

- Local Government Area (LGA) Boundary
- Substation (Route End Points)
- Best Potential Route**
- Underground
- Overhead
- Best Potential Route 1km Buffer
- Drainage
- Water Body
- National Park/Nature Reserve
- Urban Area
- Railway

URS

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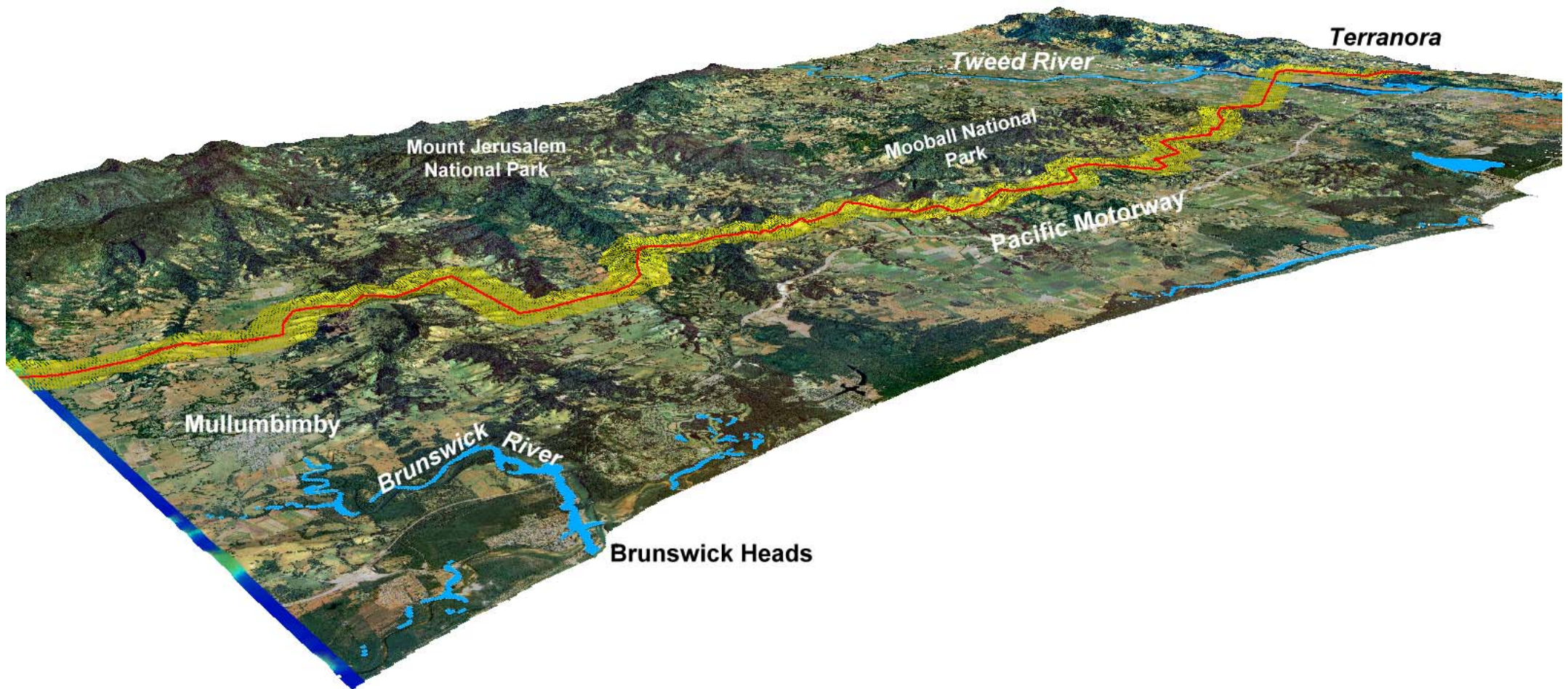
URS Australia Pty Ltd

Best Potential Route

<p>Project: Directlink 132kV Transmission Line Proposal. Project No.: 50782-002</p>	<p>Projection: MGA Zone 56 Scale: 1:160 000 @ A4</p>
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0 2.5 5
kilometers

Best Route Looking Northwest
Figure 2



Heritage

The route corridor does not impact on World Heritage listed areas or items of national or state heritage registers. Hoskin Wildlife Refuge at Mooball is located within the 1km buffer of the selected route. However it is envisaged that this small lot could be avoided during more detailed site assessment and alignment design.

Land Use/Zoning

The selected route corridor runs close to Mooball and Stotts Island National Parks, although it does not directly impact on these parks. The selected route does traverse five areas zoned environmental protection under the Tweed and Byron LEPs, namely at Terranora Escarpment, three ridges running east of Mooball NP and Chincogan Mountains. Whilst transmission lines are permissible with consent within these zones, the primary purpose of zoning in these areas is to protect visual and habitat qualities. Construction of an overhead transmission line requiring vegetation clearing would be inconsistent with the aims of the zoning. It is very unlikely that either Council or the community would support an overhead transmission line through these environmental protection zoned areas.

The majority of the selected route transverses 1(a) rural zonings which is generally considered to present a low to medium planning constraint. However, social issues such as potential impacts on agricultural production, the perceived impacts and marginalisation of rural communities would require careful and detailed planning and consultation. The impact of an overhead line on cane growers in the Tweed Valley is predicted to be most severe due to incompatible practice of reducing stubble with fire. It is recommended appropriate easements be purchase within this land use zone.

The urban zones of Terranora and the escarpment to the south are likely to be impacted by an overhead transmission line along the selected route. Further, there would be potential impacts on future proposed urban release areas surrounding Terranora and Mullumbimby.

Visual

The potential transmission line route options shown on Map 14 indicate that areas of high scenic value have been avoided as much as possible. However, due to the generally high visual quality throughout the region it is not possible to avoid all of these areas. The approximate lengths of potential transmission line that would pass through various categories of visual quality for the 'best' route are summarised in the following table.

Visual Quality	'Best' Route
Very High	8km
High	30km
Medium	9 km
Total	47km

Allowance must be made for the method employed for calculating distances to allow for increased length of lines resulting from topographic variation and route alignment within the corridor.

EMF

The transmission line route generally avoids current and future urban areas. In addition the width of the corridor would allow detailed planning of the transmission line alignment provide for reasonable separation from residences.

Undergrounding

There are two sections of recommended undergrounding. They include an 8.4km section heading north from Mullumbimby, and a 9.7km section heading into Terranora. These sections have been recommended where a number of constraints combine to increase the sensitivity of overhead transmission line route selection and where no other option exists for placement of the route. The environmental planning justification of this decision is outlined below:

- In the areas adjoining the urban centres of Terranora and Mullumbimby through which the transmission line would need to pass, the density of rural residential development is relatively high making it more difficult to locate an acceptable overhead transmission line route (see Map 15);
- The visual impacts of an overhead transmission line would potentially affect an increased number of residents in the urban settings and exacerbate the perceived effects on lifestyle and amenity values;
- The value and viability of identified future urban expansion areas could potentially be compromised (see Map 15);

-
- Urban release area approved by Tweed and Byron Shire Councils typically contain requirements for the undergrounding of powerlines;
 - On the approaches to these urban centres, the transmission line route also traverses land zoned as scenic protection under both the Tweed and Byron LEPs. (see Map 12 and 13);
 - The scenic values protected under the LEPs were confirmed by the visual assessment conducted by URS as part of this investigation (see Map 14);
 - These scenic zones also contain native vegetation remnants associated with threatened species habitat models and corridors as identified by DEC (Former NPWS - see Maps 4a-4c);
 - High visual impacts were also recognised along the Tweed River Valley (see Map 14);
 - There may also be incompatibilities with the use of fire by sugar cane growers and this conflict is most significant along the Tweed River Valley; and
 - There would also be major acid sulphate soil management issues associated with an underground transmission line route across the open Tweed River Valley.

8.2.2 Mitigation Requirements

Standard Conditions of Approval

The standard conditions of approval issued by DIPNR for similar projects have been examined by URS to identify the likely extent and type of conditions that could be expected for the potential transmission line development. It should be noted that only generic conditions can be outlined as each proposal will be unique and require tailored consent requirements. However, a range of standard conditions of approval can be identified. A typical list of requirements can include:

- A Compliance Report
- A 24 hour contact telephone number
- A Traffic Management Plan
- Establishment of a complaints register
- Requirements for Environmental Management Systems (including for contractors in accordance with AS/NZS ISO 14000 or BS 7750-1994 and certified by an accredited certifier
- Employment and approval of an Environmental Management Representative

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- An Environmental Management Plans (EMPs) for construction and operations
 - Route Alignment Sheets identifying outstanding issues and features
 - Environmental Monitoring Reports
 - An Environmental Impact Verification Report
 - Electromagnetic Field Measurements
 - A Visual Impact Management Strategy
 - A Waste Management Strategy
 - An Acid Sulphate Soil Management Plan
 - Indigenous Heritage Management Strategy including local Aboriginal consultation
 - A Revegetation Strategy
 - Monitoring of Birdstrike (particularly for wetlands and migratory birds)
 - A Construction Noise Management Strategy
 - A Soil Management Strategy
 - Generic Threatened Species Protocols
 - Surveys for individual threatened species at specific locations
 - A Flora and Fauna Management Strategy

Potential Visual Impact and Mitigation Requirements

URS has identified potential visual impact and mitigation requirements that would be associated with the best route. These are presented in Table 8.1.

Table 8.1: Visual Impact Mitigation Requirements

Section of Powerline Route	Potential Visual Impact	Anticipated Mitigation Requirements
Urban Development at Terranora	High	- undergrounding within road reserve
Terranora Escarpment	High	- undergrounding within road reserve
Tweed River Crossing	High	- undergrounding and submarine crossing
Sugar Cane Fields of Tweed River Valley	High visual impact (potential impact on sugar cane planting and harvesting operations)	- undergrounding within designated easements

Table 8.1: Visual Impact Mitigation Requirements (continued)

Section of Powerline Route	Potential Visual Impact	Anticipated Mitigation Requirements
Foothills on southern edge of Tweed Valley	Moderate to high	<ul style="list-style-type: none"> - very careful siting of poles to minimise tree clearing and views from individual residences - painting of some poles to reduce visual contrast with background - tree planting to block some views from residences and roads
Upper slopes and ridges of central landform	Moderate to high	<ul style="list-style-type: none"> - very careful siting of poles to minimise tree clearing and views from individual residences - painting of some poles to reduce visual contrast with background - tree planting to block some views from residences and roads - potential undergrounding in some sections of very high visual quality on ridgelines where tree clearing would be required to construct a section of overhead powerline
Rural and scenic landscape north of Mullumbimby	High to moderate	<ul style="list-style-type: none"> - undergrounding within break in scenic ridgeline;
Rural residential and future urban development near Mullumbimby	High	<ul style="list-style-type: none"> - undergrounding within road reserves or property boundaries;

8.2.3 Likelihood of Approval

Given the constraints listed above, the impacts identified within the selected route and considering the degree of expected public opposition, acceptance of recommended underground sections and the extent of influence of mitigation measures, URS believes that following a detailed environmental and social impact assessment, a long and protracted development assessment process including extensive community consultation would be necessary. URS believes that the route selection process followed and the incorporation of 18km of undergrounding would sufficiently mitigate potential environmental impacts for a transmission line proposal to create a reasonable probability of eventually obtaining environmental and planning approval. However, there is a high probability that, as a result of further assessment and community consultation, DIPNR would impose a large number of approval conditions, some

of which may require additional environmental impact mitigation such as alignment changes or increased undergrounding for a number of very sensitive areas along the route. The likelihood of DIPNR issuing a consent and the nature of any attached conditions would be strongly influenced by the level and strength of community opposition, the views of Tweed and Byron Councils, and the DIPNR's own assessment of the proposal.

8.3 Alternative Route

Map 17 illustrates the 'Alternative Route'. This route is not dissimilar to the 'best' route, but it is aligned west of the major ridgeline between the Tweed River Valley and the coastal zone. Consequently it would be less visible from the Pacific Motorway and development in the coastal zone and the system of valleys extending west of the Motorway. The route is slightly longer at approximately 52km long and with more of the route being underground, approximately 27km. Again, route length calculations have been prepared using GIS, which measures only in one plane, horizontal (i.e. flat) and that additional line distance would be expected to allow for topography and route variations within the identified corridor.

8.3.1 Reasons for Route Selection

Topographical

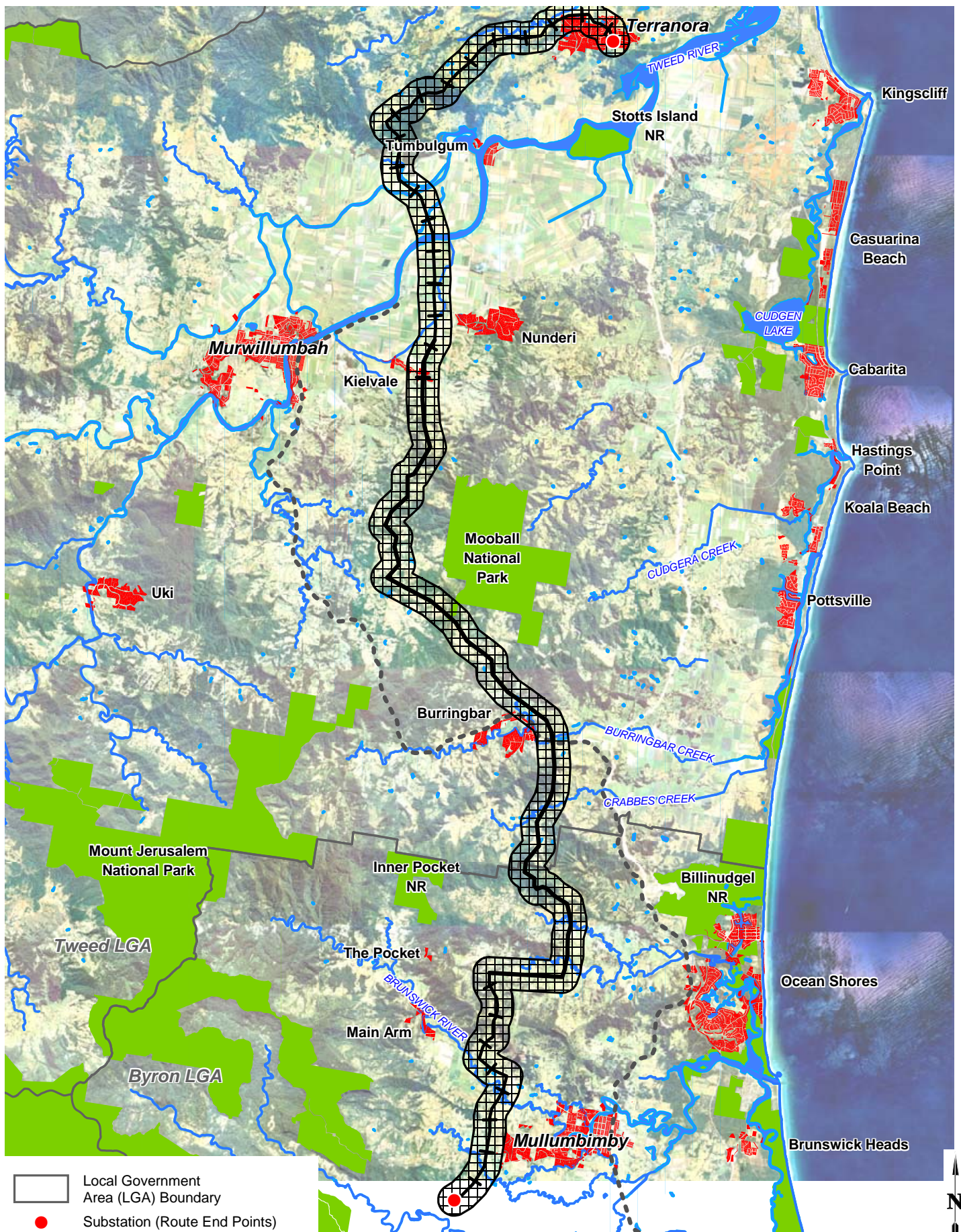
The route again generally avoids extreme topography while there are additional creek and river crossings, namely Burringbar Ck, Lacks Creek, Dunbible Ck, Rous River. However there is little difference between the number or size of crossings between the 'best' and alternative routes. Figure 2 illustrates the terrain of the selected route.











Ecological

To a lesser extent this route avoids the concentration of areas with threatened species records, habitat and remnant vegetation on the areas of higher elevations dominated by National Park. The alternative route also traverses a longer distance of the disturbed hinterland on the western side of Mooball National Park utilising existing cleared and disturbed areas. Based on aerial photography interpretation it is estimated that approximately 18km of the route or approximately 70 hectares (ha) of vegetation would need to be cleared.

Although outside of the mapped Koala habitat (map 5) the extent of impact on primary and secondary Koala habitats would be greater than the 'best' route thus requiring additional considerations under SEPP 44. There would be no direct impacts on SEPP 14 wetlands or SEPP 26 littoral rainforests although adjacent wetlands on the Tweed River may require preventative

management practices during construction to avoid indirect impacts. The area requiring management of Acid Sulphate Soils (ASS) would be more extensive for the 'best' route but still restricted to the Tweed River Valley.



-  Local Government Area (LGA) Boundary
-  Substation (Route End Points)
- Alternate Route**
-  Overhead
-  Underground
-  Alternate Route 1km Buffer
-  Drainage
-  Water Body
-  National Park/Nature Reserve
-  Urban Area
-  Railway

URS

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MAP: 17	Approved: MSA
Client: Burns & Roe Worley	Status: FINAL
Location: T:\Proj\GIS\50782\002\GIS\Workspaces\Maps\Map 16.WOR	

URS Australia Pty Ltd

Alternate Route

Project: Directlink 132kV Transmission Line Proposal. Project No.: 50782-002

0 2.5 5 kilometers	Projection: MGA Zone 56 Scale: 1:160 000 @ A4
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Alternate Route Looking Southwest
Figure 3



Heritage

Heritage items in Barringar are located within the 1km buffer of the selected route. However, it is envisaged that impacts could be avoided through detailed selection of the transmission line alignment.

Land Use Zoning

The selected route traverses to the south and west of Mooball National Park. On the SW corner some careful route selection would be required to avoid directly impacting on the National Parks estate.

The alternative route also traverses areas zoned as environmental protection under the Tweed and Byron LEPs. These include Terranora Escarpment, the ridgeline joining Mt Jerusalem and Mooball National Parks and Chincogan Mountains. While transmission lines are permissible with consent within these zones, construction of an overhead line requiring vegetation clearing would be contrary to the intent of the zoning. It is very unlikely that either of the councils involved or the local communities would support overhead line development in these zones.

More of the alternative route transverses 1(a) rural zonings and there is a greater density of rural residential development in the upper Tweed Valley compared to the ‘best’ route. The social issues including potential impacts on agricultural production and the perceived reduction in amenity of rural communities associated with EMFs as well as visual impacts would be greater than for the ‘best’ route.

Visual

The potential transmission line route option shown on Map 14 indicate that areas of high scenic value have been avoided as much as possible. However due to the generally high visual quality throughout the region it is not possible to avoid areas of high visual quality. The approximate length of potential transmission line that would pass through various categories of visual quality for the selected route is shown in the table below.

Visual Quality	Alternate Route Length
Very High	5km
High	37km
Medium	10km
Total	52km

Allowance must be made for the method employed for calculating distances to allow for increased length of lines due to topographical relief and detailed alignment within route corridor.

EMF

The transmission line route generally avoids existing and future urban areas although there may be an increased number of residences potentially affected due to the greater rural residential densities and the increased distance of the route on the northern side of the Tweed River. The width of the corridor would still allow detailed planning to provide for adequate separation from residences.

Undergrounding

The section from Mullumbimby north remains the same for both the best and alternative routes. A larger amount of undergrounding is required for this more western route in order to access Terranora substation. The northern underground section into Terranora is longer (18.6km) and differs in the following manner:

- The Terranora escarpment, identified as scenic and of high visual significance is traversed for a longer distance;
- On the north side of the escarpment the alternate route passes through areas already experiencing expanding urban and rural residential development (see Map 15);
- The forested escarpment is an area also recognised as containing significant wildlife habitat values (see Map 4a-4c);
- The urban areas and future urban release areas to the east of Kiel Vale and Murwillumbah at the break of slope from the Tweed Valley are additional constraints;
- The length of the Tweed River Valley that would require underground cabling is increased due to the more westerly alignment; and
- Due to the greater distance across the Tweed River Valley there is likely to be more work required to ameliorate potential impacts associated with acid sulphate soils.

8.3.2 Mitigation Requirements

It is anticipated that mitigation requirements would be very similar to those of the ‘best’ route. However, due to the potentially higher number of rural residential properties effected, a greater length passing through acid sulphate soils and increased amounts of clearing associated with the

alternative route, mitigation measures are likely to be more extensive and apply to a greater length of the alternate route.

8.3.3 Likelihood of Approval

The constraints outlined above for the alternative route have additional impacts identified within the selected route especially in relation to the increase area expected to be cleared of native vegetation and the greater number of rural and urban residents expected to oppose the overhead development. Acceptance of the recommended underground sections is considered mandatory in addition to broader application of mitigation measures. URS believes that following a detailed environmental and social impact assessment, a long and protracted development assessment process including extensive community consultation would be necessary. URS believes that the route selection process for this alternative route and incorporation of 27km of undergrounding would mitigate the potential environmental impacts for a transmission line proposal to a level that would create a reasonable probability of obtaining planning approval in the long term.

However, there is a very high probability that, as a result of further assessment and community consultation, DIPNR would impose a large number of approval conditions, some of which may require additional environmental impact mitigation including alignment changes or increased undergrounding in a number of very sensitive areas along the route such as the section adjoining Mooball National Park. The likelihood of DIPNR issuing consent and the nature of the attached conditions would be strongly influenced by the extent and strength of community opposition, the views of Tweed and Byron Councils, and the DIPNR's own assessment of the proposal.

Based on the results of the assessment carried out by URS the following recommendations are made to progress the project.

1. That the 'best' route be adopted for the purposes of estimating the cost of establishing a transmission line from Terranora to Mullumbimby.
2. That there are no identified significant issues within the best route that would justify the use of the longer alternative route.
3. That a more detailed assessment would increase the environmental, cultural and community constraints placed upon the selected routes.
4. Given the identified planning constraints, the impacts identified within the routes and considering the expected degree of public opposition, acceptance of recommended underground sections and the extent of influence of mitigation measures, URS believes that following a detailed environmental and social impact assessment, a long and protracted development assessment process including extensive community consultation would be necessary in order to obtain development approval. There would be a high possibility of major route alignment changes and if approval were obtained from DIPNR it would contain a large number of consent conditions.
5. That this report be reviewed by DIPNR, Tweed and Byron Shire Councils to determine:
 - If this desk-top review carried out by URS provides an acceptable standard of assessment of all the material environmental and planning approval issues that would have to be addressed if approval were being sought;
 - If there are any other relevant planning or environmental constraints not identified or adequately addressed in this report; and
 - Whether the assumptions and findings are a reasonable interpretation of the regulatory requirements for such a project.
6. URS acknowledges and highlights the limitations associated with undertaking a desktop analysis for such a proposal and notes that additional constraints would be identified at a more detailed level of assessment, which would be necessary for such a project to move forward.

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The following is an excerpt from PlanningNSW EIS Guidelines for Network Electricity Systems and Related Facilities (Draft for discussion - February 2002)

When selecting potentially feasible options, broader environmental, social, economic and land use constraints and opportunities must be considered along with operational, financial and engineering factors.

The greater the potential for adverse effects on the environment or the community, the more important the route selection process. Appropriate route selection studies can avoid or reduce many of the environmental problems with electricity network system proposals and:

- avoid potential delays in the approval process
- reduce the need for technically based environmental and health risk mitigation measures and costly ongoing management measures
- result in substantial savings in establishment and operational costs
- reduce levels of public concern.

A route selection study should be objective, transparent and avoid unsupported or unsubstantiated opinions biased towards a predetermined option. The level of detail in a route selection study should be commensurate with the scale of the proposal, the potential environmental risks associated with the proposal and the potential sensitivity of the location. All route selection studies should involve an appropriate level of consultation with the government and community throughout stages of the interactive process. A systematic- and rigorous approach to route selection is recommended as set out in Figure 2.

Figure 2. Selection of route options – to be added

It should be noted that the selection methodology outlined to assess the suitability of a new route can also be applied to assessing the appropriateness of an existing route for upgrading or augmentation.

The first stage of the selection study can be a cost- effective device to exclude fundamentally unsuitable routes from further consideration. Most route selection studies for new electricity network lines should involve some form of desktop study involving techniques such as constraints and opportunities mapping along with limited site investigations. These techniques allow locations with serious environmental incompatibilities or which are likely to result in major community conflicts to be identified and eliminated as early as possible.

It is important that a scale appropriate to the complexity of the constraints in the study area be used. As a general guide, a scale of 1:25 000 will normally be considered as a minimum for non-urban areas whilst 1:10 000 or larger is likely to be more appropriate for urban areas. Aerial photography, orthophoto maps, topographic maps and GIS are extremely valuable tools in the analysis and assist both the assessment and

Appendix 1- DIPNR Guidelines for Route Selection APPENDIX 1

also the community understanding of the issues at stake. When evaluating route options, the following should be considered:

a) Permissibility of land use

At an early stage in the route selection process it is essential to check with the local council to determine where electricity network lines are not permissible under the provisions of the LEP or other planning instruments. If electricity network systems are not permissible in an area proposed, discussions should be held with Council to determine its attitude towards rezoning the route.

Table 1. List of Environmentally Sensitive Areas to be Avoided

Area	Objective
<p>Areas of significant environmental or conservation value identified under relevant legislation or environmental planning instruments, including:</p> <ul style="list-style-type: none"> • National parks; reserves for environmental protection e.g. marine, aquatic, nature, karsts; other areas protected under the <i>National parks and wildlife Act 1974</i>; areas covered by a Conservation Agreement • World heritage areas, other historic and heritage areas, building or sites • Areas of National environmental significance as specified under the Environment Protection and Biodiversity Conservation Act 1999 • Wilderness areas identified or declared under the <i>Wilderness Act, 1987</i> • SPP 14 – Coastal Wetlands, SEPP 26 – Littoral Rainforests, SEPP 44 – Koala Habitat and Native Vegetation Plans under the Native Vegetation Conservation Act 1998 • Areas zoned under a LEP or REP for environmental protection purposes, e..g. high scenic, scientific, cultural, wetlands or natural heritage. 	<p>To avoid the risk of damaging areas of high environmental value</p>
<p>Sites within an identified drinking water catchment (surface water or groundwater) including any lands nominated or mapped as 'special or protected areas' by water supply authorities or in the vicinity of a drinking water bore</p>	<p>To avoid the risk of polluting drinking water</p>
<p>Sites where the substrata is prone to land degradation, land slip or subsidence</p>	<p>To avoid erosion and land degradation</p>

b) Environmentally sensitive areas

Areas of high environmental value should be identified and wherever possible, excluded from any further consideration as site selection options.

Table 1 provides examples of areas to be avoided.

c) Compatibility with land uses within electricity network system corridors

Another important consideration is the compatibility of the proposal with existing or proposed surrounding land uses. Conflicts commonly arise when the community's amenity is seriously threatened, particularly by impaired visual amenity or potential health concerns. Any potential conflicts and possible options for reducing or preventing conflicts during the route selection process should be considered. In some circumstances, increased separation distances from sensitive land uses can significantly reduce impacts. The need for and extent of separation distances should be determined on a case specific basis.

If the proposal is potentially incompatible with surrounding land uses, consideration should be given to acquiring sufficient land to provide adequate on-site separation from nearby land uses. As the establishment of 'buffer' areas around electricity network systems can lead to unacceptable land sterilisation, separation distances should not be viewed as the only means of ameliorating impacts.

Instead, separation distances should be seen as a last resort option to ensure the amenity of existing land uses can be maintained. The role of separation distances as an impact mitigation measure should simply reinforce the impact mitigation measures provided by other means.

In particular, the principles of "prudent avoidance" should be applied during the options phase. It is suggested that in siting a electricity network line it would be prudent to keep the line as far away as possible from human habitation, or in the case of a new double circuit line to ensure that the phases are in a low reactance or reverse phase configuration.

The following procedure from Gibbs (1991) provides a logical sequence for applying the principle of prudent avoidance to electricity network line proposals:

- Step 1:* Calculate the electric and magnetic fields associated with the available electricity network line design options and confirm that the proposed design does not result in electric and magnetic fields that exceed National Health and Medical Research Council Guidelines.
- Step 2:* Ascertain whether the application of reverse phase technology is applicable to the construction proposed, i.e. double circuit lines or joint use lines. This should be incorporated in the design if appropriate.
- Step 3:* Ascertain whether the electric and magnetic fields close to dwellings would be significantly increased following the completion of the proposed powerline.
- Step 4:* Where Step 3 shows a significant increase, then alternative routes should be examined and their cost and environmental impacts assessed.
- Step 5:* Where the costs and environmental impacts of an alternative route are not significantly greater than for the original proposal, then under the principle of prudent avoidance, the alternative option should be selected.

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It is not possible to quantify in general terms what is classified as a significant increase in electric and magnetic fields and a significant increase in cost/environmental impact. These factors should be considered with respect to the individual project.

d) Initial route investigations

The purpose of preliminary investigations is to provide an early evaluation of the suitability of the proposed route in terms of management, engineering and environmental factors. The initial investigations can help provide confidence about including or excluding a potential route from the list of potentially feasible routes and when selecting a preferred option. Limited field studies at this stage can help demonstrate whether a route is fundamentally suitable for a electricity network system proposal prior to proceeding with more detailed assessments. Examples of factors which may need to be considered in the initial route assessment are listed in Table 2.

11.1 Detailed project definition

Preliminary selection processes, as described in sections 5.1 and 5.2 above, may establish that there are a number of feasible route options. In order to further eliminate alternatives and to select a cost- effective option which minimises the environmental degradation and maximises the benefits to the community and the environment, further information will be required for both the proposal as well as the environment. In addition to the environmental studies, input from consultation with the community should be included in the analysis during the option selection process.

The option selection study should provide a comparative evaluation of potentially feasible options including the likely costs and effectiveness of mitigation measures.

At this stage, additional information will be required on the proposal parameters such as proposed standards, locations of major structures, approximate earthwork quantities or comparative costs. In some cases, three dimensional modelling may be required to aid in the definition of proposal options to enable an adequate comparison in terms of engineering, financial and environmental factors.

In addition, limited environmental field studies such as preliminary fauna, flora, soils, hydrological and social surveys or studies will be required. A parallel task involves community consultation to assess values, needs, concerns and preferences.

Involvement of the community should be as broad as possible and should not be limited to specific factional interests or targeted at specific individuals. Care should be taken to ensure that any affected disadvantaged groups are given an opportunity to comment.

Option selection should preferably be a staged iterative process with the number of options reduced or refined at each level of decision making. An increasing level of detail may be required to assist in eliminating options in relation to key environmental, operational, engineering, financial and strategic planning issues. Techniques such as multi-criteria analysis, weighted factor analysis or comparisons against pre-determined performance criteria/measures can be helpful in this process. The option analysis

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process can be greatly strengthened when independent technical experts in key environmental areas are consulted and their inputs are considered.

A commitment to preferred options should not be made until community feedback has been considered in the analysis. In addition, the full costs and the potential effectiveness of mitigation measures should be considered. For instance, while option A may seem preferable to option B based on the level of the impacts, when the costs, effectiveness and certainty of mitigation strategies are considered the preference could be reversed. The results of the selection process, along with the reasons for eliminating options, should be publicly available at key decision points. The selection of the preferred option should be clearly justified on the basis of environmental, social and economic goals with an overarching consideration of the principles of ecologically sustainable development.

In some circumstances, the acceptability of a preferred option may still be uncertain following a route selection study. A precautionary approach should be adopted with these types of 'environmentally marginal' routes.

The potential availability of impact mitigation measures alone to alleviate serious environmental deficiencies should not be used to conclude that a location is suitable. Before proceeding with these types of routes, the views of relevant government authorities and the community should be sought regarding the:

- nature of the environmental constraint and its significance for the proposal's likely impacts
- availability and predictability of impact mitigation measures
- comparative merits of alternative routes.

A balanced judgement should be made taking account of all environmental factors. If a route is deemed to be suitable, the EIS should include an outline of the selection process including the results of the initial investigations and consultation process and a full explanation of the rationale for selecting the route.

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Table 2. Matters to be Considered in Initial Route Investigations

Operational requirements

- Does the corridor provide sufficient land area for present and future requirements?
- Is there suitable access for construction and maintenance?
- Are the rainfall patterns or prevailing wind directions likely to cause management difficulties?
- Are there any other operational problems which may affect route selection?

Water Issues

- Are there any constraints so that on-site water management is difficult (including stormwater and stream diversions)?
- Are there risks of surface water pollution because of the proximity or pathways to waterbodies or wetlands?
- Are there risks of groundwater problems because of shallow or rising groundwater tables, or proximity to groundwater recharge areas, or areas with a high vulnerability to pollution?
- Is any part of the route susceptible to flooding?
- Any other water related issues which may affect route selection?

Flora and fauna issues

- Can clearing of vegetation be avoided?
- Can clearing of vegetation of high significance be avoided e.g. vegetation used for visual screening, riparian vegetation, vegetation used as corridors for the movement of fauna?
- Are threatened flora or fauna species, populations or ecological communities or their habitats likely to be affected? Will a Species Impact Statement be required?
- Can areas of native vegetation with associated high bushfire risks be avoided?
- Are there any other ecologically related issues which may affect route selection?

Genealogical or soil issues

- Are the local topographic characteristics likely to result in design and management difficulties?
- Are there any geological characteristics which will cause difficulties in managing impacts (subsidence, slippage, seismic)?
- Are the soils highly erodible; identify any potential sediment management problems?

Appendix 1- DIPNR Guidelines for Route Selection APPENDIX 1

- Are there existing soils problems e.g. contaminated soils, acid sulfate or saline soils? Are there any other soils or geological related issues which may affect site selection?

Electricity issues

- Does the proposal in this location enhance the efficiency of the electricity network?

Community issues

- Are any environmental risks or uncertainties appropriately managed eg in relation to electric and magnetic field effects, including the application of “prudent avoidance”?
- Is the proposal likely to be compatible with surrounding existing or proposed land uses, particularly any residential, special uses (such as schools, hospitals, community buildings), any sites of outstanding natural, environmental, agricultural or mineral value or the location of high tech industries?
- Does the route corridor avoid unnecessary dislocation of existing roads, other infrastructure or utility networks? Can dislocation of residential areas be avoided, particularly severance of communities with strong community identity? Can dislocation of the operation of agricultural, forestry, commercial or industrial activities be avoided?
- Is there likely to be a problem in meeting sustained compliance with noise, air or water quality requirements due to the proximity and nature of nearby land uses? Is the proposal likely to pose health risks?
- Is the proposal likely to affect the heritage significance of any Aboriginal or non-Aboriginal heritage items found or likely to be found along the route?
- Is any part of the route highly visible? Can significant visual impacts be avoided?
- Are there any other social or economic issues which may affect route selection?

Cumulative issues

- Is the proposed location likely to contribute to any existing cumulative problems (air, noise, congestion, economic hardship, social issues)?

12.1 Byron Heritage Schedule (LEP)

Lot/DP	Address	Description
Bangalow		
		Buildings within Heritage Precinct on map
Lot 2 DP 122668	Deacon Street	Catholic Church
Lot 2 DP 719871	Pacific Highway	Residence, Jelbon Leigh
Lot 281 DP 837699	Byron Bay Road	Residence
Byron Bay		
-	-	Lighthouse Complex
-	Butler Street	Railway Water Tower
Lot 387 DP 728536	Shirley Street	Police Station and old Courthouse
Lot 1 DP 736784	Jonson Street	Old Post Office
-	Jonson Street	Railway Station
Lot 1 DP 827049	Jonson Street	Station Master's Cottage
Lot 1 Section 26 DP 758207	27-31 Fletcher Street	Attached buildings
Lot 2 Section 26 DP 758207	33-35 Fletcher Street	Attached buildings
Lot A DP 195700	4 Browning Street	Residence, Jasmine House
Mullumbimby		
Lots 4 and 5 Section 3 DP 2772	Burringbar Street	National Bank
Lots 21 and 40 Section 4 DP 2772	Burringbar Street	Westpac Bank
Lot 389 DP 728162	Stuart Street	Heritage Museum
Lot 387 DP 728164	Dalley Street	Court House
Lots 69-71 Section 3 DP 2772	Stuart Street	Church of England
Lot 2 DP 875011	Main Arm Road	"Inverary"
Lots 1 and 2 DP 314096, Lot 1 DP 395638, Lot 2 DP 365195	Wilson's Creek Road	Power Station and Race
Lot 4 Section 12 DP 758727	140 Dalley Street, Mullumbimby	Cedar House
Lot 2 DP 209440	12 Azalea Street, Mullumbimby	"Somerset"

12.2 Tweed Heritage Schedule (LEP)

Locality	Street & No.	Property description	Item	Significance Level	Listed by
Burringbar	Broadway Street 61-63	Lot 11, DP 571794	Saint Michael's Roman Catholic Church.	Local	
			Burringbar Railway Station	Regional	
Chinderah	Chinderah Road	Lot 493, DP 720407, Lot 49, DP 841783	Chinderah Cemetery	State	
Dulguigan	Dulguigan Road	Lot 6, DP 578144	Grave site and headstone of Mr Paddy Smith	Local	
Dum Dum	Kyogle Road 973	Lot 3, DP 611094	Dum Dum Homestead	Local	
Dunbible		Near Stokers Road rail crossing	Dunbible Creek Railway Bridge	Regional	
Fingal Head	Lighthouse Road	Lot 1, DP 847751	Fingal Head Lighthouse	Local	AHC
Kynnumboon	Numinhah Road	Pt. Lot 7, DP 817563	"Lisnagar" House and Dairy	Local	AHC, NTA
Midginbil	Midginbil Road 321	Lot 74, DP 755710	Bag End Wildlife Refuge	Local	
Mooball	Wabba Road	Pt. Lot 1 & Lot 2, DP 873618	Hoskin Wildlife Refuge	Local	

Locality	Street & No.	Property description	Item	Significance Level	Listed by
Murwillumbah	Eyles Avenue 4	Lots 5 & 6, Sec 28, DP 8950	"Goldsborough"	Local	
	Murwillumbah Street 1-3	Lot 1, DP 772892	B.G.F. Building	Local	AHC, NTA
	Murwillumbah Street 38	Lot 1, DP 772600	National Australia Banking Chambers	Local	NTA
	Murwillumbah Street 61-83	Lot 4, Sec. 1, DP 758739	Murwillumbah Police Station and Courthouse Group (including all trees and spaces between and in front of buildings)	Regional	AHC, NTA
	Murwillumbah Street 143	Lot 2, DP 225827	Roman Catholic Presbytery	Local	
	Queen Street 21	Lot A, DP 395020	Former Salvation Army Building	Regional	
	Queensland Road 2	Lot 1, Sec 30, DP 75839	Former Tweed Shire Council Chambers	Regional	
	Riverview Street	Lot 6, DP 820602A	Block A — Murwillumbah High School	State	
	Wollumbin Street 1	Lot 1, DP 772596	"Austral" Building	Regional	
Terragon	Palmers Road	Lot 67, DP 755754	Wollumbin Wildlife Refuge	Local	

Appendix 2 – LEP Heritage Items

APPENDIX 2

Locality	Street & No.	Property description	Item	Significance Level	Listed by
Tweed area			Osprey nests as mapped from time to time by the National Parks and Wildlife Service and notified to the Council	Local	
Uki	Kyogle Road 1468	Lot 6, DP 8107	The Old Bank	Regional	
	Kyogle Road 1473	Lot 116, DP 755730	Holy Trinity Church	Regional	
Wooyung	Old Coast Road	Lot 1, DP 779830	Natural area north of Brunswick Heads (Ocean Shores)	Local	

12.3 North Coast Regional Environmental Plan

BYRON

Bangalow

- Former Bangalow Court House (Lot 2 DP 808373), Byron Street (A092)

Mullumbimby

- Cedar House, 140 Dalley Street (A085)
- Mullumbimby Court House and Police Station (including the lock-up on the southern side), 61 Dalley Street (A131)

TWEED

Burringbar

- Burringbar Railway Station (1890s weatherboard building) (A014)

Dunbible

- Dunbible Creek Railway Bridge, near Stokers Road Rail Crossing (A016)

Murwillumbah

- Austral Building (also known as “Tongs Corner”), 1 Wollumbin Street (Lot 1 DP 772596) (A033)
- Former Salvation Army Building, 21 Queen Street (Lot A DP 395020) (A189)
- “Lisnagar” near Kynumboom Bridge
- Murwillumbah Civic Precinct (comprising the Murwillumbah Court House, Police Station with original lock-up and Police Residence), 61–83 Murwillumbah Street (Lot 4 Section 1 DP 758739) (A017)
- Murwillumbah Museum, 2 Queensland Road (Cnr Lot 1 Section 30 DP 758739) (A011)

Uki

- Holy Trinity Church (Lot 116 DP 755730), 1473 Kyogle Road (A185)
- The Old Bank (formerly the ES&A Bank) (Lot 6 DP 8107), 1468 Kyogle Road (A188)

Appendix 3- Threatened Species Listings

APPENDIX 3

13.1 Byron (TSC Act)

13.1.1 Endangered Populations

Emu, *Dromaius novaehollandiae*, population in the NSW North Coast Bioregion

Endangered Ecological Communities

Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions, Lowland Rainforest on Floodplain in the NSW North Coast Bioregion, Byron Bay Dwarf Graminoid Clay Heath Community, and White Box Yellow Box Blakely's Red Gum Woodland.

13.1.2 Listed Fauna Species

Scientific_Name	Common_Name	Legal_Status
Menura alberti	Albert's Lyrebird	V
Botaurus poiciloptilus	Australasian Bittern	V
Coracina lineata	Barred Cuckoo-shrike	V
Esacus neglectus	Beach Stone-curlew	E1
Ixobrychus flavicollis	Black Bittern	V
Pteropus alecto	Black Flying-fox	V
Ephippiorhynchus asiaticus	Black-necked Stork	E1
Pterodroma nigripennis	Black-winged Petrel	V
Grus rubicundus	Brolga	V
Climacteris picumnus	Brown Treecreeper	V
Burhinus grallarius	Bush Stone-curlew	E1
Amauornis olivaceus	Bush-hen	V
Todiramphus chloris	Collared Kingfisher	V
Irediparra gallinacea	Comb-crested Jacana	V
Syconycteris australis	Common Blossom-bat	V

Appendix 3- Threatened Species Listings

APPENDIX 3

Scientific_Name	Common_Name	Legal_Status
Planigale maculata	Common Planigale	V
Cyclopsitta diophthalma coxeni	Double-eyed Fig-parrot	E1
Miniopterus schreibersii oceanensis	Eastern Bent-wing Bat	V
Nyctophilus bifax	Eastern Long-eared Bat	V
Cercartetus nanus	Eastern Pygmy-possum	V
Nyctimene robinsoni	Eastern Tube-nosed Bat	V
Stictonetta naevosa	Freckled Duck	V
Mixophyes iteratus	Giant Barred Frog	E1
Calyptorhynchus lathami	Glossy Black-Cockatoo	V
Pterodroma leucoptera leucoptera	Gould's Petrel	E1
Tyto capensis	Grass Owl	V
Calidris tenuirostris	Great Knot	V
Scoteanax rueppellii	Greater Broad-nosed Bat	V
Litoria aurea	Green and Golden Bell Frog	E1
Procelsterna cerulea	Grey Ternlet	V
Pteropus poliocephalus	Grey-headed Flying-fox	V
Phascolarctos cinereus	Koala	V
Myotis adversus	Large-footed Myotis	V
Miniopterus australis	Little Bentwing-bat	V
Sterna albifrons	Little Tern	E1
Potorous tridactylus	Long-nosed Potoroo	V
Philoria loveridgei	Loveridge's Frog	V
Anseranas semipalmata	Magpie Goose	V
Lichenostomus fasciularis	Mangrove Honeyeater	V
Podargus ocellatus	Marbled Frogmouth	V
Tyto novaehollandiae	Masked Owl	V

Appendix 3- Threatened Species Listings

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Scientific_Name	Common_Name	Legal_Status
Thersites mitchellae	Mitchell's Rainforest Snail	E1
Pachycephala olivacea	Olive Whistler	V
Litoria olongburensis	Olongburra Frog	V
Pandion haliaetus	Osprey	V
Haematopus longirostris	Pied Oystercatcher	V
Assa darlingtoni	Pouched Frog	V
Ninox strenua	Powerful Owl	V
Erythrotriorchis radiatus	Red Goshawk	E1
Thylogale stigmatica	Red-legged Pademelon	V
Calyptorhynchus banksii	Red-tailed Black-Cockatoo	V
Phaethon rubricauda	Red-tailed Tropicbird	V
Xanthomyza phrygia	Regent Honeyeater	E1
Ptilinopus regina	Rose-crowned Fruit-Dove	V
Aepyprymnus rufescens	Rufous Bettong	V
Atrichornis rufescens	Rufous Scrub-bird	V
Tyto tenebricosa	Sooty Owl	V
Haematopus fuliginosus	Sooty Oystercatcher	V
Sterna fuscata	Sooty Tern	V
Pyrrholaemus sagittatus	Speckled Warbler	V
Lophoictinia isura	Square-tailed Kite	V
Hoplocephalus stephensii	Stephens' Banded Snake	V
Ptilinopus superbus	Superb Fruit-Dove	V
Lathamus discolor	Swift Parrot	E1
Crinia tinnula	Wallum Froglet	V
Gygis alba	White Tern	V
Monarcha leucotis	White-eared Monarch	V

Appendix 3- Threatened Species Listings

APPENDIX 3

Scientific_Name	Common_Name	Legal_Status
Ptilinopus magnificus	Wompoo Fruit-Dove	V
Petaurus australis	Yellow-bellied Glider	V

Note: Marine Mammals have been removed from this list.

13.1.3 Listed Flora Species

Family_Name	Scientific_Name	Legal_Status
Acanthaceae	Harnieria hygrophiloides	E1
Apocynaceae	Ochrosia moorei	E1
Asclepiadaceae	Marsdenia longiloba	E1
Casuarinaceae	Allocasuarina defungens	E1
Corokiaceae	Corokia whiteana	V
Cyperaceae	Cyperus rupicola	V
Davidsoniaceae	Davidsonia jerseyana	E1
Dilleniaceae	Hibbertia hexandra	E1
Doryanthaceae	Doryanthes palmeri	V
Ebenaceae	Diospyros mabacea	E1
Elaeocarpaceae	Elaeocarpus sp. 'Rocky Creek'	E1
Euphorbiaceae	Acalypha eremorum	E1
Fabaceae (Caesalpinioideae)	Senna acclinis	E1
Fabaceae (Faboideae)	Desmodium acanthocladum	V
Fabaceae (Mimosoideae)	Acacia bakeri	V
Flacourtiaceae	Xylosma terrae-reginae	E1
Grammitaceae	Grammitis stenophylla	E1
Lamiaceae	Plectranthus nitidus	E1
Lauraceae	Cryptocarya foetida	V

Appendix 3- Threatened Species Listings

APPENDIX 3

Family_Name	Scientific_Name	Legal_Status
Meliaceae	Owenia cepiodora	V
Menispermaceae	Tinospora tinosporoides	V
Myrtaceae	Austromyrtus fragrantissima	E1
Orchidaceae	Diuris sp. aff. chrysantha	E1
Polypodiaceae	Drynaria rigidula	E1
Proteaceae	Floydia praealta	V
Rubiaceae	Randia moorei	E1
Rutaceae	Acronychia littoralis	E1
Sapindaceae	Diploglottis campbellii	E1
Sapotaceae	Amorphospermum whitei	V
Symplocaceae	Symplocos baeuerlenii	V

13.2 Tweed (TSC Act)

13.2.1 Endangered Populations

Emu, *Dromaius novaehollandiae*, population in the NSW North Coast Bioregion.

13.2.2 Endangered Ecological Communities

Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions, Lowland Rainforest on Floodplain in the NSW North Coast Bioregion and White Box Yellow Box Blakely's Red Gum Woodland.

13.2.3 Critical Habitat

Mitchell's Rainforest Snail (*Thersites mitchellae*), Stotts Island Nature Reserve

Appendix 3- Threatened Species Listings

APPENDIX 3

13.2.4 Listed Fauna Species

Scientific_Name	Common_Name	Legal_Status
Menura alberti	Albert's Lyrebird	V
Ninox connivens	Barking Owl	V
Coracina lineata	Barred Cuckoo-shrike	V
Esacus neglectus	Beach Stone-curlew	E1
Mormopterus beccarii	Beccari's Freetail-bat	V
Ixobrychus flavicollis	Black Bittern	V
Pteropus alecto	Black Flying-fox	V
Turnix melanogaster	Black-breasted Button-quail	E1
Ephippiorhynchus asiaticus	Black-necked Stork	E1
Limosa limosa	Black-tailed Godwit	V
Oxyura australis	Blue-billed Duck	V
Phascogale tapoatafa	Brush-tailed Phascogale	V
Burhinus grallarius	Bush Stone-curlew	E1
Amaurornis olivaceus	Bush-hen	V
Todiramphus chloris	Collared Kingfisher	V
Irediparra gallinacea	Comb-crested Jacana	V
Syconycteris australis	Common Blossom-bat	V
Planigale maculata	Common Planigale	V
Cyclopsitta diophthalma coxeni	Double-eyed Fig-parrot	E1
Miniopterus schreibersii oceanensis	Eastern Bent-wing Bat	V
Dasyornis brachypterus	Eastern Bristlebird	E1
Mormopterus norfolkensis	Eastern Freetail-bat	V
Nyctophilus bifax	Eastern Long-eared Bat	V
Nyctimene robinsoni	Eastern Tube-nosed Bat	V

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Scientific_Name	Common_Name	Legal_Status
Puffinus carneipes	Flesh-footed Shearwater	V
Mixophyes iteratus	Giant Barred Frog	E1
Calyptorhynchus lathami	Glossy Black-Cockatoo	V
Kerivoula papuensis	Golden-tipped Bat	V
Tyto capensis	Grass Owl	V
Calidris tenuirostris	Great Knot	V
Scoteanax rueppellii	Greater Broad-nosed Bat	V
Charadrius leschenaultii	Greater Sand Plover	V
Chelonia mydas	Green Turtle	V
Litoria brevipalmata	Green-thighed Frog	V
Pteropus poliocephalus	Grey-headed Flying-fox	V
Phascolarctos cinereus	Koala	V
Chalinolobus dwyeri	Large-eared Pied Bat	V
Myotis adversus	Large-footed Myotis	V
Charadrius mongolus	Lesser Sand Plover	V
Miniopterus australis	Little Bentwing-bat	V
Sterna albifrons	Little Tern	E1
Potorous tridactylus	Long-nosed Potoroo	V
Philoria loveridgei	Loveridge's Frog	V
Anseranas semipalmata	Magpie Goose	V
Lichenostomus fasciogularis	Mangrove Honeyeater	V
Podargus ocellatus	Marbled Frogmouth	V
Tyto novaehollandiae	Masked Owl	V
Thersites mitchellae	Mitchell's Rainforest Snail	E1
Pachycephala olivacea	Olive Whistler	V
Litoria olongburensis	Olongburra Frog	V

Appendix 3- Threatened Species Listings

APPENDIX 3

Scientific_Name	Common_Name	Legal_Status
Pandion haliaetus	Osprey	V
Haematopus longirostris	Pied Oystercatcher	V
Assa darlingtoni	Pouched Frog	V
Ninox strenua	Powerful Owl	V
Erythrotriorchis radiatus	Red Goshawk	E1
Thylogale stigmatica	Red-legged Pademelon	V
Calyptorhynchus banksii	Red-tailed Black-Cockatoo	V
Phaethon rubricauda	Red-tailed Tropicbird	V
Ptilinopus regina	Rose-crowned Fruit-Dove	V
Aepyprymnus rufescens	Rufous Bettong	V
Atrichornis rufescens	Rufous Scrub-bird	V
Calidris alba	Sanderling	V
Tyto tenebricosa	Sooty Owl	V
Haematopus fuliginosus	Sooty Oystercatcher	V
Dasyurus maculatus	Spotted-tailed Quoll	V
Lophoictinia isura	Square-tailed Kite	V
Petaurus norfolcensis	Squirrel Glider	V
Hoplocephalus stephensii	Stephens' Banded Snake	V
Ptilinopus superbus	Superb Fruit-Dove	V
Xenus cinereus	Terek Sandpiper	V
Coeranoscincus reticulatus	Three-toed Snake-tooth Skink	V
Crinia tinnula	Wallum Froglet	V
Gygis alba	White Tern	V
Cacophis harriettae	White-crowned Snake	V
Monarcha leucotis	White-eared Monarch	V
Ptilinopus magnificus	Wompoo Fruit-Dove	V

Appendix 3- Threatened Species Listings

APPENDIX 3

Scientific_Name	Common_Name	Legal_Status
Petaurus australis	Yellow-bellied Glider	V

Note: Marine Mammals have been removed from this list.

13.2.5 Listed Flora Species

Family_Name	Scientific_Name	Legal_Status
Acanthaceae	Isoglossa eranthemoides	E1
Apocynaceae	Ochrosia moorei	E1
Asclepiadaceae	Marsdenia longiloba	E1
Corokiaceae	Corokia whiteana	V
Cyperaceae	Cyperus rupicola	V
Davidsoniaceae	Davidsonia jerseyana	E1
Doryanthaceae	Doryanthes palmeri	V
Ebenaceae	Diospyros mabacea	E1
Elaeocarpaceae	Elaeocarpus williamsianus	E1
Euphorbiaceae	Acalypha eremorum	E1
Fabaceae (Caesalpinioideae)	Cassia brewsteri var. marksiana	E1
Fabaceae (Faboideae)	Desmodium acanthocladum	V
Fabaceae (Mimosoideae)	Acacia bakeri	V
Flacourtiaceae	Xylosma terrae-reginae	E1
Lauraceae	Cryptocarya foetida	V
Marattiaceae	Angiopteris evecta	E1
Meliaceae	Owenia cepiodora	V
Menispermaceae	Tinospora tinosporoides	V
Myrtaceae	Austromyrtus fragrantissima	E1
Orchidaceae	Geodorum densiflorum	E1

Appendix 3- Threatened Species Listings

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Poaceae	Elyonurus citreus	E1
Polypodiaceae	Drynaria rigidula	E1
Proteaceae	Floydia praealta	V
Rhamnaceae	Pomaderris notata	E1
Rubiaceae	Oldenlandia galioides	E1
Rutaceae	Acronychia littoralis	E1
Sapindaceae	Cupaniopsis serrata	E1
Sapotaceae	Amorphospermum whitei	V
Scrophulariaceae	Euphrasia bella	V
Symplocaceae	Symplocos baeuerlenii	V
Urticaceae	Dendrocnide moroides	E1

13.3 Relevant Threatened and Migratory Species in the Study Area Listed under the EPBC

Birds		
<i>Cyclopsitta diophthalma coxeni</i> Coxen's Fig-Parrot	Endangered	Species or species habitat likely to occur within area
<i>Dasyornis brachypterus</i> Eastern Bristlebird	Endangered	Species or species habitat likely to occur within area
<i>Diomedea dabbenena</i> Tristan Albatross	Endangered	Foraging may occur within area
<i>Lathamus discolor</i> Swift Parrot	Endangered	Species or species habitat may occur within area
<i>Macronectes giganteus</i> Southern Giant-Petrel	Endangered	Species or species habitat may occur within area
<i>Macronectes halli</i> Northern Giant-Petrel	Vulnerable	Species or species habitat may occur within area
<i>Poephila cincta cincta</i> Black-throated Finch (southern)	Vulnerable	Species or species habitat likely to occur within area

Appendix 3- Threatened Species Listings

APPENDIX 3

<i>Pterodroma neglecta neglecta</i> Kermadec Petrel (western)	Vulnerable	Species or species habitat may occur within area
<i>Rostratula australis</i> Australian Painted Snipe	Vulnerable	Species or species habitat may occur within area
<i>Thalassarche impavida</i> Campbell Albatross	Vulnerable	Species or species habitat may occur within area
<i>Turnix melanogaster</i> Black-breasted Button-quail	Vulnerable	Species or species habitat likely to occur within area
<i>Xanthomyza phrygia</i> Regent Honeyeater	Endangered	Species or species habitat may occur within area
Frogs		
<i>Litoria aurea</i> * Green and Golden Bell Frog	Vulnerable	Species or species habitat likely to occur within area
<i>Litoria olongburensis</i> * Wallum Sedge Frog	Vulnerable	Species or species habitat likely to occur within area
<i>Mixophyes fleayi</i> * Fleay's Frog	Endangered	Species or species habitat likely to occur within area
<i>Mixophyes iteratus</i> * Southern Barred Frog, Giant Barred Frog	Endangered	Species or species habitat likely to occur within area
Insects		
<i>Phyllodes imperialis</i> (southern subsp. - ANIC 3333) a moth	Endangered	Species or species habitat likely to occur within area
Mammals		
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat, Large Pied Bat	Vulnerable	Species or species habitat may occur within area
<i>Dasyurus maculatus maculatus</i> (s. lat.) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (south-east mainland and Tasmanian subspecies)	Vulnerable	Species or species habitat likely to occur within area
<i>Petrogale penicillata</i> Brush-tailed Rock-wallaby	Vulnerable	Species or species habitat may occur within area
<i>Potorous tridactylus tridactylus</i> Long-nosed Potoroo (SE mainland)	Vulnerable	Species or species habitat may occur within area
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox	Vulnerable	Species or species habitat likely to occur within area

Appendix 3- Threatened Species Listings

APPENDIX 3

Reptiles		
<i>Coeranoscincus reticulatus</i> * Three-toed Snake-tooth Skink	Vulnerable	Species or species habitat may occur within area
Snails, slugs		
<i>Thersites mitchellae</i> Mitchell's Rainforest Snail	Critically Endangered	Species or species habitat likely to occur within area
Plants		
<i>Acronychia littoralis</i> Scented Acronychia	Endangered	Species or species habitat likely to occur within area
<i>Amyema scandens</i> *	Endangered	Species or species habitat likely to occur within area
<i>Arthraxon hispidus</i> Hairy-joint Grass	Vulnerable	Species or species habitat likely to occur within area
<i>Austromyrtus fragrantissima</i> Scale Myrtle, Sweet Myrtle	Endangered	Species or species habitat likely to occur within area
<i>Baloghia marmorata</i> Marbled Baloghia, Jointed Baloghia	Vulnerable	Species or species habitat likely to occur within area
<i>Bosistoa selwynii</i> Heart-leaved Bosistoa	Vulnerable	Species or species habitat likely to occur within area
<i>Bosistoa transversa</i> Three-leaved Bosistoa	Vulnerable	Species or species habitat likely to occur within area
<i>Bulbophyllum globuliforme</i> Miniature Moss-orchid	Vulnerable	Species or species habitat likely to occur within area
<i>Clematis fawcettii</i> Stream Clematis	Vulnerable	Species or species habitat likely to occur within area
<i>Corchorus cunninghamii</i> Native Jute	Endangered	Species or species habitat likely to occur within area
<i>Corokia whiteana</i>	Vulnerable	Species or species habitat likely to occur within area
<i>Cryptocarya foetida</i> Stinking Cryptocarya	Vulnerable	Species or species habitat likely to occur within area
<i>Davidsonia pruriens</i> var. <i>jerseyana</i> Davidson's Plum, Ooray	Endangered	Species or species habitat likely to occur within area

Appendix 3- Threatened Species Listings

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<i>Davidsonia</i> sp. Mullumbimby-Currumbin Ck (A.G.Floyd 1595)	Endangered	Species or species habitat likely to occur within area
<i>Desmodium acanthocladum</i> Thorny Pea	Vulnerable	Species or species habitat likely to occur within area
<i>Diospyros mabacea</i> Red-fruited Ebony	Endangered	Species or species habitat likely to occur within area
<i>Diploglottis campbellii</i> Small-leaved Tamarind	Endangered	Species or species habitat likely to occur within area
<i>Eidothea hardeniana</i> Nightcap Oak	Critically Endangered	Species or species habitat likely to occur within area
<i>Elaeocarpus</i> sp. Rocky Creek (G.Read AQ 562114) Minyon Quandong	Endangered	Species or species habitat likely to occur within area
<i>Elaeocarpus williamsianus</i> Hairy Quandong	Endangered	Species or species habitat likely to occur within area
<i>Endiandra floydii</i> Floyd's Walnut	Endangered	Species or species habitat likely to occur within area
<i>Endiandra hayesii</i> Rusty Rose Walnut; Velvet Laurel	Vulnerable	Species or species habitat likely to occur within area
<i>Floydia praealta</i> * Ball Nut, Possum Nut, Big Nut	Vulnerable	Species or species habitat likely to occur within area
<i>Fontainea australis</i>	Vulnerable	Species or species habitat likely to occur within area
<i>Hicksbeachia pinnatifolia</i> Monkey Nut, Bopple Nut, Red Bopple, Red Bopple Nut, Red Nut, Beef Nut, Red Apple Nut	Vulnerable	Species or species habitat likely to occur within area
<i>Isoglossa eranthemoides</i> *	Endangered	Species or species habitat likely to occur within area
<i>Macadamia integrifolia</i> * Macadamia Nut, Queensland Nut, Smooth-shelled Macadamia, Bush Nut, Nut Oak	Vulnerable	Species or species habitat likely to occur within area
<i>Macadamia tetraphylla</i> * Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut	Vulnerable	Species or species habitat likely to occur within area
<i>Marsdenia longiloba</i> * Clear Milkvine	Vulnerable	Species or species habitat likely to occur within area

Appendix 3- Threatened Species Listings

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<i>Ochrosia moorei</i> Southern Ochrosia	Endangered	Species or species habitat likely to occur within area
<i>Owenia cepiodora</i> Onionwood, Bog Onion	Vulnerable	Species or species habitat likely to occur within area
<i>Ozothamnus vagans</i>	Vulnerable	Species or species habitat likely to occur within area
<i>Phaius australis</i> Lesser Swamp-orchid	Endangered	Species or species habitat likely to occur within area
<i>Plectranthus nitidus</i>	Endangered	Species or species habitat likely to occur within area
<i>Randia moorei</i> Spiny Gardenia	Endangered	Species or species habitat likely to occur within area
<i>Sarcochilus fitzgeraldii</i> Ravine Orchid	Vulnerable	Species or species habitat likely to occur within area
<i>Sarcochilus hartmannii</i> Waxy Sarcochilus, Blue Knob Orchid	Vulnerable	Species or species habitat likely to occur within area
<i>Sophora fraseri</i>	Vulnerable	Species or species habitat likely to occur within area
<i>Symplocos baeuerlenii</i> Small-leaved Hazelwood, Shrubby Hazelwood	Vulnerable	Species or species habitat likely to occur within area
<i>Syzygium hodgkinsoniae</i> Smooth-bark Rose Apple, Red Lilly Pilly	Vulnerable	Species or species habitat likely to occur within area
<i>Syzygium moorei</i> Rose Apple, Coolamon, Robby, Durobby, Watermelon Tree, Coolamon Rose Apple	Vulnerable	Species or species habitat likely to occur within area
<i>Tinospora tinosporoides</i> Arrow-head Vine	Vulnerable	Species or species habitat likely to occur within area
<i>Uromyrtus australis</i> Peach Myrtle	Endangered	Species or species habitat likely to occur within area
<i>Westringia rupicola</i>	Vulnerable	Species or species habitat likely to occur within area
Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		

Appendix 3- Threatened Species Listings

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<i>Cyclopsitta diophthalma coxeni</i> Coxen's Fig-Parrot	Migratory	Species or species habitat likely to occur within area
<i>Haliaeetus leucogaster</i> * White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
<i>Hirundapus caudacutus</i> White-throated Needletail	Migratory	Species or species habitat may occur within area
<i>Monarcha melanopsis</i> Black-faced Monarch	Migratory	Breeding may occur within area
<i>Monarcha trivirgatus</i> Spectacled Monarch	Migratory	Breeding likely to occur within area
<i>Myiagra cyanoleuca</i> Satin Flycatcher	Migratory	Breeding likely to occur within area
<i>Rhipidura rufifrons</i> Rufous Fantail	Migratory	Breeding may occur within area
<i>Xanthomyza phrygia</i> Regent Honeyeater	Migratory	Species or species habitat may occur within area
Migratory Wetland Species		
Birds		
<i>Gallinago hardwickii</i> Latham's Snipe, Japanese Snipe	Migratory	Species or species habitat may occur within area
<i>Nettapus coromandelianus albipennis</i> Australian Cotton Pygmy-goose	Migratory	Species or species habitat may occur within area
<i>Numenius phaeopus</i> Whimbrel	Migratory	Species or species habitat likely to occur within area
<i>Rostratula benghalensis s. lat.</i> Painted Snipe	Migratory	Species or species habitat may occur within area
Migratory Marine Birds		
<i>Diomedea dabbenena</i> Tristan Albatross	Migratory	Foraging may occur within area
<i>Macronectes giganteus</i> Southern Giant-Petrel	Migratory	Species or species habitat may occur within area
<i>Macronectes halli</i> Northern Giant-Petrel	Migratory	Species or species habitat may occur within area

Appendix 3- Threatened Species Listings

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<i>Puffinus pacificus</i> Wedge-tailed Shearwater	Migratory	Breeding known to occur within area
<i>Thalassarche impavida</i> Campbell Albatross	Migratory	Species or species habitat may occur within area

13.4 Other Matters Protected by the EPBC Act

Listed Marine Species [Dataset Information]	Status	Type of Presence
Birds		
<i>Anseranas semipalmata</i> Magpie Goose	Listed - overfly marine area	Species or species habitat may occur within area
<i>Catharacta skua</i> Great Skua	Listed	Species or species habitat may occur within area
<i>Diomedea dabbenena</i> Tristan Albatross	Listed	Foraging may occur within area
<i>Gallinago hardwickii</i> Latham's Snipe, Japanese Snipe	Listed - overfly marine area	Species or species habitat may occur within area
<i>Haliaeetus leucogaster</i> * White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
<i>Hirundapus caudacutus</i> White-throated Needletail	Listed - overfly marine area	Species or species habitat may occur within area
<i>Lathamus discolor</i> Swift Parrot	Listed - overfly marine area	Species or species habitat may occur within area
<i>Macronectes giganteus</i> Southern Giant-Petrel	Listed	Species or species habitat may occur within area
<i>Macronectes halli</i> Northern Giant-Petrel	Listed	Species or species habitat may occur within area
<i>Monarcha melanopsis</i> Black-faced Monarch	Listed - overfly marine area	Breeding may occur within area
<i>Monarcha trivirgatus</i> Spectacled Monarch	Listed - overfly marine area	Breeding likely to occur within area
<i>Myiagra cyanoleuca</i> Satin Flycatcher	Listed - overfly marine area	Breeding likely to occur within area
<i>Nettapus coromandelianus albipennis</i> Australian Cotton Pygmy-goose	Listed - overfly marine area	Species or species habitat may occur within area

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<i>Numenius phaeopus</i> Whimbrel	Listed	Species or species habitat likely to occur within area
<i>Puffinus pacificus</i> Wedge-tailed Shearwater	Listed	Breeding known to occur within area
<i>Rhipidura rufifrons</i> Rufous Fantail	Listed - overfly marine area	Breeding may occur within area
<i>Rostratula benghalensis s. lat.</i> Painted Snipe	Listed - overfly marine area	Species or species habitat may occur within area
<i>Sterna bergii</i> Crested Tern	Listed	Breeding known to occur within area
<i>Thalassarche chlororhynchos</i> Yellow-nosed Albatross, Atlantic Yellow-nosed Albatross	Listed	Species or species habitat may occur within area
<i>Thalassarche impavida</i> Campbell Albatross	Listed	Species or species habitat may occur within area

CERRA World Heritage Listings for National Parks Estate - NSW

RESERVE NAME	APPROXIMATE AREAS (hectares)
<i>New South Wales</i>	
National parks managed by NSW National Parks and Wildlife Service (NPWS)	
Border Ranges (part)	31508
Mebbin (part)	11
Nightcap (part)	4945
Mount Warning	2380
Koreelah (part)	769
Mount Clunie (part)	485
Mount Nothofagus (part)	650
Toonumbar (part)	1225
Tooloom (part)	1665
Richmond Range (part)	870
Mallanganee	222
Washpool (part)	27715
Gibraltar Range (part)	17273
New England (part)	30115
Cunnawarra (part)	270
Dorrigo (part)	7885
Oxley Wild Rivers (part)	102820

Werrikimbe (part)	25578
Willi Willi (part)	1610
Mt Royal (part)	230
Barrington Tops (part)	39193
Nature reserves managed by NPWS	
Limpinwood	2646
Numinbah	858
Captains Creek (part)	380
Iluka	136
Mount Hyland (part)	1636
The Castles	2360
Mount Seaview	1703
Flora reserve managed by State Forests of NSW (SFNSW)	
Amaroo	36
TOTAL	307174

NSW National Parks and Wildlife Estate within the Study Area.

Billinudgel Nature Reserve, NSW

Brunswick Heads Nature Reserve, NSW

Couchy Creek Nature Reserve, NSW

Cudgen Nature Reserve, NSW

Cumbebin Swamp Nature Reserve, NSW

Goonengerry National Park, NSW

Hattons Bluff Nature Reserve, NSW

Inner Pocket Nature Reserve, NSW

Julian Rocks Nature Reserve, NSW

Marshalls Creek Nature Reserve, NSW

Mooball National Park, NSW

Mount Jerusalem National Park, NSW

Mount Nullum Nature Reserve, NSW

Mount Warning National Park, NSW

Nicoll Scrub National Park, QLD

Nightcap National Park, NSW

Numinbah Nature Reserve, NSW

Outside NPWS Estate , NSW

Snows Gully Nature Reserve, NSW

Springbrook National Park, QLD

Stotts Island Nature Reserve, NSW

Tomewin Conservation Park, QLD

Tyagarah Nature Reserve, NSW

Wooyung Nature Reserve, NSW