareicola	*Allocasuarina glareicola*	E	E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Grows in Castlereagh woodland on lateritic soil.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Allocasuarina portuensis	Nielsen Park She-oak	E	E	The original known habitat of the Neilsen Park She-oak is at Nielsen Park, in Woollahra local government area. There are no plants left at the original site where it was discovered. However, propagation material has been planted successfully at a number of locations at Nielsen Park and other locations in the local area, e.g. Gap Bluff, Hermit Point and Vaucluse House. The original habitat is tall closed woodland. Canopy species include: Ficus rubiginosa, Angophora costata, Elaeocarpus reticulatus and Gloichidion ferdinandi with a shrub layer of Pittosporum revolutum, Kunzea ambigua and Monotoca elliptica. The original habitat occurs above a sandstone shelf approximately 20 m above the harbour. The shallow sandy soils are highly siliceous, coarsely textured and devoid of a soil profile. The plantings have occurred on similar soils.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Asterolasia elegans	*Asterolasia elegans*	E	E	Occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby local government areas. Also likely to occur in the western part of Gosford local government area. Known from only seven populations, only one of which is wholly within a conservation reserve. Occurs on Hawkesbury sandstone. Found in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest. The canopy at known sites includes Turpentine (Syncarpia glomulifera subsp. glomulifera), Smooth-barked Apple (Angophora costata), Sydney Peppermint (Eucalyptus piperita), Forest Oak (Allocasuarina torulosa) and Christmas Bush (Ceratopetalum gummiferum).	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Caladenia tessellata	Thick Lip Spider Orchid	E	V	The Thick Lip Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct. It was also recorded in the Huskisson area in the 1930s. The species occurs on the coast in Victoria from east of Melbourne to almost the NSW border. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	2 –BioNet, PMST	Low – two records found nearby Alexandra Park. This species has not been recorded in the study area and no suitable habitat is present.
Cryptostylis hunteriana	Leafless Tongue Orchid	V	V	The Leafless Tongue Orchid has been recorded from as far north as Gibraltar Range National Park, south into Victoria around the coast as far as Orbost. Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (Eucalyptus sclerophylla), Silvertop Ash (E. sieberi), Red Bloodwood (Corymbia gummifera) and Black Sheoak (Allocasuarina littoralis); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (C. subulata) and the Tartan Tongue Orchid (C. erecta).	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Dichanthium setosum	Bluegrass	V	V	Dichanthium setosum has been reported from mid-coastal to inland NSW and Queensland. Dichanthium setosum occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, extending west to Narrabri. Dichanthium setosum is associated with heavy basaltic black soils and red-brown loams with clay subsoil.	1 – BioNet	Low – single record located in Darlinghurst. This species has not been recorded in the study area and no suitable habitat is present.
Darwinia biflora	*Darwinia biflora*	V	V	Occurs at 129 sites in the northern and north-western suburbs of Sydney, in the Ryde, Baulkham Hills, Hornsby and Ku-Ring-Gai Local Government Areas (LGAs). Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. Associated overstorey species include Eucalyptus haemastoma, Corymbia gummifera and/or E. squamosa. The vegetation structure is usually woodland, open forest or scrub-heath.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Doryanthes palmeri	Giant Spear Lily	V	-	In NSW, Doryanthes palmeri occurs on the coastal ranges that are part of the Mt Warning Caldera. Its southern distributional limit is Mount Billen. The species is currently known from eleven sites within NSW, five of which are conservation reserves. Most populations consist of only a few hundred individuals. Doryanthes palmeri occurs on exposed rocky outcrops on infertile soils or on bare rock. It grows in a narrow band of vegetation along the cliff-tops and on steep cliff-faces or rocky ledges in montane heath next to subtropical rainforest, warm temperate rainforest or wet eucalypt forest.	1 – BioNet	Low – single record located in Trumper Park, Paddington. This species has not been recorded in the study area and no suitable habitat present.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Eucalyptus camfieldii	Camfield's Stringybark	V	V	Restricted distribution in a narrow band with the most northerly records in the Raymond Terrace area south to Waterfall. Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges. Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas. Associated species frequently include stunted specimens of E. oblonga (Narrow-leaved Stringybark), E. capitellata (Brown Stringybark) and E. haemastoma (Scribbly Gum).	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Eucalyptus pulverulenta	Silver-leafed Gum	V	V	The Silver-leafed Gum is found in two quite separate areas, the Lithgow to Bathurst area and the Monaro (Bredbo to Bombala). Grows in shallow soils as an understorey plant in open forest, typically dominated by Brittle Gum (Eucalyptus mannifera), Red Stringybark (E. macrorhyncha), Broad-leafed Peppermint (E. dives), Silvertop Ash (E. sieberi) and Apple Box (E. bridgesiana).	1 – BioNet	Low – single record located near Hyde Park. This species has not been recorded in the study area and no suitable habitat present.
Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V	This species is sparsely distributed but widespread on the New England Tablelands from Nundle to north of Tenterfield, being most common in central portions of its range. Found largely on private property and roadsides, and occasionally conservation reserves. Planted as urban trees, windbreaks and corridors. Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock.	1 – BioNet	Low – single record located in Rozelle along the edge of Victoria Road near the Iron Cove Bridge. The study area provides potential suitable habitat for this species however the species presence has not been recorded in the locality.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Genoplesium baueri	Yellow Gnat-orchid	E	E	The species has been recorded from locations between Ulladulla and Port Stephens. About half the records were made before 1960 with most of the older records being from Sydney suburbs including Asquith, Cowan, Gladesville, Longueville and Wahroonga. No collections have been made from those sites in recent years. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded at locations now likely to be within the following conservation reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments. Grows in dry sclerophyll forest and moss gardens over sandstone.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Hibbertia puberula	*Hibbertia puberula*	E	-	Recent work on this species and its relatives has shown it to be widespread, but never common. It extends from Wollemi National Park south to Morton National Park and the south coast near Nowra. It favours low heath on sandy soils or rarely in clay, with or without rocks underneath.	1 – BioNet	Low – single record found in Moore Park. This species has not been recorded in the study area and no suitable habitat is present.
Melaleuca biconvexa	Biconvex Paperbark	V	V	Found only in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Melaleuca deanei	*Deane's Paperbark*	V	V	The distribution of the species extends from St. Albans (Hawkesbury LGA) in the north, Nowra (Shoalhaven LGA) in the south, and west to Faulconbridge (Blue Mountains LGA). It mostly occupies broad flat ridgetops, dry ridges and slopes between 20 and 410 metres above sea level. It is strongly associated with sandy loam soils that are low in nutrients, sometimes with ironstone present. In southern Sydney, the species most frequently occurs on deep and well developed lateritic soils, i.e. soils where an indurated iron-rich layer usually overlies a mottled clay and a pallid clay .It occurs in a wide range of vegetation communities, but is most often found in Coastal Sandstone Ridgetop Woodland and to a lesser extent, Hinterland Sandstone Gully Forest, Sydney Hinterland Transition Woodland and Coastal Sandstone Gully Forest and other communities on sandstone and transitional geology.	8 – BioNet	Low – nearby records located in Sydenham and further south west of the study area. This species has not been recorded in the study area and no suitable habitat is present.
Persicaria elatior	Tall Knotweed	V	V	Tall Knotweed has been recorded in south-eastern NSW (Mt Dromedary (an old record), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Persoonia hirsuta	Hairy Geebung	E	E	Persoonia hirsuta is patchily distributed on the Central Coast and Tablelands of NSW, in an area bounded by Putty, Glen Davis and Gosford in the north, and Royal National Park (NP) and Hill Top in the south. It occurs in the Sydney coastal area (Gosford, Berowra, Manly and Royal NP), the Blue Mountains area (Springwood, Lithgow and Putty) and the Southern Highlands (Balmoral, Buxton, Yanderra and Hill Top). It is frequently found on ridge tops and the mid slopes of hills and rises in dry sclerophyll forest and woodland with a shrubby understorey, heath, shrubby thickets and sandstone scrubs from near sea level to 600 m altitude. Associated canopy species include Eucalyptus sclerophylla, Corymbia gummifera, Leptospermum trinervium, Eucalyptus sieberi, Eucalyptus punctata, Eucalyptus sparsifolia, Corymbia eximia and Banksia ericifolia. It grows on sandy to stony soils derived from sandstone or very rarely on shale and is often found in disturbed areas, like along track edges.	4 – BioNet, PMST	Low – single records located in Marrickville, Tempe, Woolloomooloo and Elizabeth Bay. This species has not been recorded in the study area and no suitable habitat present.
Pimelea curviflora var. *curviflora*	*Pimelea curviflora* var. *curviflora*	V	V	Pimelea curviflora var. curviflora occurs on ridge tops and upper slopes in open forest and woodland on sandy soil derived from sandstone, on shaley/lateritic soils and shale/sandstone transition soils. The population at Albion Park on the Illawara coastal plain occurs in Lowland Grassy Woodland habitat. It often grows among dense grasses and sedges making it difficult to detect.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Pimelea spicata	Spiked Rice-flower	E	E	The Spiked Rice-flower occurs in two disjunct areas; the Cumberland Plain (Marayong and Prospect Reservoir south to Narellan and Douglas Park) and the Illawarra (Landsdowne to Shellharbour to northern Kiama). The western Sydney/Cumberland Plain populations occur on undulating to hilly country in remnant bushland on Wiannamatta shales. Habitats include open woodlands and grasslands of Grey Box (Eucalyptus moluccana), Narrow-leaved Ironbark (E. crebra), Forest Redgum (E. tereticornis), Blackthorn (Bursaria spinosa) and Kangaroo Grass (Themeda triandra).	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Prostanthera marifolia	Seaforth Mintbush	CE	CE	Prostanthera marifolia is currently only known from the northern Sydney suburb of Seaforth and has a very highly restricted distribution within the Sydney Basin Bioregion. The single population is fragmented by urbanisation into three small sites. All known sites are within an area of 2x2 kilometres. Two of the sites are within the local government area of Manly and one site is in the LGA of Warringah. Occurs in localised patches in or in close proximity to the endangered Duffys Forest ecological community. Located on deeply weathered clay-loam soils associated with ironstone and scattered shale lenses, a soil type which only occurs on ridge tops and has been extensively urbanised.	3 – BioNet	Low – three records found in Darlinghurst. This species has not been recorded in the study area and no suitable habitat present.
Pterostylis saxicola	Sydney Plains Greenhood	E	E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. There are very few known populations and they are all very small and isolated. Only one population occurs within a conservation reserve (Georges River National Park). Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where Pterostylis saxicola occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Rhodamnia rubescens	Scrub Turpentine	CE	-	Rhodamnia rubescens is currently known to occur in coastal districts north from Batemans Bay in New South Wales (NSW), approximately 280 kilometres south of Sydney, to areas inland of Bundaberg in Queensland. Populations of R. rubescens typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000- 1,600 mm (Benson and McDougall 1998).	1 – BioNet	Low – single record located in the Sydney Royal Botanic Gardens. This species has not been recorded in the study area and no suitable habitat is present.
Syzygium paniculatum	Magenta Lilly Pilly	E	V	Occurs between Bulahdelah and St Georges Basin where it grows in subtropical and littoral rainforest on sandy soils or stabilized dunes near the sea (Harden, 2002). On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	25 – BioNet, PMST	Low – nearest record in Erskineville. This species has not been recorded in the study area and no suitable habitat is present.
Tetratheca juncea	Black-eyed Susan	V	V	Confined to the northern portion of the Sydney Basin bioregion and the southern portion of the North Coast bioregion in the local government areas of Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes and Cessnock. It is usually found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. However, it has also been recorded in heathland and moist forest. The majority of populations occur on low nutrient soils associated with the Awaba Soil Landscape. While the species has a preference for cooler southerly aspects, it has been found on slopes with a variety of aspects. It generally prefers well-drained sites and occurs on ridges, although it has also been found on upper slopes, mid-slopes and occasionally in gullies.	7 – BioNet	Low – nearest record in Marrickville and farthest record in Rozelle. This species has not been recorded in the study area and no suitable habitat is present.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Thesium australe	Austral Toadflax	V	V	Austral Toad-flax is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Although originally described from material collected in the SW Sydney area, populations have not been seen in a long time. It may persist in some areas in the broader region. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.

Habitat assessment table – Threatened Fauna

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Frogs						
Crinia tinnula	Wallum Froglet	V	-	Wallum Froglets are found along the coastal margin from Litabella National Park in south-east Queensland to Kurnell in Sydney. Wallum Froglets are found in a wide range of habitats, usually associated with acidic swamps on coastal sand plains. They typically occur in sedgelands and wet heathlands. They can also be found along drainage lines within other vegetation communities and disturbed areas, and occasionally in swamp sclerophyll forests. The species breeds in swamps with permanent water as well as shallow ephemeral pools and drainage ditches. Breeding is thought to peak in the colder months, though can occur throughout the year following rain. Eggs of 1.1-1.2mm are deposited in water with a pH of <6 and tadpoles take 2-6 months to develop into frogs. Wallum Froglets shelter under leaf litter, vegetation, other debris or in burrows of other species. Shelter sites are wet or very damp and often located near the water's edge. Males may call throughout the year and at any time of day, peaking following rain.	1 – BioNet	Low – single record found in Eve Street Wetland. No suitable habitat within the study area.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Heleioporus australiacus	Giant Burrowing Frog	V	V	In the northern population there is a marked preference for sandstone ridgetop habitat and broader upland valleys. In these locations, the frog is associated with small headwater creek lines and along slow flowing to intermittent creek lines. The vegetation is typically woodland, open woodland and heath and may be associated with 'hanging swamp' seepage lines and where small pools form from the collected water. They have also been observed occupying artificial ponded structures such as fire dams, gravel 'borrows', detention basins and box drains that have naturalised over time and are still surrounded by other undisturbed habitat. Do not appear to inhabit areas that have been cleared for agriculture or for urban development. Breed in summer and autumn in burrows in the banks of small creeks (Cogger, 2000, NSW National Parks and Wildlife Service, 2001a).	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Litoria aurea	Green and Golden Bell Frog	E	V	Various types of habitat have been documented. For breeding utilises a wide range of waterbodies, including both natural and man-made structures, such as marshes, dams and stream sides, and ephemeral locations that are more often dry than wet. Is found in various small pockets of habitat in otherwise developed areas and has the tendency of often turning up in highly disturbed sites. Lotic situations such as fast flowing streams appear to be one of the few water bodies not utilised, at least for breeding purposes (Department of Environment and Conservation, 2004a, Department of Environment and Conservation, 2005).	215 – BioNet, PMST	Low – nearby records exist in Marrickville, Alexandria, Rosebery and scattered records located further south. The Sydney Park Wetlands adjacent to the study area may offer suitable habitat for this species. However, there is no suitable habitat in the proposed study area.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Litoria raniformis	Growling Grass Frog	E	V	The species is currently widespread throughout the Murray River valley and has been recorded from six Catchment Management Areas in NSW: Lower Murray Darling, Murrumbidgee, Murray, Lachlan, Central West and South East. Found mostly amongst emergent vegetation, including Typha sp. (bullrush), Phragmites sp. (reeds) and Eleocharis sp.(sedges), in or at the edges of still or slow-flowing water bodies such as lagoons, swamps, lakes, ponds and farm dams.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Mixophyes balbus	Stuttering Frog	E	V	Occur along the east coast of Australia from southern Queensland to north-eastern Victoria. Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Birds						
Anseranas semipalmata	Magpie Goose	V	-	Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. Equally at home in aquatic or terrestrial habitats; often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes. Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level; most breeding now occurs in monsoonal areas; nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW.	9 – BioNet	Low – records located in Centennial Park. No suitable habitat within the study area.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Anthochaera phrygia	Regent Honeyeater	CE	CE	Occurs mostly in box-ironbark forests and woodland and prefers the wet, fertile sites such as along creek flats, broad river valleys and foothills. Riparian forests with Casuarina cunninghamiana and Amyema cambagei are important for feeding and breeding. Important food trees include Eucalyptus sideroxylon (Mugga Ironbark), E. albens (White Box), E. melliodora (Yellow Box) and E. leucoxylon (Yellow Gum) (Garnett and Crowley, 2000) with Eucalyptus robusta (Swamp Mahogany) and Corymbia maculata (Spotted Gum) used in coastal habitats.	1 – BioNet, PMST	Low - the Regent Honeyeater is a rare visitor to the locality and has not been recorded since 1996 when it was found in a residential garden in the Inner West LGA. The habitat in the study area is not likely to form any significant habitat for this species.
Artamus cyanopterus	Dusky Woodswallow	V	-	The Dusky Woodswallow is often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests (Higgins and Peter, 2002).	3 – BioNet	Low – records located in the Eastlakes Golf Course and University of Sydney. This species has not been recorded in the study area and no suitable habitat is present.
Botaurus poiciloptilus	Australasian Bittern	V	E	Occurs in shallow, vegetated freshwater or brackish swamps. Requires permanent wetlands with tall dense vegetation, particularly bulrushes and spike rushes. When breeding, pairs are found in areas with a mixture of tall and short sedges but will also feed in territory that is more open. (Garnett and Crowley, 2000, NSW National Parks and Wildlife Service, 2002b).	2 – BioNet, PMST	Low – record located in Eve Street Wetland and Centennial Park.
Burhinus grallarius	Bush Stone-curlew	E	-	Open forests and woodlands with a sparse grassy ground layer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch.	5 – BioNet	Low – records located in Five Dock, Ultimo and Rozelle. This species has not been recorded in the study area and no suitable habitat is present.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Calidris alba	Sanderling	V	M	A regular summer migrant from Siberia and other Arctic breeding grounds to most of the Australian coastline. It is uncommon to locally common, arriving from September and leaving by May (some may overwinter in Australia). Sanderlings occur along the NSW coast, with occasional inland sightings. Often found in coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and bare open coastal lagoons; individuals are rarely recorded in near-coastal wetlands.	3 – BioNet	Low – records located in Eve Street Wetland, Landing Lights Wetland and North Botany Foreshore Reserve. This species is unlikely to utilise the study area as it does not contain suitable habitat.
Calidris canutus	Red Knot	-	E, M	Common in all the main suitable habitats around the coast of Australia. Mainly inhabit intertidal mudflats, sand flats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Calidris ferruginea	Curlew Sandpiper	E	CE	In Australia, Curlew Sandpipers occur around the coasts of all states and are also quite widespread inland, though in smaller numbers. They occur in Australia mainly during the non-breeding period but also during the breeding season when many non-breeding one year old birds remain. Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They generally roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh and in mangroves.	154 – BioNet, PMST	Low – records located in Rozelle, Rockdale, Brighten Le Sands, Botany, Botany Bay, Botany, Botany Bay North, Five Dock, North Botany Bay Foreshore Reserve and Landing Light Wetland. This species has not been recorded in the study area and no suitable habitat is present.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Calidris tenuirostris	Great Knot	V	CE, M	In NSW, the species has been recorded at scattered sites along the coast down to about Narooma. It has also been observed inland at Tullakool, Armidale, Gilgandra and Griffith. Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sand flats, including inlets, bays, harbours, estuaries and lagoons. Often recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms. Migrates to Australia from late August to early September, although juveniles may not arrive until October-November.	12 – BioNet, PMST	Low – records located in Eve Street Wetland, Cooks River Mouth, North Botany Foreshore Reserve and Botany. This species is unlikely to utilise the study area as it does not contain suitable habitat.
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-	Occurs in wetter forests and woodland from sea level to an altitude over 2000 metres, timbered foothills and valleys, coastal scrubs, farmlands and suburban gardens (Pizzey and Knight, 1997).	1 – BioNet	Low – single record in Woolloomooloo. There is a low possibility that this species may visit the study area as a vagrant.
Calyptorhynchus lathami	Glossy-black Cockatoo	V	-	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of Sheoak occur. Black Sheoak (Allocasuarina littoralis) and Forest Sheoak (A. torulosa) are important foods. Inland populations feed on a wide range of Sheoaks, including Drooping Sheoak, Allocasuarina diminuta, and A. gymnanthera. Belah is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak, but also recorded in open woodlands dominated by Belah (Casuarina cristata).	2 – BioNet	Low – records in a suburban area near Alexandria Park. No suitable feed trees in or around the study area. There is a low possibility that this species may visit the study area as a vagrant.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Charadrius leschenaultii	Greater Sand-plover	V	V	The Greater Sand-plover breeds in central Asia from Armenia to Mongolia, moving further south for winter. In Australia the species is commonly recorded in parties of 10-20 on the west coast, with the far northwest being the stronghold of the population. The species is apparently rare on the east coast, usually found singly. In NSW, the species has been recorded between the northern rivers and the Illawarra, with most records coming from the Clarence and Richmond estuaries. Almost entirely restricted to coastal areas in NSW, occurring mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks. Roosts during high tide on sandy beaches and rocky shores; begin foraging activity on wet ground at low tide, usually away from the edge of the water; individuals may forage and roost with other waders.	4 – BioNet, PMST	Low – records located in Eve Street Wetland, North Botany Bay Foreshore Reserve and Cooks River Mouth. No suitable habitat within the study area.
Charadrius mongolus	Lesser Sand-plover	V	E	The Lesser Sand-plover breeds in central and north eastern Asia, migrating further south for winter. In Australia the species is found around the entire coast but is most common in the Gulf of Carpentaria, and along the east coast of Queensland and northern NSW. Individuals are rarely recorded south of the Shoalhaven estuary, and there are few inland records. Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sand flats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms. Highly gregarious, frequently seen in flocks exceeding 100 individuals; also often seen foraging and roosting with other wader species. Roosts during high tide on sandy beaches, spits and rocky shores; forage individually or in scattered flocks on wet ground at low tide, usually away from the water's edge.	4 – BioNet, PMST	Low – records located in Botany Bay North, Botany and Eve Street Wetland. No suitable habitat within the study area.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Dasyornis brachypterus	Eastern Bristlebird	E	E	The distribution of the Eastern Bristlebird has contracted to three disjunct areas of south-eastern Australia. There are three main populations: Northern - southern Queensland/northern NSW, Central - Barren Ground NR, Budderoo NR, Woronora Plateau, Jervis Bay NP, Booderee NP and Beecroft Peninsula and Southern - Nadgee NR and Croajingalong NP in the vicinity of the NSW/Victorian border. Habitat for central and southern populations is characterised by dense, low vegetation including heath and open woodland with a heathy understorey. In northern NSW the habitat occurs in open forest with dense tussocky grass understorey and sparse mid-storey near rainforest ecotone; all of these vegetation types are fire prone.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Epthianura albifrons	White-fronted Chat	V	-	The White-fronted Chat is found across the southern half of Australia, from southernmost Queensland to southern Tasmania, and across to Western Australia as far north as Carnarvon. Found mostly in temperate to arid climates and very rarely sub-tropical areas, it occupies foothills and lowlands up to 1000 m above sea level. In NSW, it occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state. Along the coastline, it is found predominantly in saltmarsh vegetation but also in open grasslands and sometimes in low shrubs bordering wetland areas. Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground. Have been observed breeding from late July through to early March, with 'open-cup' nests built in low vegetation. Nests in the Sydney region have also been seen in low isolated mangroves. Nests are usually built about 23 cm above the ground (but have been found up to 2.5 m above the ground).	1 – BioNet	Low – single record located in Centennial Park. No suitable habitat within the study area.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Epthianura albifrons (endangered population)	White-fronted Chat population in the Sydney Metropolitan Catchment Management Area	EP	-	The White-fronted Chat is found across the southern half of Australia, from southernmost Queensland to southern Tasmania, and across to Western Australia as far north as Carnarvon. Found mostly in temperate to arid climates and very rarely sub-tropical areas, it occupies foothills and lowlands up to 1000 m above sea level. In NSW, it occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state. Along the coastline, it is found predominantly in saltmarsh vegetation but also in open grasslands and sometimes in low shrubs bordering wetland areas. Two isolated sub-populations of White-fronted Chats are currently known from the Sydney Metropolitan Catchment Management Authority (CMA) area; one at Newington Nature Reserve on the Parramatta River and one at Towra Point Nature Reserve in Botany Bay. These sub-populations are separated from each other by 25 kilometres of urbanised land, across which the Chats are unlikely to fly. The nearest extant populations outside Sydney Metropolitan CMA are at Ash Island north of Newcastle and Lake Illawarra, south of Wollongong. White-fronted Chats were previously recorded at Penrith Lakes (2001), Hawkesbury Swamps (2002), Tuggerah Lake (1997) and Lake Macquarie (1998). Regularly observed in the saltmarsh of Newington Nature Reserve (with occasional sightings from other parts of Sydney Olympic Park and in grassland on the northern bank of the Parramatta River). Current estimates suggest this population consists of 8 individuals. Regularly observed in the saltmarsh and on the sandy shoreline of a small island of Towra Point Nature Reserve. This population is estimated to comprise 19-50 individuals.	1 – BioNet	Low – record located in Centennial Park. No suitable habitat within the study area.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Erythrotriorchis radiatus	Red Goshawk	CE	V	This unique Australian endemic raptor is distributed sparsely through northern and eastern Australia, from the western Kimberley Division of northern Western Australia to north-eastern Queensland and south to far north-eastern NSW, and with scattered records in central Australia. The species is very rare in NSW, extending south to about 30°S, with most records north of this, in the Clarence River Catchment, and a few around the lower Richmond and Tweed Rivers. Formerly, it was at least occasionally reported as far south as Port Stephens. Red Goshawks inhabit open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water, and are often found in riparian habitats along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers.	1 – BioNet	Low – single record located in a suburban area near Alexandria Park. This species is extremely rare in the region. No suitable habitat is present in the study area.
Glossopsitta pusilla	Little Lorikeet	V	-	The distribution of the Little Lorikeet extends from just north of Cairns, around the east coast of Australia, to Adelaide. In New South Wales Little Lorikeets are distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri (Royal Australian Ornithologists Union, 2003). Little Lorikeets are generally considered to be nomadic (Higgins, 1999) and forage mainly on flowers, nectar and fruit. The breeding biology of Little Lorikeets is little known however studies indicate that nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts, and hollow openings are approximately 3 cm in diameter (Courtney and Debus, 2006).	1 – BioNet	Moderate – single record from 2015 located in Erskineville. Potential foraging habitat is present in the study area.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Grantiella picta	Painted Honeyeater	V	V	Lives in dry forests and woodlands. Primary food is the mistletoes in the genus Amyema, though it will take some nectar and insects. Its breeding distribution is dictated by presence of mistletoes which are largely restricted to older trees. Less likely to be found in in strips of remnant box-ironbark woodlands, such as occur along roadsides and in windbreaks, than in wider blocks (Garnett and Crowley, 2000).	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Haematopus fuliginosus	Sooty Oystercatcher	V	-	Sooty Oystercatchers are found around the entire Australian coast, including offshore islands, being most common in Bass Strait. Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels.	1 – BioNet	Low – no suitable habitat within the study area.
Haematopus longirostris	Pied Oystercatcher	E	-	The species is distributed around the entire Australian coastline, although it is most common in coastal Tasmania and parts of Victoria, such as Corner Inlet. In NSW the species is thinly scattered along the entire coast, with fewer than 200 breeding pairs estimated to occur in the State. Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. The chisel-like bill is used to pry open or break into shells of oysters and other shellfish. Nests mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones.	5 – BioNet	Low – no suitable habitat within study area.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	M	Distributed along the coastline (including offshore islands) of mainland Australia and Tasmania. Found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, and the sea).	6 – BioNet	Low - there is a low possibility that this species may visit the study area as a vagrant, but no high-quality habitat is present.
Hieraaetus morphnoides	Little Eagle	V	-	The Little Eagle is distributed throughout the Australian mainland occupying habitats rich in prey within open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. For nest sites it requires a tall living tree within a remnant patch, where pairs build a large stick nest in winter and lay in early spring. Prey includes birds, reptiles and mammals, with the occasional large insect and carrion. Most of its former native mammalian prey species in inland NSW are extinct and rabbits now form a major part of the diet (Marchant and Higgins, 1993).	1 – BioNet	Low - there is a low possibility that this species may visit the study area as a vagrant, but no high-quality habitat is present.
Hirundapus caudacutus	White-throated Needletail	-	V, M	Occurs in airspace over forests, woodlands, farmlands, plains, lakes, coasts and towns. Breeds in the northern hemisphere and migrates to Australia in October-April (Pizzey and Knight, 1997).	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Lathamus discolor	Swift Parrot	E	CE	Breeding occurs in Tasmania, majority migrates to mainland Australia in autumn, over-wintering, particularly in Victoria and central and eastern NSW, but also south-eastern Queensland as far north as Duaringa. Until recently it was believed that in New South Wales, swift parrots forage mostly in the western slopes region along the inland slopes of the Great Dividing Range but are patchily distributed along the north and south coasts including the Sydney region, but new evidence indicates that the forests on the coastal plains from southern to northern NSW are also extremely important. In mainland Australia is semi-nomadic, foraging in flowering eucalypts in eucalypt associations, particularly box-ironbark forests and woodlands (Garnett and Crowley, 2000),(Swift Parrot Recovery Team, 2001).	2 – BioNet, PMST	Low - there is a low possibility that this species may visit the study area as a vagrant, but no high-quality habitat is present.
Limicola falcinellus	Broad-billed Sandpiper	V	-	The eastern form of this species breeds in northern Siberia before migrating southwards in winter to Australia. In Australia, Broad-billed Sandpipers overwinter on the northern coast, particularly in the north-west, with birds located occasionally on the southern coast. In NSW, the main site for the species is the Hunter River estuary, with birds occasionally reaching the Shoalhaven estuary. There are few records for inland NSW. Broad-billed Sandpipers favour sheltered parts of the coast such as estuarine sand flats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs as feeding and roosting habitat. Occasionally, individuals may be recorded in sewage farms or within shallow freshwater lagoons. Broad-billed Sandpipers roost on banks on sheltered sand, shell or shingle beaches.	2 – BioNet	Low – no suitable habitat within study area.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Limosa lapponica baueri	Bar-tailed Godwit (western Alaskan)	-	V	The bar-tailed godwit (both subspecies combined) has been recorded in the coastal areas of all Australian states. During the non-breeding period, the distribution of bar-tailed godwit (western Alaskan) is predominately New Zealand, northern and eastern Australia. The migratory bar-tailed godwit (western Alaskan) does not breed in Australia. The bar-tailed godwit (western Alaskan) occurs mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Limosa lapponica menzbieri	Bar-tailed godwit (northern Siberian)	-	CE	The bar-tailed godwit (both subspecies combined) has been recorded in the coastal areas of all Australian states. During the non-breeding period, the distribution of L. l. menzbieri is predominantly in the north and north-west of Western Australia and in south-eastern Asia. The migratory bar-tailed godwit (northern Siberian) does not breed in Australia. The bar-tailed godwit (northern Siberian) occurs mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Limosa limosa	Black-tailed Godwit	V	M	A migratory wading bird that breeds in Mongolia and Eastern Siberia and flies to Australia for the southern summer, arriving in August and leaving in March. In NSW, it is most frequently found at Kooragang Island (Hunter River estuary). Occurs in sheltered bays, estuaries and lagoons with large intertidal mudflats and sand flats. Also found at inland mudflats, swamps.	7 – BioNet	Low – no suitable habitat within study area.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Lophoictinia isura	Square-tailed Kite	V	-	This species hunts primarily over open forest, woodland and mallee communities as well as over adjacent heaths and other low scrubby habitats in wooded towns. It feeds on small birds, their eggs and nestlings as well as insects. Seems to prefer structurally diverse landscapes (Garnett and Crowley, 2000).	1 – BioNet	Low – no suitable habitat within study area.
Lxobrychus flavicollis	Black Bittern	V	-	The Black Bittern is found along the coastal plains within NSW, although individuals have rarely been recorded south of Sydney or inland. It inhabits terrestrial and estuarine wetlands such as flooded grasslands, forests, woodlands, rainforests and mangroves with permanent water and dense waterside vegetation. The Black Bittern typically roosts on the ground or in trees during the day and forages at night on frogs, reptiles, fish and invertebrates. The breeding season extends from December to March. Nests are constructed of reeds and sticks in branches overhanging the water.	2 – BioNet	Low – there is a low possibility that this species may occur within the Sydney Park Wetlands as a vagrant, but no high-quality habitat is present in the study area.
Neophema chrysogaster	Orange-bellied Parrot	CE	CE	The Orange-bellied Parrot breeds in the south-west of Tasmania and migrates in autumn to spend the winter on the mainland coast of south-eastern South Australia and southern Victoria. There are occasional reports from NSW, with the most recent records from Shellharbour and Maroubra in May 2003. On the mainland, the Orange-bellied Parrot spends winter mostly within 3 kilometres of the coast in sheltered coastal habitats including bays, lagoons, estuaries, coastal dunes and saltmarshes. The species also inhabits small islands and peninsulas and occasionally salt works and golf courses. Birds forage in low samphire herbland or taller coastal shrubland.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Neophema pulchella	Turquoise Parrot	V	-	Range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	1 – BioNet	Low – single record located in Camperdown. There is a low possibility that this species may visit the study area as a vagrant but no high–quality habitat is present in the study area.
Ninox strenua	Powerful Owl	V	-	A sedentary species with a home range of approximately 1,000 hectares it occurs within open eucalypt, casuarina or Callitris pine forest and woodland. It often roosts in denser vegetation including rainforest of exotic pine plantations. Generally, feeds on medium-sized mammals such as possums and gliders but will also eat birds, flying-foxes, rats and insects. Prey are generally hollow dwelling and require a shrub layer and owls are more often found in areas with more old trees and hollows than average stands (Garnett and Crowley, 2000).	58 – BioNet	High – nearest records located in St Peters and Alexandria. Potential foraging habitat present on site. This species may hunt in the study area on occasion. Though there is a low possibility for suitable breeding habitat within the study area.
Numenius madagascariensis	Eastern Curlew	-	CE, M	Within Australia, the Eastern Curlew has a primarily coastal distribution. The species is found in all states, particularly the north, east, and south-east regions including Tasmania. The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sand flats, often with beds of seagrass.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Pachyptila turtur subantarctica	Fairy Prion (southern)	-	V	Fairy Prions (including other subspecies) are often beachcast on the south-eastern coast of Australia, and are commonly seen offshore over the continental shelf and over pelagic waters. The southern subspecies of the Fairy Prion is a marine bird, found mostly in temperate and subantarctic seas. On Macquarie Island and adjacent islets, the burrows of Fairy Prions are usually in crevices, in hollows beneath cushions of Colobanthus muscoides or in burrows in peaty soil held together by a thick cover of Cotula plumosa.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Petroica boodang	Scarlet Robin	V	-	In NSW, the Scarlet Robin occupies open forests and woodlands from the coast to the inland slopes. Some dispersing birds may appear in autumn or winter on the eastern fringe of the inland plains. It prefers an open understorey of shrubs and grasses and sometimes in open areas. Abundant logs and coarse woody debris are important structural components of its habitat. In autumn and winter it migrates to more open habitats such as grassy open woodland or paddocks with scattered trees. It forages from low perches, feeding on invertebrates taken from the ground, tree trunks, logs and other coarse woody debris (Higgins and Peter, 2002).	1 – BioNet	Low – single record located in Tempe Wetlands. There is a low possibility that this species may visit the study area as a vagrant, but no high-quality habitat is present.
Ptilinopus superbus	Superb Fruit-Dove	V	-	The Superb Fruit-dove occurs principally from north-eastern in Queensland to north-eastern NSW. Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.	8 – BioNet	Moderate – two records located adjacent to the study area along St Peters Street in the North and West. This species is likely to forage in the study area on occasion.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Rostratula australis	Australian Painted snipe	E	E	The Australian Painted Snipe is restricted to Australia. Most records are from the south east, particularly the Murray Darling Basin, with scattered records across northern Australia and historical records from around the Perth region in Western Australia. 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.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Stagonopleura guttata	Diamond Firetail	V	-	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum (Eucalyptus pauciflora) Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests. Birds roost in dense shrubs or in smaller nests built especially for roosting.	2 – BioNet	Low – record located in Wolli Creek and Centennial Park. There is a low possibility that this species may visit the study area as a vagrant, but no high-quality habitat is present.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Sternula albifrons	Little Tern	E	M	Migrating from eastern Asia, the Little Tern is found on the north, east and south-east Australian coasts, from Shark Bay in Western Australia to the Gulf of St Vincent in South Australia. In NSW, it arrives from September to November, occurring mainly north of Sydney. Almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records). Nests in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands.	52 – BioNet	Low – records located across Botany Bay North, Botany Bay, Cooks River, Eve Street Wetland, Eastlakes Golf Course, North Botany Bay Foreshore Reserve and Centennial Park. No suitable habitat within the study area.
Sternula nereis nereis	Australian Fairy Tern	-	V	Within Australia, the Fairy Tern occurs along the coasts of Victoria, Tasmania, South Australia and Western Australia; occurring as far north as the Dampier Archipelago near Karratha. The subspecies has been known from New South Wales (NSW) in the past, but it is unknown if it persists there. The Fairy Tern (Australian) nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation. The subspecies has been found in embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline. The bird roosts on beaches at night.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Stictonetta naevosa	Freckled Duck	V	-	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	1 – BioNet	Low – single record located in Eastlakes Golf Course. There is a low possibility that this species may visit the Sydney Park Wetlands as a vagrant, though no suitable habitat within the study area.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Thinornis rubricollis	Hooded Plover (eastern)	CE	V, M	The Hooded Plover is endemic to southern Australia and is nowadays found mainly along the coast from south of Jervis Bay, NSW, south through Victoria and Tasmania to the western side of the Eyre Peninsula (South Australia). In south-eastern Australia Hooded Plovers prefer sandy ocean beaches, especially those that are broad and flat, with a wide wave-wash zone for feeding, much beach cast seaweed, and backed by sparsely vegetated sand-dunes for shelter and nesting. Occasionally Hooded Plovers are found on tidal bays and estuaries, rock platforms and rocky or sand-covered reefs near sandy beaches, and small beaches in lines of cliffs. They regularly use near-coastal saline and freshwater lakes and lagoons, often with saltmarsh.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Xenus cinereus	Terek Sandpiper	V	M	A rare migrant to the eastern and southern Australian coasts, being most common in northern Australia, and extending its distribution south to the NSW coast in the east. The two main sites for the species in NSW are the Richmond River estuary and the Hunter River estuary. The latter has been identified as nationally and internationally important for the species. In Australia, has been recorded on coastal mudflats, lagoons, creeks and estuaries. Favours mud banks and sandbanks located near mangroves, though may also be observed on rocky pools and reefs, and occasionally up to 10 kilometres inland around brackish pools.	5 – BioNet	Low - there is a low possibility that this species may occur within the Sydney Park Wetlands as a vagrant, but no high-quality habitat is present in the study area.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Mammals						
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Petrochelidon ariel), frequenting low to mid-elevation dry open forest and woodland close to these features. Found in well-timbered areas containing gullies.	1 – BioNet, PMST	Low – single record located in Centennial Park. No suitable habitat within the study area.
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Occurs from the Bundaberg area in south-east Queensland, south through NSW to western Victoria and Tasmania. In NSW, it occurs on both sides of the Great Dividing Range and north-east NSW represents a national stronghold (NSW National Parks and Wildlife Service, 1999d). Occurs in wide range of forest types, although appears to prefer moist sclerophyll and rainforest forest types, and riparian habitat. Most common in large unfragmented patches of forest. It has also been recorded from dry sclerophyll forest, open woodland and coastal heathland, and despite its occurrence in riparian areas, it also ranges over dry ridges. Nests in rock caves and hollow logs or trees. Feeds on a variety of prey including birds, terrestrial and arboreal mammals, small macropods, reptiles and arthropods (NSW National Parks and Wildlife Service, 1999c, NSW National Parks and Wildlife Service, 1999d).	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	E	E	The Southern Brown Bandicoot has a patchy distribution. It is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland. They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-	Occurs along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm water tunnels, buildings and other manmade structures (Churchill, 2008).	26 – BioNet	Moderate – nearest record is in Sydney Park. This species may use the study area as foraging habitat. Though a low likelihood of cave-type roosting or breeding habitat within the study area.
Myotis macropus	Southern Myotis	V	-	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December.	13 – BioNet	Low – no records located within the study area. This species may use the study area as foraging habitat. Though a low likelihood of cave-type roosting or breeding habitat within the study area.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Perameles nasuta (endangered population)	Long-nosed Bandicoot population in inner western Sydney	EP	-	The exact area occupied by the population is not clearly defined, and includes the local government areas (LGA) of Marrickville and Canada Bay, with the likelihood that it also includes Canterbury, Ashfield and Leichhardt LGAs. Future research may better define the population and possibly indicate a wider distribution. This population is disjunct from the nearest records of the Long-nosed Bandicoot, which occur north of the Parramatta River or much further south at Holsworthy Military Reserve. Shelter mostly under older houses and buildings. There are apparently no large blocks of suitable habitat, likely to support a large source population, on the Cooks River to the south, or along the southern foreshore of Parramatta River and Sydney Harbour to the north.	19 – BioNet	Low – no records located within the study area. There is a low possibility that this species may occur within the study area as a vagrant, but no large blocks of suitable habitat present in the study area.
Petauroides volans	Greater Glider	-	V	The Greater Glider inhabits eucalyptus forests and woodlands as this species feeds exclusively on Eucalyptus buds and leaves. They occupy tree hollows in the day and tree canopies at night (Department of Environment and Climate Change 2007).	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	The range of the Brush-tailed Rock-wallaby extends from south-east Queensland to the Grampians in western Victoria, roughly following the line of the Great Dividing Range. However, the distribution of the species across its original range has declined significantly in the west and south and has become more fragmented. In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Phascolarctos cinereus	Koala	V	V	Found in sclerophyll forest. Throughout New South Wales, Koalas have been observed to feed on the leaves of approximately 70 species of eucalypt and 30 non-eucalypt species. However, in any one area, Koalas will feed almost exclusively on a small number of preferred species. The preferred tree species vary widely on a regional and local basis. Some preferred species in NSW include Forest Red Gum Eucalyptus tereticornis, Grey Gum E. punctata, Monkey Gum E. cypellocarpa and Ribbon Gum E. viminalis. In coastal areas, Tallowwood E. microcorys and Swamp Mahogany E. robusta are important food species (NSW National Parks and Wildlife Service, 1999b, NSW National Parks and Wildlife Service, 2003).	3 – BioNet, PMST	Low – no associated habitat types present within the study area.
Pseudomys novaehollandiae	New Holland Mouse	-	V	The New Holland Mouse has a fragmented distribution across Tasmania, Victoria, NSW and Queensland. The species is now largely restricted to the coast of central and northern NSW, with one inland occurrence near Parkes. In NSW, the New Holland Mouse is known from: Royal National Park (NP) and the Kangaroo Valley; Kuringgai Chase NP; and Port Stephens to Evans Head near the Queensland border. Across the species' range, the New Holland Mouse is known to inhabit open heathland, open woodland with heathy understorey, and vegetated sand dunes.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat.
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps. Urban gardens and cultivated fruit crops also provide habitat for this species. Feeds on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. Also forages in cultivated gardens and fruit crops. It roosts in the branches of large trees in forests or mangroves (NSW National Parks and Wildlife Service, 2001b, Churchill, 2008)	1688 – BioNet, PMST	Moderate – this species is likely to forage in the study area as suitable foraging habitat is present in the form of planted street trees which may provide an occasional foraging resource.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat	V	-	Occurs in eucalypt forest where it feeds above the canopy and in mallee or open country where it feeds closer to the ground. Generally, a solitary species but sometimes found in colonies of up to 10. It roosts in tree hollows. Thought to be a migratory species (Churchill, 2008).	1 – BioNet	Low – no records located within the study area. No high-quality foraging or breeding habitat in the study area.
Fish						
Epinephelus daemelii	Black Cod	-	V	In Australia, the distribution of black cod ranges from southern Queensland through NSW to northern Victoria. However, records from Queensland and Victoria are rare, and the NSW coastline forms the species' main range, both in Australia and internationally. It generally inhabits near-shore reefs at depths down to 50 m from southern Queensland through NSW to northern Victoria. Small juvenile black cod are often found in coastal rock pools while slightly older juveniles are often found in estuary systems. The use of estuaries may be an important part of the ecology of juvenile black cod in NSW waters.	PMST	None – study area not suitable as habitat.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Macquaria australasica	Macquarie Perch	-	E	The Macquarie Perch is a riverine species that prefers clear water and deep, rocky holes with abundant cover such as aquatic vegetation, large boulders, debris and overhanging banks. In Victorian parts of the Murray-Darling, only small natural populations remain in the upper reaches of the Mitta Mitta, Ovens, Broken, Campaspe and Goulburn Rivers; translocated populations occur in the Yarra River and Lake Eildon. In NSW, natural inland populations are isolated to the upper reaches of the Lachlan and Murrumbidgee Rivers. Populations of the eastern form are confined to the Hawkesbury-Nepean and Shoalhaven river systems. Translocated populations in NSW are found in the Mongarlowe River, Queanbeyan River upstream of the Googong Reservoir and in Cataract Dam. In the ACT, it is restricted to the Murrumbidgee, Paddys and Cotter River.	PMST	None – study area not suitable as habitat.
Prototroctes maraena	Australian Grayling	E	V	The Australian Grayling is diadromous, spending part of its lifecycle in freshwater and at least part of the larval and/or juvenile stages in coastal seas. Adults (including pre spawning and spawning adults) inhabit cool, clear, freshwater streams with gravel substrate and areas alternating between pools and riffle zones. The species has also recorded in a muddy-bottomed, heavily silted habitat in the Tarwin River (Victoria). The species has been found over 100 kilometres upstream from the sea. It has been recorded from many rivers across its range, particularly in Tasmania and Victoria. In NSW it is found from the Shoalhaven River south, with important river systems for the species including the Shoalhaven River, Bega River and Clyde River systems.	PMST	None – study area not suitable as habitat.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Reptiles						
Hoplocephalus bungaroides	Broad-headed Snake	E	V	The Broad-headed Snake is largely confined to Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250 kilometres of Sydney. Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in crevices or hollows in large trees within 500 m of escarpments in summer.	PMST	Low – no suitable habitat and no records found nearby. This species has not been recorded in the locality in the past and predicted presence in the PMST is based on modelled habitat

Note: This habitat assessment table does not consider habitat for species such as migratory marine birds (i.e. albatross and petrels), marine fish, whales, dolphins, sharks, rays, or turtles as the proposal will not impact on habitat for these species.

Distribution and habitat requirement information adapted from:

- Australian Government Department of the Environment http://www.environment.gov.au/biodiversity/threatened/index.html
- NSW Department of Planning, Industry and Environment http://www.environment.nsw.gov.au/threatenedspecies/
- Department of Primary Industries – Threatened Fish and Marine Vegetation http://pas.dpi.nsw.gov.au/Species/All_Species.aspx

Data source includes:

- Number of records from the NSW Department of Planning, Industry and Environment BioNet Atlas record data (Accessed May 2020); and
- Identified from the Protected Matters Search Tool (PMST) Australian Government Department of Sustainability, Environment, Water, Populations and Community http://www.environment.gov.au/epbc/pmst/index.html

Key:

CE = critically endangered species

E = endangered species

EP = endangered population

V = vulnerable species

M = migratory species

3. Tests of significance

Tests of significance have been conducted for threatened species, populations and communities that were identified as having a moderate or high potential to occur in the study area based on the presence of suitable habitat (see Appendix A).

Section 7.3 of the BC Act outlines the 'test of significance' that is to be undertaken to assess the likelihood of significant impact upon threatened species or ecological communities listed under the BC Act. These tests of significance have been undertaken in accordance with the Threatened Species Test of Significance Guidelines (Office of Environment and Heritage 2018), which outlines a set of guidelines to help applicants/proponents of a development or activity with interpreting and applying the factors of the assessment process. The guidance provided by the former Office of Environment and Heritage has been used here in preparing these tests of significance and in determining whether there is likely to be a significant effect to a threatened species, population or ecological community listed under the BC Act.

For threatened biodiversity listed under the EPBC Act, significance assessments have been completed in accordance with the EPBC Act Policy Statement 1.1 Significant Impact Guidelines (Department of Environment, 2013). Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment that is affected, and upon the intensity, duration, magnitude and geographic extent of the impacts (Department of Environment, 2013). Importantly, for a 'significant impact' to be 'likely', it is not necessary for a significant impact to have a greater than 50 per cent chance of happening; it is sufficient if a significant impact on the environment is a real or not remote chance or possibility (Department of Environment, 2013). This advice has been considered while undertaking the assessments.

The species subject to this assessment are outlined in **Table C.1** along with the predicted impact from the proposal.

Table C.1 Threatened biodiversity subject to this assessment

Species / community	BC Act	EPBC Act	Predicted impact
Grey-headed Flying-fox (*Pteropus poliocephalus*)	V	V	6 planted street trees
Large Bent-winged Bat (*Miniopterus orianae oceanensis*)	V	-	6 planted street trees, foraging habitat only
Little Lorikeet (*Glossopsitta pusilla*)	V	-	6 planted street trees
Powerful Owl (*Ninox strenua*)	V	-	6 planted street trees, some of which may provide temporary roosting habitat for prey species
Superb Fruit-Dove (*Ptilinopus superbus*)	V	-	2 planted street trees

3.1 Biodiversity Conservation Act 2016 assessment

3.1.1 Grey-headed Flying-fox (*Pteropus poliocephalus*)

The Grey-headed Flying-fox is considered highly likely to forage in the trees within the study area, particularly *Melaleuca quinquenervia* and *Ficus obliqua*. No roost camps are present in the study area, however, the bats from the Turrella Reserve at Wolli Creek, Centennial Parklands at Lachlan Swamp and Sydney Royal Botanic Gardens camps are likely to forage in the study area.

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats*:*

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Grey-headed Flying-fox occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 kilometres of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Annual mating commences in January and conception occurs in April or May with a single young born in October or November.

There are no roost camps located in the study area and at the time of this assessment the proposal would not directly impact on any known breeding / maternity site. As such, the impacts of the proposal to the Grey-headed Flying-fox would be limited to loss of feeding habitat caused by direct clearing or damage to native planted street trees during the construction phase.

The proposal would remove six native planted street trees of potential foraging habitat (although not this entire habitat is likely to be used) for the Grey-headed Flying-fox. The affected area of foraging habitat would represent a small percentage of the total extent of important foraging vegetation types present within the locality. Given the relatively widespread nature of similar poor-quality vegetation in the locality and abundance of higher-quality foraging habitat within the feeding range of the camps located near the study area, the proposal is not expected to significantly affect the life cycle of the species.

The proposal is unlikely to reduce the population size of the Grey-headed Flying-fox or decrease the reproductive success of this species.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

- **i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- **ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

Not applicable.

c. in relation to the habitat of a threatened species or ecological community:

- **i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and**
- **ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**
- **iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.**

The potential habitat of the Grey-headed Flying-fox within the study area is limited to foraging habitat and includes all vegetation where fruiting and flowering trees and shrubs are present, particularly *Melaleuca quinquenervia* and *Ficus obliqua* occurring within the study area. The extent of potential foraging habitat for the Grey-headed Flying-fox would be reduced by six native planted street trees to be removed. This amount of habitat removal is small when the amount of available foraging habitat in the locality is considered.

Importantly, the proposal would not result in fragmentation of habitat for the Grey-headed Flying-fox. This species is highly mobile and will freely fly long distances (up to 50 kilometres) over open areas including urbanised city centres to move between roost camps and foraging sites. The proposal would not affect the movement of the Grey-headed Flying-fox between habitat patches.

Importantly, the proposal would not affect the most important habitats for Grey-headed Flying-fox within the locality. The most important habitats for the local Grey-headed Flying-fox sub-populations are the roosting camps at Turrella Reserve at Wolli Creek, Centennial Parklands at Lachlan Swamp and Sydney Royal Botanic Gardens. These camps would not be affected by the proposal. Foraging habitat within the study area is likely to form part of an overall foraging range of these sub-populations and would only form a small proportion of available habitat for this species. As such, the foraging habitat within the study area is unlikely to be of critical importance for the survival of the Grey-headed Flying-fox within the locality.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

The proposal will not impact on any declared area of outstanding biodiversity value.

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

With respect to the Grey-headed Flying-fox, the proposal will directly contribute to one key threatening process (KTPs) listed under the BC Act; Clearing of native vegetation. The proposal may also indirectly contribute to several other KTPs including:

- Pest animals that can compete with or prey upon native animals. They can also damage native plants and degrade natural habitats.
- Weeds that compete with native plants for resources such as light and nutrients. They can aggressively invade areas, displacing native plants and animals.
- Diseases, those exotic fungal infections, viruses and other pathogens can weaken and kill native species.

The extent of native vegetation clearing and habitat removal associated with the proposal is considered unlikely to be significant in terms of available habitat for the Grey-headed Flying-fox adjacent to the study area. Hygiene and weed control measures will reduce or avoid the impact of most other KTPs.

Conclusion

The Grey-headed Flying-fox would potentially suffer a small reduction in extent of foraging habitat from the proposal, removing six native planted street trees. No roosting camps or other important habitat would be impacted. As such, the proposal is considered unlikely to reduce the population size of the Grey-headed Flying-fox or decrease the reproductive success of this species. After consideration of the factors above, an overall conclusion has been made that the proposal is unlikely to result in a significant effect to the Grey-headed Flying-fox.

3.1.2 Large Bent-winged Bat (Miniopterus orianae oceanensis)

The Large Bent-winged Bat is considered moderately likely to use the study area as potential foraging habitat on occasion. The nearest record in proximity to the study area is found in Sydney Park. Though a low likelihood of cave-type roosting or breeding habitat is present within the study area.

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Large Bent-winged Bat primarily roosts in caves, but will also use derelict mines, storm water tunnels, buildings and other man-made structures. The Large Bent-winged Bat forms populations centred on a maternity cave that

is used annually in spring and summer for the birth and rearing of young. At other times of the year, populations disperse within about 300 kilometres range of maternity caves. The Large Bent-winged Bat hunts in forested areas.

A roost site for the Large Bent-winged Bat exists at Astrolabe Park (3.8 kilometres away from the proposal) where now decommissioned twin stormwater culverts enter the lake system in Eastlakes Golf Course, around Mill Stream, the Intersection of Southern Cross Drive and the railway line in Mascot. There is potential roosting habitat located in a rail corridor just north of the proposal including the rail overbridge along King Street and a stormwater canal that crosses under Sydney Park Road, however there is a low possibility that these areas will be impacted by the proposal and would not directly impact on any known breeding / maternity sites. As such, the impacts of the proposal to the Large Bent-winged Bat would be limited to loss of feeding habitat caused by direct clearing or damage to native vegetation during the construction phase.

All vegetation within the study area is likely to provide foraging habitat for this species. Riparian zones are also likely to be a focal point for foraging of the Large Bent-winged Bat and may utilise Sydney Park Wetlands as potential foraging habitat adjacent to the study area. The proposal will not result in damage to the storm water tunnels used as a roost by the Large Bent-winged Bat. The proposal would remove six native planted street trees of potential foraging habitat for this species. Much of this area is planted vegetation and is not considered high-quality habitat. The current potential for these species to occur based on the presence of potential foraging habitat is expected to remain after completion of the project. Foraging, movement and other life-cycle attributes would not be impacted.

The proposal is unlikely to reduce the population size of the Large Bent-winged Bat or decrease the reproductive success of this species.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

- **i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- **ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

Not applicable.

c. in relation to the habitat of a threatened species or ecological community:

- **i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and**
- **ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**
- **iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.**

The proposal will remove six native planted street trees of potential foraging habitat for the Large Bent-winged Bat. Considering much of this area is planted vegetation it is not considered high-quality habitat. This amount of habitat removal is considered small when the amount of available foraging habitat in the locality is considered. Importantly, the proposal will not remove or damage any known neighbouring storm water tunnels used as roosting habitat by this species.

Importantly, the proposal would not result in fragmentation of habitat for the Large Bent-winged Bat. This species is highly mobile and will freely fly long distances over open areas to move between habitats, as is indicated by their presence in the study area. The proposal would not affect the movement of the Large Bent-winged Bat between habitat patches.

The vegetation in the study area would be characterised as poor-quality foraging habitat for these species, as much of the area being impacted is planted vegetation. The Sydney Park Wetlands may provide a focal point of foraging activity as are the edges of vegetation patches in this area. Though, the loss of native vegetation from the study area may reduce the amount of foraging habitat available for these species, it is considered unlikely to be of critical importance for the long-term survival of the Large Bent-winged Bat within the locality.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

The proposal will not impact on any declared area of outstanding biodiversity value.

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

With respect to the Large Bent-winged Bat, the proposal will directly contribute to one key threatening process (KTPs) listed under the BC Act; Clearing of native vegetation. The proposal may also indirectly contribute to several other KTPs including:

- Pest animals that can compete with or prey upon native animals. They can also damage native plants and degrade natural habitats.
- Weeds that compete with native plants for resources such as light and nutrients. They can aggressively invade areas, displacing native plants and animals.
- Diseases, those exotic fungal infections, viruses and other pathogens can weaken and kill native species.

The extent of native vegetation clearing and habitat removal associated with the proposal is considered unlikely to be significant in terms of available habitat for the Large Bent-winged Bat adjacent to the study area. Hygiene and weed control measures will reduce or avoid the impact of most other KTPs.

Conclusion

The Large Bent-winged Bat would potentially suffer a small reduction in extent of foraging habitat from the proposal, removing six native planted street trees. No roosting sites or other important habitat would be impacted. As such, the proposal is considered unlikely to reduce the population size of the Large Bent-winged Bat or decrease the reproductive success of this species. After consideration of the factors above, an overall conclusion has been made that the proposal is unlikely to result in a significant effect to the Large Bent-winged Bat.

3.1.3 Little Lorikeet (Glossopsitta pusilla)

The Little Lorikeet is considered moderately likely to occur within the study area due to the presence of potential foraging habitat, particularly *Melaleuca quinquenervia* and *Ficus obliqua*. It was recorded in 2015 occurring 800 metres from the study area in a suburban area in Erskineville.

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats*:*

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Little Lorikeets are known to occupy a diversity of forest and woodland habitats, including old-growth and logged forests, and remnant woodland patches and roadside vegetation. The species is generally considered to be nomadic, with irregular large or small influxes of individuals occurring at any time of year, apparently related to food availability. However, they do exhibit some site fidelity, with breeding pairs resident from April to December, and even during their non-resident period some individuals will return to the nest area for short periods if there is some tree-flowering in the vicinity. They feed in small flocks, often with other species of lorikeet, primarily on nectar and pollen in the tree canopy. They prefer profusely flowering eucalypts but will also feed on other species such as melaleucas and mistletoes. The species breeds in tree hollows in living trees, during May to September, raising clutches of three to five eggs. They likely start breeding at one year and live for around 10 years in the wild.

The study area contains potential foraging habitat for the Little Lorikeet, particularly *Melaleuca quinquenervia* and *Ficus obliqua*. Breeding habitat may be present within the study area as Little Lorikeets tend to nest in proximity to feeding areas, though it is considered unlikely due to unsuitable tree nesting species and much of the native vegetation being planted. The loss of feed trees would directly affect the species opportunity to feed and breed in the area; however, the study area is not considered a critical area for the Little Lorikeet. The Little Lorikeet is likely to utilise trees in the study area for foraging intermittently when no other suitable resources are available. The proposal would remove six native planted street trees of potential foraging habitat (although not this entire

habitat is likely to be used) for the Little Lorikeet. The affected area of foraging habitat is characterised as poor-quality habitat and represents a small percentage of the total extent of important foraging vegetation types present within the locality, therefore the proposal is not expected to significantly affect the life cycle of the species.

The proposal is unlikely to reduce the population size of the Little Lorikeet or decrease the reproductive success of this species.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:
   i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
   ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable.

c. in relation to the habitat of a threatened species or ecological community:
   i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
   ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
   iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.

The potential habitat of the Little Lorikeet within the study area is limited to foraging habitat and includes all vegetation where flowering trees and shrubs are present. The extent of potential foraging habitat for the Little Lorikeet would be reduced by six native planted street trees to be removed. This amount of habitat removal is small when the amount of available foraging habitat in the locality is considered.

Importantly, the proposal will not result in fragmentation of habitat for the Little Lorikeet. This species is highly mobile and will freely fly long distances over open areas to move between habitats. The proposal will not affect the movement of the Little Lorikeet between habitat patches.

The vegetation in the study area would form a small component of a larger foraging range for these species. The Little Lorikeet has been recorded nearby the study area (notably a single record in Erskineville in 2015). *Melaleuca quinquenervia* flowers during Autumn to Winter and *Ficus obliqua* produce fruit all year round, each tree species providing a foraging resource for the Little Lorikeet on occasion in the study area. The Little Lorikeet may pass through the study area during movements between larger foraging habitats, though the habitat that will be impacted is not considered to be important to the long-term survival of this species. The Little Lorikeet is likely to utilise trees in the study area for foraging intermittently when no other suitable resources are available. The current potential for the species to occur based on the presence of potential foraging habitat is expected to remain after completion of the project such that foraging, movement and other life-cycle attributes would not be impacted.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

The proposal will not impact on any declared area of outstanding biodiversity value.

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

With respect to the Little Lorikeet, the proposal will directly contribute to one key threatening process (KTPs) listed under the BC Act; Clearing of native vegetation. The proposal may also indirectly contribute to several other KTPs including:

- Pest animals that can compete with or prey upon native animals. They can also damage native plants and degrade natural habitats.
- Weeds that compete with native plants for resources such as light and nutrients. They can aggressively invade areas, displacing native plants and animals.

- Diseases, those exotic fungal infections, viruses and other pathogens can weaken and kill native species.

The extent of native planted street trees to be removed and habitat removal associated with the proposal is considered unlikely to be significant in terms of available habitat for the Little Lorikeet adjacent to the study area. Hygiene and weed control measures will reduce or avoid the impact of most other KTPs.

Conclusion

The Little Lorikeet would potentially suffer a small reduction in extent of foraging habitat from the proposal, removing six native planted street trees. However, considering the small proportion of habitat to be lost, the proposal is unlikely to reduce the population size of these species or decrease the reproductive success of these species. After consideration of the factors above, an overall conclusion has been made that the proposal is unlikely to result in a significant effect to the Little Lorikeet.

3.1.4 Powerful Owl (*Ninox strenua*)

The Powerful Owl is known to utilise highly modified and partially-cleared habitats and is considered highly likely to forage within the study area periodically. The study area is considered unlikely to form suitable breeding habitat for these species and habitat use would be likely restricted to foraging. The nearest records to the study area are found in St Peters and Alexandria.

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats*:*

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Optimal habitat for the Powerful Owl includes a tall shrub layer and abundant hollows supporting high densities of arboreal marsupials. For roosting, this species prefers groves of dense mid-canopy trees or tall shrubs in sheltered gullies, typically on wide creek flats and at the heads of minor drainage lines. Nests in old hollow eucalypts in unlogged, unburnt gullies and lower slopes within 100 metres of streams or minor drainage lines, with hollows greater than 45 centimetres diameter and greater than 100 centimetres deep; surrounded by canopy trees and subcanopy or understorey trees or tall shrubs.

The Powerful Owl may visit the study area on occasion to hunt, however no high-quality habitat is present as much of the native vegetation being impacted is planted street trees within the study area. The nearest record of the Powerful Owl is in St Peters and Alexandria. The presence of suitable breeding habitat is considered unlikely as there is a low likelihood of large tree hollows, in large eucalypts that are at least 150 years old occurring in the study area, this being the preferred breeding habitat requirement for the Powerful Owl.

The proposal would remove six native planted street trees of potential foraging habitat for this species. However, much of this area is not considered critical habitat for these species. It is unlikely nesting habitat for these species will be impacted by the proposal. Shelter and food resources in the study area are likely to be important for the life cycle of these species, however there is a low potential that the proposal would adversely affect the life-cycle of the Powerful Owl given the widespread occurrence of suitable foraging habitat and nearby records in the locality.

This amount of habitat removal is not considered likely to have an adverse effect on the life cycle of these species such that a viable local population is likely to be placed at risk of extinction.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable.

c. in relation to the habitat of a threatened species or ecological community:

- **i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and**
- **ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**
- **iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.**

The proposal will remove six native planted street trees of potential foraging habitat for the Powerful Owl. Considering, much of this area is planted vegetation it is not considered high-quality habitat. The Powerful Owl may only visit the study area on occasion to hunt. The amount of habitat removal is considered small when the amount of available foraging habitat in the locality is considered.

Much of the native vegetation within the study area is quite fragmented in nature. Importantly, the proposal would not result in fragmentation of habitat for these species. The Powerful Owl is known to utilise highly modified and partially-cleared habitats and are likely to pass through the study area on occasion to hunt. The study area is considered unlikely to form suitable breeding habitat for the Powerful Owl and habitat use would be likely restricted to foraging. The proposal would not affect the movement of this species between habitat patches.

The vegetation in the study area would form a small component of a larger foraging range for these species. The loss of native vegetation from the study area would reduce the amount of foraging habitat available for these species by a small amount. However, when compared to the larger and higher quality vegetation remnants in the locality, the vegetation within the study area is not considered as important for the long-term survival of these species.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

The proposal will not impact on any declared area of outstanding biodiversity value.

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

With respect to the Powerful Owl, the proposal will directly contribute to one key threatening process (KTPs) listed under the BC Act; Clearing of native vegetation. The proposal may also indirectly contribute to several other KTPs including:

- Pest animals that can compete with or prey upon native animals. They can also damage native plants and degrade natural habitats.
- Weeds that compete with native plants for resources such as light and nutrients. They can aggressively invade areas, displacing native plants and animals.
- Diseases, those exotic fungal infections, viruses and other pathogens can weaken and kill native species.

The extent of native vegetation clearing and habitat removal associated with the proposal is considered unlikely to be significant in terms of available habitat for the Powerful Owl adjacent to the study area. Hygiene and weed control measures will reduce or avoid the impact of most other KTPs.

Conclusion

The Powerful Owl would potentially suffer a small reduction in extent of foraging habitat from the proposal, removing six native planted street trees. No breeding habitat is likely to be impacted. The proposal is unlikely to reduce the population size of these species or decrease the reproductive success of these species. After consideration of the factors above, an overall conclusion has been made that the proposal is unlikely to result in a significant effect to the Powerful Owl.

3.1.5 Superb Fruit-Dove (*Ptilinopus superbus*)

The Superb Fruit-Dove is considered moderately likely to forage in the trees within the study area periodically, particularly the fruits of *Ficus obliqua*. The study area is considered unlikely to form suitable breeding habitat for

these species and habitat use would be likely restricted to foraging. The nearest records are found along St Peters Street in the North and West vicinity of the study area.

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Superb Fruit-dove occurs primarily from north-eastern in Queensland to north-eastern NSW. Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees. Part of the population is migratory or nomadic. At least some of the population, particularly young birds, moves south through Sydney, especially in autumn. Breeding takes place from September to January. The nest is usually 5-30 metres up in rainforest and rainforest edge tree and shrub species.

The study area contains potential foraging habitat for the Superb Fruit-Dove, particularly the fruits of *Ficus obliqua*. Suitable breeding habitat is considered unlikely due to the much of the native vegetation being planted within the study area. The loss of feed trees would directly affect the species opportunity to feed in the area, however, the study area is not considered a critical area for the Superb Fruit-Dove. The Superb Fruit-Dove is likely to utilise trees in the study area for foraging intermittently when passing through. The proposal would remove two native planted street trees of potential foraging habitat (although not this entire habitat is likely to be used) for the Superb Fruit-dove. The affected area of foraging habitat is characterised as poor-quality habitat and represents a small percentage of the total extent of important foraging vegetation types present within the locality, therefore the proposal is not expected to significantly affect the life cycle of the species.

The proposal is unlikely to reduce the population size of the Little Lorikeet or decrease the reproductive success of this species.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:
- **i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- **ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

Not applicable.

c. in relation to the habitat of a threatened species or ecological community:
- **i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and**
- **ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**
- **iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.**

The potential habitat of the Superb Fruit-Dove within the study area is limited to foraging habitat and includes all vegetation where fruit-bearing trees are present. The extent of potential foraging habitat for the Superb Fruit-Dove would be reduced by two native planted street trees to be removed. This amount of habitat removal is small when the amount of available foraging habitat in the locality is considered.

Importantly, the proposal will not result in fragmentation of habitat for the Superb Fruit-Dove. This species is nomadic and will freely fly long distances over open areas to move between habitats. The proposal will not affect the movement of the Superb Fruit-Dove between habitat patches.

The vegetation in the study area would form a small component of a larger foraging range for these species. The Superb Fruit-Dove has been recorded nearby the study area (notably along St Peters Street in 1995). *Ficus obliqua* produce fruit all year round providing a foraging resource for the Superb Fruit-Dove. The Superb Fruit-Dove may

pass through the study area during movements between larger foraging habitats, though the habitat that will be impacted is not considered to be important to the long-term survival of this species. The Superb Fruit-Dove is likely to utilise trees in the study area for foraging intermittently when no other suitable resources are available. The current potential for the species to occur based on the presence of potential foraging habitat is expected to remain after completion of the project such that foraging, movement and other life-cycle attributes would not be impacted.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

The proposal will not impact on any declared area of outstanding biodiversity value.

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

With respect to the Superb Fruit-Dove, the proposal will directly contribute to one key threatening process (KTPs) listed under the BC Act; Clearing of native vegetation. The proposal may also indirectly contribute to several other KTPs including:

- Pest animals that can compete with or prey upon native animals. They can also damage native plants and degrade natural habitats.
- Weeds that compete with native plants for resources such as light and nutrients. They can aggressively invade areas, displacing native plants and animals.
- Diseases, those exotic fungal infections, viruses and other pathogens can weaken and kill native species.

The extent of native vegetation clearing and habitat removal associated with the proposal is considered unlikely to be significant in terms of available habitat for the Superb Fruit-Dove adjacent to the study area. Hygiene and weed control measures will reduce or avoid the impact of most other KTPs.

Conclusion

The Superb Fruit-Dove would potentially suffer a small reduction in extent of foraging habitat from the proposal, removing two native planted street trees. However, considering the small proportion of habitat to be lost, the proposal is unlikely to reduce the population size of these species or decrease the reproductive success of these species. After consideration of the factors above, an overall conclusion has been made that the proposal is unlikely to result in a significant effect to the Superb Fruit-Dove.

3.2 Environment Protection and Biodiversity Conservation Act 1999 assessment

3.2.1 Grey-headed Flying-fox (Pteropus poliocephalus)

The Grey-headed Flying-fox is considered highly likely to forage in the trees within the study area, particularly *Melaleuca quinquenervia* and *Ficus obliqua*.

The Grey-headed Flying-fox exists as one interconnected population along the eastern Australian coastal belt from Rockhampton in central Queensland to Melbourne in Victoria. As a result, for this assessment, the impact has been considered in terms of 'important habitat' as opposed the presence of an 'important population'.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

1. lead to a long-term decrease in the size of an important population of a species

There are no roost camps in the study area and the action would not affect any known permanent roosting, breeding / maternity site. Therefore, it is likely that the impacts of construction and operation of the action would be confined to minor loss of foraging habitat caused by direct clearing or damage to native vegetation during the construction phase.

The proposal would remove six native planted street trees of foraging habitat for the Grey-headed Flying-fox. Much of this area comprises of native planted vegetation. Foraging habitat mainly comprises nectar resources from planted native trees and shrubs as well as fruit resources, particularly from *Melaleuca quinquenervia* and *Ficus obliqua*. This area of habitat may be defined as a portion of the potential area of occupancy for feeding life-cycle attributes of the population. The affected area of foraging habitat would represent a small percentage of the total extent of important foraging vegetation types present within a 50-kilometre radius of the project boundary. Given the relative widespread nature of similar native planted vegetation in the locality and abundance of higher quality foraging habitat within the feeding range of regional populations, the project is not expected to lead to a long-term decrease in the size of an important population.

2. reduce the area of occupancy of an important population

The area of occupancy of the Grey-headed Flying-fox is not known but the species exists as one interconnected population along the eastern Australian coastal belt from Rockhampton in central Queensland to Melbourne in Victoria. The area occupied by this species would remain the same after the action. No decrease in the area of occupancy for this species expected as a result of the proposal.

3. fragment an existing important population into two or more populations

Highly mobile species such as bats are expected to be less impacted by fragmentation. The Grey-headed Flying-fox is particularly well adapted to accessing widely spaced habitat resources given its mobility and preference for seasonal fruits and blossom in differing parts of the landscape. The proposal would not fragment an important population of the Grey-headed Flying-fox. Individuals would still be able to disperse between roosts along the east Australian coast. Genetic exchange within the population and dispersal would not be disrupted by the proposal.

4. adversely affect habitat critical to the survival of a species

This species typically exhibits very large home range and Grey-headed Flying-fox is known to travel distances of at least 50 kilometres from roost sites to access seasonal foraging resources. There are no known roost camps within the study area and the site does not provide critical roosting habitat. However, there are several known roost camps with a 50-kilometre radius of the proposal, the three closest being Turrella Reserve at Wolli Creek, Centennial Parklands at Lachlan Swamp and Sydney Royal Botanic Gardens. The draft recovery plan for the Grey-headed Flying-fox identifies critical foraging habitat for this species as:

- Productive during winter and spring, when food bottlenecks have been identified
- Known to support populations of >30,000 individuals, within an area of 50-kilometre radius of a camp site

- Productive during the final weeks of gestation, and during the weeks of birth, lactation and conception (Sept-May)
- Productive during the final stages of fruit development and ripening in commercial crops affected by Grey-headed Flying-foxes
- Known to be continuously occupied as a camp site.

Native vegetation within the study area may constitute critical foraging habitat but the affected area of foraging habitat would represent a small percentage of the total extent of important foraging vegetation types present within a 50-kilometre radius of the Turrella Reserve at Wolli Creek, Centennial Parklands at Lachlan Swamp and Sydney Royal Botanic Gardens. Foraging habitat within the study area is likely to form part of an overall foraging range of these sub-populations and would only form a small proportion of available habitat for this species. As such, the foraging habitat within the study area is unlikely to be of critical importance for the survival of the Grey-headed Flying-fox within the locality.

5. disrupt the breeding cycle of an important population

As stated above there would be a minor impact on foraging habitat during the breeding cycle of the species. The upgrade would not directly impact on a known roost camp / breeding or maternity site. Extensive foraging resources are available in the locality that would provide suitable resources during the maternity season. The habitats in the study area are not limiting for this species.

6. modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The impacts to foraging habitat are minimal and no evidence of a roost camp has been identified from the study area. This impact is not expected to lead to a decline in the species in this region considering the magnitude of this impact and the expanse of known roost camps in proximity to the study area at Turrella Reserve at Wolli Creek, Centennial Parklands at Lachlan Swamp and Sydney Royal Botanic Gardens.

7. result in invasive species that are harmful to a vulnerable species becoming established in the Vulnerable species' habitat

The action is unlikely to result in an invasive species harmful to the Grey-headed Flying-fox becoming established in the habitat. The potential for weed invasion was considered possible with a proposal of this nature and appropriate controls are required during construction and operation of the road to reduce this threat. The management of invasive species would be managed under the construction environmental management plan (CEMP) and during operation of the proposed roadworks and landscaping using best practice methods.

8. introduce disease that may cause the species to decline, or

There are no known disease issues affecting this species in relation to the action. The action would be unlikely to increase the potential for significant disease vectors to affect local populations.

Infection of native plants by *Phytophthora cinnamomi* has been identified as being spread by construction machinery. This water-borne mould infects the roots of plants and has the potential to cause dieback. Machinery associated with vegetation clearance and subsequent construction has the potential to transmit the fungus to remaining native vegetation remnants of the species. This is a potential indirect impact to the species through the transmission of pathogens into retained habitat near the facility. This can be mitigated through the development and implementation of suitable control measures for vehicle and plant hygiene and is unlikely to have a significant impact. It is the intention to use current best practice hygiene protocols as part of the CEMP to prevent the introduction or spread of pathogens.

The project mitigation strategy and environmental management procedures would include guidance for preventing the introduction and/or spread of disease-causing agents such as bacteria and fungi.

9. interfere substantially with the recovery of the species.

The *Draft National Recovery Plan for the Grey-headed Flying-fox* (*Pteropus poliocephalus*) (Department of Environment Climate Change and Water, 2009) outlines the following actions:

- Identify and protect foraging habitat critical to the survival of Grey-headed Flying-foxes across their range
- Enhance winter and spring foraging habitat for Grey-headed Flying-foxes
- Identify, protect and enhance roosting habitat critical to the survival of Grey-headed Flying-foxes
- Significantly reduce levels of deliberate Grey-headed Flying-fox destruction associated with commercial horticulture
- Provide information and advice to managers, community groups and members of the public that are involved with controversial flying-fox camps
- Produce and circulate educational resources to improve public attitudes toward Grey-headed Flying-foxes, promote the recovery program to the wider community and encourage participation in recovery actions
- Monitor population trends for the Grey-headed Flying-fox
- Assess the impacts on Grey-headed Flying-foxes of electrocution on powerlines and entanglement in netting and barbed wire, and implement strategies to reduce these impacts
- Oversee a program of research to improve knowledge of the demographics and population structure of the Grey-headed Flying-fox
- Maintain a National Recovery Team to oversee the implementation of the Grey-headed Flying-fox National Recovery Plan

The recovery actions listed above are largely not applicable to the action and the action is not expected to interfere substantially with the recovery of the species.

Conclusion

The Grey-headed Flying-fox would potentially suffer a small reduction in extent of suitable foraging habitat from the action. No breeding camps or other important habitat would be impacted. The action is unlikely to reduce the population size of the Grey-headed Flying-fox or decrease the reproductive success of this species. The action would not interfere with the recovery of the Grey-headed Flying-fox and would not contribute to the key threats to this species. After consideration of the factors above, an overall conclusion has been made that the action is unlikely to result in a significant impact to the Grey-headed Flying-fox.