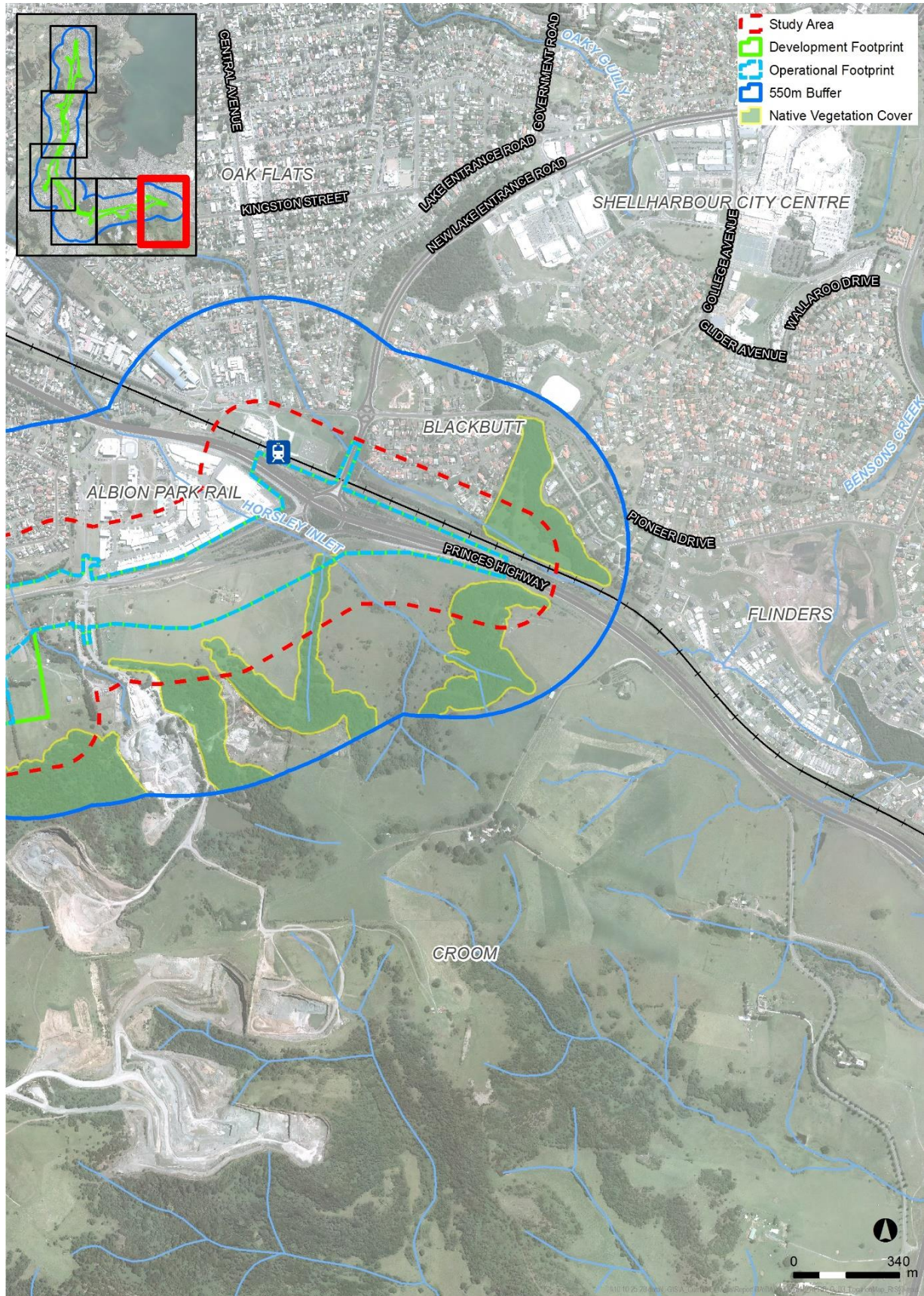




APPENDIX C CREDIT PROFILE

As of 15/02/2017

Proposal ID for the assessment: 0035/2017/4182MP Version 1 (Calculator version 4)

Assessment type: 'Major Project'.

Biodiversity credit report



This report identifies the number and type of biodiversity credits required for a major project.

Date of report: 15/02/2017

Time: 3:37:16PM

Calculator version: v4.0

Major Project details

Proposal ID:	0035/2017/4182MP
Proposal name:	Albion park rail revised footprint
Proposal address:	Princes Highway Albion NSW 2530
Proponent name:	Cardno
Proponent address:	1 1 NSW 2000
Proponent phone:	1
Assessor name:	Brooke Marshall
Assessor address:	1/216 Carp St Bega NSW 2250
Assessor phone:	64928333
Assessor accreditation:	0035

Summary of ecosystem credits required

Plant Community type	Area (ha)	Credits created
Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion	7.20	292.75
Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion	23.12	849.00
River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion	0.15	3.00
Swamp Mahogany swamp sclerophyll forest on coastal lowlands of the Sydney Basin Bioregion and South East Corner Bioregion	2.62	63.00
Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	0.75	22.70
Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion	7.22	361.09
Total	41.06	1,592

Credit profiles

1. Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion, (SR545)

Number of ecosystem credits created	849
IBRA sub-region	Illawarra

Offset options - Plant Community types	Offset options - IBRA sub-regions
Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion, (SR545) Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion, (SR544) Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion, (SR669)	Illawarra and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

2. Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion, (SR669)

Number of ecosystem credits created	361
IBRA sub-region	Illawarra

Offset options - Plant Community types	Offset options - IBRA sub-regions
Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion, (SR669)	Illawarra and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

3. Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion, (SR536)

Number of ecosystem credits created	293
IBRA sub-region	Illawarra

Offset options - Plant Community types	Offset options - IBRA sub-regions
Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion, (SR536)	Illawarra and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

4. River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion, (SR606)

Number of ecosystem credits created	3
IBRA sub-region	Illawarra

Offset options - Plant Community types	Offset options - IBRA sub-regions
River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion, (SR606) River Peppermint - Rough-barked Apple - River Oak herb/grass riparian forest of coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion, (SR608) White Sally Wattle - Leptospermum emarginatum riparian scrub of the Bega and Towamba valleys, southern South East Corner Bioregion, (SR665)	Illawarra and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

5. Swamp Mahogany swamp sclerophyll forest on coastal lowlands of the Sydney Basin Bioregion and South East Corner Bioregion, (SR648)

Number of ecosystem credits created 63
 IBRA sub-region Illawarra

Offset options - Plant Community types	Offset options - IBRA sub-regions
Swamp Mahogany swamp sclerophyll forest on coastal lowlands of the Sydney Basin Bioregion and South East Corner Bioregion, (SR648) Forest Red Gum - Woollybutt - Pithy Sword-sedge swamp woodland in dune swales near Pambula, southern South East Corner Bioregion, (SR546)	Illawarra and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

6. Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion, (SR649)

Number of ecosystem credits created 23
 IBRA sub-region Illawarra

Offset options - Plant Community types	Offset options - IBRA sub-regions
Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion, (SR649) Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion, (SR650)	Illawarra and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

Summary of species credits required

Common name	Scientific name	Extent of impact Ha or individuals	Number of species credits created
Chorizema parviflorum Benth. (a shrub) population, Wollongong and Shellharbour local government areas	Chorizema parviflorum Benth. (a shrub) population, Wollongong and Shellharbour local government areas	115.00	1,725

APPENDIX D SEARS

The project is considered State Significant Infrastructure and requires assessment under Part 5.1 of the EP&A Act. Biodiversity factors were assessed in an EIS, as per the Secretary Environmental Assessment Requirements (SEARs) for environmental impact assessment. The Final SEARs was provided by the Department of Planning and Environment on 18 March 2015.

Secretary's Environmental Assessment Requirements

Section 115Y of the *Environmental Planning and Assessment Act 1979*

Application Number	SSI 6878
Proposal	Albion Park Rail bypass (including relocation of Croom Regional Sporting Complex facilities)
Location	Land in the suburbs of Dapto, Yallah, Albion Park Rail, Albion Park and Croom, within the Wollongong and Shellharbour local government areas.
Proponent	Roads and Maritime Services
Date of Issue	18 March 2015
General Requirements	The Environmental Impact Statement (EIS) must be prepared in accordance with, and meet the minimum requirements of, Part 3 of Schedule 2 of the <i>Environmental Planning and Assessment Regulation 2000</i> (the Regulation), including: - the information required under clause 6 of Schedule 2 of the Regulation. - the content listed in clause 7 of Schedule 2 of the Regulation, including but not limited to: - a statement of the objectives of the proposal, including a description of the strategic need, justification, objectives and outcomes for the proposal, taking into account existing and proposed transport infrastructure and services within the adjoining subregions, and as relevant the outcomes and objectives of relevant strategic planning and transport policies, including, but not limited to, <i>NSW 2021</i>, <i>NSW Government State Infrastructure Strategy</i>, <i>NSW Long Term Transport Master Plan</i> (December 2012), <i>Your Future Illawarra: Draft Regional Growth and Infrastructure Plan</i> (October 2014) and any other relevant plans; - an analysis of feasible alternatives to the carrying out of the proposal and proposal justification, including: - an analysis of alternatives/options considered having regard to the proposal objectives (including an assessment of the environmental costs and benefits of the proposal relative to alternatives and the consequences of not carrying out the proposal), and the provision of a clear discussion of the route development and selection process, the suitability of the chosen alignment taking into account environmental impacts, and consideration of whether or not the proposal is in the public interest, and - justification for the preferred proposal taking into consideration the objects of the <i>Environmental Planning and Assessment Act 1979</i>; - a detailed description of the proposal, including: - the proposed route, - design of the alignment (vertical and horizontal), associated structures, interchanges, and road user, pedestrian and cyclist facilities (including street furniture and lighting), - land use changes, including resumption of residential, commercial, industrial and recreational lands, and impacts to Crown land, - Croom Regional Sporting Complex works and ancillary development; - interactions with key utilities and services;

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	○ location and operational requirements of construction ancillary facilities and access tracks, and ○ relationship and/or interaction with existing public and freight transport services (including air, rail, and bus services); • an analysis of the proposal including an assessment, with a particular focus on the requirements of the listed key issues, in accordance with clause 7(1)(d) of Schedule 2 of the Regulation (where relevant), including an identification of how relevant planning, land use and development matters (including relevant strategic and statutory matters) have been considered in the impact assessment (direct, indirect and cumulative impacts) and/or in developing management/mitigation measures; • detail how the principles of ecologically sustainable development will be incorporated in the design, construction and ongoing operation phases of the proposal; and • provide an assessment of the cumulative impacts of the proposal, taking into consideration other projects on the Princes Highway and M1 Princes Motorway. Notwithstanding the key issues specified below, the EIS must include an environmental risk analysis to identify the potential environmental impacts associated with the proposal. Where relevant, the assessment of the key issues below, and any other significant issues identified in the risk assessment, must include: • adequate baseline data; • consideration of potential cumulative impacts due to other development in the vicinity; and • measures to avoid, minimise and if necessary, offset the predicted impacts, including detailed contingency plans for managing any significant risks to the environment.
Key Issues	Traffic and Transport — including but not limited to: • details of how: ○ the preferred alignment, design and staging, ○ the proposed interchanges and connections to the surrounding road network, and ○ associated road infrastructure facilities; meet the traffic and transport objectives of the proposal, taking into account the following local and regional issues: ○ adjacent sensitive land uses, ○ transport connectivity to and from existing communities and centres (such as East Dapto), ○ future growth areas (including but not limited to Calderwood, Tallawarra, West Dapto and Tullimbar), ○ approved and proposed infrastructure projects (including the proposed Albion Park (Tripoli Way) bypass and Yallah Road realignment), and ○ traffic (vehicular, cyclist and pedestrian) needs; • an assessment and modelling of operational traffic and transport impacts on the local and regional road network, and the M1 Princes Motorway, including an assessment of road user safety and bus impacts; • impacts on cyclist and pedestrian access and safety, and consideration of opportunities to integrate cycleway and pedestrian elements with surrounding networks; • an assessment of aviation issues associated with the Illawarra Regional Airport (during construction and operation, including proposed future operations), including impact on: ○ communications/navigation/surveillance infrastructure, ○ the Obstacle Limitation Surface (OLS),

	○ Precision Approach Path Indicator (PAPI) Obstacle Assessment Surfaces (OAS); ○ the Procedures for Air Navigational Services — Aircraft Operations Surface (PANS-OPS); ○ road structure generated windshear and turbulence, and ○ lighting distractions and glare to pilots; and • construction traffic and transport impacts of the proposal (including ancillary facilities) and associated management measures, in particular: ○ impacts to the road network (including safety and level of service, pedestrian and cyclist access, and disruption to public transport services and access to properties), ○ access and route identification and scheduling of transport movements, ○ the number, frequency and size of construction related vehicles (both passenger, commercial and heavy vehicles), ○ the nature of existing traffic on construction access routes (including consideration of peak traffic times), and ○ the need to close, divert or otherwise reconfigure elements of the road network associated with construction of the proposal, having reference to the cumulative construction impacts of other major projects preparing for or commencing construction. Biodiversity – including, but not limited to: • an assessment of the potential ecological impacts of the proposal, with specific reference to vegetation and habitat clearing, connectivity, edge effects, weed dispersal, riparian and aquatic habitat impacts, soil and water quality impacts and operational impacts. The assessment must: ○ make specific reference to impacts on landscape values, biodiversity values of native vegetation and threatened species or populations, including worst case estimates of vegetation clearing and operational impacts; ○ demonstrate a design philosophy of impact avoidance on ecological values, and in particular, ecological values of high significance, and be consistent with the 'avoid, minimise or offset' principle; ○ be undertaken in accordance with the <i>Framework for Biodiversity Assessment</i> (Office of Environment and Heritage (OEH) 2014) and the <i>NSW Biodiversity Offsets Policy for Major Projects</i> (OEH 2014), and by a person accredited in accordance with section 142B(1)(c) of the <i>Threatened Species Conservation Act 1995</i>. Impacts on species, populations and ecological communities that will require further consideration and provision of information specified in section 9.2 of the <i>Framework for Biodiversity Assessment</i> include those identified by the OEH. Species specific surveys shall be undertaken for those species and in accordance with the survey requirements specified by the OEH (including during further consultation with the OEH); ○ in relation to aquatic biodiversity be consistent with the draft <i>Policy and Guidelines for Fish Habitat Conservation and Management – Update 2013</i> (DPI 2013); ○ consider impacts to the Croom Voluntary Conservation Agreement; and ○ where there are potential impacts to the OEH estate reserved under the <i>National Parks and Wildlife Act 1974</i> or where the proposal is located upstream of OEH estate, an assessment of the matters to be considered outlined in the <i>Guidelines for developments adjoining land and water managed by DECCW</i> (DECCW 2010). Hydrology, Soils and Water - including but not limited to: • impacts on watercourses and surface water flows, quality, quantity, availability and users (commercial and recreational), with particular
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	reference to any likely impacts on surrounding water bodies and their catchments (including Macquarie Rivulet, Duck Creek, Horsley Inlet, Frazers Creek and Lake Illawarra), wetlands and their habitats, including how these are to be monitored; • identification of water supply, use and disposal; • an assessment of construction and operational water quality impacts, taking into account impacts from both accidents and runoff (i.e. acute and chronic impacts), having consideration to impacts to surface water runoff, soil erosion and sediment transport, mass movement, and spoil and waste management. The assessment of water quality impacts is to have reference to relevant public health and environmental water quality criteria, including those specified in the <i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality</i> (ANZECC/ARMCANZ 2000), any applicable regional, local or site-specific guidelines, water quality objectives, and any licensing requirements; • assessment of waterways to be modified as a result of the proposal, including ecological, hydrological and geomorphic impacts (as relevant), including temporary crossings, and measures to rehabilitate the waterways to preconstruction conditions or better, including fish passage requirements consistent with <i>Policy and Guidelines for Fish Friendly Waterway Crossings</i> (DPI 2004); • identification of potential impacts and benefits of the proposal on existing flood regimes, consistent with the <i>Floodplain Development Manual</i> (Department of Natural Resources 2005), with an assessment of the potential changes to flooding behaviour (levels, velocities and direction) and impacts on bed and bank stability, through flood modelling, including: ◦ detailed description, justification and assessment of the flood management objectives, and other design objectives (including bridge, culvert and embankment design), ◦ flood assessment and modelling undertaken in determining the design flood levels and velocities for events, including (as a minimum) the 10%, 2%, 1%, 0.5%, and 0.2% AEP design flood events and the probable maximum flood, or an equivalent extreme event. The assessment is to demonstrate how the assessment, including the use of the modelled events listed above, provides consideration of blockage, climate change and impacts of land use change on flood hydrology, noting below, ◦ modelling of the effect of the proposal (including fill) on current and future flood behaviour for the range of design events identified above, with use of the 0.5% and 0.2% AEP design flood events as proxies for assessing sensitivity to an increase in rainfall intensity due to climate change and, where applicable, identified land use change, ◦ an assessment of afflux and flood duration (inundation period) on land, infrastructure, property and business operations (including agricultural land and stock movement to flood refuges and evacuation routes), hazard, evacuation and emergency service provision within the affected area, and future development potential of upstream and access affected land, and ◦ an assessment of emergency management, evacuation and access, and contingency measures for the development considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event); • groundwater impacts, taking into consideration impacts associated with geotechnical ground treatments, deep cuttings and fill locations, and cumulative impacts on regional hydrology. The assessment shall consider: the extent of drawdown, impacts to groundwater characteristics, quality, quantity, and connectivity, discharge and recharge rates, and implications for water courses, groundwater users, groundwater dependent ecosystems, riparian areas and wetlands;
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	- identifying potential impacts of the development on acid sulfate soils in accordance with the relevant guidelines and a description of the mitigation measures proposed to minimise potential impacts; and - a contaminated lands assessment in accordance with relevant guidelines. Noise and Vibration – including, but not limited to: - an assessment of the noise impacts of the proposal during operation, consistent with the <i>Road Noise Policy</i> (EPA 2011) and <i>NSW Industrial Noise Policy</i> (EPA 2000). The assessment must include specific consideration of impacts to receivers (dwellings, child care centres, educational establishments, hospitals, motels, nursing homes, or places of worship), including specific consideration of sleep disturbance and, as relevant, the characteristics of noise (eg. low frequency noise), and identify reasonable and feasible mitigation measures; - an assessment of construction noise and vibration impacts, consistent with the <i>Interim Construction Noise Guideline</i> (DECCW 2009) and <i>Assessing Vibration: a technical guideline</i> (DEC 2006). The assessment must have regard to the nature of construction activities (including transport, tonal or impulsive noise-generating works and the removal of operational noise barriers, as relevant), the intensity and duration of noise and vibration impacts, the nature, sensitivity and impact to potentially affected receivers, the need to balance timely conclusion of noise and vibration-generating works with periods of receiver respite, and other factors that may influence the timing and duration of construction activities (such as traffic management), and mitigation and management measures; - if blasting is required, addressing the relevant requirements of <i>Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration</i> (ANZEC 1990); and - if relevant, an indication of potential for works outside standard working hours, including predicted levels and exceedences, justification for the activity and discussion of available mitigation and management measures.
Other Issues	Social and Economic — including, but not limited to: - impacts on directly affected properties and land uses, including impacts related to access and severance, land use, property acquisition and amenity related changes; - social and economic impacts to the community and businesses in the vicinity of the proposal (including agricultural businesses), associated with traffic, access, property, public domain and amenity related changes; - social impact assessment for the Croom Regional Sporting Complex, including details of existing uses, nature and duration of impacts to those uses, consideration of relocation options, staging and offsets for affected clubs, and consideration of alternative sites; and - a draft Community Involvement Framework identifying relevant stakeholders, procedures for distributing information and receiving/responding to feedback and procedures for resolving community complaints. Key issues that should be addressed in the draft framework should include: - traffic management (including property access, pedestrian access), - social impacts, - landscaping/urban design matters, - construction activities, including out of hours work, and - noise and vibration mitigation and management. Urban Design and Visual Amenity – including, but not limited to: - consideration of the urban design and visual amenity implications of the proposal, including supporting infrastructure, during construction and

	operation. The assessment must identify: - o urban design and landscaping objectives to enhance the design of the alignment and associated structures (including batters, cuttings, bridge and viaduct structures), interchanges, road infrastructure facilities, and Croom Regional Sporting Complex works, - o consider uses for resulting surplus or residual land, and - o demonstrate how the proposed hard and soft urban design elements of the proposal would be consistent with the existing and desired future character of the area; • identification and evaluation of the visual impacts and urban design aspects of the proposal (and its components) on surrounding areas; • a consideration of impacts on views and vistas, streetscapes, key sites and buildings; • measures to manage lighting impacts both during construction and operation; and • artists' impressions and perspective drawings of the proposal from a variety of locations along and adjacent to the route. Heritage – including but not limited to: • impacts to <i>State and local historic heritage</i> (including conservation areas, built heritage, landscapes and archaeology) should be assessed. Where impacts to State or locally significant historic heritage are identified, the assessment shall: - o outline the proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the mitigation measures) generally consistent with the guidelines in the <i>NSW Heritage Manual</i> (Heritage Office and DUAP 1996), - o be undertaken by a suitably qualified heritage consultant(s) with relevant heritage expertise (note: where archaeological excavations are proposed the relevant consultant must meet the NSW Heritage Council's Excavation Director criteria), - o include a statement of heritage impact for all heritage items/conservation areas to be impacted (including significance assessment). This should include detailed mapping of all heritage items and how they are affected by the proposal, - o include details of any proposed mitigation measures (architectural and landscape), - o consider impacts from, including but not limited to, vibration, demolition, archaeological disturbance, altered historical arrangements and access, landscape and vistas, and architectural noise treatment (as relevant), - o where physical archaeological test excavations are proposed, develop an appropriate archaeological assessment methodology, including research design, in consultation with the Department and the Heritage Council of New South Wales, to guide the test excavations, and include the results of these excavations, and - o provision of future mitigation strategies for all identified archaeological impacts that would arise from the proposal; and • impacts to <i>Aboriginal heritage</i> (including cultural and archaeological significance), in particular impacts to Aboriginal objects and potential archaeological deposits (PAD), should be assessed. Where impacts are identified, the assessment shall: - o outline the proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the measures) generally consistent with the <i>Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation</i> (DEC 2005) and other relevant guidelines and requirements,
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	- o be undertaken by a suitably qualified heritage consultant(s), - o demonstrate effective consultation with Aboriginal communities in determining and assessing impacts and developing and selecting options and mitigation measures (including the final proposed measures), - o assess and document the archaeological and cultural significance of cultural heritage values of affected sites, and - o undertake appropriate archaeological investigations generally in accordance with the <i>Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW</i> (DECCW 2010), to establish the full spatial extent and significance of any archaeological evidence across each site/area of PAD, and include the results of these excavations. If an alternative excavation method is proposed, it shall be developed in consultation with Office of Environment and Heritage. Environmental Risk Analysis — notwithstanding the above key assessment requirement, the EIS must include an environmental risk analysis to identify potential environmental impacts associated with the proposal (construction and operation), proposed mitigation measures and potentially significant residual environmental impacts after the application of proposed mitigation measures. Where additional key environmental impacts are identified through this environmental risk analysis, an appropriately detailed impact assessment of this additional key environmental impact must be included in the EIS.
Consultation	During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners. In particular you must consult with: • local, State and Commonwealth government authorities, including the: - o Environment Protection Authority, - o Office of Environment and Heritage (including Heritage Division), - o Department of Primary Industries, - o NSW Office of Water, - o NSW Trains, - o TransGrid, - o Civil Aviation Safety Authority, - o Airservices Australia, - o Illawarra Regional Airport, - o Shellharbour City Council, - o Wollongong City Council, and - o emergency services; • specialist interest groups, including local sporting groups, Illawarra Local Aboriginal Land Council, Aboriginal stakeholders, and pedestrian and bicycle user groups; • utilities and service providers; and • the public, including community groups, businesses, and adjoining and affected landowners. The EIS must describe the consultation process and the issues raised, and identify where the design of the proposal has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.
Further consultation after 2 years	If you do not lodge an EIS for the proposal within 2 years of the issue date of these SEARs, you must consult further with the Secretary in relation to the preparation of the EIS.

APPENDIX E THREATENED SPECIES EVALUATIONS

The following evaluation has been carried out for each listed entity of relevance to the project. The evaluation of presence of habitat and likelihood of occurrence of threatened flora and fauna recorded within the Illawarra CMA. Records are from a search of the OEH Wildlife Atlas (Bionet) and the EPBC Act Environmental Reporting Tool for the Department of the Environment and Energy (DoEE), undertaken to determine if further more detailed assessment is required for any entity. Ecology information has been obtained from the Threatened Species Profiles on the NSW OEH website (www.threatenedspecies.environment.nsw.gov.au). Species identified with potential for impact are considered in greater depth in the assessment.

Codes:

Presence of Habitat

- Present:** Potential or known suitable abiotic factors such as soil type, geology, moisture content, topography, aspect and/or altitude are present within the proposal site. Associated species/vegetation type is present within the proposal site.
- Marginal:** Some suitable habitat is present within the proposal site.
- Absent:** No suitable resources/landscape/vegetation type is present within the proposal site

Likelihood of Occurrence

- None:** Species / EEC does not occur at the site.
- Unlikely:** Species is not likely to occur.
- Possible:** Species could occur and proposal site may provide suitable conditions.
- Present:** Species was recorded during the field investigations.

Potential Impact

- No:** The proposal would not impact this species or its habitats. The proposal would not result in an impact to this species. No Assessment of Significance (AoS) is necessary for this species.
- Yes:** The proposal could impact this species or its habitats. An AoS has been applied to these entities.

- TSC-V** Listed as Vulnerable under the *Threatened Species Conservation Act*
- TSC-E** Listed as Endangered under the *Threatened Species Conservation Act*
- TSC-EEC** Listed as an Endangered Ecological Community under the *Threatened Species Conservation Act*
- TSC-EP** Listed as an Endangered Population under the *Threatened Species Conservation Act*
- EPBC-V** Listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act*
- EPBC-E** Listed as Endangered under the *Environment Protection and Biodiversity Conservation Act*
- EPBC-EEC** Listed as an Endangered Ecological Community under the *Environment Protection and Biodiversity Conservation Act*
- EPBC-CEEC** Listed as a Critically Endangered Ecological Community under the *Environment Protection and Biodiversity Conservation Act*

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
Frogs							
<i>Heleioporus australiacus</i> Giant Burrowing Frog	V	V	The Giant Burrowing Frog occurs from the NSW Central Coast to eastern Victoria, but is most common on the Sydney sandstone. It has been found from the coast to the Great Dividing Range. Found in heath, woodland and open forest with sandy soils. Generally, lives in the heath or forest and will travel several hundred metres to creeks to breed. Burrows into deep litter or loose soil, emerging to feed or breed after rain. Diet includes ground-dwelling invertebrates such as ants, beetles and spiders. Breeds from August to March and the eggs are laid in a white foam-mass under vegetation in creeks or in yabby holes.	0	Absent – habitat features absent – no ridge top, and spp. unlikely to occur on grassy groundlayer	Unlikely	No
<i>Litoria aurea</i> Green and Golden Bell Frog	E	V	Its former distribution was predominantly coastal but extended inland to the central and southern tablelands, including Bathurst in the west. It was known from the northern coastal part of NSW from around Brunswick Heads south along the entire NSW coast extending into the north-eastern portion of Victoria. There are presently 43 identified remaining key populations, most of which have a small fragmented distribution of mainly near coastal locations. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast. There is only one known population on the NSW Southern Tablelands. Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (<i>Typha</i> spp.) or spikerushes (<i>Eleocharis</i> spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (<i>Gambusia holbrooki</i>), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet. Tadpoles feed on algae and other plant-	18	Marginal – Typha and other suitable habitat features present in some areas	Possible – No records in the proposal site previously or after extensive surveys however still possible due to	Yes

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			matter; adults eat mainly insects, but also other frogs. Preyed upon by various wading birds and snakes.				suitable habitat.
<i>Litoria littlejohni</i> Littlejohn's Tree Frog	V	V	Occurs in scattered locations between the Watagan Mountains in eastern New South Wales and Buchan in north-east Victoria. It occurs within the Hunter-Central Rivers, Southern Rivers (NSW) and East Gippsland (Victoria) Natural Resource Management Regions. Inhabits forest, coastal woodland and heath from 100 to 950 m above sea level, but is not associated with any specific vegetation types. This species breeds in the upper reaches of permanent streams and in perched swamps. Non-breeding habitat is heath based forests and woodlands where it shelters under leaf litter and low vegetation, and hunts for invertebrate prey either in shrubs or on the ground. Breeding is triggered by heavy rain and can potentially occur all year, but is usually from late summer to early spring. Eggs and tadpoles are mostly found in still or slow flowing pools that receive extended exposure to sunlight, but will also use temporary isolated pools.	0	Absent – habitat features (permanent rocky streams and perched swamps) lacking at site	Unlikely – no records	No
<i>Mixophyes balbus</i> Stuttering Frog	E	V	Stuttering Barred Frogs occur along the east coast of Australia from southern Queensland to the north-eastern Victoria. The species has suffered a marked decline in distribution and abundance, particularly in south-east NSW. It is the only <i>Mixophyes</i> species that occurs in south-east NSW and in recent surveys it has only been recorded at three locations south of Sydney. 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. Feed on insects and smaller frogs. Breed in streams during summer after heavy rain. Eggs are laid on rock shelves or shallow riffles in small, flowing streams. As the tadpoles grow they move to	0	Absent - habitat features (wet tall forest and leaf litter) lacking at site.	Unlikely – no records	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			deep permanent pools and take approximately 12 months to metamorphose.				
<i>Mixophyes iteratus</i> Giant Barred Frog	E	E	Distributed along coast and ranges from south-eastern Queensland to the Hawkesbury River in NSW. North-eastern NSW, particularly the Coffs Harbour-Dorrigo area, is now a stronghold. Giant Barred Frogs forage and live amongst deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest, at elevations below 1000 m. They breed around shallow, flowing rocky streams from late spring to summer. Females lay eggs onto moist creek banks or rocks above water level, from where tadpoles drop into the water when hatched. Tadpoles grow to a length of 80 mm and take up to 14 months before changing into frogs. When not breeding the frogs disperse hundreds of metres away from streams. They feed primarily on large insects and spiders.	0	Absent	Unlikely – does not occur in IBRA subregion of site	No
<i>Pseudophryne australis</i> Red-crowned Toadlet	V		The Red-crowned Toadlet has a restricted distribution. It is confined to the Sydney Basin, from Pokolbin in the north, the Nowra area to the south, and west to Mt Victoria in the Blue Mountains. Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters. Eggs are laid in moist leaf litter, from where they are washed by heavy rain; a large proportion of the development of the tadpoles takes place in the egg. Disperses outside the breeding period, when they are found under rocks and logs on sandstone ridges and forage amongst leaf-litter.	1	Absent – habitat features lacking from site (sandstone ridges, leaf litter)	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
Birds							
<i>Anthochaera phrygia</i> Regent Honeyeater	CE	E, Migratory	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years non-breeding flocks converge on flowering coastal woodlands and forests. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River She-oak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast. The Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises <i>E. microcarpa</i> , <i>E. punctata</i> , <i>E. polyanthemos</i> , <i>E. mollucana</i> , <i>Corymbia robusta</i> , <i>E. crebra</i> , <i>E. caleyi</i> , <i>Corymbia maculata</i> , <i>E. mckieana</i> , <i>E. macrorhyncha</i> , <i>E. laevopinea</i> , and <i>Angophora floribunda</i> . Nectar and fruit from the mistletoes <i>A. miquelii</i> , <i>A. pendula</i> and <i>A. cambagei</i> are also eaten during the breeding season. When nectar is scarce lerp and honeydew comprise a large proportion of the diet. A shrubby understorey is an important source of insects and nesting	0	Absent	Unlikely Condition of vegetation at site does not meet species requirements	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			material. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and Sheoaks. Also nest in mistletoe haustoria.				
<i>Artamus cyanopterus cyanopterus</i> Dusky Woodswallow	V		The Dusky Woodswallow is widespread in eastern, southern and southwestern Australia. In New South Wales it is widespread from coast to inland, including the western slopes of the Great Dividing Range and farther west. 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. At sites where Dusky Woodswallows are recorded the understorey is typically open with sparse eucalypt saplings, acacias and other shrubs, including heath. The ground cover may consist of grasses, sedges or open ground, often with coarse woody debris. Birds are also often observed in farm land, usually at the edges of forest or woodland or in roadside remnants or wind breaks with dead timber. The majority of breeding records for this species, as well as presence records within the breeding period, occur on the western slopes of the Great Dividing Range, a region dominated by woodland and open dry forest. Nesting in the Dusky Woodswallow occurs from late September to late February, with eggs present between September and January. Depending on location and local climatic conditions (temperature and rainfall) the Dusky Woodswallow can be resident year round or migratory. In New South Wales birds migrate after breeding to the north of the state and to southeast Queensland, while Tasmanian birds migrate after breeding to southeast New South Wales. Dusky Woodswallows prefer larger remnants over smaller remnants.	3	Present	Possible - may occur on occasion	No – patchy habitat and site not a core breeding area for this species

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Botaurus poiciloptilus</i> Australasian Bittern	E	E	In NSW, this species occurs along the coast and is frequently recorded in the Murray-Darling Basin, notably in floodplain wetlands of the Murrumbidgee, Lachlan, Macquarie and Gwydir Rivers. Occurs in permanent freshwater wetlands with tall, dense vegetation. Favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and/or reeds (e.g. <i>Phragmites</i> , <i>Cyperus</i> , <i>Eleocharis</i> , <i>Juncus</i> , <i>Typha</i> , <i>Baumea</i> , , <i>Bolboschoenus</i>) or cutting grass (<i>Gahnia</i>) growing over muddy or peaty substrate. Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains. Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds. In Australia, the Bittern occurs with the Australian Painted Snipe <i>Rostratula benghalensis australis</i> .	5	Present	Possible – no records of species within 10 km of site and not observed despite extensive targeted surveys, however suitable habitat is present	Yes
<i>Burhinus grallarius</i> Bush Stone-curlew	E		The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy groundlayer 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. Two eggs are laid in spring and early summer.	0	Marginal – spp has broad habitat preferences	Unlikely – no records is a good indication that spp is absent from site	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Calidris alba</i> Sanderling	V		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. Generally, occurs in small flocks, however may associate freely with other waders. Individuals run behind receding waves, darting after insects, larvae and other small invertebrates in the sand, then dart back up the beach as each wave breaks. Also feeds on plants, seeds, worms, crustaceans, spiders, jellyfish and fish, foraging around rotting heaps of kelp, at the edges of shallow pools on sandspits and on nearby mudflats. Roosts on bare sand, behind clumps of beach-cast kelp or in coastal dunes. Breeding occurs in the Northern Hemisphere.	15	Absent - Not associated with PCTs on site	Unlikely – not observed, and very few wading birds present in study area during targeted surveys at an appropriate time of year.	No
<i>Calidris ferruginea</i> Curlew Sandpiper	E	Marine, Migratory	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 occur in both fresh and brackish waters. Curlew Sandpipers 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. This species does not breed in Australia.	10	Absent –Not associated with PCTs within IBRA subregion onsite	Unlikely – not observed, and very few wading birds present in study area during	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			This species forages mainly on invertebrates, including worms, molluscs, crustaceans, and insects, as well as seeds.			targeted surveys at an appropriate time of year.	
<i>Calidris tenuirostris</i> Great Knot	V	Marine, Migratory	Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, 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. Most birds return north in March and April, however some individuals may stay over winter in Australia. Forages for food by methodically thrusting its bill deep into the mud to search for invertebrates, such as bivalve molluscs, gastropods, polychaete worms and crustaceans.	10	Absent – Not associated with PCTs on site	Unlikely – not observed, and very few wading birds present in study area during targeted surveys at an appropriate time of year.	No
<i>Callocephalon fimbriatum</i>	V		The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern New South Wales. In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter	3	Marginal – occurs in grassy	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
Gang-gang Cockatoo			region, and inland to the Central Tablelands and south-west slopes. It occurs regularly in the Australian Capital Territory. It is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee. In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. May also occur in sub-alpine Snow Gum <i>Eucalyptus pauciflora</i> woodland and occasionally in temperate rainforests. Favours old growth attributes for nesting and roosting. Feed mainly on seeds of native and introduced trees and shrubs, with a preference for eucalypts, wattles and introduced hawthorns. They will also eat berries, fruits, nuts and insects and their larvae. They are mainly arboreal (found in trees), coming to the ground only to drink and to forage among fallen fruits or pine cones.		woodland but absence of hollows for breeding and roosting		Condition of vegetation does not meet spp requirements (not old growth)
<i>Calyptrorhynchus lathamii</i> 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. Dependent on large hollow-bearing eucalypts for nest sites. One or two eggs are laid between March and August. Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak (<i>Allocasuarina littoralis</i>), Forest She-oak (<i>A. torulosa</i>) or Drooping She-oak (<i>A. verticillata</i>) occur. In the Riverina area, inhabits open woodlands dominated by Belah (<i>Casuarina cristata</i>). Feeds almost exclusively on the seeds of several species of she-oak (<i>Casuarina</i> and <i>Allocasuarina</i> species), shredding the cones with the massive bill.	2	Marginal - occurs in grassy woodland but absence of hollows for breeding	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Charadrius leschenaultii</i> Greater Sand-plover	V	Marine, Migratory	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. Diet includes insects, crustaceans, polychaete worms and molluscs. Prey is detected visually by running a short distance, stopping to look, then running to collect the prey.	7	Absent – Not associated with PCTs on site. Breeds in northern hemisphere.	Unlikely – not observed, and strictly coastal in habitat preferences.	No
<i>Charadrius mongolus</i> Lesser Sand-plover	V	Marine, Migratory	In non-breeding grounds in Australia, this species usually occurs in coastal littoral and estuarine environments. It inhabits large intertidal sandflats or mudflats in sheltered bays, harbours and estuaries, and occasionally sandy ocean beaches, coral reefs, wave-cut rock platforms and rocky outcrops. It also sometime occurs in short saltmarsh or among mangroves. The species also inhabits saltworks and near-coastal saltpans, brackish swamps and sandy or silt islands in river beds. The species feeds mostly on extensive, freshly-exposed areas of intertidal sandflats and mudflats in estuaries or beaches, or in shallow ponds in saltworks. They roost near foraging areas, on beaches, banks, spits and banks of sand or shells, and occasionally on rocky spits, islets or reefs. They rarely roost in mangroves. The species does not breed in Australia.	2	Absent – Not associated with PCTs on site. Breeds in northern hemisphere.	Unlikely – not observed, and very few wading birds present in study area during targeted surveys at an appropriate time of year.	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Circus assimilis</i> Spotted Harrier	V		The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months. Preys on terrestrial mammals (e.g. bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion.	6	Marginal – occasional foraging habitat only	Possible – may occur on occasion, although no nest sites recorded during surveys	No
<i>Daphoenositta chrysoptera</i> Varied Sittella	V		The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands, with a nearly continuous distribution in NSW from the coast to the far west. It inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and <i>Acacia</i> woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy. It builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.	1	Present	Present	Yes
<i>Dasyornis brachypterus</i> Eastern Bristlebird	E	E	The distribution of the Eastern Bristlebird has contracted to three disjunct areas of south-eastern Australia: southern Queensland/northern NSW, the Illawarra Region and in the vicinity of the NSW/Victorian border. The estimated population size is less than 2000 individuals occupying a total area of about 120 sq. km. There are now only four populations in the southern Queensland/northern NSW area with a total of 35 birds, compared to 15	0	Absent - Not associated with PCTs on site	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			years ago when 14 populations and 154 birds were recorded. This population once extended as far south as at least Dorrigo and has recently been identified as a separate ultrataxon (<i>monoides</i>) but further research is being undertaken to determine the validity of this. The remaining populations are the nominate ultrataxon (<i>brachypterus</i>) and once extended at least to what is now the Sydney urban area. The Illawarra population comprises an estimated 1600 birds, mainly from Barren Grounds Nature Reserve, Budderoo National Park and the Jervis Bay area. Habitat is characterised by dense, low vegetation including heath and open woodland with a heathy understorey; in northern NSW occurs in open forest with tussocky grass understorey; all of these vegetation types are fire prone. Age of habitat since fires (fire-age) is of paramount importance to this species; Illawarra and southern populations reach maximum densities in habitat that has not been burnt for at least 15 years; however, in the northern NSW population a lack of fire in grassy forest may be detrimental as grassy tussock nesting habitat becomes unsuitable after long periods without fire; northern NSW birds are usually found in habitats burnt five to 10 years previously. Shy and cryptic and rarely flies, although can be seen scampering over the ground; when approached, may move to a lookout perch 1 m or more above the ground, then retreat into dense vegetation. Feeds on a variety of insects, particularly ants. Nests are elliptical domes constructed on or near the ground amongst dense vegetation. Two eggs are laid during August to February.				
<i>Ephippiorhynchus asiaticus</i> Black-necked Stork	E		The species is widespread across coastal northern and eastern Australia, becoming increasingly uncommon further south into NSW, and rarely south of Sydney. Some birds may move long distances and can be recorded well outside their normal range. Inhabits permanent freshwater wetlands including margins of billabongs, swamps, shallow floodwaters, and adjacent	2	Marginal	Unlikely – No rarely found south of	

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			grasslands and savannah woodlands; can also be found occasionally on inter-tidal shorelines, mangrove margins and estuaries. Feeds in shallow, still water on a variety of prey including fish, frogs, eels, turtles, crabs and snakes. Breeds in late summer in the north, and early summer further south. A large nest, up to 2 m in diameter, is made in a live or dead tree, in or near a freshwater swamp. Two to four eggs are laid; incubation is by both parents.			Sydney. Surveys did not detect this species	
<i>Epthianura albifrons</i> White-fronted Chat	V		The White-fronted Chat is found in damp open habitats, particularly wetlands containing saltmarsh areas that are bordered by open grasslands or lightly timbered lands. Along the coastline, White-fronted Chats are found in estuarine and marshy grounds with vegetation less than 1 m tall. The species is also observed in open grasslands and sometimes in low shrubs bordering wetland areas. Inland, the White-fronted Chat is often observed in open grassy plains, saltlakes and salt pans that are along the margins of rivers and waterways. The species is sensitive to human disturbance and is not found in built areas.	6	Marginal – no saltmarsh within impact area.	Unlikely – not observed despite extensive surveys	No
<i>Erythrotriorchis radiates</i> Red Goshawk		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, <i>Melaleuca</i> swamp	0	Absent	Unlikely - Distribution is outside development IBRA subregion	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			forest and riparian <i>Eucalyptus</i> forest of coastal rivers. Adults appear to occupy territories throughout the year and breeding territories are traditionally used from year to year. Adults have large home-ranges, estimated in the Northern Territory to be as great as about 120 km ² for females and 200 km ² for males. Red Goshawks mainly eat medium to large birds, including species as large as Australian Brush-turkeys <i>Alectura lathami</i> , but they also take mammals, reptiles and insects. Red Goshawks usually hunt from concealed or, less often, exposed perches, but also fly close above or through forest or woodland searching for prey. They often hunt from perches early in the morning and late in the day and tend to hunt more on the wing at other times of the day. Breeding is likely to be in spring and summer in southern Queensland and NSW (if they breed in the state at all). The birds lay clutches of 1-2 eggs, in a stick nest in a tall tree (>20 m tall) within 1 km of a watercourse or wetland. In winter in eastern Australia, the birds appear to move from nesting sites in the ranges to coastal plains, where they are associated with permanent wetlands.				
<i>Esacus magnirostris</i> Beach Stone-curlew	CE		The Beach Stone-curlew has been recorded around the north coast of Australia, mainly between mid-north Western Australia and north-east NSW. The species has largely disappeared from the south-east of its former range and is now rarely recorded on ocean beaches in NSW. Occurs on open, undisturbed beaches, islands, reefs, and estuarine intertidal sandflats and mudflats; beaches with estuaries or mangroves nearby are preferred; may also frequent river mouths, offshore sandbars and rock platforms. Individuals forage with slow deliberate heron-like actions. The diet consists of crabs and other marine invertebrates. Less strictly nocturnal than the Bush Stone-curlew. Breeding occurs from September to November, with nests being located on sandbanks, spits or islands in estuaries, among mangroves, or in sand surrounded by short grasses and scattered	0	Marginal – Not associated with PCTs on site and no records within 10 km.	Unlikely – not observed, and very few wading birds present in study area, and likely to only be a	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			casuarinas. One egg is laid, and both parents care for the young until independence is reached at seven to twelve months.			vagrant to the area.	
<i>Glossopsitta pusilla</i> Little Lorikeet	V		The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability. Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophoras, Melaleucas and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards. Roosts in treetops, often distant from feeding areas. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like Allocasuarina. Nesting season extends from May to September.	0	Marginal – foraging habitat only	Unlikely – no records within 10 km, and species not observed in previous studies or during surveys.	No – no individuals likely to rely on the impact area for any stage of their lifecycle.
<i>Haematopus fuliginosus</i> Sooty Oystercatcher	V		Sooty Oystercatchers are found around the entire Australian coast, including offshore islands, being most common in Bass Strait. Small numbers of the species are evenly distributed along the NSW coast. The availability of suitable nesting sites may limit populations. 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. Breeds in spring and summer, almost exclusively on offshore	3	Absent – not associated with PCTs on site	Unlikely – not observed during targeted surveys for	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			islands, and occasionally on isolated promontories. The nest is a shallow scrape on the ground, or small mounds of pebbles, shells or seaweed when nesting among rocks.			wading birds, and generally prefers coastal habitat.	
<i>Haematopus longirostris</i> Pied Oystercatcher	E		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. Two to three eggs are laid between August and January. The female is the primary incubator and the young leave the nest within several days.	15	Absent – not associated with PCTs on site	Unlikely – not observed during targeted surveys for wading birds, and generally prefers coastal habitat.	No
<i>Hieraaetus morphnoides</i> Little Eagle	V		The Little Eagle is a medium-sized bird of prey that is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large	4	Marginal – foraging habitat only	Possible – may occur on occasion. Recorded in	No – no large stick nests observed during

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.			the locality by Daly (2010).	surveys. Likely to be a rare vagrant or uncommon resident in area.
<i>Irediparra gallinacean</i> Comb-crested Jacana	V		Occurs on freshwater wetlands in northern and eastern Australia, mainly in coastal and subcoastal regions, from the north-eastern Kimberley Division of Western Australia to Cape York Peninsula then south along the east coast to the Hunter region of NSW, with stragglers recorded in south-eastern NSW (possibly in response to unfavourable conditions further north). Inhabit permanent freshwater wetlands, either still or slow-flowing, with a good surface cover of floating vegetation, especially water-lilies, or fringing and aquatic vegetation. Forage on floating vegetation. They feed primarily on insects and other invertebrates, as well as some seeds and other vegetation. Breed mainly in spring and summer in NSW, with clutches recorded from September to April. The nest is a platform or shallow cup of vegetable material, though eggs sometimes laid directly onto a large leaf with no nest built. The male builds the nest, incubates the eggs and broods the young. Eggs that roll into the water from a nest are usually retrieved. Comb-crested Jacanas are dispersive, moving about in response to the condition of wetlands, and occasionally turn up well beyond normal range.	1	Marginal – although development is not in core area of spp distribution	Unlikely – not recorded despite extensive surveys in study area	No
<i>Ixobrychus flavicollis</i> Black Bittern	V		Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland,	9	Present	Possible	Yes

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			rainforest and mangroves. Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night. During the day, roosts in trees or on the ground amongst dense reeds. When disturbed, freezes in a characteristic bittern posture (stretched tall, bill pointing up, so that shape and streaked pattern blend with upright stems of reeds), or will fly up to a branch or flush for cover where it will freeze again. Generally solitary, but occurs in pairs during the breeding season, from December to March. Like other bitterns, but unlike most herons, nesting is solitary. Nests, built in spring are located on a branch overhanging water and consist of a bed of sticks and reeds on a base of larger sticks.				
<i>Lathamus discolor</i> Swift Parrot	E	E	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> . Commonly used lerp infested trees include Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> and Blackbutt <i>E. pilularis</i> . Return to home foraging sites on a cyclic basis depending on food availability.	11	Marginal – absence of favoured feed trees at site	Possible – vagrants may occur on occasion	No development contains non-breeding marginal habitat
<i>Lophoictinia isura</i> Square-tailed Kite	V		The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-	2	Marginal – foraging habitat only.	Possible – recorded in the locality	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			east, including the NSW south coast, arriving in September and leaving by March. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage. Appears to occupy large hunting ranges of more than 100 km ² . Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.		Broad habitat preference.	by ELA (2012).	
<i>Neophema chrysogaster</i> Orange-bellied Parrot	CE	CE	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. It is expected that NSW habitats may be being more frequently utilised than observations suggest. Typical winter habitat is saltmarsh and strandline/foredune vegetation communities either on coastlines or coastal lagoons. Spits and islands are favoured but they will turn up anywhere within these coastal regions. The species can be found foraging in weedy areas associated with these coastal habitats or even in totally modified landscapes such as pastures, seed crops and golf courses. On the mainland, the Orange-bellied Parrot spends winter mostly within 3 km 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 saltworks and golf courses. Birds forage in low samphire herbland or taller coastal shrubland. Diet mainly comprises seeds and fruits of sedges and salt-tolerant coastal and saltmarsh plants. Occasionally, flowers and stems are	0	Marginal – non-breeding habitat only	Possible – may occur on occasion but no records in study area	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			eaten. Orange-bellied Parrots are known to forage among flocks of Blue-winged Parrots. Recent records from unexpected places, including Shellharbour and Maroubra suggest that the species may be expanding their selection of habitats and foraging plant species. Birds seen in NSW in 2003 were foraging on weed species several hundred metres from the coast.				
<i>Neophema pulchella</i> Turquoise Parrot	V		The Turquoise Parrot's 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. Usually seen in pairs or small, possibly family, groups and have also been reported in flocks of up to thirty individuals. Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants, or browsing on vegetable matter. Forages quietly and may be quite tolerant of disturbance. However, if flushed it will fly to a nearby tree and then return to the ground to browse as soon as the danger has passed. Nests in tree hollows, logs or posts, from August to December. It lays four or five white, rounded eggs on a nest of decayed wood dust.	2	Absent – not associated with PCTs on site	Unlikely	No
<i>Ninox connivens</i> Barking Owl	V		Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting. During the day they roost along creek lines, usually in tall understorey trees with dense foliage such as <i>Acacia</i> and <i>Casuarina</i> species, or the dense clumps of canopy leaves in large <i>Eucalypts</i> . Feeds on a variety of prey, with invertebrates predominant for most of the year, and birds and mammals such as smaller gliders, possums, rodents and rabbits becoming important during breeding. Live alone or in pairs. Territories range from 30 to 200 hectares and birds are present all year. Three eggs are laid in nests in hollows of large, old eucalypts including River Red Gum (<i>Eucalyptus camaldulensis</i>), White Box (<i>Eucalyptus albens</i>), (Red Box)	1	Marginal – lack of habitat features at development (hollows)	Possible – may occur on occasion.	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			<i>Eucalyptus polyanthemos</i> and Blakely's Red Gum (<i>Eucalyptus blakelyi</i>). Breeding occurs during late winter and early spring.				
<i>Ninox strenua</i> Powerful Owl	V		Endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW the Powerful Owl lives in forests and woodlands occurring in the coastal, escarpment, tablelands and western slopes environments. Specific habitat requirements include eucalypt forests and woodlands on productive sites on gentle terrain; a mosaic of moist and dry types, with mesic gullies and permanent streams; presence of leafy sub-canopy trees or tall shrubs for roosting; presence of large old trees to provide nest hollows. Optimal habitat includes a tall shrub layer and abundant hollows supporting high densities of arboreal marsupials. Roosts in 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, but also adjacent to cliff faces and below dry waterfalls. Species commonly used for roosting include the She-oaks <i>Allocasuarina</i> spp., rainforest species such as Coachwood <i>Ceratopetalum apetalum</i> , Lilly Pilly <i>Acmena smithii</i> and Sassafras <i>Doryphora sassafras</i> , Black Wattle <i>Acacia melanoxylon</i> , Turpentine <i>Syncarpia glomulifera</i> and eucalypts. Roosting sites are commonly among small groves of up to 2 ha of similar-sized trees with dense foliage in the height range 3-15 m.	4	Absent – lack of habitat features on site (no hollows for roosting and lack of arboreal mammals)	Unlikely	No
<i>Oxyura australis</i> Blue-billed Duck	V		The Blue-billed Duck is endemic to south-eastern and south-western Australia. It is widespread in NSW, but most common in the southern Murray-Darling Basin area. Birds disperse during the breeding season to deep swamps up to 300 km away. It is generally only during summer or in drier years that they are seen in coastal areas. The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover. It will fly if disturbed, but prefers to dive if	39	Present	Possible	No – No breeding habitat and unlikely to occur in disturbed

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			approached. Blue-billed Ducks will feed by day far from the shore, particularly if dense cover is available in the central parts of the wetland. They feed on the bottom of swamps eating seeds, buds, stems, leaves, fruit and small aquatic insects such as the larvae of midges, caddisflies and dragonflies. Blue-billed Ducks are partly migratory, with short-distance movements between breeding swamps and overwintering lakes with some long-distance dispersal to breed during spring and early summer. Blue-billed Ducks usually nest solitarily in Cumbungi over deep water between September and February. They will also nest in trampled vegetation in Lignum, sedges or Spike-rushes, where a bowl-shaped nest is constructed. Young birds disperse in April-May from their breeding swamps in inland NSW to non-breeding areas on the Murray River system and coastal lakes.				wetlands. Not recorded during targeted surveys.
<i>Pachycephala olivacea</i> Olive Whistler	V		Inhabits the wet forests on the ranges of the east coast. It has a disjunct distribution in NSW chiefly occupying the beech forests around Barrington Tops and the MacPherson Ranges in the north and wet forests from Illawarra south to Victoria. In the south it is found inland to the Snowy Mountains and the Brindabella Range. Mostly inhabit wet forests above about 500m. During the winter months they may move to lower altitudes. Forage in trees and shrubs and on the ground, feeding on berries and insects. Make nests of twigs and grass in low forks of shrubs. Lay two or three eggs between September and January.	0	Absent - Not associated with PCTs on site	Unlikely	No
<i>Pandion cristatus</i> Eastern Osprey	V		The breeding range of the Eastern Osprey extends around the northern coast of Australia (including many offshore islands) from Albany in Western Australia to Lake Macquarie in NSW. In NSW, the breeding population occurs from the Queensland border (contiguous with the Queensland population) south to Gosford and recently (2005-2007) to Sydney, with a more recent (2008) breeding attempt recorded further south at Ulladulla, where a bird has been observed nest-building (Clancy 2008, 2009). Vagrants	28	Absent – site does not contain foraging habitat and no	Unlikely – not recorded during field surveys	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			occur south to and beyond the Victorian border. Forages over clear estuarine and inshore marine waters and coastal rivers, and nests in tall (usually dead or dead-topped) trees in coastal habitats from open woodland to open forest, within 1-2 km of water. Build a large stick bowl usually in the top of a dead or partly dead tree, from isolated trees in open country to open forest, with prominent emergent perches nearby (e.g. dead trees). The species is increasingly seen making use of artificial structures for nest sites and lookout perches (e.g. power pylons, towers, bridges) and purpose-built nest platforms on poles. A clutch of usually three eggs is laid in winter, with a single attempt per season. Feed mostly on surface-swimming, schooling fish caught by diving into water. Highly mobile and dispersive.		nest trees recorded		
<i>Petroica boodang</i> Scarlet Robin	V		Found from SE Queensland to SE South Australia and also in Tasmania and SW Western Australia. In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes. Some birds may appear as far west as the eastern edges of the inland plains in autumn and winter. Lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. Breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions; this species is occasionally found up to 1000 metres in altitude. Primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees.	1	Marginal – lacking abundant logs and fallen timber.	Possible	Yes

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Petroica phoenicea</i> Flame Robin	V		Endemic to SE Australia, and ranges from near the Queensland border to SE South Australia and also in Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands. Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense. Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgeland at high altitudes. In winter, birds migrate to drier more open habitats in the lowlands (i.e. valleys below the ranges, and to the western slopes and plains). Often occurs in recently burnt areas; however, habitat becomes unsuitable as vegetation closes up following regeneration. In winter lives in dry forests, open woodlands and in pastures and native grasslands, with or without scattered trees. In winter, occasionally seen in heathland or other shrublands in coastal areas. Birds forage from low perches, from which they sally or pounce onto small invertebrates which they take from the ground or off tree trunks, logs and other coarse woody debris. Flying insects are often taken in the air and sometimes gleans for invertebrates from foliage and bark. In their autumn and winter habitats, birds often sally from fence-posts or thistles and other prominent perches in open habitats.	0	Marginal – winter only	Possible – No may occur on occasion, but no records within 10 km of development	
<i>Petroica rodinogaster</i> Pink Robin	V		Found in Tasmania and the uplands of eastern Victoria and far south-eastern NSW, almost as far north as Bombala. On the mainland, the species disperses north and west and into more open habitats in winter, regularly as far north as the ACT area, and sometimes being found as far north as the central coast of NSW. Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies. Catches prey by the perch-and-	1	Absent - Not associated with PCTs on site	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			pounce method, foraging more on the ground than the more flycatcher-like Rose Robin. Insects and spiders are the main dietary items. Breeds between October and January and can produce two clutches in a season. The nest is a deep, spherical cup made of green moss bound with cobweb and adorned with camouflaging lichen, and is lined with fur and plant down. It is situated in an upright or oblique fork, from 30cm to 6m above the ground, in deep undergrowth. Females do most or all of the nest building and incubate unaided, but both adults feed the nestlings. The most common call most closely resembles a snapping twig.				
<i>Pezoporus wallicus</i> Eastern Ground Parrot	V		Occurs in high rainfall coastal and near coastal low heathlands and sedgeland, generally below one metre in height and very dense (up to 90% projected foliage cover). These habitats provide a high abundance and diversity of food, adequate cover and suitable roosting and nesting opportunities for the Ground Parrot, which spends most of its time on or near the ground. When flushed, birds fly strongly and rapidly for up to several hundred metres, at a metre or less above the ground. The coastal and subcoastal heathland and sedgeland habitats of the Ground Parrot are particularly fire-prone. Ground Parrots can re-colonise burnt habitat after 1-2 years and reach maximum densities after 15-20 years without fire. Therefore, it is recommended that habitat be protected from extensive and intense fires. Home ranges of adult birds is typically 10 ha and overlapping with other birds, while juveniles have a significantly larger home range. There is no evidence of regular long-distance dispersal or migration events. Ground Parrots feed mostly on seeds from a large range of plant species, which varies seasonally. An individual bird may consume in the order of 8000 seeds per day from as many as 60 plant species. Other plant material and invertebrates may be ingested. Ground Parrots breed from September to December. Breeding is thought to be triggered by increasing seed	0	Absent - Not associated with PCTs on site	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			availability in spring. 2-7 eggs are laid in a shallow bowl of fine sticks and grass, well hidden under overhanging tall, coarse grass, sedge or low, heathy shrubs. The nest is usually screened from above and sides, often with a tunnel in the surrounding dense plants. The female incubates the eggs for 21-24 days and on average a pair successfully fledges two young per season. Whilst the dense structure of Ground Parrot habitat makes it difficult for predators to hunt, birds are taken frequently in open habitats such as tracks, roads and fire breaks.				
<i>Ptilinopus regina</i> Rose-crowned Fruit-Dove	V		Coast and ranges of eastern NSW and Queensland, from Newcastle to Cape York. Vagrants are occasionally found further south to Victoria. Rose-crowned Fruit-doves occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful. They are shy pigeons, not easy to see amongst the foliage, and are more often heard than seen. They feed entirely on fruit from vines, shrubs, large trees and palms, and are thought to be locally nomadic as they follow the ripening of fruits. Some populations are migratory in response to food availability - numbers in north-east NSW increase during spring and summer then decline in April or May.	0	Absent - Not associated with PCTs on site	Unlikely	No
<i>Ptilinopus superbus</i> Superb Fruit-Dove	V		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. There are records of single birds flying into lighted windows and lighthouses, indicating that birds travel at night. 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 a structure of fine interlocked forked twigs, giving a stronger structure than its flimsy appearance would suggest, and is usually 5-30 metres up in rainforest and rainforest edge tree and	0	Absent - Not associated with PCTs on site	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			shrub species. The male incubates the single egg by day, the female incubates at night.				
<i>Rostratula australis</i> Australian Painted Snipe	E	V, Migratory	Little is known of the ecology, habitat requirements and reproductive biology of Australian Painted Snipe. They feed in shallow water or at the waters' edge and on mudflats, taking seeds and invertebrates such as insects, worms, molluscs and crustaceans. Females, which are larger and more brightly coloured than males, are thought to sometimes be polyandrous, mating with several males and leaving each one to incubate and raise chicks. They lay 3-4 eggs per clutch and incubation lasts about 15-16 days. Most records of Australian Painted Snipe are from temporary or infrequently filled freshwater wetlands and although they have occurred at many sites, no site can be identified in which they are resident or regular in occurrence. This may suggest the species is nomadic but the extent to which its cryptic behaviour may contribute to this belief is uncertain. The birds are able to remain hidden in rank vegetation, but many reports are of birds not being secretive, but rather still and unobtrusive. Primarily occurs along the east coast from north Queensland (excluding Cape York) to the Eyre Peninsula in South Australia, including the majority of Victoria and NSW. In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin. Inhabits inland and coastal shallow freshwater wetlands. The species occurs in both ephemeral and permanent wetlands, particularly where there is a cover of vegetation, including grasses, Lignum and Samphire. Individuals have also been known to use artificial habitats, such as sewage ponds, dams and waterlogged grassland. Nests on the ground amongst tall vegetation, such as grass tussocks or reeds. Forages nocturnally on mud flats and in shallow water. Breeding is often in response to local conditions; generally occurs from September to December.	1	Present	Possible	Yes

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Sternula albifrons</i> Little Tern	E		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. The nest is a scrape in the sand, which may be lined with shell grit, seaweed or small pebbles. Both parents incubate up to three well-camouflaged eggs for up to 22 days, aggressively defending the nest against intruders until the young fledge at 17 - 19 days. Often seen feeding in flocks, foraging for small fish, crustaceans, insects, annelids and molluscs by plunging in the shallow water of channels and estuaries, and in the surf on beaches, or skipping over the water surface with a swallow-like flight.	118	Marginal – Not associated with PCTs on site	Unlikely – highly coastal and will not utilise study area for any length of time if present.	No
<i>Stictonetta naevosa</i> Freckled Duck	V		The Freckled Duck is found primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers, and other rivers within the Riverina. The duck is forced to disperse during extensive inland droughts when wetlands in the Murray River basin provide important habitat. The species may also occur as far as coastal NSW and Victoria during such times. Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. The largest numbers of Freckled Ducks occur in brackish to hyposaline wetlands that are densely vegetated with Lignum. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds. Generally rest in dense cover during the day, usually in deep water. Feed at dawn and dusk and at night on algae, seeds and vegetative parts of aquatic grasses and sedges and small invertebrates. Nesting usually occurs between October and December but	41	Present	Possible	Yes

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			can take place at other times when conditions are favourable. Nests are usually located in dense vegetation at or near water level.				
<i>Thinornis rubricollis</i> Hooded Plover	CE		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 in South Australia. In south-west Western Australia the Hooded Plover is not restricted to the coast, and can also live and breed around inland salt lakes. Presently the Hooded Plover occurs north to Sussex Inlet. Occasionally, individual birds are sighted slightly further north to the Shoalhaven River and Comerong Beach and one bird was sighted at Lake Illawarra in March 2001. 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 beachcast 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. Hooded Plovers forage in sand at all levels of the zone of wave wash during low and mid-tide or among seaweed at high-tide, and occasionally in dune blowouts after rain. At night they favour the upper zones of beaches for roosting. When on rocks they forage in crevices in the wave-wash or spray zone, avoiding elevated rocky areas and boulder fields. In coastal lagoons they forage in damp or dry substrates and in shallow water, depending on the season and water levels. Hooded Plovers are seen singly, in pairs, family groups or small flocks, with 16 birds at Cudmirrah Beach being the largest group recorded in NSW in recent years. During winter, very few birds are seen in pairs. The Hooded Plover diet consists mainly of marine worms, molluscs, crustaceans, insects, water plants and seeds. In eastern Australia,	1	Absent – one bird sighted near to locality, but not associated with PCTs on site	Unlikely - very few records from region, mostly vagrants, with none in 10 km radius of study area.	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			Hooded Plovers usually breed from August to March on sandy ocean beaches strewn with beachcast seaweed, in a narrow strip between the high-water mark and the base of the fore-dunes. They often nest within 6 m of the fore-dune, mostly within 5 m of the high-water mark, but occasionally among or behind dunes. The nest is a scrape in the sand near debris, making it vulnerable to predators and beach disturbance. On mainland Australia, nests may be 2-5 km apart. Surveys conducted over the past 15 years to determine the total population in NSW have made a maximum count of 64 adults. The estimated population for all of Australia is approximately 5000 birds.				
<i>Tyto novaehollandiae</i> Masked Owl	V		Extends from the coast where it is most abundant to the western plains. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. Habitat for this species is also widespread throughout the dry eucalypt forests of the tablelands, western slopes and the undulating wet-dry forests of the coast. Optimal habitat includes an open understorey and a mosaic of sparse (grassy) and dense (shrubby) ground cover on gentle terrain. Roosts in hollows in live or occasionally dead eucalypts; dense foliage in gullies; and caves. Nest in old hollow eucalypts, live or dead, in a variety of topographic positions, with hollows greater than 40 cm wide and greater than 100 cm deep. Hollow entrances are at least 3 m above ground, in trees of at least 90 cm diameter at breast height. A specialist predator of terrestrial mammals, particularly native rodents. Home range has been estimated as 400-1000 ha according to habitat productivity.	2	Marginal – broad habitat preferences but lack of hollows on site	Unlikely	No
<i>Tyto tenebricosa</i> Sooty Owl	V		Habitat is limited mainly to the moist eucalypt forests and rainforests of the coastal, escarpment and eastern tablelands regions of NSW. Sooty Owls occur in both steep and undulating country but are strongly associated with sheltered gullies, particularly those with a tall, rainforest understorey. Hollows in live or occasionally dead trees, eucalypt or rainforest species, in	2	Absent - Not associated with PCTs on site	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			moist forest; among dense foliage in rainforest gullies; caves, recesses or ledges in cliffs or banks. Roost sites are in the darkest and most secluded or sheltered positions in the forest. Foliage roosts are typically in narrow, gloomy side-gullies near creek junctions or below dry waterfalls, less than 10 m from drainage lines. Foliage roosts used are rainforest species, tree ferns and vine tangles. Hollows used are usually less than 100 m from streams. Nests in old hollow trees in unlogged, unburnt gullies and lower slopes within 100 m of streams, with hollows greater than 40 cm wide and greater than 100 cm deep; surrounded by canopy trees. Also nests in caves. Hollow entrances are at least 16 m above ground, in trees of at least 120 cm diameter at breast height. The Sooty Owl is a generalist predator taking almost all arboreal, scansorial and small terrestrial mammals occurring within its more specialised habitat.				
<i>Xenus cinereus</i> Terek Sandpiper	V	Marine, Migratory	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 mudbanks and sandbanks located near mangroves, but may also be observed on rocky pools and reefs, and occasionally up to 10 km inland around brackish pools. Generally roosts communally amongst mangroves of dead trees, often with related wader species. Breaks up into smaller flocks or even solitary birds when feeding in open intertidal mudflats. The diet includes worms, crabs and other crustaceans, small shellfish and the adults and larvae of various flies, beetles and water-bugs. Feeding is undertaken by moving rapidly and erratically over soft, wet mud, pecking or probing at the surface.	5	Marginal – Generally coastal in estuaries but may use lagoons and wetlands near coast. Foraging habitat only.	Unlikely – very little available habitat in study area, no records from within 10 km and very few wading birds observed during	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
						targeted surveys.	
Fish							
<i>Epinephelus daemeli</i> Black Rockcod	V	V	Adult black cod can grow to 2 m in length and at least 80 kg in weight, but it is more common to see smaller fish (up to 1m/30kg). A large, reef-dwelling, carnivorous grouper species. They are found in warm temperate and subtropical parts of the south-western Pacific, and naturally occurred along the entire NSW coast including Lord Howe Island. Adult black cod are usually found in caves, gutters and beneath bomboras on rocky reefs. They are territorial and often occupy a particular cave for life. Small juveniles are often found in coastal rock pools, and larger juveniles around rocky shores in estuaries. Black cod are opportunistic carnivores, eating mainly other fish and crustaceans. They can change from one colour pattern to another in just a few seconds. They are usually black in estuaries and banded around clear water reefs.	0	Absent	Unlikely	No
<i>Maccullochella peelii</i> Murray Cod	P	V	Grow up to a maximum size of 1200mm. Found extensively throughout the Murray Darling Basin in the south-eastern region of Australia. Murray cod are able to live in a wide range of habitats from clear, rocky streams in the upper western slopes regions of New South Wales to the slow flowing, turbid rivers and billabongs of the western plains. Generally, they are found in waters up to 5m deep and in sheltered areas with cover from rocks, timber or overhanging banks. The most common components of adult cod's diet include crustaceans such as yabbies, shrimp and crayfish, and fish such as the introduced common carp, goldfish and redfin perch, and the native fishes bony herring, catfish, golden perch, western carp gudgeon and even other cod. It appears that Murray cod prefer protected spawning sites, and	0	Absent	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			typically spawn large (3.0-3.5mm diameter) adhesive eggs onto firm substrates such as hollow logs, rocks, pipes and clay banks, from spring to early summer.				
<i>Maccullochella macquariensis</i> Trout Cod	E	E	The trout cod is endemic to the southern Murray-Darling river system, including the Murrumbidgee and Murray Rivers, and the Macquarie River in central NSW. The species was once widespread and abundant in these areas but has undergone dramatic declines in its distributional range and abundance over the past century. The last known reproducing population of trout cod is confined to the Murray River below Yarrawonga downstream to Tocumwal. A conservation stocking program has seen the species restocked into the Murrumbidgee and Macquarie Rivers over the last decade, but it is yet to be determined if these fish have established reproducing populations. Trout cod are often found close to cover and in relatively fast currents, especially in fairly deep water close to the bank, and often congregate around large woody debris (snags). They tend to remain at the one site and to have small home ranges. They are carnivores, preying mainly on other fishes as well as crustaceans and aquatic insects. Trout cod reach sexual maturity at 3-5 years, when approximately 35cm (males) or 43cm (females) in length, and 0.75 to 1.5kg in weight. They form pairs and spawn during spring and early summer.	0	Absent	Unlikely	No
<i>Macquaria australasica</i> Macquarie Perch	E	E	Only known from the Central and Southern Tablelands, and the South Western Slopes. There is a concentration of populations in the Canberra/Queanbeyan Region. Other populations have been recorded near Cooma, Yass, Bathurst, Albury and West Wyalong. This species is also found in the Australian Capital Territory. Inhabits sloping, open woodland areas with predominantly native grassy groundlayers, particularly those dominated by Kangaroo Grass (<i>Themeda australis</i>). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. Commonly	0	Absent	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites. Feeds on the larvae and eggs of the ants with which it shares its burrows. It is thought that this species lays 2 eggs inside the ant nests during summer; the young first appear in March. Best detected from September to February.				
<i>Prototroctes maraena</i> Australian Grayling		V	Australian Grayling occur in freshwater streams and rivers, especially clear gravelly streams with a moderate flow, as well as estuarine areas. They occur in fast-moving shoals and are a shy fish, fleeing when disturbed. They reach sexual maturity at 1–2 years of age when approximately 150 mm in length. Spawning takes place during late summer or autumn. Females can lay up to 82 000 small (approx. 1 mm) eggs, probably in the middle reaches of rivers, where they presumably settle among the gravel of the streambed. Once hatched, the larvae swim towards the water surface where they are swept downstream to the sea. The larvae and young juveniles have a marine stage before returning to freshwater rivers during spring when they are about 6 months old. The rest of their life cycle is spent in freshwater. Australian grayling are opportunistic omnivores, with a mixed diet of aquatic algae and insects.	0	Absent	Unlikely	No
Mammals							
<i>Cercartetus nanus</i> Eastern Pygmy-possum		V	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are	0	Marginal – broad habitat preference, but lack of food	Unlikely – no records within 10 km	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			eaten when flowers are unavailable. Also feeds on insects throughout the year; this feed source may be more important in habitats where flowers are less abundant such as wet forests. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (<i>Pseudocheirus peregrinus</i>) dreys or thickets of vegetation, (e.g. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. Appear to be mainly solitary, each individual using several nests, with males having non-exclusive home-ranges of about 0.68 hectares and females about 0.35 hectares. Young can be born whenever food sources are available, however most births occur between late spring and early autumn. Agile climbers, but can be caught on the ground in traps, pitfalls or postholes; generally nocturnal. Frequently spends time in torpor especially in winter, with body curled, ears folded and internal temperature close to the surroundings.		resources on site		
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. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Hirundo ariel</i>), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves. Found in well-timbered areas containing gullies. This species probably forages for small, flying insects below the forest canopy. Likely to hibernate through the coolest months. It is uncertain whether mating occurs early in winter or in spring.	6	Marginal – small amount of foraging and potential roosting habitat only (Duck Creek Bridge)	Present - Possible occurrence	Yes

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Dasyurus maculatus</i> Spotted-tailed Quoll	V	E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites. Mostly nocturnal, although will hunt during the day; spends most of the time on the ground. The home-range of this species is unknown, but estimates are between 800ha and 20km ² . Usually traverse their ranges along densely vegetated creeklines. They need suitable den sites and abundant food, requiring large areas of intact vegetation for foraging. Use 'latrine sites', often on flat rocks among boulder fields and rocky cliff-faces; latrine sites can be recognised by the accumulation of the sometimes characteristic 'twisty-shaped' faeces deposited by animals. Consumes a variety of prey, including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits and insects; also eats carrion and takes domestic fowl.	1	Marginal – may occur in grassy woodland, but lack of habitat features (caves, hollows etc.) present on site	Unlikely - Patch size of marginal habitat does not meet spp requirements	No
<i>Falsistrellus tasmaniensis</i> Eastern False Pipistrelle	V		The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. Hibernates in winter. Females are pregnant in late spring to early summer.	8	Present	Present - Probable occurrence	Yes
<i>Isodon obesulus obesulus</i> Southern Brown Bandicoot	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	0	Absent – lack of heathy	Unlikely - no records	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			northern tip of Queensland. Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruited) fungi. Their searches for food often create distinctive conical holes in the soil. Males have a home range of approximately 5-20 hectares whilst females forage over smaller areas of about 2-3 hectares. Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. Nests may be located under Grass trees <i>Xanthorrhoea sp.</i> , blackberry bushes and other shrubs, or in rabbit burrows.		understorey at site	within 10 km	
<i>Miniopterus australis</i> Little Bentwing-bat			Moist eucalypt forest, rainforest or dense coastal banksia scrub. Little Bentwing-bats roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. In NSW the largest maternity colony is in close association with a large maternity colony of Common Bentwing-bats (<i>M. schreibersii</i>) and appears to depend on the large colony to provide the high temperatures needed to rear its young.	16	Marginal – small amount of foraging habitat only	Unlikely	No
<i>Miniopterus schreibersii oceanensis</i> Eastern Bentwing-bat	V		Eastern Bent-wing Bats occur 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 man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or	34	Marginal – foraging habitat only	Present - Probable occurrence	Yes

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			roosting colonies can number from 100 to 150,000 individuals. Hunt in forested areas, catching moths and other flying insects above the tree tops.				
<i>Mormopterus</i> sp. 2 (=norfolkensis) Eastern Freetail-bat	V		The East Coast Freetail bat is found along the east coast from south Queensland to southern NSW. Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous.	15	Present	Present - Yes confident occurrence	
<i>Myotis macropus</i> Southern Myotis	V		The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. 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.	3	Present – numerous creeklines present in study area.	Possible	Yes
<i>Petaurus australis</i> Yellow-bellied Glider	V		Distribution is mostly continuous from about 50 kilometres east of Melbourne in Victoria, to Sarina near Mackay in central Queensland. In NSW, distribution of the Yellow-bellied Glider is essentially coastal, extending inland to adjacent ranges. It typically occurs in tall, mature eucalypt forest in regions of high rainfall, but is also known to occur in drier areas. It inhabits a wide range of forest types but prefers resource rich forests where mature trees provide nesting hollows and tree species composition provides year-round continuity of food resources. Preferred Yellow-bellied Glider habitat is often characterised by a mosaic of tree species associations likely to provide a continuous, year-round food supply. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and	0	Marginal – mature vegetation with hollows absent from site. Patch size on site does not meet spp requirements	Unlikely – no records within 10 km	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			creek flats to tall montane forests in the south. In NSW, the tree species utilised as sap trees are mostly eucalypts (<i>Eucalyptus</i> and <i>Corymbia</i> species). In Victoria and the southern tablelands of NSW, densities were found to be in the order of 0.04-0.06 individuals per hectare. On the south coast of NSW density was found to be 0.1-0.16 individuals per hectare. Yellow-bellied Glider family groups occupy large home ranges of approximately 20-85 hectares.				
<i>Petaurus norfolcensis</i> Squirrel Glider	V		The Squirrel Glider is sparsely distributed along the east coast and immediate inland districts from western Victoria to north Queensland. The species is found inland as far as the Grampians in Victoria and the Pilliga and the Coonabarabran areas of NSW. Inhabits dry sclerophyll forest and woodland and is generally absent from rainforest and closed forest. In NSW, potential habitat includes Box-Ironbark forests and woodlands in the west, the River Red Gum forests of the Murray Valley and the eucalypt forests of the northeast. Requires abundant hollow-bearing trees and a mix of eucalypts, acacias and banksias. Nightly movements are estimated at between 300 and 500 m. Home-ranges have been estimated at between 0.65 and 8.55ha. Smooth-barked eucalypts are preferred as these eucalypts form hollows more readily than rough-barked and support a greater diversity of invertebrates. Squirrel Glider's forage in the upper and lower forest canopies and in the shrub understorey.	1	Absent – not associated with PCTs on site and lack of hollows	Unlikely	No
<i>Petrogale penicillata</i> 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. The species' range is now fragmented, particularly in the south where they are now mostly found as small isolated populations dotted across their former range. 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	0	Absent - Not associated with PCTs on site	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north. Throughout their range, Brush-tailed Rock-wallabies feed on a wide variety of grasses and shrubs, and have flexible dietary requirements. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night. Highly territorial and have strong site fidelity with an average home range size of about 15 ha. Live in family groups of 2 – 5 adults and usually one or two juvenile and sub-adult individuals. Dominant males associate and breed with up to four females. Breeding is likely to be continuous, at least in the southern populations, with no apparent seasonal trends in births.				
<i>Phascolarctos cinereus</i> Koala	V	V	Occurs in eastern Australia, from north-eastern Queensland to south-eastern South Australia and to the west of the Great Dividing Range. In NSW it mainly occurs on the central and north coasts with some populations in the western region. It was historically abundant on the south coast of NSW, but now occurs in sparse and possibly disjunct populations. The koala inhabits a range of eucalypt forest and woodland communities, including coastal forests, the woodlands of the tablelands and western slopes, and the riparian communities of the western plains. Examples of important shelter trees are cypress pine and brush box. The quality of forest and woodland communities as habitat for koalas is influenced by a range of factors, such as; species and size of trees present; structural diversity of the vegetation; soil nutrients; climate and rainfall; size and disturbance history of the habitat patch. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size. Breeding season for the koala peaks between September and February.	0	Present – areas of Illawarra Lowlands Grassy Woodland contain feed tree species.	Unlikely – there are no records of Koalas within 10 km, although there is a record from 2000 just beyond 10 km to the south-west	No – No individuals identified during surveys, remnant patches likely too fragmented and <i>Melaleuca</i> trees are generally unsuitable habitat.

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Potorous tridactylus tridactylus</i> Long-nosed Potoroo	V	V	In NSW it is generally restricted to the east of the Great Dividing Range, with an annual rainfall exceeding 760 mm. Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. The main habitat requirements would appear to be access to some form of dense vegetation for shelter and the presence of an abundant supply of fungi for food. The fruit-bodies of hypogeous (underground-fruited) fungi are a large component of the diet of the Long-nosed Potoroo. They also eat roots, tubers, insects and their larvae and other soft-bodied animals in the soil. Individuals are mainly solitary, non-territorial and have home range sizes ranging between 2-5 ha. Breeding peaks typically occur in late winter to early summer.	0	Absent - Not associated with PCTs on site	Unlikely	No
<i>Pseudomys fumeus</i> Smoky Mouse	CE	E	The Smoky Mouse is currently limited to a small number of sites in western, southern and eastern Victoria, south-east NSW and the ACT. In NSW there are 3 records from Kosciuszko National Park and 2 records adjacent to the park in Bondo and Ingbyra State Forests; the remainder are centred around Mt Poole, Nullica State Forest and the adjoining S. E. Forests National Park. The Smoky Mouse appears to prefer heath habitat on ridge tops and slopes in sclerophyll forest, heathland and open-forest from the coast (in Victoria) to sub-alpine regions of up to 1800 metres, but sometimes occurs in ferny gullies. Seeds and fruits from leguminous shrubs form the main summer and autumn diet, with some invertebrates, e.g., Bogong Moths in the high country. Hypogean (truffle-like) fungi predominate in winter and spring, with some flowers, seeds and soil invertebrates. May occur singly, as pairs or small communal groups based around patches of heath, sometimes comprising a male and up to five females sharing a burrow system. Breeding is in spring with one or two litters produced of up to four young. Nesting	0	Absent -	Unlikely - Spp known from outside development IBRA subregion.	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			burrows have been found in rocky localities among tree roots and under the skirts of Grass Trees <i>Xanthorrhoea</i> spp. The persistence of colonies appears to be very ephemeral. It is not known how much this is due to natural fluctuations in food availability, but predation from feral carnivores appears to be implicated.				
<i>Pseudomys novaehollandiae</i> New Holland Mouse		V	The New Holland Mouse has a fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Known to inhabit open heathlands, open woodlands with a heathland understorey and vegetated sand dunes. Lives predominantly in burrows shared with other individuals. The home range of the New Holland Mouse ranges from 0.44 ha to 1.4 ha. Breeding typically occurs between August and January, but can extend into autumn. The species peaks in abundance during early to mid-stages of vegetation succession typically induced by fire. Nocturnal and omnivorous, feeding on seeds, insects, leaves, flowers and fungi, and is therefore likely to play an important role in seed dispersal and fungal spore dispersal.	0	Absent - Not associated with PCTs on site	Unlikely - No predicted to occur in Illawarra subregion, but north of Coledale	
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox	V	V	Grey-headed Flying-foxes are found within 200 km of the eastern coast of Australia, from Bundaberg in Queensland to Melbourne in Victoria. Occur 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 km of a regular food source, often in stands of riparian rainforest, Paperbark or Casuarina forest, and are commonly found in gullies, close to water, or in vegetation with a dense canopy. Forage on the nectar and pollen of native trees, in particular <i>Eucalyptus</i> , <i>Melaleuca</i> and <i>Banksia</i> , and fruits of rainforest trees and vines. Travel up to 50 km to forage. Annual mating commences in January and a single young is born each October or November. Site fidelity to camps is high with some camps being used for over a century.	11	Present	Possible - Yes heard approximately 30 m to the west of the study area.	

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Saccolaimus flaviventris</i> Yellow-bellied Sheathtail-bat	V		The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.	8	Present	Possible	Yes
<i>Scoteanax rueppellii</i> Greater Broad-nosed Bat	V		The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m. Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young.	9	Marginal – foraging habitat only	Present – possible occurrence	Yes

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Sminthopsis leucopus</i> White-footed Dunnart	V		The Shoalhaven area is the species' northern-most limit. It has not been recorded west of the coastal escarpment with the western-most record being from Coolangubra State Forest, approximately 10 km south-east of Bombala. The White-footed Dunnart is found in a range of different habitats across its distribution, including coastal dune vegetation, coastal forest, tussock grassland and sedgeland, heathland, woodland and forest. In NSW, the species seems to favour vegetation communities with an open understorey structure (contrasting with populations in Victoria which apparently prefer dense shrub and ground layers). It is patchily distributed across these habitats and, where present, typically occurs at low densities. Breeding populations have been recorded in logged forest shortly after disturbance, but these usually do not persist as regeneration proceeds and a dense ground cover of vegetation establishes. Home range and movement patterns of this species vary according to sex. Adult females usually have small, discrete home ranges, approximately 80 metres in length. Adult males have overlapping home ranges, approximately 100 metres in length, but are capable of making regular exploratory movements of up to 1 km. White-footed Dunnarts appear to have only one short breeding season during their lifetime. In NSW and Victoria, mating occurs in late July and August. From August to September, up to ten young are born. They shelter in bark nests in hollows under standing or fallen timber, burrows in the ground, piles of logging debris, large grass clumps such as provided by Grass Trees <i>Xanthorrhoea sp.</i> and Macrozamia and rock crevices.	0	Absent Development is outside spp range	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
Reptiles							
<i>Hoplocephalus bungaroides</i> Broad-headed Snake	E	V	The Broad-headed Snake is restricted to the Sydney Basin and within a radius of about 200 km of Sydney on Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges. Four key distribution areas; Blue Mountains, southern Sydney, an area north west of the Cumberland Plain and the Nowra hinterland. The sites where they occur are typified by exposed sandstone outcrops and benching and in these locations the vegetation is mainly woodland, open woodland and/or heath. They shelter in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. These rocky outcrops typically face north or west. Moves from the sandstone rocks to shelters in hollows in large trees within 200 m of escarpments in summer. Some of the canopy tree species found to regularly co-occur at known sites include <i>Corymbia eximia</i> , <i>C. gummifera</i> , <i>Eucalyptus sieberi</i> , <i>E. punctata</i> and <i>E. piperita</i> . Feeds mostly on geckos and small skinks; will also eat frogs and small mammals occasionally. Females produce young from January to March. Nocturnal.	0	Absent - Not associated with PCTs on site	Unlikely – no records within 10 km	No
<i>Varanus rosenbergi</i> Rosenberg's Goanna	V		Rosenberg's Goanna occurs on the Sydney Sandstone in Wollemi National Park to the north-west of Sydney, in the Goulburn and ACT regions and near Cooma in the south. There are records from the South West Slopes near Khancoban and Tooma River. Also occurs in South Australia and Western Australia. Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat. Feeds on carrion, birds, eggs, reptiles and small mammals. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens. Runs along the	0	Absent - Not associated with PCTs on site	Unlikely – no records within 10 km	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			ground when pursued (as opposed to the Lace Monitor, which climbs trees). Lays up to 14 eggs in a termite mound; the hatchlings dig themselves out of the mounds. Generally slow moving; on the tablelands likely only to be seen on the hottest days.				
Plants							
<i>Allocasuarina glareicola</i>	E	E	An erect, often depauperate she-oak shrub 1-2 m high, with 20 cm branchlets. 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. Found in open woodland with <i>Eucalyptus parramattensis</i> , <i>Eucalyptus fibrosa</i> , <i>Angophora bakeri</i> , <i>Eucalyptus sclerophylla</i> and <i>Melaleuca decora</i> . Common associated understorey species include <i>Melaleuca nodosa</i> , <i>Hakea dactyloides</i> , <i>Hakea sericea</i> , <i>Dillwynia tenuifolia</i> , <i>Micromyrtus minutiflora</i> , <i>Acacia elongata</i> , <i>Acacia brownei</i> , <i>Themeda australis</i> and <i>Xanthorrhoea minor</i> . Not killed outright by fire but resprouts from the rootstock. Spreads by vegetative means, such that clumps of up to 100s of stems may be a single individual. The time taken for the plants to flower and set seed is not known, but only those plants growing in areas unburnt for some time produced substantial numbers of fruit.	0	Marginal - not typical habitat and species restricted to the north.	None	No
<i>Arthropteris palisotii</i> Lesser Creeping Fern	E		The Lesser Creeping Fern grows on trees. Occurs in north-eastern NSW and also in Queensland. This species may be extinct in NSW. Known to occur in the following CMA sub-regions: Illawarra; Comboyne Plateau; Upper Manning; and Woodenbong. Found in rainforest, mainly on tree trunks.		Absent - Not associated with PCTs on site	None	No
<i>Boronia deanei</i> Deane's Boronia	V	V	A small erect shrub to 1.5 m tall. There are scattered populations of Deane's Boronia between the far south-east of NSW and the Blue Mountains (including the upper Kangaroo River near Carrington Falls, the Endrick River	0	Absent	None – Spp known	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			near Nerriga and Nalbaugh Plateau), mainly in conservation reserves. Mainly found in the higher Blue Mountains, north of Clarence and Kanangra–Boyd National Park NSW, with an isolated occurrence at Fitzroy Falls, and south to near the Victorian border. The species grows on the margins of high altitude swamps, in wet heath and in drier open forest on low nutrient, poorly drained peaty soils on sandstone or granite. The distribution of this species overlaps with the following EPBC Act-listed threatened ecological communities: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory, and Temperate Highland Peat Swamps on Sandstone. Flowering occurs Aug.-Nov.			from outside development IBRA subregion	
<i>Caladenia tessellata</i> Thick-lipped Spider-orchid	E	V	The Tessellated Spider Orchid is from a group of orchids characterised by five long spreading petals and sepals around a broad down-curved labellum ('lip'). 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. In NSW current populations occur in Morton NP, Munmorah State Recreation Area, Braidwood (private property), South Pacific Heathland Reserve, Wyrabalong NP, and Porter Creek Wetland Reserve. 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. The single leaf regrows each year. Flowers appear between September and November (but apparently generally late September or early October in extant southern populations).	0	Marginal	Unlikely - no records from the area despite extensive surveys.	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Callistemon linearifolius</i> Netted Bottle Brush	V		A shrub up to 3-4m tall. Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. Recorded in 2000 at Coal Cliffs in the Southern Rivers CMA. For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. Was more widespread across its distribution in the past. There are currently only 5-6 populations in the Sydney area, of the 22 populations recorded in the past. Three of these are reserved in Ku-ring-gai Chase National Park, Lion Island Nature Reserve, and Spectacle Island Nature Reserve. Further north it has been recorded from Yengo National Park. Grows in dry sclerophyll forest on the coast and adjacent ranges. Flowers spring to summer.	0	Absent	None - Spp known from outside development IBRA subregion	No
<i>Calomnion complanatum</i>	E		A small moss to 10 mm long. <i>C. complanatum</i> occurs only in south-eastern Australia and New Zealand. In NSW, <i>C. complanatum</i> has been recorded from only three locations: Cambewarra Mountain (near Nowra), Rocky Creek Canyon (Newnes Plateau), and two sites at Mount Wilson (Waterfall Reserve and Zircon Creek). Each record is of only a few plants. <i>C. complanatum</i> grows on the trunks of tree ferns, and occasionally on sandstone rock. Records are from moist, shaded gullies within closed forests in mountainous areas with relatively high rainfall. At both Mount Wilson and Cambewarra Mountain, the closed forests are associated with basalt soils, overlying shales and/or sandstone. The closed forest on Cambewarra Mountain is quite diverse, with many genera and many species of rainforest trees, vines and ferns. The closed forest at Mount Wilson is dominated by Coachwood (<i>Ceratopetalum apetalum</i>) and Sassafras (<i>Doryphora sassafras</i>). The Rocky Creek Canyon site is cut into sandstone with underlying shales on the Newnes Plateau.	0	Absent - Not associated with PCTs on site	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Chamaesyce psammogeton</i> Sand Spurge	E		Sand Spurge is a herb that forms mats to 1 m across. It is found sparsely along the coast from south of Jervis Bay (at Currarong, Culburra and Seven Mile Beach National Park) to Queensland (and Lord Howe Island). Populations have been recorded in Wamberal Lagoon Nature Reserve, Myall Lakes National Park and Bundjalung National Park. Grows on fore-dunes and exposed headlands, often with Spinifex (<i>Spinifex sericeus</i>). Flowering occurs in summer. <i>C. psammogeton</i> seeds float, so some dispersal between beaches may occur. Longevity of the species is approximately 5 – 30 years with a primary juvenile period of less than 1 year. Plant growth occurs in spring and summer.	0	Absent - Not associated with PCTs on site	None	No
<i>Chorizema parviflorum</i> <i>Benth. in the Wollongong and Shellharbour Local Government Areas</i> Eastern Flame Pea	EP		Shrub to 50 cm high, with a stout rootstock. This endangered population has been recorded from between Austinmer and Albion Park in the local government areas of Wollongong and Shellharbour. All known sites (excluding the site at Austinmer) occupy woodland or forest dominated by Forest Red Gum (<i>Eucalyptus tereticornis</i>) and/or Woollybutt (<i>E. longifolia</i>). At Austinmer, the species is recorded from a coastal headland. Flowering period is August to January, with seeds maturing from November. The species is difficult to locate when not in flower, as it is often tangled amongst (and partially concealed by) a grassy understorey. The response of the species to fire is reportedly variable. Some plants have been observed to reshoot following fire while others have been killed. A soil seedbank for the species exists although the longevity of this seedbank is not known.	115	Present	Present	Yes
<i>Cryptostylis hunteriana</i> Leafless Tongue-orchid	V	V	The Leafless Tongue Orchid has no leaf. It produces an upright flower-stem to 45 cm tall, bearing five to 10 flowers between November and February. This species has inconsistent flowering, with individuals not always flowering each season. The species occurs mostly in coastal heathlands, margins of coastal swamps and sedgeland, coastal forest, dry woodland,	0	Absent - Not associated with PCTs on site	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			and lowland forest. It prefers open areas in the understorey of forested communities. The soils include moist sands, moist to dry clay loam and occasionally in accumulated eucalypt leaves. The larger populations typically occur in woodland dominated by Scribbly Gum (<i>Eucalyptus sclerophylla</i>), Silvertop Ash (<i>E. sieberi</i>), Red Bloodwood (<i>Corymbia gummifera</i>) and Black Sheoak (<i>Allocasuarina littoralis</i>); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (<i>C. subulata</i>) and the Tartan Tongue Orchid (<i>C. erecta</i>).				
<i>Cynanchum elegans</i> White-flowered Wax Plant	E	E	A climber or twiner with a highly variable form. Mature stems have a fissured corky bark and can grow to 10 metres long and 3.5 cm thick. Restricted to eastern NSW where it is distributed from Brunswick Heads on the north coast to Gerroa in the Illawarra region. The species has been recorded as far west as Merriwa in the upper Hunter River valley. The White-flowered Wax Plant usually occurs mainly at the ecotone between dry subtropical rainforest and sclerophyll forest/woodland communities. Other associated vegetation types include littoral rainforest; Coastal Tea-tree <i>Leptospermum laevigatum</i> , Coastal Banksia <i>Banksia integrifolia</i> subsp. <i>integrifolia</i> coastal scrub; Forest Red Gum <i>Eucalyptus tereticornis</i> aligned open forest and woodland; Spotted Gum <i>Eucalyptus maculata</i> aligned open forest and woodland; and Bracelet Honeymyrtle <i>Melaleuca armillaris</i> scrub to open scrub. Flowering occurs between August and May, with a peak in November. Flower abundance on individual plants varies from sparse to prolific. The fruit can take up to six months to mature. Seeds are wind dispersed. It is considered to be unlikely that a soil seed bank for this species exists. Plants are capable of suckering from rootstock in response to occasional slashing or grazing	46	Marginal - Forest Red Gum woodland common in places. Also associated with ILGW.	Unlikely - No records despite lots of historical surveys, and no rainforest in study area.	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Daphnandra sp. C Illawarra</i> Illawarra Socketwood	E	E	Rainforest tree to 20 metres tall. Restricted to the Illawarra region where it has been recorded from the local government areas of Shoalhaven, Kiama, Shellharbour and Wollongong. The main distribution of the species extends from Avondale (Wollongong LGA) to Toolijooa (Kiama LGA), a distance of 27 kilometres. An outlying site is located at Scarborough. Usually found in subtropical rainforest, less frequently on the margins and in disturbed areas, to 150 m alt., mostly on rocky sites along gullies near creeks. Occupies the rocky hillsides and gullies of the Illawarra lowlands, occasionally extending onto the upper escarpment slopes. Associated vegetation includes rainforest and moist eucalypt forest. Associated soils are loams and clay loams derived from volcanic and fertile sedimentary rocks. The species occurs within the Illawarra Subtropical Rainforest endangered ecological community at a number of sites. Occasionally found in moist Eucalypt forest in association with <i>Eucalyptus tereticornis</i> (Forest Red Gum), <i>E. pilularis</i> (Blackbutt), <i>E. quadrangulata</i> (White Box) or <i>Casuarina cunninghamiana</i> (River She-Oak). Flowers briefly in September and early October with fruits taking 10 to 12 months to mature. Capable of vegetative reproduction from stems (coppicing) and rhizomes (suckering). Low levels of seed production are suspected, with stems at most sites appearing to only produce 'pseudo-fruit' which lack seeds. Possibly killed by fire.	10	Absent – Not associated with PCTs on site	Unlikely	No
<i>Eucalyptus langleyi</i> Albatross Mallee	V	V	Grows to 6 m tall, with smooth, grey, green or pink bark that sheds in ribbons. The main occurrence of the Albatross Mallee is to the south-west of Nowra as far as Yarramunmun Creek. A very small population is found to the north of the Shoalhaven River in the Bomaderry Creek Regional Park. Found in mallee shrubland on shallow, poorly drained sandy soil over sandstone or associated with laterite. It occurs on plateaux in highly dissected areas, often in heath patches surrounded by woodland of Red Bloodwood (<i>Corymbia gummifera</i>), Yertchuk (<i>Eucalyptus considaniana</i>) and	0	Absent - Not associated with PCTs on site	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			a 'Scribbly Gum', probably <i>E. racemosa</i> . The species regenerates from rootstock after fire.				
<i>Genoplesium baueri</i> Bauer's Midge Orchid	E		A terrestrial orchid 6-15 cm high, fleshy, brittle, yellowish-green or reddish. The species has been recorded from locations between Nowra and Pittwater and may occur as far north as 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. 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 sparse sclerophyll forest and moss gardens over sandstone. Flowers December to March.	0	Marginal – sclerophyll forest present in some areas however not associated with PCTs on site	None	No
<i>Gentiana wingecarribiensis</i> Wingecarribee Gentian	CE	E	An erect annual herb, to 9 cm tall, with a reddish, unbranched or sparsely-branched stem. Known only from Hanging Rock Swamp and Wingecarribee Swamp on the Southern Highlands, near Robertson. Grows in bogs, in Sphagnum Moss humps and in sedge communities. It is an annual herb. Typically occurs on either paths made by kangaroos or amongst grasses cropped short by kangaroos. Associated vegetation comprises <i>Leptospermum juniperinum</i> and <i>L. obovatum</i> scattered within a damp grassland of <i>Poa labillardieri</i> , <i>Isachne globosa</i> and <i>Tetrarrhena turfosa</i> . Flowers chiefly from October to December.	0	Absent	None – distribution outside IBRA subregion of development	No
<i>Gossia acmenoides</i> population in the Sydney Basin	EP		Shrub or small crooked tree to 18m found in sub-tropical and dry rainforest. Bark is smooth mottled brown, shedding in thin papery patches. Known from Shellharbour, Wollongong and Kiama LGAs and encompasses all occurrences south of the Georges River. This population is the southern	2	Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
Bioregion south of the Georges River			most occurrence of the species and is approximately 175 km from the nearest population to the north in the Hunter region of NSW. Found in subtropical and dry rainforest on the ranges and coastal plain of eastern Australia. Estimated less than 100 mature plants, through approximately 30 sites. Occurring often as a single individual or small group. Flowers late spring to early autumn.				
<i>Haloragis exalata</i> subsp. <i>exalata</i> Square Raspwort	V	V	A shrub that reaches 1.5 m tall with square, four-ribbed stems. Occurs in 4 widely scattered localities in eastern NSW. It is disjunctly distributed in the central coast, south coast and north-western slopes botanical subdivisions of NSW. Square Raspwort appears to require protected and shaded damp situations in riparian habitats. Flowering specimens in NSW are recorded from November to January.	0	Marginal – some riparian (degraded) areas present	None – no records within 10 km	No
<i>Irenepharsus trypherus</i> Illawarra Irene	E	E	A hairless annual or short-lived perennial herb that grows to 250 cm. Has been recorded from 18 sites within the local government areas of Kiama, Shellharbour, Shoalhaven, Tallaganda, Wingecarribee, and Wollongong. Found at such places as Minnamurra Falls, the Jamberoo area, Bee's Nest Nature Reserve, and Morton and Macquarie Pass National Parks. The species has rarely been collected, perhaps because it looks like a weed. Typically inhabits steep rocky slopes near cliff lines and ridge tops. Associated soils are derived from volcanic or fertile sedimentary rocks. The species is less typically found growing out of rock crevices or on narrow benches along cliff lines. The vast majority of sites are recorded from the upper slopes of the ridge systems that extend south and east of the Illawarra escarpment, although the species has also been recorded from the deep sandstone gorges of the Shoalhaven River. Associated vegetation includes moist sclerophyll forest, Ironwood <i>Backhousia myrtifolia</i> thicket, and rainforest. The altitudinal range of the species is 85 to 400 metres although	10	Absent – not associated with PCTs on site	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			the vast majority of sites have been recorded between 150 and 340 metres. Flowers December to June.				
<i>Lastreopsis hispida</i> Bristly Shield Fern	E		An erect perennial fern, either tufted or on a thick creeping underground stem (rhizome). Sometimes grows as an epiphyte on tree ferns and mossy logs. Rare in NSW with the only recent confirmed records from Mt Wilson in the Blue Mountains. Also occurs in southern Victoria and Tasmania, and is common in New Zealand. Grows in moist humus-rich soils in wet forest and rainforest gullies. At Mt Wilson, associated species include <i>Ceratopetalum apetalum</i> , <i>Elaeocarpus holopetalus</i> , <i>Fieldia australis</i> , <i>Cyathea australis</i> , <i>Blechnum nudum</i> , <i>B. patersonii</i> and <i>Leptopteris fraseri</i> .	0	Absent - not associated with PCTs on site	None	No
<i>Lespedeza juncea</i> subsp. <i>sericea</i> in the Wollongong Local Government Area	EP		An erect or spreading perennial subshrub, 60 to 120 cm high. This endangered population occurs south of Dapto in the Wollongong local government area. The population is disjunct from the other (non-endangered) populations of the species in NSW, which occur in western Sydney, the far South Coast and the Southern Tablelands. Known from just one roadside population of approximately 200 plants located in a small strip of open forest dominated by <i>Eucalyptus tereticornis</i> (Forest Red Gum), <i>E. longifolia</i> (Woollybutt), and <i>Melaleuca decora</i> (White Feather Honey-myrtle), on Budgong Sandstone. Also originally recorded in <i>Pennisetum clandestinum</i> (Kikuyu) grassland directly across the road from this site. This grassland was subsequently cleared and the species has not regenerated. Prefers full sun to light shade. Flowers between February and March. Has a long-lived seed and a soil stored seedbank. It is capable of resprouting in response to fire and flowering the following season. Germination is reportedly triggered by fire. It is suspected that frequent fire will lead to a decline in plant numbers, while infrequent fire may lead to local extinctions.	3	Present	Unlikely – No known population restricted to two locations to the north-west of the study area.	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Melaleuca biconvexa</i> Biconvex Paperbark	V	V	A shrub or small tree, usually up to 10 m tall, though occasionally as high as 20 m. Found in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Within the Gosford and Wyong area most populations occur on private land or on road reserves. Generally, it grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. May occur in dense stands forming a narrow strip adjacent to watercourses, in association with other <i>Melaleuca</i> species or as an understorey species in wet forest types. Flowering occurs over just 3-4 weeks in September and October. Resprouts following fire.	0	Marginal – <i>Melaleuca decora</i> common in the northern end of the study area.	Unlikely – no records from the area and site is generally too dry.	No
<i>Pelargonium sp. striatellum</i> (G.W.Carr 10345) Omeo Stork's-bill	E	E	A tufted perennial herb with a basal vegetative rosette and flowering stems to 15 cm tall. Currently known to occur at four localities in the Southern Tablelands, at altitudes ranging from 680-1030m a.s.l.: Lake Bathurst near Goulburn, on grazing leasehold; two sites (one probably extinct) on private grazing properties south-west of Cooma; and at Maffra Lake near Dalgety in a fenced Travelling Stock Reserve assessed as having high conservation values. A terrestrial plant with a narrow habitat just above the high-water level of irregularly inundated or ephemeral lakes, in the transition zone between surrounding grasslands or pasture and the paludal and aquatic communities. It colonises exposed lake beds during dry periods. The extent of habitat at any one site, and the persistence of the species, is likely be closely related to the combined effects of inundation frequency and the topography of lake bed and shoreline, in maintaining a more or less extensive disturbed interzone between grass-dominated communities and sedge-dominated aquatic vegetation, as well as to past and current grazing regimes and other forms of disturbance. Species directly associated with <i>Pelargonium</i> sp. (G. W. Carr 10345) vary considerably between sites, but are	0	Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			typically a disturbed (often intermittently grazed) grass/sedge/herb assemblage.				
<i>Pimelea curviflora</i> var. <i>curviflora</i> Curved Rice Flower	V	V	An erect herb to 90 cm tall. 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). The species also occurs in Queensland. Normally grows in damp places, especially beside streams and lakes. Occasionally found in swamp forest or associated with disturbance. Grows on sandy, alluvial soil in swampy areas and riparian herblands along watercourses and lake edges. Associated plant species include <i>Melaleuca linearifolia</i> , <i>M. quinquenervia</i> , <i>Pseudognaphalium luteoalbum</i> , <i>Persicaria hydropiper</i> , <i>Floydia praealta</i> and <i>Cyperus semifertilis</i> . The distribution of this species overlaps with the “White Box-Yellow Box-Blakely’s Red Gum Grassy Woodland and Derived Native Grassland” EPBC Act-listed threatened ecological community. Widespread within Croom Reserve (Kirsten Vine, pers. comm. 2014).	13	Present – woodland with riparian areas present on site, but is generally too dry in undisturbed locations. TransGrid site supports potential habitat.	Present - Observed within Croom Reserve and Illawarra Light Rail Museum Society land.	Yes
<i>Pimelea spicata</i> Spiked Rice-flower	E	E	A shrub to 50 cm tall that may be erect or somewhat prostrate in habit. Once widespread on the Cumberland Plain, Spiked Rice-flower occurs in two disjunct areas, the Cumberland Plain (Narellan, Marayong, Prospect Reservoir, Freemans Reach, Georges Hall areas) and the Illawarra (Landsdowne to Shellharbour to northern Kiama). In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils. Associated species include: Grey Box (<i>Eucalyptus moluccana</i>), Forest Red Gum (<i>E. tereticornis</i>), Narrow-leaved Ironbark (<i>E. crebra</i>), Blackthorn (<i>Bursaria spinosa</i>), and Kangaroo Grass (<i>Themeda australis</i>). On the inland Cumberland Plain sites it is associated with Grey Box and	27	Marginal - some Forest Red Gum trees present, but no Coast Banksia open woodland.	Possible – however not detected during surveys	Yes

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			Ironbark. In the coastal Illawarra it occurs commonly in Coast Banksia open woodland with a more well developed shrub and grass understorey. Has been recorded from both shale hills and shale plains woodland. Cryptic and difficult to detect. Flowers sporadically throughout the year (but mostly in summer), with flowering likely to depend upon climatic conditions, particularly rainfall.				
<i>Pomaderris adnata</i> Sublime Point Pomaderris	E		A spreading shrub to 2 metres tall, with hairy young stems. Known only from one site at Sublime Point, north of Wollongong. Occurs near the edge of the plateau behind the Illawarra escarpment. Grows in heathy woodland and dry sclerophyll forest. Associated vegetation is <i>Eucalyptus sieberi</i> (Silver-top Ash) - <i>Corymbia gummifera</i> (Red Bloodwood) forest with occasional <i>Hakea salicifolia</i> (Willow-leaved Hakea). Understorey species include <i>Acacia suaveolens</i> , <i>Hakea dactyloides</i> , <i>Lambertia formosa</i> , <i>Leptospermum trinervium</i> , <i>Banksia spinulosa</i> var. <i>spinulosa</i> , <i>Leucopogon lanceolatus</i> , and <i>Lomatia silaifolia</i> . Herbs include <i>Lomandra longifolia</i> , <i>L. obliqua</i> , <i>L. sp.</i> , <i>Entolasia stricta</i> , <i>Billardiera scandens</i> , <i>Smilax glycyphylla</i> , <i>Dianella sp.</i> , and <i>Patersonia sp.</i> Soil is a sandy loam over sandstone. Flowers in late September although buds are present on the plant for many months before the flowers open. Fruit matures in November - December. Estimated longevity of 10 to 25 years.	0	Absent – not associated with PCTs on site	None	No
<i>Prasophyllum affine</i> Jervis Bay Leek Orchid	E	E	A relatively inconspicuous ground orchid. Currently known from three areas south-east of Nowra on the South Coast. These are Kinghorne Point, Wowly Gully near the town of Callala Bay, and near the township of Vincentia. Grows on poorly drained clay soils that support low heathland and sedgeland communities, sometimes amongst emergent mallee <i>Eucalyptus gummifera</i> and other tall shrubs of Banksia and Hakea. Avoids swampy habitats. Flowers are followed by a fleshy seed capsule. Plants retreat into	0	Absent	None - does not occur in IBRA subregion of site	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			subterranean tubers after fruiting, so are not visible above-ground. Flowers November to December.				
<i>Pterostylis gibbosa</i> Illawarra Greenhood	E	E	A ground-dwelling orchid with a flower stem up to 45cm high. Known from a small number of populations in the Hunter region (Milbrodale), the Illawarra region (Albion Park and Yallah) and the Shoalhaven region (near Nowra). It is apparently extinct in western Sydney which is the area where it was first collected (1803). All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. In the Illawarra region, the species grows in woodland dominated by Forest Red Gum <i>Eucalyptus tereticornis</i> , Woollybutt <i>E. longifolia</i> and White Feather Honey-myrtle <i>Melaleuca decora</i> . Near Nowra, the species grows in an open forest of Spotted Gum <i>Corymbia maculata</i> , Forest Red Gum and Grey Ironbark <i>E. paniculata</i> . In the Hunter region, the species grows in open woodland dominated by Narrow-leaved Ironbark <i>E. crebra</i> , Forest Red Gum and Black Cypress Pine <i>Callitris endlicheri</i> . The Illawarra Greenhood is a deciduous orchid that is only visible above the ground between late summer and spring, and only when soil moisture levels can sustain its growth. The leaf rosette grows from an underground tuber in late summer, followed by the flower stem in winter. After a spring flowering, the plant begins to die back and seed capsules form (if pollination has taken place).	27	Present – in both study area and proposal site.	Present – individuals found in the study area but not in the available habitat at the proposal site.	Yes
<i>Pterostylis pulchella</i> Pretty Greenhood	V	V	A ground-dwelling orchid with a 15cm flower stem. Found only at Fitzroy Falls, Belmore Falls, upper Bundanoon Creek (Meryla) and Minnamurra Falls. Found on cliff faces close to waterfalls, on moist, sheltered ridges, creek banks and mossy rocks alongside running water. It prefers high rainfall areas. Flowers appear from February to May.	1	Absent – not associated with PCTs on site	None – few rocky areas present alongside creeks; no	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
						records in area.	
<i>Pterostylis saxicola</i> Sydney Plains Greenhood	E	E	A cryptic ground orchid with reddish brown and green translucent flowers on a slender stem to 35 cm tall. 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. Localities include: Georges River National Park (near Yeramba Lagoon), Ingleburn, Holsworthy, Peter Meadows Creek and St Marys Towers near Douglas 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 <i>Pterostylis saxicola</i> occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils. The time of emergence and withering has not been recorded for this species, however flowering occurs from October to December and may vary due to climatic conditions. The above ground parts of the plant wither and die following seed dispersal and the plant persists as a tuberoid until the next year.	0	Absent	None - does not occur in IBRA subregion of site	No
<i>Pultenaea aristata</i> Prickly Bush-pea	V	V	A small shrub, usually less than 40 cm tall. Restricted to the Woronora Plateau, a small area between Helensburgh, south of Sydney, and Mt Kiera above Wollongong. The species occurs in either dry sclerophyll woodland or wet heath on sandstone. Grows in low nutrient sandstone soils in both moist and dry areas. The species is often associated with the Upland Swamp vegetation complex and has been recorded from several locations within the sub-communities of Banksia Thicket and Restioid Heath. The species is also known to occur in association with areas of impeded drainage and creek lines within sandstone woodland and gully forest plant communities. Flowering has been recorded in winter and spring.	0	Absent - not associated with PCTs on site	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Senna acclinis</i> Rainforest Cassia	E		A shrub to 3 m tall. Occurs in coastal districts and adjacent tablelands of NSW from the Illawarra in NSW to Queensland. Grows in or on the edges of subtropical and dry rainforest. Flowers in spring and summer. Fruits occur from February to March.	0	Absent – not associated with PCTs on site	None	No
<i>Solanum celatum</i>	E		A recently described shrub 1 - 2.5 m high. Restricted to an area from Wollongong to just south of Nowra, and west to Bungonia. Majority of records are prior to 1960 and the majority of populations are likely to have been lost to clearing. A recent survey of six sites found only a single plant within Macquarie Pass National Park, SW of Wollongong. Grows in rainforest clearings, or in wet sclerophyll forests. Flowers August to October and produces fruit December to January. Commonly found after fire or disturbance.	8	Absent - not associated with PCTs on site	None	No
<i>Streblus pendulinus</i> Siah's Backbone		E	A tree or large shrub that grows to 6 m in height. Occurs from Cape York Peninsula to Milton, south-east New South Wales (NSW), as well as Norfolk Island. On the Australian mainland, Siah's Backbone is found in warmer rainforests, chiefly along watercourses. The altitudinal range is from near sea level to 800 m above sea level. The species grows in well-developed rainforest, gallery forest and drier, more seasonal rainforest. Siah's Backbone is dioecious (plants are either male or female) (DNP, 2010) with fruit ripe in January–April.	0	Absent - not associated with PCTs on site	None	No
<i>Syzygium paniculatum</i> Magenta Lilly Pilly	E	V	A tree to 15 m tall, but is generally 3–8 m high and shrubby in form. Found only in NSW, in a narrow, linear coastal strip from Bulahdelah to Conjola State Forest. Has been recorded in widely scattered small populations along the NSW coast from Booti Booti (near Forster) in the north to Conjola State Forest (near Jervis Bay) in the south. Found in rainforest on sandy soils or stabilised Quaternary sand dunes at low altitudes in coastal areas. Rainforests are often remnant stands of littoral or gallery rainforest.	0	Absent - not associated with PCTs on site	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
Associated species include <i>Alphitonia excelsa</i> , <i>Acmena smithii</i> , <i>Cryptocarya glaucescens</i> , <i>Toona ciliata</i> , <i>Eucalyptus saligna</i> , <i>Ficus fraseri</i> , <i>Syzygium oleosum</i> , <i>Acmena smithii</i> , <i>Cassine australe</i> , <i>F. obliqua</i> , <i>Glochidion ferdinandi</i> , <i>Endiandra sieberi</i> , <i>Synoum glandulosum</i> , <i>Podocarpus elatus</i> , <i>Notelaea longifolia</i> , <i>Guioa semiglauca</i> and <i>Pittosporum undulatum</i> . Is thought to tolerate wet and dry conditions on sands. 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. Flowers December to March, with fruit ripe from March to May, occasionally to September.							
<i>Thelymitra sp.</i> <i>Kangaloon</i> (D.L.Jones 18108) Kangaloon Sun-orchid	CE	CE	A terrestrial orchid, with a green or purplish flower stem (scape) growing 20–56 cm high. Occurs at three locations near Robertson in the Southern Highlands of New South Wales. The three populations grow in seasonally swampy sedgeland on grey silty clay loam at 600-700 m above sea level. Grows amongst tall sedges and rushes in grey silty soil, in open swamps which are seasonally wet. The Kangaloon Sun-orchid has an estimated area of occupancy of 10 km ² . Butler's Swamp and Stockyard Swamp are the key known locations for the species, in the Kangaloon Aquifer area. Butlers Swamp, Stockyard Swamp and Wildes Meadow Swamp occur within the Temperate Highland Peat Swamps on Sandstone endangered ecological community. Flowers in late October and early November.	0	Absent	None - does not occur in IBRA subregion of site	No
<i>Thesium australe</i> Austral Toadflax		V	An erect perennial herb to 40 cm high. 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. Occurs in grassland or grassy woodland, often found in damp sites in association with Kangaroo Grass (<i>Themeda australis</i>). A root parasite	0	Marginal – some areas of Kangaroo Grass	Unlikely – does occur in IBRA subregion	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			that takes water and some nutrients from other plants, especially Kangaroo Grass. Flowering is predominantly in spring and summer.		present, but likely too dry.	of site; no records in the area.	
<i>Triplarina nowraensis</i> Nowra Heath-myrtle	E	E	A small erect shrub which can attain a maximum height of 5m. Known from only five small populations in the Nowra area. Three of these form a cluster to the immediate west of Nowra in an area 6 km by 2.5 km. These sites occur on Nowra Sandstone. The fourth population occurs in the Boolijong Creek valley, and the remaining population is located north of the Shoalhaven River and appears to be confined to the plateau above Bundanoon; more specifically, it is restricted to the creeklines north of Illaroo Road. There are a number of <i>Baeckea sens. lat.</i> that grow in association with the Nowra Heath-myrtle: <i>B. ramosissima</i> , <i>B. virgata</i> , <i>B. imbricata</i> , <i>B. diosmifolia</i> , <i>B. brevifolia</i> and <i>B. linifolia</i> . Has only been found between the elevations of 10 and 220 m. Often found on moist soils or poorly drained sites such as water courses and bedrock surfaces with impeded drainage although two populations are known to occur in drier sites. Populations occur in forest and woodland communities that are dominated by <i>Eucalyptus punctata</i> , <i>E. aggregata</i> , <i>E. sclerophylla</i> , <i>E. consideniana</i> , <i>E. piperita</i> and <i>Corymbia gummifera</i> . Because of the preference for wetter sites, the species is often found in patches that are treeless or with a very open canopy. The species may also be found in sandstone sedgeland or shrubland dominated by <i>Kunzea ambigua</i> . Flowers in spring.	0	Absent - not associated with PCTs on site	None	No
<i>Zieria baeuerlenii</i> Bomaderry Zieria	E	E	A much-branched, rounded to straggly shrub usually 50-80 cm high. The species occurs in only one location north-west of Nowra. The population occurs in a total of 43 colonies in six discrete clusters. These clusters are confined within a 0.5 km x 1.0 km area of the bushland, and are found on both sides of Bomaderry Creek. Bomaderry Zieria occurs on skeletal sandy	0	Absent - not associated with PCTs on site	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			loam overlaying sandstone, on a rocky plateau amongst sandstone boulders in either shrubby open forest, shrubby woodland or closed scrub. Common associated forest and woodland species are <i>Eucalyptus punctata</i> , <i>E. agglomerata</i> , <i>Corymbia gummifera</i> and <i>C. maculata</i> and <i>Syncarpia glomulifera</i> with a shrub understorey including <i>Kunzea ambigua</i> , <i>Leptospermum flavescens</i> , <i>Acacia suaveolens</i> , <i>Banksia spinulosa</i> , <i>Davesia ulicifolia</i> , <i>Platysace lanceolata</i> , <i>Hakea sericea</i> , <i>Lomandra glauca</i> , <i>Themeda triandra</i> and <i>Plectranthus parviflorus</i> . Flowers are produced prolifically from August to October.				
Zieria granulata Illawarra Zieria	E	E	An erect and bushy shrub, to 6 m high. Restricted to the Illawarra region where it is recorded from a number of sites. The species primarily occupies the coastal lowlands between Oak Flats and Toolijooa, in the local government areas of Shellharbour and Kiama. This is a range of approximately 22 kilometres. The typical habitat is dry ridge tops and rocky outcrops on shallow volcanic soils, usually on Bumbo Latite. Less frequently found on the moist slopes of the Illawarra escarpment and in low-lying areas on Quaternary sediments. Associated vegetation includes Bracelet Honey-myrtle <i>Melaleuca armillaris</i> scrub, Forest Red Gum <i>Eucalyptus tereticornis</i> woodland and rainforest margins, although the species has been recorded from a number of other vegetation types. Much of the natural habitat for the species has been removed and many sites now occupy road verges and paddock edges and dense thickets of Lantana. Flowering occurs between early spring and summer. Observed to coppice from damaged stems in response to physical disturbance including grazing and slashing, although the age at which the species is capable of this is not known. White flowers occur August to October, or between late spring to summer, with fruiting specimens observed in summer.	35	Marginal – associated with grassy woodland however ridge tops and outcrops absent from site	Possible – relatively common in surrounding region, but little suitable habitat in the study area and not found during targeted surveys	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
Zieria tuberculata Warty Zieria	V	V	A rounded, open to moderately dense shrub, to 3.5 m high. Grows in the Mt Dromedary and Tilba Tilba area on the south coast of NSW. The population in the Cambewarra Mountain area near Nowra is now referable to a separate taxon. Grows in heath amongst rocky outcrops on rain forest edges and in tall forest and shrubland. The species occasionally extends into the eucalypt forest understorey. Associated heath species include <i>Kunzea ambigua</i> , <i>Acacia mearnsii</i> , <i>Beyeria lasiocarpa</i> , <i>Ficus rubiginosa</i> , <i>Prostanthera nivea</i> , <i>Dodonaea viscosa</i> , <i>Notelaea venosa</i> , <i>Plectranthus parviflorus</i> , <i>Dendrobium speciosum</i> and <i>Coprosma</i> sp. The flowers appear from late winter to spring with fruits observed in summer.	0	Absent – not associated with PCTs on site	None	No
Endangered Ecological Communities							
Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions	EEC		Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions typically has a dense to open tree canopy, approximately 5 - 20 m tall, depending on exposure and disturbance history. The most common tree species include <i>Eucalyptus botryoides</i> (Bangalay) and <i>Banksia integrifolia</i> subsp. <i>integrifolia</i> (Coast Banksia), while <i>Eucalyptus pilularis</i> (Blackbutt) and <i>Acmena smithii</i> (Lilly Pilly) may occur in more sheltered situations, and <i>Casuarina glauca</i> (Swamp Oak) may occur on dunes exposed to salt-bearing sea breezes or where Bangalay Sand Forest adjoins Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions, as listed under the Threatened Species Conservation Act 1995. The open shrub stratum may be dominated by sclerophyllous species, such as <i>Banksia serrata</i> (Old Man Banksia), <i>Leptospermum laevigatum</i> (Coast Teatree) and <i>Monotoca elliptica</i> , or mesophyllous, species, such as <i>Breynia oblongifolia</i> (Coffee Bush) and <i>Pittosporum undulatum</i> (Sweet Pittosporum), or a combination of both. Shrubs may vary in height from one to ten m tall. The groundcover varies from open to dense, and may be sparse		Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			where the tree canopy is dense or where there is a thick litter of leaves and branches. Dominant species include <i>Dianella</i> spp. (Blue Flax Lilies), <i>Lepidosperma concavum</i>, <i>Lomandra longifolia</i> (Spiny-headed Matrush), <i>Pteridium esculentum</i> (Bracken), and the grasses <i>Imperata cylindrica</i> var. <i>major</i> (Blady Grass), <i>Microlaena stipoides</i> var. <i>stipoides</i> (Weeping Grass) and <i>Themeda australis</i> (Kangaroo Grass), while herbs, such as <i>Desmodium gunnii</i>, <i>Dichondra repens</i> (Kidney Weed), <i>Pratia purpurascens</i> (Whiteroot) and <i>Viola hederacea</i> (Ivy-leaved Violet), are scattered amongst the larger plants. Vines of <i>Glycine clandestina</i>, <i>Hardenbergia violacea</i> (False Sarsparilla), <i>Kennedia rubicunda</i> (Running Postman), <i>Marsdenia rostrata</i> (Common Milk Vine) and <i>Stephania japonica</i> var. <i>discolor</i> (Snake Vine) scramble through the groundcover and occasionally over shrubs or tree trunks. Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions is currently known from parts of the Local Government Areas of Sutherland, Wollongong, Shellharbour, Kiama, Shoalhaven, Eurobodalla and Bega Valley but may occur elsewhere in these bioregions.				
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	EEC		Coastal Saltmarsh occurs in the intertidal zone along the NSW coast on the shores of estuaries and lagoons that are permanently or intermittently open to the sea. It is frequently found as a zone on the landward side of mangrove stands. Characteristic plants include <i>Baumea juncea</i>, <i>Juncus kraussii</i>, <i>Sarcocornia quinqueflora</i>, <i>Sporobolus virginicus</i>, <i>Triglochin striata</i>, <i>Isolepis nodosa</i>, <i>Samolus repens</i>, <i>Selliera radicans</i>, <i>Suaeda australis</i> and <i>Zoysia macrantha</i>. Occasionally mangroves are scattered through the saltmarsh. Tall reeds may also occur, as well as salt pan. Species composition varies with elevation and latitude, with Saltmarsh in southern NSW being generally more species-rich than further north. The sediment surface may support a diversity of seaweed species. Species restricted to coastal saltmarshes include <i>Distichlis distichophylla</i> (endangered), <i>Halosarcia pergranulata</i>		Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			<i>subsp. pergranulata</i> , <i>Wilsonia backhousei</i> (vulnerable) and <i>Wilsonia rotundifolia</i> (endangered). Coastal Saltmarsh occurs in a number of conservation reserves including the Ramsar listed sites at Towra Point and Kooragang Island Nature Reserves, and at Sydney Olympic Park.				
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	EEC		Associated with coastal areas subject to periodic flooding and in which standing fresh water persists for at least part of the year in most years. Typically occurs on silts, muds or humic loams in low-lying parts of floodplains, alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes but may also occur in backbarrier landforms where floodplains adjoin coastal sandplains. Generally, they occur below 20 m elevation on level areas. They are dominated by herbaceous plants and have very few woody species. The structure and composition of the community varies both spatially and temporally depending on the water regime: Those that lack standing water most of the time are usually dominated by dense grassland or sedgeland vegetation, often forming a turf less than 0.5 metre tall and dominated by amphibious plants including <i>Paspalum distichum</i> (water couch), <i>Leersia hexandra</i> (swamp rice-grass), <i>Pseudoraphis spinescens</i> (mud grass) and <i>Carex appressa</i> (tussock sedge). Where they are subject to regular inundation and drying the vegetation may include large emergent sedges over 1 metre tall, such as <i>Baumea articulata</i> , <i>Eleocharis equisetina</i> and <i>Lepironia articulata</i> , as well as emergent or floating herbs such as <i>Hydrocharis dubia</i> (frogbit), <i>Philydrum lanuginosum</i> (frogsmouth), <i>Ludwigia peploides</i> subsp. <i>montevidensis</i> (water primrose), <i>Marsilea mutica</i> (nardoo) and <i>Myriophyllum</i> spp. (milfoils). As standing water becomes deeper or more permanent, amphibious and emergent plants become less abundant, while floating and submerged aquatic herbs become more abundant. These latter species include <i>Azolla filiculoides</i> var. <i>rubra</i> , <i>Ceratophyllum demersum</i> (hornwort), <i>Hydrilla verticillata</i> (water thyme),		Present – degraded wetlands present in southern half of study area on private property.	Present – as SEPP14 wetland and nearby wetland areas.	Yes

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Lemna</i> spp. (duckweeds), <i>Nymphaea gigantea</i> (giant waterlily), <i>Nymphoides indica</i> (water snowflake), <i>Ottelia ovalifolia</i> (swamp lily) and <i>Potamogeton</i> spp. (pondweeds). The threatened aquatic plants, <i>Aldrovanda vesiculosa</i> and <i>Najas marina</i>, also occur within this community. Known from along the majority of the NSW coast. However, it is distinct from Sydney Freshwater Wetlands which are associated with sandplains in the Sydney Basin bioregion. Extensively cleared and modified. In the 1990s the extent remaining were: 3% in the NSW North Coast bioregion, 66% in the lower Hunter – Central coast region, 40% on the Cumberland Plain, 70% in the Sydney – South Coast region, and 30% in the Eden region. There is less than 150 ha remaining on the Tweed lowlands (estimate in 1985); about 10,600 ha on the lower Clarence floodplain (in 1982); about 11,200 ha on the lower Macleay floodplain (in 1983); about 3,500 ha in the lower Hunter – Central Hunter region (in 1990s); less than 2,700 ha on the NSW south coast from Sydney to Moruya (in the mid-1990s), including about 660 ha on the Cumberland Plain (in 1998) and about 100 ha on the Illawarra Plain (in 2001); and less than 1000 ha in the Eden region (in 1990). Poorly reserved, known to occur in Ukerebagh, Tuckean, Tabbimoble Swamp, Hexham Swamp, Pambalong and Pitt Town Nature Reserves and Bungawalbin, Scheyville and Seven Mile Beach National Parks.							
Illawarra Lowlands Woodland in the Sydney Basin Bioregion	EEC		This community comprises vegetation types that occupy the Illawarra coastal plain and escarpment foothills. Characteristic tree species include Forest Red Gum <i>Eucalyptus tereticornis</i> , Thin-leaved Stringybark <i>Eucalyptus eugenioides</i> , Woollybutt <i>Eucalyptus longifolia</i> , Coast Grey Box <i>Eucalyptus bosistoana</i> and White Feather Honey-myrtle <i>Melaleuca decora</i> . The understorey is not necessarily grassy as moist forest vegetation types are also included within this broad community. Common shrub species include <i>Acacia mearnsii</i> and <i>Dodonaea viscosa</i> subsp. <i>angustifolia</i> . Floodplain		Present – includes remnant vegetation and regrowth.	Present – in northern half of proposal site, e.g. on	Yes

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			vegetation dominated by <i>Casuarina</i> species or rainforests on latite soils are not part of this community. Recorded from the local government areas (LGAs) of Wollongong, Shellharbour and Kiama, and Shoalhaven. Not recorded within formal conservation reserves, although some remnants occur in small council reserves including Blackbutt Reserve and Croom Road Reserve in Shellharbour LGA. Occurs near coastal areas below about 200 metres on gently undulating terrain. Occurs on Berry Siltstone, Budgong Sandstone and Quaternary Alluvium. Much of this community has been cleared and it now occurs chiefly as scattered fragments. Provides habitat for the endangered orchid <i>Pterostylis gibbosa</i> . Some remnants consist of regrowth after clearing or other disturbances.			Transgrid property.	
Illawarra Subtropical Rainforest in the Sydney Basin Bioregion	EEC		A rainforest community that occupies high nutrient soils in the Illawarra region, south of Sydney. Characteristic tree species include <i>Baloghia inophylla</i> (Brush Bloodwood), <i>Brachychiton acerifolius</i> (Flame Tree), <i>Dendrocnide excelsa</i> (Giant Stinging Tree), <i>Diploglottis australis</i> (Native Tamarind), <i>Ficus</i> spp., <i>Pennantia cunninghamii</i> (Brown Beech), and <i>Toona ciliata</i> (Red Cedar). Species of <i>Eucalyptus</i> , <i>Syncarpia</i> and <i>Acacia</i> may also be present as emergents or incorporated into the dense canopy. While rainforest canopies are generally closed, in highly disturbed stands the canopy of Illawarra Subtropical Rainforest (ISR) may be irregular and open. The height of the canopy varies considerably, and structurally some stands of ISR are scrub. Recorded from the local government areas of Wollongong, Shellharbour, Shoalhaven and Kiama, but may occur elsewhere in the Sydney Basin Bioregion. The main occurrences of ISR are located between Albion Park and Gerringong (referred to as the Illawarra Brush in Mills & Jakeman 1995) and on the Berkeley Hills north of Lake Illawarra (referred to as the Berkeley Brush in Mills & Jakeman 1995). Outlying occurrences extend south to the Shoalhaven River and west into the Kangaroo Valley.		Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			Small areas of ISR occur in Budderoo National Park, Macquarie Pass National Park, Morton National Park, Cambewarra Range Nature Reserve, Devils Glen Nature Reserve and Rodway Nature Reserve. Occupies the Illawarra coastal plain and escarpment foothills, rarely extending onto the upper escarpment slopes. Usually found on Permian volcanic rocks, but can occur on a range of rock types.				
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	EEC		Generally a closed forest, the structure and composition of which is strongly influenced by its proximity to the ocean. The plant species of this community are predominantly rainforest species. Several species have compound leaves, and vines may be a major component of the canopy. These features differentiate littoral rainforest from forest or scrub, but while the canopy is dominated by rainforest species, scattered emergent individuals of sclerophyll species, such as <i>Angophora costata</i> , <i>Banksia integrifolia</i> , <i>Eucalyptus botryoides</i> and <i>Eucalyptus tereticornis</i> occur in many stands. Littoral Rainforest occurs only on the coast and is found at locations in the NSW North Coast Bioregion, Sydney Basin Bioregion and South East Corner Bioregion. Littoral Rainforest is very rare and occurs in many small stands. In total, it comprises less than one percent of the total area of rainforest in NSW. The largest known stand occurs in Iluka Nature Reserve, which is about 136 hectares in size. Occurs on sand dunes and on soil derived from underlying rocks. Stands on headlands exposed to strong wind-action may take the form of dense, wind-pruned thickets. Stands are generally taller in sheltered sites such as hind dunes, although wind-pruning may still occur on their windward sides. Most stands occur within two kilometres of the sea, though are occasionally found further inland within reach of the maritime influence. A number of species characteristic of Littoral Rainforest in NSW reach their southern limits at various places along the coast; a number of temperate species are restricted to the south coast; the total Littoral		Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			Rainforest flora declines from north to south. The species composition (flora and fauna) of a site will be influenced by its geographic location, the size of the site, its degree of exposure and rainfall, its disturbance history (including fire) and, if previously disturbed, the stage of regeneration.				
Melaleuca armillaris Tall Shrubland in the Sydney Basin Bioregion	EEC		A dense, dry shrubland to about five metres tall, which is dominated by the large Paperbark shrub, <i>Melaleuca armillaris</i> (Bracelet Honey-myrtle). Characteristic tree and shrub species include <i>Acacia mearnsii</i> (Black Wattle), <i>Alphitonia excelsa</i> (Red Ash), <i>Commersonia fraseri</i> (Brown Kurrajong), <i>Dodonaea viscosa</i> ssp. <i>viscosa</i> , <i>Hibiscus heterophyllus</i> (Native Rosella), and <i>Prostanthera linearis</i> . Characteristic groundcovers include <i>Bracteantha bracteata</i> (Golden Everlasting), <i>Calandrinia pickeringii</i> (Pink Purslane), <i>Cheilanthes distans</i> (Bristly Cloak Fern), <i>C. sieberi</i> (Mulga Fern), <i>Commelina cyanea</i> (Scurvy Weed), <i>Crassula sieberana</i> (Austral Stonecrop), and <i>Plectranthus graveolens</i> . The community also provides habitat for large populations of the endangered shrub <i>Zieria granulata</i> (Illawarra Zieria). Dense stands of <i>M. armillaris</i> on coastal headlands are not included within this ecological community. Occurs in the local government areas of Shellharbour and Kiama, where remnants have been recorded at Dunmore, Jamberoo Valley, and in small patches in and around Killalea State Park. May occur elsewhere within the Sydney Basin Bioregion. Occupies very dry rocky ridges away from the coast, usually where volcanic soils overlay latite. The shrub component of the community can die back during drought as the soils are shallow and unable to retain moisture.		Absent	None	No
Montane Peatlands and Swamps of the New England Tableland, NSW	EEC		Comprises a dense, open or sparse layer of shrubs (including species of <i>Baeckea</i> , <i>Callistemon</i> and <i>Leptospermum</i>) with soft-leaved sedges, grasses and forbs. It is the only type of wetland that may contain more than trace amounts of <i>Sphagnum</i> spp., the hummock peat-forming mosses. Small trees may be present as scattered emergents or absent. currently known from		Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions			parts of the Local Government Areas of Armidale Dumaresq, Bega Valley, Bellingen, Blue Mountains, Bombala, Cooma-Monaro, Eurobodalla, Gloucester, Greater Argyle, Guyra, Hawkesbury, Lithgow, Oberon, Palerang, Severn, Shoalhaven, Snowy River, Tenterfield, Tumbarumba, Tumut, Upper Lachlan and Wingecarribee but may occur elsewhere in these bioregions. The community is currently known from conservation reserves including Werrikimbee, Barrington, Kanangra-Boyd, Monga, Wadbilliga, South East Forests and Kosciusko National Parks. The Montane Peatlands community is associated with accumulated peaty or organic-mineral sediments on poorly drained flats in the headwaters of streams. It occurs on undulating tablelands and plateaux, above 400-500 m elevation, generally in catchments with basic volcanic or fine-grained sedimentary substrates or, occasionally, granite.				
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	EEC		This EEC is found on the river flats of the coastal floodplains. It has a tall open tree layer of eucalypts, which may exceed 40 m in height. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include <i>Eucalyptus tereticornis</i> (forest red gum), <i>E. amplifolia</i> (cabbage gum), <i>Angophora floribunda</i> (rough-barked apple) and <i>A. subvelutina</i> (broad-leaved apple). <i>Eucalyptus baueriana</i> (blue box), <i>E. botryoides</i> (bangalay) and <i>E. elata</i> (river peppermint) south from Sydney. A layer of small trees may be present, including <i>Melaleuca decora</i> , <i>M. styphelioides</i> (prickly-leaved teatree), <i>Backhousia myrtifolia</i> (grey myrtle), <i>Melia azaderach</i> (white cedar), <i>Casuarina cunninghamiana</i> (river oak) and <i>C. glauca</i> (swamp oak). Scattered shrubs include <i>Bursaria spinosa</i> , <i>Solanum prinophyllum</i> , <i>Rubus parvifolius</i> , <i>Breynia oblongifolia</i> , <i>Ozothamnus diosmifolius</i> , <i>Hymenanthera dentata</i> , <i>Acacia floribunda</i> and <i>Phyllanthus gunnii</i> . The groundcover is composed of abundant forbs, scramblers and grasses including <i>Microlaena stipoides</i> , <i>Dichondra repens</i> ,		Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			<i>Glycine clandestina</i>, <i>Oplismenus aemulus</i>, <i>Desmodium gunnii</i>, <i>Pratia purpurascens</i>, <i>Entolasia marginata</i>, <i>Oxalis perennans</i> and <i>Veronica plebeia</i>. The composition and structure of the understorey is influenced by grazing and fire history, changes to hydrology and soil salinity and other disturbance, and may have a substantial component of exotic shrubs, grasses, vines and forbs. Associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. Generally occurs below 50 m elevation, but may occur on localised river flats up to 250 m above sea level. The structure of the community may vary from tall open forests to woodlands, although partial clearing may have reduced the canopy to scattered trees. Typically form mosaics with other floodplain forest communities and treeless wetlands, and often fringe treeless floodplain lagoons or wetlands with semi-permanent standing water. Given its habitat, the community has an important role in maintaining river ecosystems and riverbank stability.				
Robertson Basalt Tall Open-forest in the Sydney Basin Bioregion	EEC		An open forest or woodland reaching to 30 m tall with a sparse to moderately dense shrub layer and a dense herbaceous ground layer. Dominant tree species include Brown Barrel <i>Eucalyptus fastigata</i>, Manna Gum <i>E. viminalis</i>, Narrow-leafed Peppermint <i>E. radiata</i> and Mountain Grey Gum <i>E. cypellocarpa</i>. Blackwood <i>Acacia melanoxylon</i> is a common small tree species in this community. Common shrubs include <i>Coprosma quadrifida</i> and <i>Senecio linearifolius</i>. The composition of the community varies across its distribution, largely reflecting a rainfall gradient from east (near the Illawarra Escarpment) to west (near Bundanoon). Restricted chiefly to occurrences of Robertson Basalt on the Southern Highlands of NSW but also found on the Cambewarra Range to the south. It is found in the Wingecarribee and Shoalhaven local government areas, but may occur elsewhere in the Sydney Basin Bioregion. Found on highly fertile soils		Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			derived from basalt. Found mostly on rolling hills on gentle to steep slopes. Occurs in areas with rainfall between 1000 mm to 1600 mm. Disturbed remnants are considered to form part of the community if the vegetation is likely to respond to assisted natural regeneration. About 400 hectares, or less than 15% of this community's original occurrence has been estimated to remain. Most remnants are small and isolated pockets on private land.				
Robertson Rainforest in the Sydney Basin Bioregion	EEC		A warm or cool temperate rainforest with a generally dense structure. It is dominated by Possumwood <i>Quintinia sieberi</i> , Featherwood <i>Polyosma cunninghamii</i> , Sassafras <i>Doryphora sassafras</i> and Blackwood <i>Acacia melanoxylon</i> . Common shrub species include Tree Violet <i>Hymenanthera dentata</i> , Prickly Coprosma <i>quadrifida</i> and Brush Pepperbush <i>Tasmannia insipida</i> . Robertson Rainforest has a restricted distribution in the eastern parts of the Southern Highlands of NSW. There are two main occurrences of the community within this distribution; the principal occurrence is on the Robertson Plateau around the town of Robertson (within 8km) on the Southern Highlands; the second is on the higher parts of the Cambewarra Range further to the south where it is less widespread. It occurs in the Wingecarribee and Shoalhaven local government areas, but may occur elsewhere in the Sydney Basin Bioregion. Occurs almost exclusively on highly fertile soils derived from basalt and basanite. Occurs on the gently undulating Robertson Plateau in the eastern parts of the Southern Highlands, at altitudes of between 500 to 700 metres. Appears to be restricted to the Robertson Basalt; no observations of the community have been recorded on the surrounding Wianamatta Shale. Disturbed remnants are considered to form part of the community if the vegetation is likely to respond to assisted natural regeneration. Between 400 and 600 hectares, or about 20% of this community's original extent is estimated to survive. Remnants are highly fragmented, with most occurring on private land.		Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
Southern Sydney sheltered forest on transitional sandstone soils in the Sydney Basin Bioregion	EEC		An open forest dominated by eucalypts with scattered subcanopy trees, a diverse shrub layer and a well-developed groundcover of ferns, forbs, grasses and graminoids. The dominant trees include <i>Angophora costata</i> , <i>Eucalyptus piperita</i> and occasionally <i>Eucalyptus pilularis</i> , particularly around Helensburgh. Associated with occurrences of <i>Eucalyptus pilularis</i> , <i>Acacia binervata</i> , <i>Elaeocarpus reticulatus</i> , <i>Pittosporum undulatum</i> and a relatively dense groundcover of ferns, grasses, rushes, lilies and forbs. The community typically has an open forest structure, although disturbance may result in local manifestations as woodland or scrub. Found within an estimated total extent of less than 45 000 ha, bounded approximately by Hurstville, Carss Park, Bundeena, Otford, Stanwell Tops, Darkes Forest, Punchbowl Creek and Menai. Within this range, the community is currently estimated to occupy an area of approximately 400 - 4 000 ha. The community has been recorded from the local government areas of Campbelltown, Hurstville, Kogarah, Sutherland, Wollondilly and Wollongong within the Sydney Basin Bioregion and may occur elsewhere in the Bioregion. In Hurstville, Kogarah and Sutherland, the community persists as small fragments surrounded by urban development. The community is also present in the upper Hacking River catchment around Helensburgh and in Royal National Park. The terrain is primarily gentle, with slopes not often exceeding 10°, and where sandstone outcrops occur infrequently. The community is typically associated with sheltered heads and upper slopes of gullies on transitional zones where sandstone outcrops may exist, but where soils are influenced by lateral movement of moisture, nutrients and sediment from more fertile substrates.		Absent	None	No
Swamp Oak Floodplain Forest of the New South	EEC		This community is found on the coastal floodplains of NSW. It has a dense to sparse tree layer in which <i>Casuarina glauca</i> (Swamp Oak) is the dominant species northwards from Bermagui. Other trees including <i>Acmena smithii</i>		Present	Present Croom	– Yes – approximat

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
Wales Coast, Basin and East Bioregions			North Sydney and South Corner (Lilly Pilly), <i>Glochidion</i> spp. (Cheese Trees) and <i>Melaleuca</i> spp. (Paperbarks) may be present as subordinate species, and are found most frequently in stands of the community northwards from Gosford. Tree diversity decreases with latitude, and <i>Melaleuca ericifolia</i> is the only abundant tree in this community south of Bermagui. Known from parts of the Local Government Areas of Tweed, Byron, Lismore, Ballina, Richmond Valley, Clarence Valley, Coffs Harbour, Bellingen, Nambucca, Kempsey, Hastings, Greater Taree, Great Lakes, Port Stephens, Maitland, Newcastle, Cessnock, Lake Macquarie, Wyong, Gosford, Pittwater, Warringah, Hawkesbury, Baulkham Hills, Hornsby, Lane Cove, Blacktown, Auburn, Parramatta, Canada Bay, Rockdale, Kogarah, Sutherland, Penrith, Fairfield, Liverpool, Bankstown, Wollondilly, Camden, Campbelltown, Wollongong, Shellharbour, Kiama, Shoalhaven, Eurobodalla and Bega Valley but may occur elsewhere in these bioregions. Major examples once occurred on the floodplains of the Clarence, Macleay, Hastings, Manning, Hunter, Hawkesbury, Shoalhaven and Moruya Rivers. Small areas of Swamp Oak Floodplain Forest are contained within existing conservation reserves, including Stotts Island, Ukerebagh, Tuckean, Pambalong, Wamberal, Towra Point and Cullendulla Creek Nature Reserves and Bongil Bongil, Myall Lakes and Conjola National Parks. Associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Generally occurs below 20 m (rarely above 10 m) elevation. The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees. Often fringes treeless floodplain lagoons or wetlands with semi-permanent standing water.			Sporting Complex and Macquarie Rivulet (degraded)	ely 0.55 ha would be removed

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	EEC		Usually an open to closed forest with a shrubby or reedy/ferny understorey. Has an open to dense tree layer of eucalypts and paperbarks although some remnants now only have scattered trees as a result of partial clearing. The trees may exceed 25 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality where the tree stratum is low and dense. For example, stands dominated by <i>Melaleuca ericifolia</i> typically do not exceed 8 m in height. The community also includes some areas of fernland and tall reedland or sedgeland, where trees are very sparse or absent. The most widespread and abundant dominant trees include <i>Eucalyptus robusta</i> (Swamp Mahogany), <i>Melaleuca quinquenervia</i> (Paperbark) and, south from Sydney, <i>Eucalyptus botryoides</i> (Bangalay) and <i>Eucalyptus longifolia</i> (Woollybutt). This community is known from parts of the Local Government Areas of Tweed, Byron, Lismore, Ballina, Richmond Valley, Clarence Valley, Coffs Harbour, Bellingen, Nambucca, Kempsey, Hastings, Greater Taree, Great Lakes and Port Stephens, Lake Macquarie, Wyong, Gosford, Hornsby, Pittwater, Warringah, Manly, Liverpool, Rockdale, Botany Bay, Randwick, Sutherland, Wollongong, Shellharbour, Kiama and Shoalhaven but may occur elsewhere in these bioregions. The exact amount of its original extent is unknown but it is much less than 30%. There are less than 350 ha of native vegetation attributable to this community on the Tweed lowlands, less than 2,500 ha on the Clarence floodplain, less than 700 ha on the Macleay floodplain, up to 7,000 ha in the lower Hunter – central coast district, and less than 1,000 ha in the Sydney – South Coast region. Small areas of Swamp Sclerophyll Forest on Coastal Floodplains are contained within existing conservation reserves, including Bungawalbin, Tuckean and Moonee Beach Nature Reserves, and Hat Head, Crowdy Bay, Wallingat, Myall Lakes and Garigal National Parks. Associated with humic clay loams and sandy loams, on waterlogged or periodically		Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			inundated alluvial flats and drainage lines associated with coastal floodplains. Generally occurs below 20 m (though sometimes up to 50 m) elevation. The composition of the community is primarily determined by the frequency and duration of waterlogging and the texture, salinity nutrient and moisture content of the soil, and latitude. The understorey may have a substantial component of exotic grasses, vines and forbs. Often fringes treeless floodplain lagoons or wetlands with semi-permanent standing water.				
<i>Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions</i>	EEC		The structure of the community is typically closed tussock grassland, but may be open shrubland or open heath with a grassy matrix between the shrubs. <i>Themeda australis</i> is the dominant species in this ecological community. <i>Themeda australis</i> is an extremely widespread species, but in this community it may have a distinctive appearance, being prostrate and having glaucous leaves. These features are retained in cultivation and the form is believed to be genetically distinct. Scattered shrubs occur in many stands, most frequently <i>Pimelea linifolia</i> , <i>Banksia integrifolia</i> and <i>Westringia fruticosa</i> . These and other woody species often have dwarf growth forms. A number of threatened species occur in some stands of the community, including <i>Diuris</i> sp. aff. <i>chrysantha</i> , <i>Pultenaea maritima</i> , <i>Rutidosus heterogama</i> , <i>Thesium australe</i> and <i>Zieria prostrata</i> . Themeda Grassland on seacliffs and coastal headlands is found on a range of substrates in the NSW North Coast, Sydney Basin and South East Corner bioregions. Stands on sandstone are infrequent and small. Larger stands are found on old sand dunes above cliffs, as for example at Cape Banks and Henry Head in Botany Bay National Park, and on basalt headlands, as for example at Damerals Head in Moonee Beach National Park. Individual stands of the community are often very small, a few square metres, but at some sites larger stands of up to several hectares or tens of hectares occur.		Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
Overall, the community has a highly restricted geographic distribution comprising small, but widely scattered patches.							
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion		EEC	Typically, tall open eucalypt forests found on basalt and basalt-like substrates in, or adjacent to, the Sydney Basin Bioregion. The ecological community usually occurs at elevations between 650 m and 1050 m above sea level, although outliers may occur at elevations as low as 350 m (e.g. closer to the coast) or as high as 1200 m a.s.l. (e.g. on higher plateaux). The ecological community occurs in areas of high rainfall, generally ranging from 1000 to 1800 mm/year. Varies from tall open forest to woodland depending on aspect, slope, soil conditions, soil depth, and previous disturbance. Typically, the ecological community has a sparse to dense layer of shrubs and vines, and a diverse understorey of native grasses, forbs, twiners and ferns. With increasing distance from the coast (and a corresponding decrease in rainfall), the understorey tends to grade from relatively mesic (significant component of rainforest species), to relatively scleric (more drought and fire-tolerant shrubs and a more prominent grass layer). Rainforest elements are also present in the more inland remnants with sheltered aspects and topography, and along watercourses. The ecological community may also be affected by cold air drainage and ponding resulting in a more open, grassy forest.		Absent	None	No
Migratory Birds							
Apus pacificus Fork-tailed Swift		M	This species breeds in the north-east and mid-east Asia and winters in Australia and southern New Guinea. It is a visitor to most parts of Western Australia, beginning to arrive in the Kimberley in late September, in the Pilbara and Eucla in November and in the south-west land division in mid-December, and leaving by late April. It is common in the Kimberley,		Present – aerial species	Possible	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			uncommon to moderately common near north-west, west and southeast coasts and rare to scarce elsewhere. They never settle voluntarily on the ground and spend most of their lives in the air, living on the insects they catch in their beaks.				
<i>Ardea alba</i> Great Egret		M	The Eastern Great Egret has been reported in a wide range of wetland habitats (for example inland and coastal, freshwater and saline, permanent and ephemeral, open and vegetated, large and small, natural and artificial). These include swamps and marshes; margins of rivers and lakes; damp or flooded grasslands, pastures or agricultural lands; reservoirs; sewage treatment ponds; drainage channels; salt pans and salt lakes; salt marshes; estuarine mudflats, tidal streams; mangrove swamps; coastal lagoons; and offshore reefs. The species usually frequents shallow waters. Eastern Great Egrets usually nest in colonies and rarely as solitary pairs. In Australia, breeding sites are located in wooded and shrubby swamps including mangrove forests (the main habitat of the species in the Top End), <i>Melaleuca</i> swamps (on the eastern coast of Australia and south-western Western Australia) and mixed eucalypt/acacia/lignum swamps (in the Channel Country and Murray-Darling Basin). The Eastern Great Egret has a diverse diet that includes fish, insects, crustaceans, molluscs, frogs, lizards, snakes and small birds and mammal.		Present	Possible	Yes
<i>Ardea ibis</i> Cattle Egret		M	The Cattle Egret is found in grasslands, woodlands and wetlands, and is not common in arid areas. It also uses pastures and croplands, especially where drainage is poor. Will also forage at garbage dumps, and is often seen with cattle and other stock. The Cattle Egret is partially migratory, moving during winter. The Cattle Egret prefers grasshoppers, especially during breeding season, but eats many other invertebrates. It also eats frogs, cane toads, lizards and some small mammals. Its sharp bill is used in a lunging and stabbing manner. It often feeds by following large animals such as cattle,		Present	Present	Yes

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			grabbing insects and worms that they disturb with their feet. They also will sit on cattle to look out for insects. Cattle Egret pairs are monogamous for the breeding season, and they breed in colonies, usually with other waterbirds. Their shallow platform nests are made in wetland areas in trees and bushes, usually as high up as possible. Both parents build the nest and incubate the eggs, with one brood per season being raised.				
<i>Gallinago hardwickii</i> Latham's Snipe		M	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity. Latham's Snipe does not breed within Australian jurisdiction. Latham's Snipe is an omnivorous species that feeds on seeds and other plant material (mainly from species in families such as Cyperaceae, Poaceae, Juncaceae, Polygonaceae, Ranunculaceae and Fabaceae), and on invertebrates including insects (mainly flies and beetles), earthworms and spiders and occasionally molluscs, isopods and centipedes.		Present	Present – observed twice on separate days	Yes
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle		M	White-bellied Sea-Eagles are a common sight in coastal and near coastal areas of Australia. Birds form permanent pairs that inhabit territories throughout the year. Their loud "goose-like" honking call is a familiar sound, particularly during the breeding season. Birds are normally seen, perched high in a tree, or soaring over waterways and adjacent land. In addition to Australia, the species is found in New Guinea, Indonesia, China, south-east Asia and India. The White-bellied Sea-Eagle feeds mainly off aquatic animals, such as fish, turtles and sea snakes, but it takes birds and mammals as well. It is a skilled hunter, and will attack prey up to the size of a swan. Sea-Eagles also feed on carrion (dead prey) such as sheep and fish along the waterline.		Present	Possible	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			They harass smaller birds, forcing them to drop any food that they are carrying. Sea-Eagles feed alone, in pairs or in family groups. White-bellied Sea-Eagles build a large stick nest, which is used for many seasons in succession. The nest can be located in a tree up to 30m above the ground, but may be also be placed on the ground or on rocks, where there are no suitable trees. At the start of the breeding season (May to October), the nest is lined with fresh green leaves and twigs. The female carries out most of the incubation of the two white eggs, but the male performs this duty from time to time.				
<i>Hirundapus caudacutus</i> White-throated Needletail		M	White-throated Needletails often occur in large numbers over eastern and northern Australia. They arrive in Australia from their breeding grounds in the northern hemisphere in about October each year and leave somewhere between May and August. They are aerial birds and for a time it was commonly believed that they did not land while in Australia. It has now been observed that birds will roost in trees, and radio-tracking has since confirmed that this is a regular activity. The White-throated Needletail feeds on flying insects, such as termites, ants, beetles and flies. They catch the insects in flight in their wide gaping beaks. Birds usually feed in rising thermal currents associated with storm fronts and bushfires and they are commonly seen moving with wind fronts. White-throated Needletails are non-breeding migrants in Australia.		Present – aerial species	Possible	No
<i>Merops ornatus</i> Rainbow Bee-eater		M	The Rainbow Bee-eater is found throughout mainland Australia, as well as eastern Indonesia, New Guinea and, rarely, the Solomon Islands. In Australia it is widespread, except in desert areas, and breeds throughout most of its range, although southern birds move north to breed. The Rainbow Bee-eater is most often found in open forests, woodlands and shrublands, and cleared areas, usually near water. It will be found on farmland with remnant vegetation and in orchards and vineyards. It will use disturbed sites such as		Present	Possible	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			quarries, cuttings and mines to build its nesting tunnels. Southern populations move north, often in huge flocks, during winter; northern populations are present year round. Rainbow Bee-eaters eat insects, mainly catching bees and wasps, as well as dragonflies, beetles, butterflies and moths. They catch flying insects on the wing and carry them back to a perch to beat them against it before swallowing them. Bees and wasps are rubbed against the perch to remove the stings and venom glands.				
<i>Monarcha melanopsis</i> Black-faced Monarch		M	The Black-faced Monarch is found along the coast of eastern Australia, becoming less common further south. The Black-faced Monarch is found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating. Resident in the north of its range, but is a summer breeding migrant to coastal south-eastern Australia, arriving in September and returning northwards in March. The Black-faced Monarch forages for insects among foliage, or catches flying insects on the wing. The Black-faced Monarch builds a deep cup nest of casuarina needles, bark, roots, moss and spider web in the fork of a tree, about 3 m to 6 m above the ground. Only the female builds the nest, but both sexes incubate the eggs and feed the young.		Marginal	Possible	No
<i>Monarcha trivirgatus</i> Spectacled Monarch		M	Has a very large range. Populate the north-east and east coast of Australia during their breeding season. In winter the southern races migrate northwards. During the breeding season race "gouldii" is found along the east coast and the eastern slopes of the ranges from the Hunter estuary in NSW up to about the Whitsundays, QLD. Spectacled Monarchs can usually be found in wet forest and mangroves.		Marginal	Possible	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
<i>Myiagra cyanoleuca</i> Satin Flycatcher		M	The Satin Flycatcher is found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. It is also found in New Guinea. The Satin Flycatcher is not a commonly seen species, especially in the far south of its range, where it is a summer breeding migrant. The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests. The Satin Flycatcher is a migratory species, moving northwards in winter to northern Queensland and Papua New Guinea, returning south to breed in spring. The Satin Flycatcher takes insects on the wing, foraging actively from perches in the mid to upper canopy.		Marginal – prefers wetter forests	Possible	No
<i>Rhipidura rufifrons</i> Rufous Fantail		M	The Rufous Fantail is found in northern and eastern coastal Australia, being more common in the north. It is also found in New Guinea, the Solomon Islands, Sulawesi and Guam. The Rufous Fantail is found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground. During migration, it may be found in more open habitats or urban areas. Strongly migratory in the south of its range, it moves northwards in winter, and virtually disappears from Victoria and New South Wales at this time. The Rufous Fantail feeds on insects, which it gleans from the middle and lower levels of the canopy. It is a very active feeder and constantly fans tail and flicks wings and body while foraging. The Rufous Fantail builds a small compact cup nest, of fine grasses bound with spider webs, that is suspended from a tree fork about 5 m from the ground. The bottom of the nest is drawn out into a long stem.		Marginal – prefers wetter environments	Unlikely	No
<i>Rostratula australis</i> Painted Snipe	E	V M	Little is known of the ecology, habitat requirements and reproductive biology of Australian Painted Snipe. They feed in shallow water or at the waters' edge and on mudflats, taking seeds and invertebrates such as insects, worms, molluscs and crustaceans. They lay 3-4 eggs per clutch and		Present	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas)	Presence of habitat	Likelihood of occurrence	Potential Impact
			incubation lasts about 15-16 days. Most records of Australian Painted Snipe are from temporary or infrequently filled freshwater wetlands and although they have occurred at many sites, no site can be identified in which they are resident or regular in occurrence. This may suggest the species is nomadic but the extent to which its cryptic behaviour may contribute to this belief is uncertain. The birds are able to remain hidden in rank vegetation, but many reports are of birds not being secretive, but rather still and unobtrusive. Primarily occurs along the east coast from north Queensland (excluding Cape York) to the Eyre Peninsula in South Australia, including the majority of Victoria and NSW. In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin. Inhabits inland and coastal shallow freshwater wetlands. The species occurs in both ephemeral and permanent wetlands, particularly where there is a cover of vegetation, including grasses, Lignum and Samphire. Individuals have also been known to use artificial habitats, such as sewage ponds, dams and waterlogged grassland. Nests on the ground amongst tall vegetation, such as grass tussocks or reeds. Forages nocturnally on mud flats and in shallow water. Breeding is often in response to local conditions; generally occurs from September to December.				

APPENDIX F EPBC ACT ASSESSMENTS OF SIGNIFICANCE

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) protects the environment, particularly Matters of National Environmental Significance (Protected matters). It streamlines the national environmental assessment and approvals process, protects Australian biodiversity and integrates management of important natural and cultural places. The Matters of National Environmental Significance are:

- Listed threatened species and ecological communities, including the following of relevance to the project;
 - Illawarra and South Coast Lowland Forest and Woodland (CEEC)
 - Illawarra Greenhood (*Pterostylis gibbosa*) (E)
 - Curved Rice Flower *Pimelea curviflora* var. *curviflora* (V)
 - Green and Golden Bell Frog (*Litoria aurea*) (V)
 - Grey-headed Flying-fox (*Pteropus poliocephalus*) (V)
 - Large-eared Pied-bat (*Chalinolobus dwyeri*) (V)
 - Australian Painted Snipe (*Rostratula australis*) (E)
 - Australasian Bittern (*Botaurus poiciloptilus*) (E)
- Migratory species protected under international agreements, including the following of relevance to the project;
 - Australian Painted Snipe (*Rostratula australis*)
 - Great Egret (*Ardea alba*)
 - Cattle Egret (*Ardea ibis*)
 - Latham's Snipe (*Gallinago hardwickii*)
- Ramsar wetlands of international importance;
- The Commonwealth marine environment;
- World Heritage properties;
- National Heritage places; and
- Nuclear actions.

An action will require approval if the action has, will have, or is likely to have a significant impact on a species listed in any of the following categories:

- Extinct in the wild;
- Critically endangered;
- Endangered; or
- Vulnerable.

An action will also require approval if the action has, will have, or is likely to have a significant impact on an ecological community listed in any of the following categories:

- Critically endangered: or
- Endangered.

Illawarra and South Coast Lowland Forest and Woodland CEEC

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

a) Reduce the extent of an ecological community

Illawarra and South Coast Lowland Forest and Woodland CEEC

Illawarra and South Coast Lowland Forest and Woodland (ISCLFW) occurs in two areas within the proposed development footprint; the Croom Reserve, and a patch that occurs across the TransGrid site and the Old Golf Course site.

The project will reduce the extent of the ecological community due to the clearing of approximately 7.22 ha. This loss represents approximately 0.31% of the 2,312.38 ha predicted to occur in the locality¹⁵ and approximately 0.18% of the total extent of the community remaining (4,032.2 ha) (DoEE, 2016).

b) Fragment or increase fragmentation of an ecological community

Illawarra and South Coast Lowland Forest and Woodland CEEC

Areas of ISCLFW were determined using the condition thresholds for patches of ISCLFW (Table 2 of DoEE, 2016). Therefore, the patches of ISCLFW proposed to be cleared as a result of the project were High Condition meaning that:

- *Eucalyptus tereticornis* and *E.longifolia* were typically present and often dominant in the mature tree canopy;
- They had a ground layer of native grasses, herbs and sedges or a native shrubby layer;
- They were at least 2 ha in size and had at least 50% of total perennial understorey vegetation cover being comprised of native species with at least 6 native plant species per 0.5 ha in the ground layer.

The project would directly impact several patches of ISCLFW, as shown in Table 7 and Attachment C. The total area of ISCLFW to be cleared is 7.22 ha; this constitutes 6.97% of the 103.6 ha of ISCLFW in the combined patches to be impacted. The loss represents approximately 0.31% of the 2,312.38 ha predicted to occur in the locality (ie within a 10 kilometre radius of the project) and approximately 0.18% of the total extent of the community remaining (4,032.2 ha) (TSSC, 2016).

¹⁵ Based on the SCIVI mapping of Tozer *et. al.* (2010) of the vegetation units GWp3 'South Coast Lowland Swamp Woodland' and GWp34 'South Coast Grassy Woodland' within a 10km radius of the development site. These vegetation units are listed as wholly or partially corresponding to the listed ecological community in the EPBC Conservation advice for the community (DoEE 2016). DoEE mapping of the likely distribution of the community also corresponds to the distribution of map units GWp3 and GWp34 mapped by Tozer *et. al.* (2010) albeit at a courser scale.

Location	Condition	Area within project footprint (ha)	Total patch size area (ha)	Percentage loss (%)
TransGrid and Old Golf Course patch	High	4.27	47.91	8.91
Croom Reserve patch	High	0.58	46.66	1.24
Road reserve patch	High	2.18	6.41	34.01
Borg patch	High	0.19	2.62	7.25
Total		7.22	103.6	6.97

The percentage of each patch to be cleared ranges from 1.24% to 34.01%. At the Croom Reserve patch and the Borg patch, only small areas at the edge of the patch would be impacted. The Croom Reserve patch has a large area to perimeter ratio and the small area to be impacted is already exposed to edge effects. As such, the impacts on this patch are expected to be minor. In the northern TransGrid and Old Golf Course and Road reserve patches, a higher proportion of each patch will be cleared (8.91% to 34.01%).

In the north of the project footprint, the ISCLFW currently persists as fragmented patches extending across the existing highway. The project will result in further fragmentation of these patches. Approximately 1.19 hectares of ISCLFW may be isolated in the western section of the Old Golf Course site following clearing of adjacent areas of the patch. There may still be adequate connectivity across Yallah Road, with a gap of 25-30 metres remaining. This section of the community was found to be of lower quality and is already fragmented. The continuing viability of this patch would depend on the future land uses in this area. The clearing of the western parts of the road reserve patch would result in the remaining area of the patch being further fragmented and isolated from the patches of ISCLFW to the west; however, these patches are currently separated by gaps of 100 metres, so there is no existing connectivity. The 4.23 ha of ISCLFW remaining in the road reserve patch adjoins other areas of vegetation to the north east. As such, its long term viability is unlikely to be affected by the project.

c) Adversely affect habitat critical to the survival of an ecological community

Illawarra and South Coast Lowland Forest and Woodland CEEC

There are no areas of critical habitat identified for this community on the EPBC Act Register of Critical Habitat, nor is there a recovery plan that lists critical habitat for this community.

The approved conservation advice for ISCLFW (TSSC, 2016) defines habitat critical to the survival of this community as areas that meet the minimum condition thresholds or are within the buffer zone of a minimum threshold patch. The extent of the buffer zone is not defined in the approved conservation advice, and it is noted that buffer zones are not part of the ecological community. The 7.22 ha of ISCLFW to be directly impacted in the project footprint is considered to contain habitat critical to the survival of the community.

d) Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival

Illawarra and South Coast Lowland Forest and Woodland CEEC

The project would impact on abiotic factors (such as soil) within the development footprint, but as the community would be removed from these areas, abiotic factors are irrelevant to the survival of the community in these areas.

There is the potential however, to modify abiotic factors that may have an influence on areas of the community outside of the development footprint. The alteration of hydrological processes is listed as a threat to ISCLFW (DoE, 2016). The Croom Reserve site, where approximately 0.58 ha of ISCLFW would be cleared due to the project, is a Groundwater Dependent Ecosystem (GDE) with groundwater flow direction at the alluvium aquifer from South to North. The ISCLFW in this area extends beyond the impact area and may be indirectly impacted by the project. The potential impacts of the project on this GDE is summarised below.

- The groundwater flow direction at the alluvium aquifer in the Croom Reserve GDE is from South to North and as such will not be affected by possible reduced flows along certain sections of the proposed alignment.
- The average drawdown predicted at the centreline (worst case) of the Albion Park Railway bypass is 1.6 m. Considering the proximity of the current water table to the land surface, the drawdown is unlikely to lower the water table to beyond the reach of the tree roots. Impacts would be considered minor.
- There is a potential risk to groundwater quality from accidental spills during construction and operation of the road. This could potentially impact GDEs but would be managed through appropriate water quality control measures to be adopted during construction and operation.

Potential groundwater impacts during construction and operation are therefore unlikely to impact the Croom Reserve GDE and associated ISCLFW.

There are no other abiotic factors necessary for the survival of ISCLFW outside of the development footprint, likely to be impacted by the project.

e) Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species

Illawarra and South Coast Lowland Forest and Woodland CEEC

As discussed above, there is unlikely to be any changes to hydrological flow caused by the project that would impact ISCLFW and hence change species composition at the Croom Reserve site.

During construction there is potential for unauthorised access or materials/machine storage in the adjacent areas (i.e. outside of the development footprint) of ISCLFW. This unauthorised access has potential to cause long term damage to the root systems of sedges, perennial forbs and rushes within the groundcover. Should this occur this could lead to a temporary change in height for the ground and shrub layers of the community and a temporary reduction in the number of individuals for obligate seeding woody shrubs. The implementation of safeguards to restrict access to ISCLFW outside the development footprint will reduce the potential for this impact to occur (see Section 5).

Following construction, there is the potential for edge effects and weed invasion to alter the species composition of the community on the periphery of the development footprint. These factors are already operating on the edges of the patches of the community that currently exist at the site. With the implementation of the safeguards detailed in Section 5, weed invasion would be managed and the project would be unlikely to exacerbate this process beyond what is currently existing.

Other factors such as the management of runoff, have been incorporated into the project design. There is unlikely to be a substantial increase or decrease in the influx of surface water to the community such that it would result in a notable change to species composition of the remaining areas of the community.

f) Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:

- assisting invasive species, that are harmful to the listed ecological community, to become established, or
- causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community

Illawarra and South Coast Lowland Forest and Woodland CEEC

Both patches of ISCLFW in the development footprint (TransGrid site and Old Golf Course Site, and Croom Reserve) currently already have noxious weeds present, of which Lantana (*Lantana camara*) is the most common. Weeds are listed as a threat to this community (DoE, 2016). Invasion of weeds causes competition for light, space, water and nutrients with naturally occurring species in the community. Invasion, establishment and spread of *Lantana camara* is also listed as a Key Threatening Process under the TSC Act and EPBC Act. Considering invasive weeds such as Lantana are already established in ISCLFW within the development footprint, it is unlikely that the project will further contribute to this threat. Mitigation measures have been recommended to prevent further spread of invasive weeds due to the project (see Section 5). Therefore, invasive species are considered unlikely to further impact on the occurrence of this community as a result of the project.

While there will be some use of fertilisers and pesticide around landscaping in the development footprint, the project will not result in regular use of fertilisers, herbicides or other chemicals or pollutants which would kill or inhibit the growth of the remaining areas of CEEC.

g) Interfere with the recovery of an ecological community

Illawarra and South Coast Lowland Forest and Woodland CEEC

A recovery plan or threat abatement actions have not been prepared for this community due to its only recent listing. However, a number of research and conservation actions have been listed in DoE (2016). Actions relevant to the project include:

- Protect from vegetation clearance and direct habitat damage
- Protect from weeds, disease and feral animals
- Offset as a last resort

The removal of a total of 7.22 ha out of a total of approximately 2,312.38 ha in the locality and approximately 0.18% of the total extent of the community remaining (4,032.2 ha) (DoEE, 2016) is considered to interfere with the action 'protect from vegetation clearance and direct habitat damage'. As such, the project has the potential to interfere with the recovery of this community.

Mitigation measures have been recommended to ensure weeds do not further invade the ISCLFW in the surrounding patches (see Section 5).

An offset plan has been committed to by the proponent to ensure all areas of ISCLFW impacted by project are appropriately offset (see Sections 6, 7 and 8).

Conclusion

The extent of Illawarra and South Coast lowland forest and woodland will be reduced by 7.22 ha and there will be some minor fragmentation of the community. The fragmentation that would occur is in a patch that is already isolated and fragmented. The loss represents approximately 0.31% of the 2,312.38 ha predicted to remain in the locality and approximately 0.18% of the total extent of the community remaining (4032.2 ha) (DoEE, 2016). This assessment has taken a precautionary approach and concludes that in

consideration of the available information the community is likely to be significantly impacted by the proposal as:

1. This community is of high conservation value – the existing patches contain a good diversity of species and provide threatened species habitat;
2. The project would impact on habitat critical to the survival of the community as defined in the conservation advice (DoEE 2016);
3. The removal of a total of 7.22 ha of this community may interfere with the recovery of the community in the locality or region.

Curved Rice Flower (*Pimelea curviflora* var. *curviflora*), Green and Golden Bell Frog (*Litoria aurea*), Grey-headed Flying-fox (*Pteropus poliocephalus*), and Large-eared Pied-bat (*Chalinolobus dwyeri*)

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

a) Lead to a long-term decrease in the size of an important population of a species

Curved Rice Flower (*Pimelea curviflora* var. *curviflora*)

The Curved Rice Flower variation in the Illawarra occurs in open forest woodland dominated by Forest Red Gum *Eucalyptus tereticornis*, Woollybutt *E. longifolia* and White Feather Honey-myrtle *Melaleuca decora* with a native grass understory (often *Themeda australis*). It prefers areas of open sunlight and is often found on the edges of woodland remnants. This species was recorded in Croom Reserve and in the Light Rail Museum site (approximately 19) during targeted surveys. Extensive surveys (approximately 83 hours during 2013 and 2014) were undertaken for this species in all areas of suitable habitat within and outside the development footprint. The populations within Croom Reserve and the Light Rail Museum are the only known populations in the local area. No individuals were recorded within the development footprint. Given that the project would not impact on any of the known records of this species in Croom Reserve and that no other individuals were located during the surveys and the habitat within the development footprint for this species is only considered marginal, it is unlikely that the project would lead to a long-term decrease in the size of the local population of this species.

Green and Golden Bell Frog (*Litoria aurea*)

The Green and Golden Bell Frog inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The closest known population to the development footprint occurs at Port Kembla at the eastern end of Foreshore Road, approximately 12 km from the development footprint. This species has not been recorded in or within two kilometres of the development footprint. Following targeted searches, the Green and Golden Bell Frog was not detected in any wetlands within the development footprint even though suitable habitat occurs in all wetlands in the development footprint. However, this habitat is not optimal as Plague Minnow was present in most wetlands. Approximately 8 ha of suitable wetland habitat will be lost or disturbed due to the project (including the dams in the old golf course and Frazer's Creek). A number of aquatic areas suitable for this species occur outside the development footprint in the local area including the wetlands in the True Energy land, other areas of the Macquarie Rivulet and Frazer's Creek, the wetland in the Illawarra Regional Airport, the dams and wetland within the Boral quarry, and the wetlands within Shell Cove Golf Course. As no individuals were detected in or adjacent to the development footprint and enough suitable habitat occurs outside the development footprint in the local area, the project is unlikely to lead to a long-term decrease in the size of the local population of this species.

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

The Grey-headed Flying-fox is an aerial forager feeding on nectar from the flowers of native trees and fruit from figs and exotic species. During the day this species roosts in camps in trees which are generally located within 20 km of food sources. The closest camp to the development footprint occurs in Figtree, Wollongong, approximately 12 km from the northern end of the development footprint. The Grey-headed Flying-fox was recorded feeding in fig trees and woodland within the development footprint and flying over during foraging expeditions. Approximately 30.6 ha of foraging habitat will be removed as a result of the project. The 30.34 ha includes 7.22 ha of Illawarra Lowlands Grassy Woodland EEC, 23.12 ha of derived Forest Red Gum - Thin-leaved Stringy grassy woodland, in the development footprint. This represents a very small percentage of the foraging habitat for this species in the locality. Other foraging habitat unaffected by this project and conserved in reserves occurs at the Illawarra TAFE Yallah site, Mount Brown Reserve, Blackbutt Reserve, Croom Reserve and further afield in surrounding national parks such as Macquarie Pass National Park. Furthermore, vegetation suitable for this species occurs in farming and urban land including isolated native trees and landscaped gardens with native trees and shrubs. Illawarra Lowlands Grassy Woodland EEC is listed in the draft National Recovery Plan for the Grey-headed Flying-fox as a community which will benefit from actions to recover the Grey-headed Flying-fox and therefore clearing of this community will negatively impact on the habitat of this species. 7.22 ha of this community would be removed due to the project. This represents approximately 0.33% of the 2210 ha of this community that occurs in the region. As the development footprint provides foraging habitat only and no Grey-headed Flying-fox camps occur within the development footprint the project is unlikely to lead to a long-term decrease in the size of the local population of this species. Furthermore, there is still approximately 2200 ha of ILGW in the region for the Grey-headed Flying-fox to forage on. Therefore, the project is unlikely to lead to a long-term decrease in the size of the local population of Grey-headed Flying-fox.

Large-eared Pied-bat (*Chalinolobus dwyeri*)

The Large-eared Pied-bat roosts in caves, cliff crevices, old mines and disused Fairy Martin mud nests. It forages below well-timbered forest and woodland canopies for flying insects.

This species was recorded within the development footprint. Given the paucity of roosting habitat for the Large-eared Pied-bat it is unlikely that this species would use the development footprint for roosting. Therefore, this species would only be using the site for foraging. Large expanses of similar foraging habitat for microbats can be found at Mount Brown Reserve, Blackbutt Reserve, the Light Rail Museum site, the Hargrave Avenue woodland site, Croom Reserve, the TransGrid Site and the woodland within the Yallah Illawarra TAFE site. It is therefore unlikely that the project would lead to a long-term decrease in the size of the local population of this species.

b) Reduce the area of occupancy of an important population

Curved Rice Flower (*Pimelea curviflora* var. *curviflora*)

Up to 7.22 ha of potential habitat for the Curved Rice Flower would be removed as a result of the project, all of which being ILGW. This excludes areas that are too heavily grazed or consist of predominantly exotic understory species. However, no individuals were recorded in suitable habitat within the development footprint so this habitat can only be considered as potential. Furthermore, the Curved Rice Flower was only recorded in Croom Reserve and the Light Rail Museum. Approximately 0.58 ha of potential habitat within Croom Reserve will be cleared of which no individuals of this species were recorded. Therefore, the area of occupancy for this species will not be reduced due to the project.

Green and Golden Bell Frog (*Litoria aurea*)

Approximately 8 ha of potential habitat for the Green and Golden Bell Frog would be removed as a result of the project (including all freshwater wetlands, the dams in the old golf course and Frazer's Creek). The potential habitat to be removed occurs in aquatic areas, in particular wetland areas with

a diversity of habitat features including nearby open grassy areas, diurnal sheltering sites, bulrushes or spikerushes vegetation, as well as being free of plague minnow. These areas are limited to the Frazer's Creek wetland complex, the larger dam north of the Macquarie Rivulet, the dams in the old golf course and the south-eastern wetland area near the east-west link / Princess Highway interchange. As the Green and Golden Bell Frog was not detected during targeted surveys and is unlikely to occur due to a lack of previous recordings in the development footprint, the area of occupancy of the local population of Green and Golden Bell Frog is unlikely to be reduced. Furthermore, an important population is not known from the development footprint.

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

Approximately 30.3 ha of foraging habitat for the Grey-headed Flying-fox would be removed as a result of the project, including areas of ILGW, other bushland areas, and planted and regenerated vegetation areas. Considering the Grey-headed Flying-fox is an aerial species capable of travelling many kilometres to forage (up to approximately 20 km), and considering the large amounts of available foraging habitat in the locality, the loss of foraging habitat in the development footprint will not cause a decrease in the area of occupancy for this species. Furthermore, an important population of the Grey-headed Flying-fox is not known in the development footprint.

Large-eared Pied-bat (*Chalinolobus dwyeri*)

Up to 30.3 ha of potential foraging habitat for the Large-eared Pied-bat would be removed as a result of the project, including ILGW and other stands of native trees. Furthermore, open spaces and waterways which the Large-eared Pied-bat can use for foraging within the development footprint will be lost. The potential habitat to be removed occurs in the Old Golf Course, within the road reserve, on the edge of the TransGrid site, the edge of Croom Reserve, and riparian habitat and waterways. The local area outside the development footprint contains enough available foraging habitat for this species such that the project will not cause the area of occupancy to decrease for the Large-eared Pied-bat. Furthermore, an important population of this species is not known in the development footprint.

c) Fragment an existing important population into two or more populations

Curved Rice Flower (*Pimelea curviflora* var. *curviflora*)

As no individual Curved Rice Flowers will be removed due to the project, the local population will not be fragmented into two or more populations. The potential habitat to be removed occurs in the Old Golf Course, within the road reserve, on the edge of the TransGrid site and the edge of Croom Reserve. The south-west area of the Old Golf Course will become isolated due to the project, however, this area is not deemed suitable Curved Rice Flower habitat.

Green and Golden Bell Frog (*Litoria aurea*)

The project is likely to cause fragmentation of aquatic habitat in the development footprint due to the construction of roads, bridges and culverts. Isolation is unlikely to occur as the wetlands, creeks and tributaries will all maintain flow. This is relevant to all wetland areas within the development footprint unless they will be completely cleared like the old golf course dams. In particular, the vegetation within the wetlands around Frazer's Creek and Macquarie Rivulet will be fragmented due to the project. The Green and Golden Bell Frog was not recorded during extensive targeted surveys nor has this species been recorded within two kilometres of the development site. Therefore, although potential habitat for this species is likely to become fragmented, a local population of Green and Golden Frog is unlikely to become fragmented into two or more populations.

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

There were no camps for the Grey-headed Flying-fox recorded in or near the development footprint. Therefore, the project will not cause this aerial species to become fragmented into two or more populations.

Large-eared Pied-bat (*Chalinolobus dwyeri*)

The project will not cause this aerial species to become fragmented into two or more populations.

d) Adversely affect habitat critical to the survival of a species

Curved Rice Flower (*Pimelea curviflora* var. *curviflora*)

No critical habitat has been described for this species.

Green and Golden Bell Frog (*Litoria aurea*)

No critical habitat has been described for this species.

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

Habitat critical to the survival of the Grey-headed Flying-fox includes:

- A continuous sequence of productive foraging habitats, the migration corridors or stopover habitats that link them, and suitable roosting habitat within nightly commuting distance of foraging areas (Fleming and Eby 2003).
- Foraging habitat that meets at least one of the following criteria can be explicitly identified as habitat critical to survival, or essential habitat, for Grey-headed Flying-foxes. Natural foraging habitat that is:
 1. productive during winter and spring, when food bottlenecks have been identified (Parry-Jones and Auger 1991, Eby et al. 1999)
 2. known to support populations of > 30 000 individuals within an area of 50 km radius (the maximum foraging distance of an adult)
 3. productive during the final weeks of gestation, and during the weeks of birth, lactation and conception (September to May)
 4. productive during the final stages of fruit development and ripening in commercial crops affected by Grey-headed Flying-foxes (months vary between regions)
 5. known to support a continuously occupied camp.

Eucalyptus tereticornis flowers in winter/spring and *Eucalyptus eugenoides* flowers in spring. Both these species occur in the development footprint and will be removed in woodland areas. Therefore, habitat critical to the survival of the Grey-headed Flying-fox will be adversely affected. However, these species occur commonly throughout the locality and only occur sparingly throughout the development footprint.

No roosting habitat critical to survival of the Grey-headed Flying-fox occurs within the development footprint.

Approximately 33.32 ha of potential Grey-headed Flying-fox foraging habitat would be impacted by the project. However the majority of this habitat (26.1 ha) is derived or planted/regrowth vegetation and is therefore unlikely to provide preferred habitat. Approximately 7.22 ha of this habitat is considered likely foraging habitat for the species. Fig trees with foraging Grey-headed Flying-foxes were detected near to the study area, on the western edge of the property to the north of the Macquarie Rivulet. Eucalypts are the most important contributors of nectar and pollen to the diet of Australian flying foxes (Eby and Law 2008), and four eucalypt species (out of a total of 17) that occur within the study area are regarded as significant food plants:

- Forest Red Gum (*Eucalyptus tereticornis*)
- Swamp Mahogany (*E. robusta*)
- Sydney Blue Gum (*E. saligna*)
- Spotted Gum (*Corymbia maculata*).

Many of these trees within the development footprint have been planted and are relatively young, and are therefore unlikely to provide reliable and important foraging habitat for the local population. Vegetation communities present within the development footprint that are associated with the Grey-headed Flying-fox as foraging habitat include:

- Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion (PCT 1326) – 7.22 ha to be impacted
- Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion (PCT 838) – 23.26 ha to be impacted
- Swamp Mahogany swamp sclerophyll forest on coastal lowlands of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 1231) – 2.81 ha to be impacted
- River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion (PCT 1105) – 0.03 ha to be impacted.

This gives a total of 33.32 ha of potential Grey-headed Flying-fox foraging habitat that would be removed as a result of the project, however only the 7.22 ha of Woollybutt - White Stringybark - Forest Red Gum grassy woodland (ILGW) would be considered *preferred* foraging habitat. The other three vegetation communities listed above are 'derived' and would not be considered primary foraging habitat for this species.

There is one nationally important Grey-headed Flying-fox camp located at Bomaderry Creek, approximately 36 km to the south-west of the development footprint (500-16,000 individuals). There are no counts of individuals at Bomaderry Creek since the February 2015 survey. There are some other popular camps (that are not listed as nationally important) which are monitored as part of the National Flying-fox Monitoring Program (<http://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf>, Department of the Environment, accessed 02/02/17). The nearest such site on the National Flying-fox Monitoring database is at Blackbutt Reserve approximately 2 km to the east of the development footprint with anywhere from 500 to 10,000 individuals counted during surveys between 2012 and 2016. The suburb of Figtree, approximately 12 kilometres north of the development footprint, has recorded between 500 to 16,000 individuals between 2012 and 2016.

No breeding camps of the Grey-headed Flying-fox occur in the development footprint, however this species will readily travel over 20 km to forage (up to 50 km) (Eby 2009). There are approximately 160 records of this species in the Illawarra region, with a concentration of sightings around Wollongong and Bomaderry (Atlas of Living Australia, accessed 17/01/17). With an abundance of camp sites in the region, it would not be uncommon for a Grey-headed Flying-fox to occur within the study area. While the development footprint does not provide breeding habitat, it does provide some foraging habitat.

The National Recovery Plan states that if foraging habitat is 'known to support populations of > 30 000 individuals within an area of 50 km radius' then it can be defined as habitat critical to survival, or essential habitat, for Grey-headed Flying-foxes. According to the National Flying-fox database, the study area may support anywhere between 1500 to 42,000 individuals. If using the latest dataset (May 2016), the number of individuals within a 50 km radius would be 3000-12,500. On numerous visits to the study area, only one individual has been recorded, and this was outside of the development footprint. Therefore, at this time, it is unlikely that the development footprint would support more than 30,000 individuals. There are large areas of better quality native vegetation in the locality that would be capable of supporting this species (see Figure 9-1). The Grey-headed Flying-fox is an extremely mobile species with a large distribution; the presence of a foraging individual adjacent to the site does not qualify the site as important habitat.

Large-eared Pied-bat (*Chalinolobus dwyeri*)

Critical habitat for the Large-eared Pied-bat includes diurnal roosting sites that are either disused mine shafts, caves, overhangs and abandoned fairy martin nests. None of this habitat occurs within the development footprint.

e) Disrupt the breeding cycle of an important population

Curved Rice Flower (*Pimelea curviflora* var. *curviflora*)

No individual Curved Rice Flowers occur in the development footprint, therefore, the breeding cycle for this population will not be disrupted.

Green and Golden Bell Frog (*Litoria aurea*)

A Key Population for the Green and Golden Bell Frog in the local area occurs at Port Kembla. It consists of four sub-populations at or around North Port Kembla, Boiler's Point, Coomaditchy Lagoon and Korrongulla Wetland. None of these sites occur in or near the development footprint, nor have previous recordings in the Illawarra region occurred in or within 2 km of the development footprint. Furthermore, targeted surveys did not detect this species. Therefore, it is considered that an important population will not be affected by the project.

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

No roosting camps for the Grey-headed Flying-fox occur in the development footprint and no important population is known from the development footprint, therefore, the breeding cycle for an important population will not be disrupted.

Large-eared Pied-bat (*Chalinolobus dwyeri*)

The Large-eared Pied-bat breeds in roosting habitat described in a) above, none of which occurs in the development footprint. Therefore, the project will not disrupt the breeding cycle of this population.

f) Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Curved Rice Flower (*Pimelea curviflora* var. *curviflora*)

Up to 7.22 ha of potential habitat for the Curved Rice Flower would be removed as a result of the project, all part of the ILGW community. This excludes areas that are too heavily grazed or consist of predominantly exotic understory species. However, no individuals were recorded in suitable habitat within the development footprint so this can only be considered as potential habitat. Areas of potential habitat to be removed occur in the Old Golf Course, within the road reserve, on the edge of the TransGrid site and the edge of Croom Reserve. The Curved Rice Flower was only recorded in Croom Reserve and the Light Rail Museum. Only 0.58 ha of potential habitat within Croom Reserve would be cleared in which no individuals of this species were recorded. This clearing may potentially lead to weed invasion in Croom Reserve which would decrease the quality of available habitat for this species, however mitigation measures have been recommended to prevent weed invasion following clearing activities. The clearing of one hectare of habitat within Croom Reserve will not lead to a decline in the local population of Curved Rice Flower as no individuals were detected within this area.

Green and Golden Bell Frog (*Litoria aurea*)

Approximately 8 ha of potential habitat for the Green and Golden Bell Frog would be removed as a result of the project (including the dams in the old golf course and Frazer's Creek). The potential habitat to be removed occurs in aquatic areas, in particular wetland areas with a diversity of habitat features

including nearby open grassy areas, diurnal sheltering sites, bulrushes or spikerushes, as well as being free of plague minnow. These areas are limited to the Frazer's Creek wetland complex, the larger dam north of the Macquarie Rivulet, the dams in the old golf course and the south-eastern wetland area near the east-west link / Princess Highway interchange. The project is likely to cause fragmentation of aquatic habitat in the development footprint due to the construction of roads, bridges and culverts. Isolation is unlikely to occur as the wetlands, creeks and tributaries will all maintain flow. This is relevant to all wetland areas within the development footprint unless they are completely removed like the old golf course dams. In particular, the vegetation within the wetlands around Frazer's Creek and Macquarie Rivulet will be fragmented due to the project.

Considering the Green and Golden Bell Frog was not identified during optimal survey periods, has not been recorded within two kilometres of the development footprint and the development footprint is twelve kilometres away from the nearest Key Population in Port Kembla, the removal of potential habitat due to the project is unlikely to cause a decline in a local Green and Golden Bell Frog population.

Grey-headed Flying-fox

Up to 33.32 ha of potential foraging habitat for the Grey-headed Flying-fox would be removed as a result of the project, including ILGW and other stands of native trees. The potential habitat to be removed occurs in the Old Golf Course, within the road reserve, on the edge of the TransGrid site, the edge of Croom Reserve, riparian habitat and isolated native trees (including figs and Eucalypts). Due to the aerial mobility of this species, no areas of this potential habitat would become isolated or fragmented due to the project. There is an abundance of foraging habitat in the local area outside the development footprint, therefore, the loss of habitat due to the project is unlikely to cause the local population of Grey-headed Flying-fox to decline.

Large-eared Pied-bat (*Chalinolobus dwyeri*)

Up to 33.32 ha of woodland / forest foraging habitat will be removed due to the project. The habitat to be removed in the development footprint is primarily foraging habitat for the Large-eared Pied-bat. Considering none of this is breeding habitat and the abundance of similar habitat in the local area including Blackbutt Reserve, Mount Brown Reserve, Croom Reserve, the Yallah TAFE site, the TransGrid site and Macquarie Pass National Park, the project will not adversely affect this habitat such that this species is likely to decline.

g) Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Curved Rice Flower (*Pimelea curviflora* var. *curviflora*)

The project would potentially facilitate the spread of *Lantana camara* into areas of habitat for the Curved Rice Flower. Mitigation measures have been recommended to minimise the likelihood of this occurring.

Green and Golden Bell Frog (*Litoria aurea*)

Plague minnow (*Gambusia holbrooki*) is an invasive species that preys on tadpoles of the Green and Golden Bell Frog. 'Predation by the plague minnow' is listed as a Key Threatening Process under the TSC Act and 'Novel biota and their impact on biodiversity' is listed as a Key Threatening Process under the EPBC Act. Plague minnow was detected within the majority of the aquatic areas within the study area. The project could facilitate further invasion of the plague minnow into areas where it has not established, however the Green and Golden Bell Frog was not detected in the development footprint and is not considered likely to occur due to a lack of previous records in or within two kilometres of the development footprint and the nearest Key Population being approximately twelve kilometres away.

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

The project can potentially facilitate the spread of *Lantana camara* into areas of habitat near the development footprint for the Grey-headed Flying-fox. This would decrease the quality of habitat for this species by preventing the regeneration of favoured food sources like Eucalyptus species. Mitigation measures have been recommended to minimise the likelihood of this occurring.

Large-eared Pied-bat (*Chalinolobus dwyeri*)

The project is unlikely to facilitate the spread of any invasive species that are harmful to the Large-eared Pied-bat.

h) Introduce disease that may cause the species to decline

Curved Rice Flower (*Pimelea curviflora* var. *curviflora*)

The project is unlikely to cause the introduction of a disease that will lead to a decline in Curved Rice Flower in the local area.

Green and Golden Bell Frog (*Litoria aurea*)

'Chytridiomycosis due to the amphibian chytrid fungus' is a Key Threatening Process under the EPBC Act and is a known threat to the Green and Golden Bell Frog and other amphibian species. There will only be minor changes to water flow as a result of the project, therefore the project is unlikely to facilitate the introduction or spread of this infectious disease. Mitigation measures ensuring spread of Chytrid Fungus does not occur have been recommended.

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

The project is unlikely to cause the introduction of a disease that will lead to a decline of the Grey-headed Flying-fox in the local area.

Large-eared Pied-bat (*Chalinolobus dwyeri*)

The project is unlikely to cause the introduction of a disease that will lead to a decline of the Large-eared Pied-bat in the local area.

i) Interfere substantially with the recovery of the species

Curved Rice Flower (*Pimelea curviflora* var. *curviflora*)

The NSW Office of the Environment and Heritage (2012) identify the following priority actions to assist in protection of the species:

- manage weed infestation
- introduce measures to prevent habitat degradation related to unrestricted access and/or trail maintenance
- protect areas of known and potential habitat from clearing and further fragmentation.

Mitigation measures have been recommended for preventing exotic weed infestation; preventing unrestricted access, using delineation, and suitable trail management strategies; and narrowing the footprint at Croom Reserve and the TransGrid site in an attempt to minimise the impacts on Curved Rice Flower habitat during the project.

Green and Golden Bell Frog (*Litoria aurea*)

A draft NSW Recovery Plan for the Green and Golden Bell Frog has been prepared.

The overall objectives of the recovery plan are to:

- increase the security of key Green and Golden Bell Frog populations by way of preventing the further loss of Green and Golden Bell Frog habitat at key populations across the species range and where possible secure opportunities for increasing protection of habitat areas;
- ensure extant Green and Golden Bell Frog populations are managed to eliminate or attenuate the operation of factors that are known or discovered to be detrimentally affecting the species;
- implement habitat management initiatives that are informed by data obtained through investigations into the general biology and ecology of the Green and Golden Bell Frog through a systematic and coordinated monitoring program;
- establish, within more than one institution, self-sustaining and representative captive populations (particularly 'at risk' populations) of the Green and Golden Bell Frog for the primary purpose of maintaining 'insurance' colonies for re-establishment and supplementation of populations of the species; and
- increase the level of regional and local awareness of the conservation status of the Green and Golden Bell Frog and provide greater opportunity for community involvement in the implementation of this recovery plan.

The project does not interfere with any of these objectives.

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

A draft national Recovery Plan for the Grey-headed Flying-fox has been prepared.

The overall objectives of recovery are:

- to reduce the impact of threatening processes on Grey-headed Flying-foxes and arrest decline throughout the species' range
- to conserve the functional roles of Grey-headed Flying-foxes in seed dispersal and pollination
- to improve the standard of information available to guide recovery of the Grey-headed Flying-fox, in order to increase community knowledge of the species and reduce the impact of negative public attitudes on the species.

The project will contribute to the threatening process of habitat loss (approximately 30.6 ha), however, this loss in foraging habitat will not lead to a decline in the local population because no camps occur within the development footprint and there is an abundance of available foraging habitat in the surrounding area.

Large-eared Pied-bat (*Chalinolobus dwyeri*)

Specific recovery objectives for the recovery of the Large-eared Pied-bat relevant to the proposal include:

- Identify priority roost and maternity sites for protection.
- Educate the community and industry to understand and participate in the conservation of the large-eared pied bat

The project will not interfere with any of these objectives.

Conclusion

Curved Rice Flower (*Pimelea curviflora* var. *curviflora*)

There is unlikely to be a significant impact on the local population of Curved Rice Flower because (1) the number of Curved Rice Flower to be cleared is 0, and (2) only a small area of suitable potential habitat for Curved Rice Flower will be cleared (7.22 ha).

Grey-headed Flying-fox

There is unlikely to be a significant impact on the local population of Grey-headed Flying-fox because (1) the habitat to be cleared is only foraging habitat of which there is suitable larger areas within the locality, (2) no important roosting camps would be impacted, and (3) fig trees used for foraging were observed outside the development footprint.

Large-eared Pied-bat

There is unlikely to be a significant impact on a viable local population of the Large-eared Pied-bat because (1) suitable roosting and breeding habitat is non-existent (caves, mine shafts, etc.), (2) the population is unlikely to be limited to proposed clearing areas, (3) the area of foraging habitat to be cleared is relatively small (7.22 ha), (4) areas of suitable foraging woodland occur outside the development footprint, and (5) mitigation measures have been recommended to prevent loss of individuals.

Green and golden bell frog

There is unlikely to be a significant impact on a viable local population of the Green and golden bell frog because (1) despite considerable survey effort the species was not recorded, (2) only 8 ha of potential suitable habitat would be cleared and (3) there are no known important populations of this species in or near the development footprint. A Key Population for the Green and Golden Bell Frog occurs at Port Kembla. It consists of four sub-populations at or around North Port Kembla, Boiler's Point, Coomaditchy Lagoon and Korrongulla Wetland. None of these sites occur in or near the development footprint, nor have previous recordings in the Illawarra region occurred in or within 2 km of the development footprint.

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

a) Lead to a long-term decrease in the size of an important population of a species

Illawarra Greenhood (*Pterostylis gibbosa*)

The Illawarra Greenhood is a ground dwelling orchid known to occur in Yallah and Albion Park in the Illawarra region where it grows in open forest woodland dominated by Forest Red Gum *Eucalyptus tereticornis*, Woollybutt *E. longifolia* and White Feather Honey-myrtle *Melaleuca decora* with a native grass understory. This species occurs in Croom Reserve and at the TransGrid site outside the development footprint. A small population of Illawarra Greenhood Orchid has also been recorded near Dapto (1988). Extensive targeted searches were undertaken for this species in all areas of suitable habitat across two flowering seasons. Orchid expert Graham Bradburn undertook 10 hours of this survey with NGH Environmental. Approximately 83 person hours were spent searching for the Illawarra Greenhood Orchid within and outside the development footprint in the 2013 and 2014 flowering seasons. Despite this extensive survey effort, no individuals were recorded within the development footprint. While the development footprint may contain some suitable habitat for this species and individuals have been recorded in nearby Croom Reserve, there are currently no known extant individuals within the development footprint. The only other record of this species within 100 metres

of the development footprint was recorded in 1967 (OEH). Therefore it is unlikely that the project would lead to a long-term decrease in the size of the local population of the Illawarra Greenhood.

Australasian Bittern (*Botaurus poiciloptilus*)

The Australasian Bittern occurs in terrestrial freshwater wetlands and, rarely, estuarine habitats. It favours wetlands with tall, dense vegetation, where it forages in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. This species favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and/or reeds (e.g. *Phragmites*, *Cyperus*, *Eleocharis*, *Juncus*, *Typha*, *Baumea*, *Bolboschoenus*) or cutting grass (*Gahnia*) growing over muddy or peaty substrate (Marchant & Higgins 1990). The development footprint includes a number of wetlands with suitable habitat for this species. It is unlikely that the Australasian Bittern is using these wetland areas for breeding due to the disturbed nature of the sites. All wetlands in the development footprint except the Frazer's Creek wetland complex were generally considered too small or degraded (due to grazing, livestock and urbanisation) to support the Australasian Bittern. The Frazer's Creek wetland complex contains the best habitat for the Australasian Bittern and is the most likely habitat for this species due to its larger size, less degraded state, good vegetation cover, structure and complexity and availability of food resources such as frogs and aquatic invertebrates. Only 3.08 ha of the total 23.7 ha of this wetland will be disturbed due to the project. The Australasian Bittern was not detected in the wetlands within the development footprint. There are a number of suitable wetlands outside the development footprint in the local area that are also suitable for the Australasian Bittern including the man-made wetlands to the east on True Energy land, the wetland within the Illawarra Regional Airport and the wetland on Boral land near Dunmore station to the south. The wetlands in the True Energy site in particular are very suitable for the Australasian Bittern due to their larger size, lack of disturbance and good vegetation cover. Surveys over two breeding seasons were undertaken for this species in which it was never detected. Therefore, it is unlikely that the project will lead to a decrease in size of the local population of Australasian Bittern.

Australian Painted Snipe (*Rostratula australis*)

The Australian Painted Snipe occurs in terrestrial freshwater wetlands. It prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. It forages nocturnally on mud-flats and in shallow water. The Australian Painted Snipe nests in a scrape in the ground lined with grasses and leaves amongst tall vegetation. The development footprint includes a number of wetlands with suitable habitat for this species. It is unlikely that the Australian Painted Snipe is using these wetland areas for breeding due to the disturbed nature of the sites. All wetlands in the development footprint except the Frazer's Creek wetland complex were generally considered too small or degraded (due to grazing, livestock and urbanisation) to support the Australian Painted Snipe. The Frazer's Creek wetland complex contains the best habitat for the Australian Painted Snipe and is the most likely habitat for this species due to its larger size, less degraded state, good vegetation cover, structure and complexity and availability of food resources such as frogs and aquatic invertebrates. Only 3.08 ha of the total 23.7 ha of this wetland will be disturbed due to the project. The Australian Painted Snipe was not detected in the wetlands within the development footprint. There are a number of suitable wetlands outside the development footprint in the local area that are also suitable for the Australian Painted Snipe including the man-made wetlands to the east on True Energy land, the wetland within the Illawarra Regional Airport and the wetland on Boral land near Dunmore station to the south. The wetlands in the True Energy site in particular are very suitable for the Australian Painted Snipe due to their larger size, lack of disturbance and good vegetation cover. Surveys over two breeding seasons were undertaken for this species in which it was never detected. Therefore, it is unlikely that the project will lead to a decrease in size of the local population of Australian Painted Snipe.

b) Reduce the area of occupancy of the species

Illawarra Greenhood (*Pterostylis gibbosa*)

Up to 7.22 ha of potential habitat for the Illawarra Greenhood would be removed as a result of the project, all of which being ILGW. This excludes areas that are too heavily grazed or consist of predominantly exotic understory species, as the Illawarra Greenhood Orchid is unlikely to occur here. However, no individuals were recorded in suitable habitat within the development footprint so this habitat can only be considered as potential. Individuals recorded in Croom Reserve and at the TransGrid site do not occur within the development footprint and would not be impacted. Approximately 0.58 ha of potential Illawarra Greenhood Orchid habitat within Croom Reserve would be removed due to the project. The Illawarra Greenhood has not been recorded anywhere else within the development footprint for several years. Therefore, the project is only likely to decrease the area of available habitat for this species by approximately 0.58 ha.

Australasian Bittern (*Botaurus poiciloptilus*)

The Australasian Bittern occurs in eastern and south-western Australia. In NSW it occurs on the coast and along the Murray-Darling River system. This species also occurs in NZ and New Caledonia.

The project will impact some potential wetland habitat for this species. This comprises approximately 6.89 ha in the Frazer's Creek Wetland Complex, the wetland in the road reserve to the north of the development footprint and the wetland to the far-east of the development footprint near the east-west link / Princess Highway interchange. However, this minimal amount of habitat loss will not cause the area of occupancy for this species to decrease considering the Australasian Bittern was not detected during surveys and there is other available habitat within the local area.

Australian Painted Snipe (*Rostratula australis*)

The Australian Painted Snipe is restricted to Australia, and in NSW occurs particularly in the Murray-Darling Basin. The project will impact some potential wetland habitat for this species. This comprises the majority of wetland habitat within the development footprint. However, this minimal amount of habitat loss will not cause the area of occupancy for this species to decrease considering the Australian Painted Snipe was not detected during surveys and there is other available habitat within the local area.

c) Fragment an existing population into two or more populations

Illawarra Greenhood (*Pterostylis gibbosa*)

The potential habitat to be removed occurs in the Old Golf Course, within the road reserve, on the edge of the TransGrid site and the edge of Croom Reserve. The south-west area of the Old Golf Course will become isolated due to the project, however, this area is not deemed suitable Illawarra Greenhood Orchid habitat. None of the other areas of potential habitat serve as connective habitat to other habitat areas.

Australasian Bittern (*Botaurus poiciloptilus*)

The project will not cause this aerial species to become fragmented into two or more populations. Suitable wetland habitat occurs outside the development footprint in the local area for the Australasian Bittern.

Australian Painted Snipe (*Rostratula australis*)

The project will not cause this aerial species to become fragmented into two or more populations. Suitable wetland habitat occurs outside the development footprint in the local area for the Australian Painted Snipe.

d) Adversely affect habitat critical to the survival of a species

Illawarra Greenhood (*Pterostylis gibbosa*)

No critical habitat has been described for this species.

Australasian Bittern (*Botaurus poiciloptilus*)

No critical habitat has been described for this species.

Australian Painted Snipe (*Rostratula australis*)

No critical habitat has been described for this species.

e) Disrupt the breeding cycle of a population

Illawarra Greenhood (*Pterostylis gibbosa*)

Breeding for the Illawarra Greenhood occurs within each plant through pollination by male gnats (*Mycomya* sp.). Fruit and seeds are not thought to travel too far from the parent plant and will germinate in leaf litter containing fungi. The proposal may prevent some seeds from germinating if they are located within the areas to be cleared. Furthermore, this species was not recorded in the development footprint. The project is unlikely to disrupt the majority of the breeding cycle within the local population.

Australasian Bittern (*Botaurus poiciloptilus*)

Knowledge of the breeding ecology of the Australasian Bittern is relatively poor. Available data indicate that the Australasian Bittern breeds in solitary pairs in relatively deep, densely vegetated freshwater swamps and pools, building its nests in deep cover over shallow water (Marchant & Higgins 1990). The vegetation generally consists of *Typha* sp., *Phragmites* sp. or rushes. In rushland, it may avoid breeding in the densest areas (Marchant & Higgins 1990); alternatively, this may simply reflect the accessibility of the few nests that have been found (Jaensch 2005 pers. comm.). If population density is high, it may resort to open wetlands for nesting, e.g. in stunted *Acacia* swamps (Marchant & Higgins 1990), but this may be exceptional behaviour (Jaensch 2005 pers. comm.). The Australasian Bittern was not recorded during targeted surveys. The only suitable breeding habitat for this species in the study area occurs in the Frazer's Creek Wetland Complex outside the development footprint around the wetlands with plots FW7-8. The Australasian Bittern is considered unlikely to breed in this wetland as it was not recorded during targeted and general bird surveys and due to the relatively high level of disturbance surrounding the site (including noise, development and other human disturbances).

Australian Painted Snipe (*Rostratula australis*)

Australian Painted Snipe breeding habitat requirements may be quite specific: shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby. Nest records are all, or nearly all, from or near small islands in freshwater wetlands (D. Rogers 2002, pers. comm.), provided that these islands are a combination of very shallow water, exposed mud, dense low cover and sometimes some tall dense cover (Rogers et al. 2005).

The Australian Painted Snipe has also been recorded nesting in and near swamps, cane grass swamps, flooded areas including samphire, grazing land, among cumbungi, sedges, grasses, salt water couch (*Paspalum*), saltbush (*Halosarcia*) and grass, also in ground cover of water-buttons and grasses, at the base of tussocks and under low saltbush (Marchant & Higgins 1993). One nest has been found in the centre of a cow-pat in a clump of long grass (Marchant & Higgins 1993).

None of the wetlands occurring within the development footprint have an upper canopy nearby or occur near small islands. Therefore, it is highly unlikely that this species is breeding in the development footprint, especially considering this species was not detected through targeted surveys and the relatively high level of disturbance surrounding the site (including noise, development and other human disturbances).

f) Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Illawarra Greenhood (*Pterostylis gibbosa*)

Up to 7.22 ha of potential habitat for the Illawarra Greenhood Orchid would be removed as a result of the project, all part of the ILGW community. This excludes areas that are too heavily grazed or consist of predominantly exotic understory species as the Illawarra Greenhood is unlikely to occur here. However, no individuals were recorded in suitable habitat within the development footprint so this can only be considered potential habitat. Individuals recorded in Croom Reserve do not occur within the development footprint and would not be impacted. Approximately 0.58 ha of potential Illawarra Greenhood Orchid habitat within Croom Reserve would be removed due to the project. The Illawarra Greenhood Orchid has not been recorded anywhere else within the development footprint. Therefore, the project is unlikely to lead to a decline of the Illawarra Greenhood in the local area.

Australasian Bittern (*Botaurus poiciloptilus*)

The most appropriate habitat for the Australasian Bittern occurring in the study area includes the Frazer's Creek Wetland Complex (plots FW4-8). In particular, the wetlands around plots FW7-8 have dense vegetation with open deeper pools. However, these areas of wetland are outside the development footprint. Other areas of wetland habitat within the development footprint are not considered important habitat.

Australian Painted Snipe (*Rostratula australis*)

The wetland habitat within the development footprint may be used by the Australian Painted Snipe on rare occasions. Therefore, approximately 7.20 ha of potential habitat for this species will be lost. No suitable breeding habitat was identified within the development footprint. This species is more likely to occur closer to the coast and there is abundant available habitat in the nearby Lake Illawarra and wetlands in the True Energy site. Therefore, the project is unlikely to adversely affect habitat such that this species is likely to decline.

g) Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat

Illawarra Greenhood (*Pterostylis gibbosa*)

The project can potentially facilitate the spread of *Lantana camara* into areas of habitat for the Illawarra Greenhood. *Lantana camara* was recorded in many ILGW plots. Mitigation measures have been recommended to minimise the likelihood of this occurring.

Australasian Bittern (*Botaurus poiciloptilus*)

The project can potentially facilitate the spread of wetland weeds into areas of habitat for the Australasian Bittern. These invasive weeds can block growth of more suitable aquatic vegetation for the Australasian Bittern such as tall native emergent aquatic plants. Mitigation measures have been recommended to minimise the likelihood of this occurring.

Australian Painted Snipe (*Rostratula australis*)

The project would potentially facilitate the spread of wetland weeds into areas of habitat for the Australian Painted Snipe. These invasive weeds can block growth of more suitable aquatic vegetation for the Australian Painted Snipe such as tall native emergent aquatic plants. Mitigation measures have been recommended to minimise the likelihood of this occurring.

h) Introduce disease that may cause the species to decline

Illawarra Greenhood (*Pterostylis gibbosa*)

The project is unlikely to cause the introduction of a disease that will lead to a decline in Illawarra Greenhood in the local area.

Australasian Bittern (*Botaurus poiciloptilus*)

The project is unlikely to cause the introduction of a disease that will lead to a decline in Australasian Bittern in the local area.

Australian Painted Snipe (*Rostratula australis*)

The project is unlikely to cause the introduction of a disease that will lead to a decline in Australian Painted Snipe in the local area.

i) Interfere with the recovery of the species

Illawarra Greenhood (*Pterostylis gibbosa*)

A recovery plan has been prepared for the Illawarra Greenhood Orchid under the TSC Act. The specific objectives of the recovery plan are:

- To ensure that all known *P. gibbosa* populations occurring on public and private lands are protected and managed for conservation (Reservation/Conservation status of populations);

The population within Croom Reserve occurs outside of the development footprint and is hence protected.

- To minimise the risk of *P. gibbosa* populations from declining in the long term through the development and implementation of appropriate threat and habitat management practices at all known sites (Threat and Habitat Management). Threat and management practices include: Ensure all known populations are occurring on public or private land are protected and managed for conservation.

Not compliant – The project involves clearing potential habitat for this species in Croom Reserve and the TransGrid site.

- To establish the full extent of the distribution of *P. gibbosa* (Survey);

Compliant – Targeted surveys for this species have been undertaken over two flowering periods between 2013 and 2014 in all known and potential habitats within the local area. This totals 48 person hours of targeted surveys. This data is submitted to OEH annually, contributing to distribution information for this species.

- To ensure the management of *P. gibbosa* habitat is adaptive to the outcomes of research and monitoring and is informed by essential aspects of the biology and ecology of the species (Research/Monitoring); and

Compliant – Roads and Maritime have designed, re-designed and narrowed the development footprint to avoid impacting areas of habitat for this species as much as possible.

- To raise awareness among the broader community about the conservation status of *P. gibbosa* and involve the community in the recovery program (Education, Awareness and Involvement).

Compliant – Throughout the design process Roads and Maritime have consulted with community representatives in order to minimise impacts and have identified its presence in the surrounding region and conservation status.

Australasian Bittern (*Botaurus poiciloptilus*)

A national Recovery Plan has not been prepared for this species, however management actions relevant to the proposal have been recommended:

Conservation of the current Australasian Bittern population requires the maintenance of suitable wetland habitats. For many locations, the top priority is to ensure that a suitable water regime is maintained or established. At present, Fivebough Swamp in NSW, Bool Lagoon in South Australia and Lake Muir and its surrounding wetlands in Western Australia are managed to benefit the resident Bittern populations (Garnett & Crowley 2000; R. Jaensch June 2005, pers. comm.). Further recommended management actions include:

- Research to establish more accurate population estimates and to provide more detail on habitat and drought refuge requirements, diet, predators, breeding range and movements.
- Identification, protection and management of habitat, including principal breeding wetlands.
- Control of feral animals, particularly foxes and cats.
- Involvement of community groups and bird associations in the collection of information (Garnett & Crowley 2000; Smith et al. 1995).

A local Australasian Bittern population was not recorded within the development footprint. No principal breeding wetlands occur within the development footprint, however some potential habitat occurs. Due to a lack of records and minimal area of habitat to be removed, the project is unlikely to interfere with the recovery of this species.

Australian Painted Snipe (*Rostratula australis*)

Although a national recovery plan has not been prepared for the Australian Painted Snipe, the following recovery actions relevant to the project have been prepared:

- The development of a database of records
- Develop guidelines, in consultation with landholders, for the management of suitable wetlands.
- Initiate control programs for feral animals, and erect fencing to prevent grazing and trampling of wetlands by cattle, at suitable wetlands.
- Encourage participation of community groups and other relevant bodies in the recovery effort.

The project will not interfere with these recovery objectives. Mitigation measures have been recommended that will contribute to these recovery actions including protection of wetlands from livestock trampling and rehabilitation of wetlands.

Conclusion

Illawarra Greenhood (*Pterostylis gibbosa*)

There is unlikely to be a significant impact on the local population of Illawarra Greenhood because (1) the number of Illawarra Greenhood to be cleared is 0, and (2) only a small area (7.22 ha) of suitable potential habitat for Illawarra Greenhood will be cleared. Furthermore, some of these areas are more disturbed than others and are unlikely to provide suitable habitat for this species. As such only around 1.53 ha of suitable habitat (Croom Reserve and TransGrid sites) would be removed as a result of the project.

Wetland Birds

There is unlikely to be a significant impact on the Australasian Bittern and Australian Painted Snipe because (1) they were not detected in the study area during surveys, (2) the most suitable habitat for these species

in the study area generally occurs outside the development footprint, and (3) the generally disturbed nature of the wetland sites and the surrounding area is not ideal for these cryptic species.

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

a) Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles) destroy or isolate an area of important habitat for a migratory species

Australian Painted Snipe (*Rostratula australis*)

The wetland habitat within the development footprint may be used by the Australian Painted Snipe on rare occasions. Therefore, approximately 7.20 ha of potential habitat for this species will be lost. None of this habitat is considered important as it only provides minimal refuge and foraging habitat. The Australian Painted Snipe is more likely to occur closer to the coast and there is abundant available habitat in the nearby Lake Illawarra and wetlands within the True Energy site. Therefore, the project is unlikely to modify, destroy or isolate an area of important habitat for the Australian Painted Snipe.

Great Egret (*Ardea alba*)

The Great Egret is widespread throughout Australia and was recorded within the SEPP 14 wetlands in the study area regularly, however this was outside the development footprint and was not a breeding population. This species has been recorded in a wide range of wetland habitats. The habitat within the development footprint is considered suitable for this species however not important as there is an abundance of suitable wetland habitat in the local area. Furthermore, large breeding colonies for this species do not usually occur in south-eastern Australia. The proposal will not cause important habitat for the Great Egret to be substantially modified, destroyed or isolated.

Cattle Egret (*Ardea ibis*)

The Cattle Egret breeds in wooded swamps which do not occur in the development footprint. Foraging habitat (open grasslands) occur in the development footprint, however, this type of habitat is extensive throughout the local area. The Cattle Egret usually breeds outside the local area from the central NSW coast northwards. This species was only observed in open paddock grasslands outside the development footprint. The project is unlikely to cause important habitat for the Cattle Egret to be substantially modified, destroyed or isolated.

Latham's Snipe (*Gallinago hardwickii*)

Latham's Snipe was recorded in wetland areas in the study area during surveys. This included the wetland area around Macquarie Rivulet (FW1-3). The habitat recorded in these wetlands was relatively disturbed due to cattle and horse trampling. This habitat is not considered important habitat for this species. The Latham's Snipe was observed in similar habitat around dams outside the development footprint where vegetation cover was minimal. Latham's Snipe has been recorded in modified or artificial habitats, and in habitats located close to humans or human activity (Frith et al. 1977; Naarding 1983). This suggests Latham's Snipe is tolerant of disturbed wetland sites with minimal vegetation cover, however this habitat is not used for breeding purposes as this species breeds in Japan. The project will not cause important habitat for the Latham's Snipe to be substantially modified, destroyed or isolated.

b) Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or

Australian Painted Snipe (*Rostratula australis*)

The project can potentially facilitate the spread of wetland weeds into areas of habitat for the Australian Painted Snipe. These invasive weeds can block growth of more suitable aquatic vegetation for the Australasian Bittern such as tall native emergent aquatic plants. Mitigation measures have been recommended to minimise the likelihood of this occurring.

Great Egret (*Ardea alba*)

The project can potentially facilitate the spread of wetland weeds into areas of habitat for the Great Egret. These invasive weeds can block growth of more suitable aquatic vegetation for the Great Egret, however, this species is tolerant of a range of aquatic habitat types. Mitigation measures have been recommended to minimise the likelihood of this occurring.

Cattle Egret (*Ardea ibis*)

The project can potentially facilitate the spread of wetland weeds into areas of habitat for the Cattle Egret. These invasive weeds can block growth of more suitable aquatic vegetation for the Cattle Egret. Pasture weeds such as fireweed are common throughout the local area and may indirectly impact the Cattle Egret by impacting livestock on which the Cattle Egret relies for disturbing pasture invertebrates on which they forage. The project could potentially facilitate the spread of these pasture weeds. Mitigation measures have been recommended to minimise the likelihood of this occurring.

Latham's Snipe (*Gallinago hardwickii*)

The project can potentially facilitate the spread of wetland weeds into areas of habitat for the Latham's Snipe. These invasive weeds can block growth of more suitable aquatic vegetation for the Latham's Snipe such as native aquatic refuge plants. Mitigation measures have been recommended to minimise the likelihood of this occurring.

c) Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

Australian Painted Snipe (*Rostratula australis*)

An ecologically significant proportion of the local population of Australian Painted Snipe does not occur within the development footprint.

Great Egret (*Ardea alba*)

An ecologically significant proportion of the local population of Great Egret does not occur within the development footprint.

Cattle Egret (*Ardea ibis*)

An ecologically significant proportion of the local population of Cattle Egret does not occur within the development footprint.

Latham's Snipe (*Gallinago hardwickii*)

An ecologically significant proportion of the local population of Latham's Snipe does not occur within the development footprint.

Conclusion

There is unlikely to be a significant impact on the Cattle Egret, Great Egret, Latham's Snipe and Australian Painted Snipe because (1) they are generally widespread species, (2) the most suitable habitat for these species in the study area generally occurs outside the development footprint, and (3) breeding habitat for these species is unlikely to occur within the development footprint

References

NGH Environmental (2015). Albion Park Rail Bypass Biodiversity Assessment Report.

Threatened Species Scientific Committee (2016). *Approved Conservation Advice (incorporating listing advice) for the Illawarra and South Coast Lowland Forest and Woodland Ecological Community*. Canberra: Department of the Environment and Energy

APPENDIX G VOLUNTARY CONSERVATION AGREEMENT

APPENDIX H FLORA AND FAUNA SURVEY RESULTS

See below for flora and fauna recorded during surveys conducted in 2013 and 2014.

H.1 FLORA SPECIES RECORDED

All native and introduced vascular plant species encountered within the study area, and their relative abundances, were recorded (where identifiable). Cover/abundance assessments are based on visual estimates of foliage cover (after Carnahan 1997), scored using a modified Braun-Blanquet 6-point scale:

- | | |
|---|--|
| 1 | 1 to a few individuals present, less than 5% cover |
| 2 | many individuals present, but still less than 5% cover |
| 3 | 5 - <20% cover |
| 4 | 20 - <50% cover |
| 5 | 50 - <75% cover |
| 6 | 75 - 100% cover |

Cover/abundance scores relate to general abundance over the site, not to representative quadrats. Single-figure values are generalised over the study area. Where the abundance of a particular species varies markedly over the survey sector, a range of cover values is provided. Where a range of values is given, abundance is based on a standard 20 metre x 20 metre quadrat scale. Cover abundance is provided by broad vegetation type, abbreviations are as follows:

- | | |
|------|---|
| NI | non-indigenous vegetation |
| RIP | disturbed riparian vegetation and freshwater wetlands species (this includes species within the Coastal Freshwater Lagoons EEC and Swamp Oak Floodplain Forest EEC) |
| P/RG | planted/regrowth vegetation |
| ILGW | Illawarra Lowlands Grassy Woodland |

Where uncertainty exists due to the unavailability of reproductive material, the taxon is preceded by a question mark, or plants are identified to genus level only. Scientific nomenclature follows Harden (1990-2002), with recent name changes as per the Australian Plant Name Index of the Australian National Herbarium.

Species not indigenous to the area are preceded by an asterisk (*), and weeds declared as noxious within the Illawarra District Weeds Authority (including Shellharbour and Wollongong local council areas) are denoted by a triangle (△).

Scientific name	Common name	Family	Abundance			
			RIP	ILGW	NI	P/RG
TREES						
<i>Acacia binervata</i>	Two-veined Hickory	Fabaceae				2
<i>Acacia implexa</i>	Hickory Wattle	Fabaceae		1		3
<i>Acacia melanoxylon</i>	Hickory	Fabaceae		1		2
<i>Allocasuarina littoralis</i>	Black She-oak	Casuarinaceae		1-2		1
<i>Angophora floribunda</i>	Rough-barked Apple	Myrtaceae	1	2		
<i>Banksia integrifolia</i>	Coast Banksia	Proteaceae	1			
<i>Brachychiton acerifolius</i>	Illawarra Flame Tree	Malvaceae			1	2
<i>Casuarina glauca</i>	Swamp Oak	Casuarinaceae	3-4		2-3	
<i>*Corymbia ?maculata</i>	Spotted Gum	Myrtaceae				2
<i>*Erythrina x sykesii</i>	Coral Tree	Fabaceae	2-3	1		1
<i>Eucalyptus amplifolia</i>	Cabbage Tree Gum	Myrtaceae		1		
<i>Eucalyptus botryoides</i>	Bangalay	Mrytaceae				4
<i>Eucalyptus ?capitellata</i>	Brown Stringybark	Myrtaceae				1-3
<i>Eucalyptus eugenioides</i>	Thin-leaved Stringybark	Myrtaceae		3		
<i>Eucalyptus longifolia</i>	Woollybutt	Myrtaceae		3-4		1-2
<i>Eucalyprus maidenii</i>	Maiden’s Gum	Myrtaceae	1			
<i>*Eucalyptus microcorys</i>	Tallowwood	Myrtaceae			1	
<i>Eucalyptus robusta</i>	Swamp Mahogany	Myrtaceae	1			
<i>Eucalyptus tereticornis</i>	Forest Red Gum	Myrtaceae		3-4	1-2	2-3
<i>Eucalyptus ?viminalis</i>	Ribbon Gum	Myrtaceae	1			
<i>Exocarpos cupressiformis</i>	Cherry Ballart	Santalaceae		2-3		
<i>Glochidion ferdinandi</i>	Cheese Tree	Phyllanthaceae	1			1
<i>Hakea salicifolia</i>	Willow-leaved Hakea	Proteaceae				2

Scientific name	Common name	Family	Abundance			
			RIP	ILGW	NI	P/RG
<i>Homalanthus</i> (= <i>Omalthus</i>) <i>populifolius</i>	Bleeding Heart	Euphorbiaceae			1-2	
△* <i>Ligustrum</i> <i>lucidum</i>	Large-leaved Privet	Oleaceae		1		
* <i>Lophostemon</i> <i>confertus</i>	Queensland Brush Box	Myrtaceae			2	1
<i>Melaleuca decora</i>		Myrtaceae	3	3-4		
<i>Melaleuca</i> <i>stypelioides</i>	Prickly-leaved Tea- tree	Myrtaceae	1			
* <i>Morus alba</i>	White Mulberry	Moraceae			1	
* <i>Pinus</i> sp.	Pine	Pinaceae			1	
<i>Pittosporum</i> <i>undulatum</i>	Sweet Pittosporum	Pittosporaceae	3	2		1
<i>Salix</i> sp.	Willow	Salicaceae	1			
SHRUBS, SUB-SHRUBS						
<i>Acacia longifolia</i>	Sydney Golden Wattle	Fabaceae				2
<i>Acacia elongata</i>	Swamp Wattle	Fabaceae				2
<i>Acacia falcata</i>	Falcate Wattle	Fabaceae		2	1	3-4
<i>Acacia floribunda</i>	Sally Wattle	Fabaceae		1		1
<i>Acacia saligna</i>	Golden Wreath Wattle	Fabaceae				2-4
<i>Acacia ?mearnsii</i>	Black Wattle	Fabaceae		1		2-3
<i>Acacia stricta</i>	Straight Wattle	Fabaceae		2		
<i>Acacia ulicifolia</i>	Prickly Moses	Fabaceae				1-2
<i>Amyema congener</i>	Mistletoe	Loranthaceae	1-3			
<i>Amyema</i> <i>gaudichaudii</i>	Mistletoe	Loranthaceae		1		
<i>Boronia polygalifolia</i>	Dwarf Boronia	Rutaceae		2		
<i>Breynia oblongifolia</i>	Coffee Bush	Phyllanthaceae		1		
<i>Bursaria spinosa</i>	Blackthorn	Pittosporaceae				1
* <i>Callistemon</i> sp.	Bottlebrush	Myrtaceae		1		
<i>H-IIIassini</i> asp.	Cassinia	Asteraceae		1		
<i>Chorizema</i> <i>parviflorum</i>	Eastern Flame Pea	Fabaceae		2		
<i>Cassinia</i> sp.		Asteraceae		1		

Scientific name	Common name	Family	Abundance			
			RIP	ILGW	NI	P/RG
<i>Daviesia genistifolia</i>	Broom Bitter Pea	Fabaceae		2		
<i>Hakea sericea</i>	Needlebush	Proteaceae				2
<i>Melaleuca armillaris</i>	Bracelet Honey-mrytle	Mrytaceae				3
<i>Melaleuca ?parvistaminea</i>	Honey-mrytle	Mrytaceae				3
△ <i>*Lantana camara</i>	Lantana	Verbenaceae		3-4		4
<i>Leucopogon juniperinus</i>	Prickly Beard-heath	Ericaceae		2		2
△ <i>*Ligustrum sinense</i>	Small-leaved Privet	Oleaceae			2	
<i>*Ligustrum vulgare</i>	European Privet	Oleaceae	1			
<i>Ozothamnus diosmifolius</i>	Rice Flower	Asteraceae		2		
<i>*Phytolacca octandra</i>	Inkweed	Phytolaccaceae	2			1
<i>Pultenaea retusa</i>	Notched Bush-pea	Fabaceae		2		
<i>Pultenaea villosa</i>	Hairy Bush-pea	Fabaceae		2		
<i>*Ricinus communis</i>	Castor Oil Plant	Euphorbiaceae				2
△ <i>*Rubus fruticosus</i> (agg. Sp.)	Blackberry	Rosaceae			1	1
<i>*Solanum mauritianum</i>	Tobacco Tree	Solanaceae	4			
<i>Syzygium ?australe</i>	Lilly Pilly	Myrtaceae	1			2
FERNS, FORBS & AQUATICS						
<i>*Ageratina adenophora</i>	Crofton Weed	Asteraceae				2
<i>*Ageratina riparia</i>	Mistflower	Asteraceae	2			
<i>Alisma plantago-aquatica</i>	Water Plantain	Alismataceae	1-2			
<i>*Anagallis (=Lysimachia) arvensis</i>	Scarlet Pimpernel	Myrsinaceae	2			2
<i>*Arctotheca calendula</i>	Capeweed	Asteraceae			1-2	
<i>*Asparagus aethiopicus</i>	Asparagus Fern	Asparagaceae				1
<i>Bidens pilosa</i>	Cobbler's Pegs	Asteraceae	2	1		2

Scientific name	Common name	Family	Abundance			
			RIP	ILGW	NI	P/RG
<i>*Bryophyllum delagoense</i>	Mother-of-Millions	Crassulaceae				1
<i>Cassytha</i> sp.	Devil's Twine	Cassythaceae		2		
<i>Cheilanthes sieberi</i>	Fern	Pteridaceae		1-2		
<i>*Cirsium vulgare</i>	Spear Thistle	Asteraceae	2			2
<i>*Conyza</i> sp.	Fleabane	Asteraceae			1	
<i>Desmodium rhytidophyllum</i>	Desmodium	Fabaceae		1		
<i>Dichondra repens</i>	Kidney Weed	Convolvulaceae		2		
<i>Diuris sulphurea</i>	Tiger Orchid	Orchidaceae		2		
<i>*Euphorbia peplus</i>	Petty Spurge	Euphorbiaceae				2
<i>Erodium</i> sp.	Storksbill	Geraniaceae				1
<i>*Euphorbia lathyris</i>	Caper Spurge	Euphorbiaceae				1
<i>*Foeniculum vulgare</i>	Fennel	Apiaceae			2	
<i>*Fumaria</i> sp.	Fumitory	Fumariaceae	1			
<i>*Gamochaeta</i> sp.	Cudweed	Asteraceae				1
<i>Geranium ?neglectum</i>	Crane's Bill	Geraniaceae		1		
<i>*Gomphocarpus</i> sp.	Cotton-bush	Apocynaceae				1-2
<i>Goodenia hederacea</i>	Forest Goodenia	Goodeniaceae		2		
<i>Hypericum gramineum</i>	Native St John's Wort	Clusiaceae		1-2		
<i>*Hypericum perforatum</i>	St John's Wort	Clusiaceae				1-2
<i>*Lactuca serriola</i>	Prickly Lettuce	Asteraceae	1			
<i>Lagenophora stipitata</i>	Blue Bottle-daisy	Asteraceae		2	1	
<i>Lobelia (=Pratia) purpurascens</i>	Purple Pratia	Lobeliaceae		2		2
<i>Ludwigia peploides</i>	Water Primrose	Onagraceae	1			
<i>Marsilea mutica</i>	Nardoo	Marsileaceae	1			
<i>*Osteospermum</i> sp.	South African Daisy	Asteraceae				1
<i>Oxalis</i> sp.	Oxalis	Oxalidaceae	2	1		
<i>Persicaria decipiens</i>	Slender Knotweed	Polygonaceae	2			
<i>Persicaria hydropiper</i>	Water Pepper	Polygonaceae	1-2			

Scientific name	Common name	Family	Abundance			
			RIP	ILGW	NI	P/RG
<i>*Petrorhagia</i> sp.	Pink	Caryophyllaceae	1			
<i>*Plantago lanceolata</i>	Plantain	Plantaginaceae	2	1-2	2	2
<i>Pterostylis gibbosa</i>	Illawarra Greenhood	Orchidaceae		1		
<i>Ranunculus</i> sp.	Buttercup	Ranunculaceae	1-2			
<i>Rumex brownii</i>	Swamp Dock	Polygonaceae	2			2
△ <i>*Senecio madagascariensis</i>	Fireweed	Asteraceae	2-3	2		
<i>*Sida rhombifolia</i>	Paddy's Lucerne	Malvaceae			1	
<i>Sigesbeckia orientalis</i> ssp. <i>Orientalis</i>	Indian Weed	Asteraceae	1			
<i>Solanum ?prinophyllum</i>	Forest Nightshade	Solanaceae		1		
<i>*Solanum</i> sp.	Nightshade	Solanaceae	1			
<i>*Sonchus oleraceus</i>	Smooth Sowthistle	Asteraceae	2			
<i>*Taraxacum officinale</i>	Dandelion	Asteraceae				1
<i>*Tradescantia fluminensis</i>	Wandering Jew	Commelinaceae	2			
<i>*Trifolium repens</i>	White Clover	Fabaceae	2			1
<i>Urtica incisa</i>	Stinging Nettle	Urticaceae				1
<i>*Urtica urens</i>	Stinging Nettle	Urticaceae	2			
<i>Vallisneria</i> sp.	Ribbonweed	Hydrocharitaceae	1			
<i>*Verbena bonariensis</i>	Purpletop	Verbenaceae		1-2		2
<i>Veronica</i> sp.	Veronica	Plantaginaceae		1		
<i>Viola</i> sp.	Violet	Violaceae				1
<i>Wahlenbergia</i> sp.	Bluebell	Campanulaceae		1-2		2
<i>Xerochrysum bracteatum</i>	Golden Everlasting	Asteraceae		1		
VINES, SCRAMBLERS AND TWINERS						
<i>*Acetosa sagittata</i>	Turkey Rhubarb	Polygonaceae	1			
<i>*Anredera cordifolia</i>	Madeira Vine	Basellaceae	1-2			
<i>*Araujia sericifera</i>	Moth Vine	Apocynaceae	2			

Scientific name	Common name	Family	Abundance			
			RIP	ILGW	NI	P/RG
<i>*Cardiospermum grandiflorum</i>	Balloon Vine	Sapindaceae	1			
<i>*Delairea odorata</i>	Cape Ivy	Asteraceae	1-2			
<i>Geitonoplesium cymosum</i>	Scrambling Lily	Luzuriagaceae		2		
<i>Glycine clandestina</i>	Glycine	Fabaceae		1		
<i>Glycine tabacina</i>	Glycine	Fabaceae		1		
<i>Hardenbergia violacea</i>	Purple Coral Pea	Fabaceae	2	2		1
<i>*Ipomoea cairica</i>	Coastal Morning Glory	Convolvulaceae	1-2			
<i>*Ipomoea indica</i>	Morning Glory	Convolvulaceae	2			
<i>Pandorea pandorana</i>	Wonga Wonga Vine	Bignoniaceae		2		
<i>Parsonsia straminea</i>	Monkey Rope	Apocynaceae		2		
<i>*Vicia sp.</i>	Vetch	Fabaceae		2	1	2
GRASSES						
<i>*Andropogon virginicus</i>	Whisky Grass	Poaceae				1
<i>Aristida ramosa</i>	Purple Wiregrass	Poaceae		1		
<i>Aristida ?vagans</i>	Threeawn Speargrass	Poaceae		1		
<i>*Briza minor</i>	Shivery Grass	Poaceae		1		
<i>*Bromus sp.</i>	Brome	Poaceae			1	1
<i>*Chloris gayana</i>	Rhodes Grass	Poaceae		2		
<i>*Cynodon dactylon</i>	Couch	Poaceae		1		3
<i>Echinopogon caespitosus</i>	Bushy Hedgehog-grass	Poaceae		2		
<i>*Ehrharta erecta</i>	Panic Veldtgrass	Poaceae		1		
<i>Entolasia marginata</i>	Right-angle Grass	Poaceae		1-2		
<i>Entolasia stricta</i>	Wiry Panic	Poaceae		3		
<i>*Eragrostis ?brownii</i>	Brown's Lovegrass	Poaceae		1		
<i>*Eragrostis curvula</i>	African Lovegrass	Poaceae			1	1
<i>Eragrostis sp.</i>	Lovegrass	Poaceae		1		
<i>*Hordeum sp.</i>	Barley Grass	Poaceae				1

Scientific name	Common name	Family	Abundance			
			RIP	ILGW	NI	P/RG
<i>*Hyparrhenia hirta</i>	Coolatai Grass	Poaceae			2	2
<i>Imperata cylindrical</i>	Blady Grass	Poaceae		1-2		
<i>*Lolium perenne</i>	Perennial Ryegrass	Poaceae			2	2
<i>Microlaena stipoides</i>	Weeping Grass	Poaceae		2		
<i>Oplismenus</i> sp.	Basket Grass	Poaceae		1		
<i>*Paspalum dilatatum</i>	Paspalum	Poaceae		1		2
<i>*Paspalum urvillei</i>	Vasey Grass	Poaceae				
<i>*Pennisetum clandestinum</i>	Kikuyu	Poaceae			1-6	4
<i>Phragmites australis</i>	Common Reed	Poaceae	2-3			
<i>Poa ?labillardieri</i>	Tussock	Poaceae		1-3		
<i>Rytidosperma</i> sp.	Wallaby Grass	Poaceae		2-4		
<i>*Setaria</i> sp.	Pigeon Grass	Poaceae		1		2
<i>*Sporobolus</i> sp.	Parramatta Grass	Poaceae				2
<i>*Stenotaphrum secundatum</i>	Buffalo Grass	Poaceae		1	1	
<i>Themeda triandra (=australis)</i>	Kangaroo Grass	Poaceae		3-4		
<i>Typha ?orientalis</i>	Cumbungi	Typhaceae	3		2	
GRAMINOIDS & STRAPPY-LEAVED SPECIES						
<i>*Agapanthus praecox ssp. orientalis</i>	African Lily	Alliaceae			1	
<i>Carex appressa</i>	Tall Sedge	Cyperaceae	1-3			
<i>Cyperus</i> sp.	Sedge	Cyperaceae		1		
<i>Dianella caerulea</i>	Blue Flax-lily	Phormiaceae		1		
<i>Dianella revoluta</i>	Blueberry Lily	Phormiaceae		2		
<i>Eleocharis acuta</i>	Common Spike-rush	Cyperaceae	1-2			
<i>Eleocharis ?sphacelata</i>		Cyperaceae	1-2			
<i>Juncus</i> sp. 2	Thick Rush	Juncaceae	1			
<i>Juncus usitatus</i>	Rush	Juncaceae	1-3			
<i>Lepidosperma ?laterale</i>	Sedge	Cyperaceae		1-2		
<i>Lomandra filiformis</i>	Wattle Mat-rush	Lomandraceae		1		

Scientific name	Common name	Family	Abundance			
			RIP	ILGW	NI	P/RG
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Lomandraceae		1		
<i>Lomandra multiflora</i>	Many-flowered Mat-rush	Lomandraceae		1		

H.2 FAUNA SPECIES RECORDED

Species listed as vulnerable on Schedule 2 of the TSC Act are preceded by an asterisk (*)

Species listed as vulnerable under the EPBC Act are preceded by a hash (#)

Species listed as migratory under the EPBC Act are preceded by a caret (^)

Common Name	Scientific Name	Survey	Observation Type
Birds			
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>	Opportunistic	Observed
Australian Magpie	<i>Cracticus tibicen</i>	Bird survey	Observed
Australian Pelican	<i>Pelecanus conspicillatus</i>	Bird survey	Observed
Australian Reed-Warbler	<i>Acrocephalus australis</i>	Bird survey	Observed
Australian Wood Duck	<i>Chenonetta jubata</i>	Opportunistic	Observed
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	Bird survey	Observed
Black-fronted Dotterel	<i>Elseya melanops</i>	Opportunistic	Observed
Black-shouldered Kite	<i>Elanus axillaris</i>	Opportunistic	Observed
Brown Goshawk	<i>Accipiter fasciatus</i>	Bird survey	Observed
^Cattle Egret	<i>Ardea ibis</i>	Opportunistic	Observed
Chestnut Teal	<i>Anas castanea</i>	Bird survey	Observed
Common Myna	<i>Sturnus tristis</i>	Bird survey	Observed
Crimson Rosella	<i>Platycercus elegans</i>	Bird survey	Observed
Dusky Moorhen	<i>Gallinula tenebrosa</i>	Bird survey	Observed
Eastern Rosella	<i>Platycercus eximius</i>	Bird survey	Observed
Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>	Bird survey	Observed
Eastern Whipbird	<i>Psophodes olivaceus</i>	Bird survey	Observed
Eastern Yellow Robin	<i>Eopsaltria australis</i>	Opportunistic	Observed
Eurasian Coot	<i>Fulica atra</i>	Opportunistic	Observed
European Goldfinch	<i>Carduelis carduelis</i>	Bird survey	Observed
Fairy Martin	<i>Petrochelidon ariel</i>	Opportunistic	Observed
Galah	<i>Eolophus roseicapillus</i>	Bird survey	Observed
Golden Whistler	<i>Pachycephala pectoralis</i>	Bird survey	Observed
Great Cormorant	<i>Phalacrocorax carbo</i>	Opportunistic	Observed
Grey Butcherbird	<i>Cracticus torquatus</i>	Bird survey	Observed
Grey Fantail	<i>Rhipidura albiscapa</i>	Bird survey	Observed
Grey Shrike-thrush	<i>Colluricincla harmonica</i>	Opportunistic	Observed

Common Name	Scientific Name	Survey	Observation Type
Hardhead	<i>Aythya australis</i>	Opportunistic	Observed
Intermediate Egret	<i>Ardea intermedia</i>	Bird survey	Observed
^Latham's Snipe	<i>Gallinago hardwickii</i>	Bird survey	Observed
Lewin's Honeyeater	<i>Meliphaga lewinii</i>	Bird survey	Observed
Little Wattlebird	<i>Anthochaera chrysoptera</i>	Bird survey	Observed
Magpie-lark	<i>Grallina cyanoleuca</i>	Bird survey	Observed
Musk Lorikeet	<i>Glossopsitta concinna</i>	Opportunistic	Observed
Nankeen Kestrel	<i>Falco cenchroides</i>	Opportunistic	Observed
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>	Bird survey	Observed
Noisy Miner	<i>Manorina melanocephala</i>	Bird survey	Observed
Olive-backed Oriole	<i>Oriolus sagittatus</i>	Bird survey	Observed
Pacific Black Duck	<i>Anas superciliosa</i>	Bird survey	Observed
Pacific Heron	<i>Ardea pacifica</i>	Bird survey	Observed
Pied Currawong	<i>Strepera graculina</i>	Bird survey	Observed
Purple Swamphen	<i>Porphyrio porphyrio</i>	Opportunistic	Observed
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>	Bird survey	Observed
Red-browed Finch	<i>Neochmia temporalis</i>	Bird survey	Observed
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	Bird survey	Observed
Sacred Kingfisher	<i>Todiramphus sanctus</i>	Bird survey	Observed
Satin Bowerbird	<i>Ptilonorhynchus violaceus</i>	Bird survey	Observed
Scarlet Honeyeater	<i>Myzomela sanguinolenta</i>	Bird survey	Observed
Shining Bronze-Cuckoo	<i>Chalcites lucidus</i>	Bird survey	Observed
Silvereye	<i>Zosterops lateralis</i>	Bird survey	Observed
Spotted Turtle-Dove	<i>Streptopelia chinensis</i>	Bird survey	Observed
Striated Thornbill	<i>Acanthiza lineata</i>	Bird survey	Observed
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	Opportunistic	Observed
Superb Fairy-wren	<i>Malurus cyaneus</i>	Bird survey	Observed
Swamp Harrier	<i>Circus approximans</i>	Opportunistic	Observed
Tree Martin	<i>Petrochelidon nigricans</i>	Bird survey	Observed
*Varied Sittella	<i>Daphoenositta chrysoptera</i>	Bird survey	Observed
Welcome Swallow	<i>Hirundo neoxena</i>	Bird survey	Observed
White-browed Scrubwren	<i>Sericornis frontalis</i>	Bird survey	Observed
White-faced Heron	<i>Egretta novaehollandiae</i>	Opportunistic	Observed
White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>	Bird survey	Observed

Common Name	Scientific Name	Survey	Observation Type
Willie Wagtail	<i>Rhipidura leucophrys</i>	Bird survey	Observed
Yellow Thornbill	<i>Acanthiza nana</i>	Bird survey	Observed
Yellow-faced Honeyeater	<i>Lichenostomus chrysops</i>	Bird survey	Heard
Amphibians			
Common Eastern Froglet	<i>Crinia signifera</i>	Spotlight/Call Playback	Heard
Verreaux's Frog	<i>Litoria verreauxii</i>	Spotlight/Call Playback	Heard
Peron's Tree Frog	<i>Litoria peronei</i>	Spotlight/Call Playback	Heard/Observed
Eastern Dwarf Tree Frog	<i>Litoria fallax</i>	Spotlight/Call Playback	Heard/Observed
Striped Marsh Frog	<i>Limnodynastes peronii</i>	Spotlight/Call Playback	Heard
Reptiles			
Red-bellied Black Snake	<i>Pseudechis porphyriacus</i>	Opportunistic	Observed
Eastern Water Dragon	<i>Physignathus lesueurii</i>	Opportunistic	Observed
Eastern Water-skink	<i>Eulamprus quoyii</i>	Opportunistic	Observed
Jacky Lizard	<i>Amphibolurus muricatus</i>	Opportunistic	Observed
Mammals			
Common Brushtail Possum	<i>Trichosurus vulpecula</i>	Spotlight	Observed
Chocolate Wattled Bat	<i>Chalinolobus morio</i>	Anabat	Confident
*Eastern Bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	Anabat	Probable
Eastern Broad-nosed Bat	<i>Scotorepens orion</i>	Anabat	Possible
*Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	Anabat	Probable
*Eastern Freetail-bat	<i>Mormopterus norfolkensis</i>	Anabat	Confident
Gould's Wattled Bat	<i>Chalinolobus gouldii</i>	Anabat	Confident
*Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	Anabat	Possible
*#Grey-headed Flying Fox	<i>Pteropus poliocephalus</i>	Opportunistic	Heard
Large Forest Bat	<i>Vespadelus darlingtoni</i>	Anabat	Probable
*#Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	Anabat	Possible
Little Forest Bat	<i>Vespadelus vulturnus</i>	Anabat	Confident
Long-eared bat	<i>Nyctophilus sp.</i>	Anabat	Confident
Rabbit	<i>Oryctolagus cuniculus</i>	Opportunistic	Observed,Scat
Sugar Glider	<i>Petaurus breviceps</i>	Spotlight	Observed
Swamp Wallaby	<i>Wallabia bicolor</i>	Opportunistic	Observed
Unidentified Deer	<i>Cervus sp.</i>	Opportunistic	Scat
White-striped Freetail-bat	<i>Tadarida australis</i>	Anabat	Probable

