

*Appendix E*

**URS Report**

URS Australia Pty Ltd, *Alternative Projects to the Directlink Transmission Line – Environmental Review: Mullumbimby to Terranora (NSW)*, 9 March 2004

# **FINAL REPORT**

## **Alternative Projects to the Directlink Transmission Line – Environmental Review: Mullumbimby to Terranora (NSW)**

*Prepared for*

**Burns and Roe Worley**

9 March 2004

50782-002

# **URS**

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### 1.1 Introduction

URS have been engaged to identify the most appropriate route and one other alternative route for an overhead high voltage transmission line (132kV) between Terranora and Mullumbimby in Northern NSW. Based on an assessment of the environmental and social constraints, URS have also been requested to provide advice as to the extent to which this route would be acceptable to the community and to the relevant planning authorities and, in particular, the probability of receiving Department of Infrastructure Planning and Natural Resources (DIPNR) approval to either of the routes.

### 1.2 Background

Directlink is an existing link between the New South Wales and Queensland electricity grids that includes a high voltage (+/- 80kV DC) transmission line of 65km length between Mullumbimby and Terranora in northern New South Wales. It was constructed predominantly underground and in galvanised steel troughs installed along the North Coast railway easement and commenced operation in July 2000.

Directlink currently earns revenue from the National Electricity Market Management Company (NEMMCO), effectively by buying electricity from the New South Wales or Queensland region and selling into the other region with the higher electricity supply cost at any given time. The Directlink Joint Venture Partners now consider that Directlink would be more appropriately operated to provide a regulated transmission service in the same manner as the other transmission assets in Australia. The revenue basis would then change to a regulated rate of return determined largely by the assessed value of the asset.

To implement this change, the Directlink Joint Venture Partners are preparing a conversion application to the Australian Competition and Consumer Commission (ACCC). It is anticipated that the ACCC will value Directlink by having regard to a range of comparable cost-efficient alternative projects.

A number of comparable alternative projects for Directlink have been identified, most of which include a 132kV transmission line between Mullumbimby and Terranora. Among other things, the cost of a power line depends on its precise route, the type of construction employed, and the extent to which overhead and/or underground line sections are used. While the Directlink transmission line has been placed underground for its entire length, the hypothetical replacement may have a different alignment or some or all of the transmission line may be overhead.

In valuing the equivalent alternative project, the ACCC will only recognise any costs associated with mitigating environmental impacts to the extent that it is satisfied that such costs must be incurred, from consideration of the economic, environmental and social constraints required to achieve the necessary environmental and planning approvals. Therefore, unless it can be demonstrated otherwise, the ACCC would assume the most cost efficient manner to provide this link would be using an overhead transmission line for the entire length and following the most direct route available.

The extent of the environmental mitigation measures incorporated into a new transmission line is normally decided by the proponent or the determining body as an outcome of the environment and planning approval processes. It is recognised that predicting the outcome of a long and extensive environment and planning consultation and assessment process is very difficult and there is a significant amount of uncertainty associated with the question of what route, technology, and underground line sections (if any) would a proponent of a hypothetical project need to include in its project to obtain the required environmental and planning approvals.

URS has been engaged to:

- examine in detail the available transmission line route options for the alternative projects to Directlink;
- prepare a desk-top assessment of the environmental and social constraints affecting the transmission corridor; and
- identify the best route and one additional route that are considered to have the minimum environmental mitigation measures necessary for there to be a reasonable probability of planning approval.

This is required to provide a basis for estimating the cost of the equivalent grid connection between Mullumbimby and Terranora.

## **2.1 Study Area**

The study area is between the townships of Mullumbimby and Terranora in northern New South Wales in the local government areas (LGAs) of Tweed and Byron (see Map 1).

### **2.1.1 Tweed Shire**

#### ***General***

The Tweed LGA is located in the north eastern corner of New South Wales with a population of 74380 (2001). An aging population dominates the demographic with an expected increase in population of 10,000 people every five years. The table below shows the long term predictions for population increases in the LGA.

POPULATION PROJECTIONS: source: "Tweed Shire 2000+ Strategic Plan",

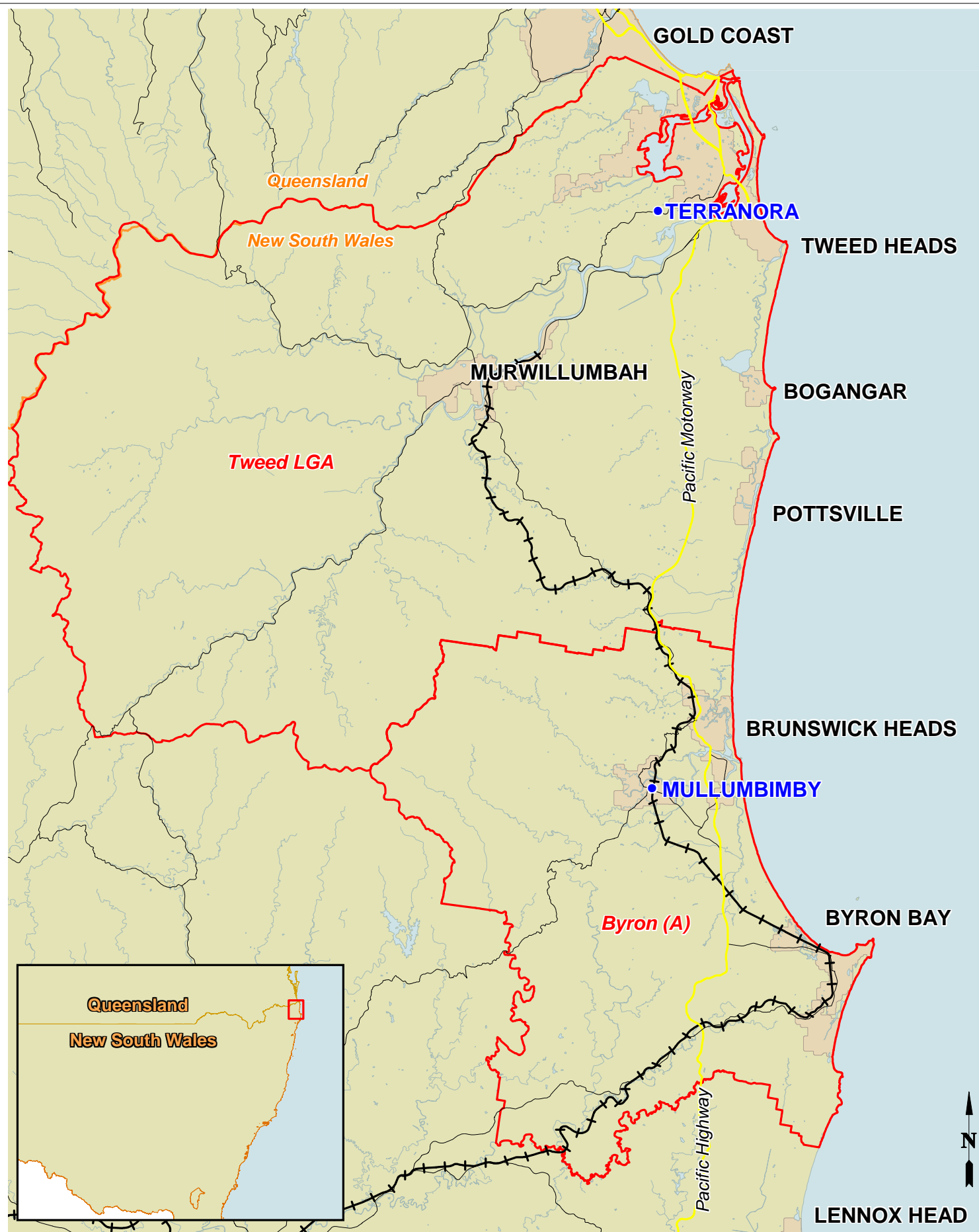
LOCALITY	1996	2011	Long Term
Tweed Heads	31,800	60,000	72,000-93,000
Kingscliff	8,300	10,400-20,000	34,000-40,000
Coastal Villages	6,900	13,300	23,400
Murwillumbah	7,800	9,900	12,000-16,000
Rural	10,900	13,500	15,500
TOTAL	65,700	107,100-116,700	156,900-186,900








The LGA has an area of approximately 1303 km<sup>2</sup>, and is encircled by three mountain ranges, namely the McPherson Range in the north, the Tweed Range in the west, and the Nightcap Range in the south. The Pacific Ocean forms the eastern boundary. The two dominating features of the LGA are Mount Warning (1156 metres), and the Tweed River which flows into the sea at Tweed Heads. Mount Warning is the remnant core of the Tweed Shield Volcano. The steep rim of the caldera surrounds Mount Warning at a radius of approximately 15 kilometres. The Tweed River, whose tributaries have carved out the Caldera, has broken the eastern side of the volcano's rim.

#### ***Ecological Characteristics***

The region has one of the highest levels of vertebrate biodiversity of any region in Australia supporting more species of bird, fish, amphibian, and mammals than Kakadu National Park (SoE Report 2001). Only in the wet tropics are similar numbers of species found within these groups. This high biodiversity combined with past clearing for human activities resulting in habitat





-  Rail Line
-  Local Government Area (LGA) Boundary
-  Drainage Line
-  Water Body
-  Built-up Area
-  Major Highway
-  Road

**URS**

**URS Australia Pty Ltd**

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 Location: T:\Proj\GIS\50782\002\GIS\Workspaces\Maps\Map 1.WOR

## Project Area

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

0 5 10  
 kilometers

Projection: MGA Zone 56  
 Scale: 1:160 000 @ A4

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fragmentation and removal has resulted in an extraordinarily high number of rare, vulnerable and endangered species. There are nine endangered and 83 vulnerable fauna species recorded in the Tweed Shire. There is also a correspondingly high number of significant plant species, with 89 Rare or Threatened Australian Plants (Briggs & Leigh 1988) or *ROTAP* scheduled species - one of which is considered extinct, 16 endangered and 25 vulnerable plant species within the Shire. It is estimated that the Tweed/Gold Coast region supports Australia's highest concentration of threatened plants (Australian Nature Conservation Agency 1996). Further the Tweed Vegetation Management Plan 1999, identifies 58 significant species endemic to Tweed Shire and the immediate surroundings.

As a new transmission line will likely involve the further removal and fragmentation of habitat and impact (to some degree) on threatened species in the region, the number of species affected would require extensive and detailed investigation.

### ***Cultural Heritage***

The Tweed Local Environmental Plan (LEP) identifies two heritage conservation areas and 24 heritage items within the Shire. The two heritage conservation areas comprise the majority of Uki Village and the riverside area of Tumbulgum village.

There are 24 heritage items listed under "Schedule 2 – Heritage items" of the Tweed Local Environmental Plan (LEP), 19 of which are of built heritage significance, while the remaining 5 are items of natural heritage significance.

Whilst the transmission line route will most likely avoid urban areas where these heritage items occur, route selection should avoid unnecessary impact on recognised heritage items due to their importance to local residence.

### ***Land Use***

The most important industries within Tweed Shire are retail, tourism, residential housing construction, agriculture, health and community services. All of these industry sectors are experiencing considerable growth except for agriculture. The Tweed does support a wide range of agricultural land uses including cattle grazing for beef production and dairying, sugar cane, small crops including vegetable growing and horticulture including banana growing.

Whilst farming occupies the greater part of rural landscape, other rural land uses are also significant, some of which are developing, including: rural living (hobby farms, rural retreats), tourism facilities and accommodation, recreation and urban infrastructure (eg Clarrie Hall Dam).

The agricultural land uses are summarised below in Table 2.1.

**Table 2.1: Major Land Types: Tweed Shire**

Mapped Category 1996	Classification Criteria
Bananas 2582 Ha	Usually on hillsides with a northerly aspect. Lines of vegetation following contours. Distinctive shade, tone and texture. Minimal mappable area 1 ha.
Sugar Cane 9292 Ha	Usually on the alluvial flats. Distinctive shade, tone and texture. Minimal mappable area 1 ha.
Other Horticulture 849 Ha	Agricultural areas depicted by widely separated rows of trees. Distinctive shade, tone and texture. Minimal mappable area 1 ha.
Other Cropping 628 Ha	Areas of intensive market gardens. Mosaic vegetation pattern in the landscape. Minimal mappable area 1 ha.
Plantations 1667	Mostly exotic pine plantations. Also includes Eucalypt plantations. Large areas over 2 ha only.

NOTE: Vegetation defined from 1996 Air photo interpretation includes woody plants such as trees and shrubs as well as herbaceous swamp plants. Thin riparian vegetation bands not shown.

There is also strong development pressure on the region with continued population expansion. This is reflected in the high number of development proposals for urban release areas including: South Kingscliff, Kings Beach, Kings Forest, Cobaki Lakes, South Tweed/Banora Point, West Kingscliff, Bilambi Heights, West Murwillumbah, Terranora Village, Koala Beach Estate, Sea Breeze Estate, and Black Rocks Estate. Currently these settlements total approximately 9,000 people but will expand to 58,000 people.

It should be noted that scenic quality is a major attraction for residents and tourists and therefore the need to protect visual quality is a major planning consideration. In recent strategic studies by Tweed Shire (Tweed Shire 2000+ Strategic Plan) visual amenity and lifestyle were regarded as the values most readily protected by residents and also as the most attractive reasons for new residents in moving to the area. As a result recent DIPNR planning initiatives have identified the Tweed as a highly sensitive visual impact area as part of the comprehensive coastal assessment for NSW.

### 2.1.2 Byron Shire

#### **General**

Byron Shire is located on the Far North Coast of NSW and shares its boundaries with the Tweed, Lismore and Ballina Local Government Areas (LGAs). The population of the Shire is approximately 30,000 and is relatively evenly distributed across the Shire. The Byron Shire community remains a diverse and colourful mix of people, with each of the towns and rural villages having their own distinctiveness, with a mix of cultural values, embracing a range of traditional and alternative lifestyles and philosophies. The North Coast Railway and Pacific

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Highway run through the area with a network of narrow roads through the hinterland linking the small villages, towns and rural areas.

Byron Shire has a sub-tropical climate with summer-dominated rainfall averaging 2000mm per year, the highest rainfall of any area in the NSW. The area of the Shire is approximately 55,000ha with a coastline of 24km and subtropical rainforest remnants in the hinterland. The two major rivers, the Brunswick and Wilson Rivers, provide inland water systems for fishing and boating and are significant components of the scenic values of the area. The escarpments also provide a dramatic backdrop to the northern part of the area, whereas the southern half of the Shire is characterised by rolling green hills with rich red volcanic soil and abundant plant growth.

### ***Ecological Characteristics***

There are 87 terrestrial animals listed as endangered or vulnerable occurring in Byron Shire. Of these the majority are bird species (50), followed by bat species (12), other terrestrial mammals (11), frog species (6), marine mammals and reptiles (5), terrestrial reptile species (2) and invertebrate species (1).

There are also 54 flora species listed as endangered or vulnerable in addition to two endangered ecological communities currently occurring in Byron Shire. There are 22 vulnerable flora species and 33 endangered flora species listed and the two listed endangered ecological communities are: Byron Bay Graminoid Clay Heath and Lowland Rainforest on Floodplains.

There are two freshwater endangered fish species listed under the *Fisheries Management Act* 1994 which occur in Byron Shire, these are: Eastern Freshwater Cod *Maccullochella ikei*; and the Oxylean Pygmy Perch *Nannoperca oxleyana*. There is also a fish species listed as vulnerable, namely the Black Cod *Epinephelus daemeli*.

### ***Cultural Heritage***

One hundred and sixty Aboriginal sites are listed within the Byron LGA. These include artefacts, burials, earth and shell mounds, stone arrangements and scar trees. The cultural heritage items listed in the LEP are predominately historic European buildings within the settlements of the shire.

### ***Land Use***

The major industries employing people in Byron LGA are retail trade (16.9%) followed by accommodation, cafes and restaurants, health and community and education, agriculture, forestry

and fishing. Of note is that approximately 20% of private property in Byron LGA is owned by people living outside of the Shire. Table 2.2 outlines the major land uses in the Byron LGA.

The land use in the Shire has an image and commitment to being sustainable with the total area of land under organic certification in Byron Shire increasing from 4.6 hectares since 2001/2002 to a total of 232 hectares (40 farms). Further the area of land approved for clearing of native vegetation in Byron Shire decreased from 0.79 hectares to nil hectares in 2003. The area of land under property agreements/voluntary conservation agreements has also increased during the past year. These areas under property agreements supplement 10,642 hectares of land zoned for environmental protection, including 2638 hectares for National Parks and Nature Reserves.

**Table 2.2: Major Land Uses in Byron Shire (BSC 2003)**

Landuse	Area (ha)	% Total
Rural	29179	48.1
Agricultural	10830	19.2
Environmental Protection	12623	22.4
Forestry	593	1.1
Residential	1137	2.0
Other	1469	2.6
Open Space	392	<1
Extractive	108	<1
Industrial	79	<1
Retail	48	<1
Unassessed	3	<1
<b>TOTAL</b>	<b>56461</b>	<b>100</b>

### 3.1.1 Supply Localities

The proposed 132kV transmission line is required to connect Mullumbimby substation located at the old Lavertys Gap power station on Wilsons Road to Terranora substation located to the south east of Terranora.

### 3.1.2 Transmission Poles

The hypothetical 132kV transmission line would consist of concrete poles carrying one set of three wires and one smaller earthwire at the top of the structure. The smaller earthwire protects the transmission line from lightning and includes an optic fibre core for end-end communications purposes. Refer to Figure 1 for a photograph of a typical transmission pole.

Single poles would be generally used though some two-pole structures would be required at line angle and termination locations. The standard height of these concrete poles would be approximately 24m, although this can be varied to allow for valleys and river crossings. On flat ground to gently undulating slopes the poles would be on average approximately 250m apart. The footprint or "impacted area" of most of the poles would be 0.3m<sup>2</sup>.

Each pole would be embedded 3-5m into the ground by a truck mounted boring machine and a small ready mixed concrete truck for the foundations. A crane would then be used to erect the pole. At rocky sites drills may be required to excavate the foundation and in some cases hard rock may need to be broken up with small explosives charges. Vehicle access to each pole during construction would be required.

**Figure 1: Typical Transmission Pole.**



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### 3.1.3 Easement Requirements

An easement of 40m width would be required for the hypothetical transmission lines (20m either side of the poles). It is standard practice for mechanical, hand clearing and chemical vegetation removal methods to be employed prior to construction and then for vegetation to be controlled for the life of the transmission line within the 40m corridor. Four wheel drive (4WD) vehicles would also need to be able to access each pole both during and after construction. Most vegetation within the easement would be required to be removed to prevent build up of combustible materials that could endanger the line. Chipping and mulching are the preferred methods of disposal of this material. Plantings of shrub and grass understories would be implemented where soil erosion potentials are high.

### 3.1.4 Construction and Maintenance

A typical ground based (as opposed to aerial) construction process for overhead transmission installation can include the following steps:

- Centreline Surveying;
- Access Track Construction;
- Vegetation clearance;
- Foundation excavation and pole erection; and
- Conductor and earthwire installation.

It should also be noted that helicopter installation is feasible in remote or difficult to access terrain and that underground cabling is also possible if required. There are different environmental, construction and engineering requirements for these options.

Once the line is constructed and operational, aerial and ground maintenance patrols would make regular inspections of the line and easement. Access tracks installed for construction and not required for maintenance are usually revegetated and rehabilitated.

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There are a myriad of legislative provisions that apply to such linear infrastructure at a Federal, State and Local level. The statutes outlined below are considered relevant to the proposed development. However one of the limitations of a desktop assessment is that there will remain a degree of uncertainty regarding the extent to which the legislation identified will apply, particularly for threatened species and Aboriginal cultural heritage as the legal obligations are dependent on what may or may not be found in the field.

### 4.1.1 Environmental Protection and Biodiversity Conservation Act 1999

The requirement for approval under the *Environmental Protection and Biodiversity Conservation Act (EPBC Act)* 1999 are triggered by a proposal that has the potential to have a significant impact on a matter of national environmental significance or a proposal that has the potential to have a significant impact on the environment that involves the Commonwealth. The *EPBC Act* includes six categories of matters considered to be of national environmental significance. These requirements reflect Australia's obligations under a number of international treaties such as the JAMBA and CAMBA migratory bird treaties and UNESCO's World Heritage Convention. The following of which are relevant to the current proposal include potential impacts upon:

- World heritage properties;
- Listed Threatened species and ecological communities;
- Listed migratory species; and
- The marine environment.

Under section 68 of the EPBC Act, a proponent must refer a proposal to the Commonwealth Environment Minister if it believes an approval under the *EPBC Act* is required. The Commonwealth Environment Minister must then decide whether the proposal requires approval under the *EPBC Act*. Due to the proposals proximity to World Heritage listed national parks, namely the 'Central Eastern Rainforest Reserve Area' (CERRA), the number of endangered and threatened terrestrial flora and fauna listed and the presence of migratory species listed under the *EPBC Act* in the study area, URS advise that such an referral would be considered prudent and that the proposal is likely to require approval under this Act.

An action that needs Commonwealth approval is called a "controlled action". An assessment report called a National Environmental Significance Assessment (NESA) must be prepared for all controlled actions. Where the controlled action requires an EIS or SEE under the *EP&A Act*, the NESA could form part of that document. Environment Australia would normally be consulted early in the process regarding the contents of a NESA. The Commonwealth



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assessment process generally parallels the NSW EIA process and can be carried out along with the NSW environmental assessment.

### 4.1.2 NSW Environmental Planning and Assessment Act 1979 (EP&A Act)

The *EP&A Act* provides a framework for environmental planning in NSW and includes provisions to ensure that proposals which have the potential to significantly affect the environment are subject to detailed assessment. It also provides an opportunity for public involvement in environmental planning and assessment.

The proposal is likely to trigger a number of environmental planning instruments created under Part 3 of the Act that can impact on how the proposal is assessed and approved, including:

State Environmental Planning Policies (SEPP):

- No. 14 – Coastal Wetlands (SEPP 14)
- No. 26 – Littoral Rainforest (SEPP 26)
- No. 44 – Koala Habitat (SEPP 44)
- No. 71 – Coastal Protection

Regional Environmental Plans (REP)

- Northern Rivers REP

Local Environmental Plans (LEP)

- Tweed LEP
- Byron LEP

The relevant provisions contained in these planning instruments are outlined below in sections 4.1.8 onwards.

The consent authority for this proposal would be the Department of Infrastructure Planning and Natural Resources (DIPNR). In determining a development application, a consent authority must take into consideration a range of matters as required by section 79C of the Act. Because of the nature of the proposal and the associated clearing involved, URS is of the opinion that under Part 4 of the Act an Environmental Impact Assessment (or its equivalent under Part V) would be required for the proposal (see 'Is an EIS Required' DUAP 1985).

A major function of an environmental impact statement (EIS) is to provide information on the potential environmental impacts of a proposal. DIPNR have prepared draft guidelines outlining

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the matters that an EIS for a proposed electricity network system may need to include (PlanningNSW, EIS Guidelines for Network Electricity Systems and Related Facilities, Draft for Discussion, February 2002, See Appendix One). In particular, the details in the EIS should reflect the level of significance of the potential impacts on the environment. Clause 73 of the *EP&A Regulation 2000* requires the applicant responsible for preparing an EIS to consult with the Director-General and obtain the Director-General's requirements for completion of the statement.

Further, the DIPNR draft guidelines direct proponents to identify early in the assessment process areas of high environmental and social value and, wherever possible, exclude these areas from consideration. These guidelines advise that careful route selection can lower community concerns and reduce potential costs of mitigation and management required to control environmental and social impacts and that early adoption of ecologically sustainable route corridors can reduce possible conflicts and additional costs and delays at later stages of the approval process. The recommended techniques prescribe those locations with serious environmental and social incompatibilities or areas that are likely to result in major community conflicts to be identified and eliminated as early as possible. A determining body in considering and responding to an EIS, would seek to have changes made to the proponent's proposal or conditions placed on its approval to the extent that, in the determining body's opinion, the proponent still proposed to pass through no-go areas or that the associated impacts of the proposal outweighed the claimed benefits.

Due to the linear and complex nature of this proposal it is likely to require development consent from one or more of nineteen approvals under eight different Acts, identified in section 91 of the EP&A. As such this proposal would be required to submit and integrated development application (s91(1)) which would introduce other NSW government agencies approvals eg: Department of Environment and Conservation, NSW Fisheries, and NSW Heritage Council. It should also be noted that there are open standing provisions particular for objectors within the *EP&A Act* under Part 4 that can mean that merit appeals to the Land and Environment Court are common.

A typical approval process would need to undertake the following steps:

**Diagram 4.1: Approval Process under EP&A Act.**

Minister/DIPNR	Directlink (Proponent)	Community/Public Bodies
	Public Announcement of Project Commencement	
Director General's Requirements	Prepare EIS	
	Undertake Specialist Studies	Public Consultation
	EIS display	Consultation Discuss/Clarify
Copy to DINPR	Receive submissions	Consultation Make Representations
	Additional Studies (if required)	
	Prepare Submissions Report	
	Seek Ministers Approval	
Prepare Director's Report	Lodge Submissions Report	
Minister Approval (consults with Minister for Energy and Environment)		
Director's report made public with conditions of approval	Determination of EIS	Open standing appeal rights are available under the EP&A Act.

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### 4.1.3 NSW Rivers and Foreshores Improvement Act 1948

*The Rivers and Foreshores Improvement Act 1948* (RFI Act) provides for the carrying out of works for the removal of obstructions from, and the improvement of, rivers and foreshores, and the prevention of erosion of lands by tidal and non-tidal waters. The Act controls the removal of materials from riverbanks and beds. A permit is required where works are conducted within 40 metres of a water body. Any route chosen within the study area would require a permit under Part 3A of the RFI Act as it will cross **any** number of small streams and larger rivers such as the Brunswick and Tweed Rivers.

### 4.1.4 NSW Soil Conservation Act 1938

This Act was administered by the Soil Conservation Service, now part of DIPNR with the aim to prevent soil erosion. Areas of soil erosion hazard are mapped and gazetted whereby regulations relating to the soils use and management take effect. There are a number of regulatory powers under the Act that allow the regulator to control development activities impacts on soils and soil erosion (s15, s18, and s22). As soil will be exposed during clearing and construction operations the SC Acts provisions need to be considered.

### 4.1.5 NSW Threatened Species Conservation Act 1995

The *TSC Act* provides a framework to ensure that the impact of any action affecting threatened species is assessed. Schedule 1 of the *TSC Act* lists endangered species, populations and ecological communities, Schedule 2 lists vulnerable species and Schedule 3 lists key threatening processes. Part 3 of the *TSC Act* defines critical habitat. There are typically fewer and often differing species listed under the *EBPC Act* as compared to the TSC Act, however both have relevance, if triggered.

If following an 8 part test a proposal is likely to have a significant impact on a threatened species, a species impact statement must be produced for all threatened species potentially impacted by the proposal. In previous pipeline and transmission line developments, generic threatened species protocols have been established for implementation during the construction phase.

Due to the exceedingly high number of threatened flora and fauna present within the two LGAs and the degree of clearing that is proposed, URS would advise that the proposal could be reasonably expected to provide a Species Impact Statement to accompany the EIS.

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### 4.1.6 NSW Heritage Act 1977

*The Heritage Act 1977* provides for the conservation of environmental heritage defined as places, buildings, works, relics, moveable objects, and precincts, of State or local heritage significance which are at least 50 years old. The Act applies to non-Aboriginal relics only. Aboriginal relics are protected under the *National Parks and Wildlife Act 1974*. The Act provides for the listing of heritage structures on the State Heritage Register. Orders would need to be made under the Act if the route selected impacted on heritage items.

### 4.1.7 State Environmental Planning Policies

#### **SEPP 14: Wetlands**

Boundary data on approximately 1900 coastal wetlands of State significance and covered by State Environmental Planning Policy No. 14 (SEPP 14) as defined in The Coastal Wetlands Survey report, 27 October 1989. SEPP 14 places planning and development controls under the Environmental Planning and Assessment Act, 1979 over the wetlands, which are illustrated on 82 hard copy printed maps. These maps are the definitive source of the wetlands boundaries although digital representation is available. Coverage extends along the NSW coastline and up to 30 kms inland from the Queensland to the Victorian Border. Where this policy applies (ie: the area mapped as wetland), development that requires clearing within these areas must obtain the consent of the Council and concurrence of the Director. The development proposal is also forwarded to the NSW National Parks and Wildlife Service (now Dept. of Environment and Conservation).

#### **SEPP 26 Littoral Rainforests**

New South Wales State Environmental Planning Policy No.26 *Littoral Rainforests* recognises that this ecosystem had been severely reduced and degraded and that remaining littoral rainforests need protection.

Littoral Rainforest are similar to subtropical rainforest, but occurs when it is close to the sea and exposed to salt laden winds. Usually on nutrient enriched deep sands or soils derived from slates and basalts, it's considered more as a distinctive series of communities rather than a subform of rainforest. Combining the characteristics of both subtropical and dry rainforest types, it is distinguished by the prevailing wind sheared upper tree canopy, with some communities displaying prominent stands of conifers such as Hoop Pine (*Araucaria cunninghamii*), Plum Pine (*Podocarpus elatus*), and featuring species such as Tuckeroo (*Cupaniopsis anacardioides*). Visitors to the Tweed Heads Historic Site & Minjungbul Aboriginal Cultural Centre, Cudgen

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Nature Reserve or the Tweed Bicentennial Environmental Park may see examples of littoral rainforest and remnant coastal and swamp forest vegetation.

The policy contains a series of development controls with concurrence required from the Director of DIPNR for clearing of this vegetation type. The development proposal is also forwarded to the NSW National Parks and Wildlife Service (now Dept. of Environment and Conservation).

### ***SEPP 44 – Koala Habitat***

In 1995 the NSW State Government enacted State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44) to underpin management of the State's declining koala populations. This SEPP applies a test to assess whether land is potential or core koala habitat. If it is, the land must be mapped, a plan of management completed and approval to develop sought from the State Government. This process has been carried out for part of the Tweed LGA.

As the development proposal falls under Part V of the EP&A Act, the development application does not need to consider SEPP 44, however, as the koala is also listed as threatened species, the tests and policies are a good guide as to how a determination will be made under the Threatened Species Conservation Act 1995.

### ***SEPP 71 – Coastal Development***

SEPP 71 was structured to give the state government more control over coastal development, and allow for more coordinated, consistent and strategic coastal land management. This SEPP 71 applies to land within the “coastal zone”. Generally speaking, this is land within 1 km of the NSW coast or a coastal lake, lagoon, bay or river and applies to development applications made after its commencement. The purpose of SEPP 71 is to ensure that there is a uniform decision-making process with respect to planning and development in the coastal zone. This purpose is implemented by a number of mechanisms. The 3 most important for developers are the following:

1. Creating additional matters for consideration in the development
2. Identifying certain development as “State Significant Development” and thereby making the Minister for Infrastructure, Planning and Natural Resources the consent authority for the development; and
3. Imposing further development control measures with respect to public access, effluent disposal and stormwater.

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### 4.1.8 North Coast Regional Environmental Plan

The North Coast Regional Environmental Plan applies to both the Byron and Tweed Local Government Areas (LGAs). In relation to the hypothetical proposal there would be a number of relevant aims outlined in the plan, particularly to provide:

- (1)(a) regional policies that protect the natural environment, encourage the efficient and attractive built environment and guide the development into a productive yet environmentally sound future;
- (c) to provide a basis for the co-ordination for activities related to growth in the region and encourage optimal economic and social benefit to the local community and visitors to the region.

There are a number of development control mechanisms within the planning instrument that would need to be considered for this proposal and meet in any development application. Those relating to the proposed transmission line include:

- impact of the development on agricultural activities (s12);
- wetlands or fishery habitats (s15) including adjoining land upstream of a river or stream, or land within the drainage catchment, the proximity of aquatic reserves dedicated under the *Fisheries Management Act 1994* and whether the watercourse is an area of protected land as defined in section 21AB of the *Soil Conservation Act 1938* and any measures to prevent soil erosion, and the need to ensure that native vegetation surrounding the wetland or fishery habitat area is conserved;
- natural areas and water catchment areas (s29A) which relates to the clearing of native vegetation in environmental protection, scenic protection or escarpment preservation zones; and
- Specifically in relation to utility services, s57 of the LEP has the objective of this plan in relation to utility services is to provide the economic and timely provision of utility services to new urban and residential areas.

### 4.1.9 Tweed Local Environmental Plan

The Tweed Local Environmental Plan 2000 is a statutory plan prepared under the Environment Planning and Assessment Act to control and guide the future development of land in the whole of the Tweed Shire. The LEP results from and seeks to implement a number of studies previously carried out by Council such as the Tweed shire 2000+ Strategic Plan, Pottsville Village Strategy, Jack Evans Boat Harbor Study etc, State Government policies such as the North Coast Regional Environmental, Council policies and general planning principles. The LEP divides land in the Shire into various land use zones (eg, Rural, Agricultural Protection, Low

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Density Residential, Open Space etc) and sets out what development can be carried out in them, whether Council approval is needed and whether any special requirements apply.

More generally the development control provisions that relate to each zone must be considered in the planning and development consent process. In particular the Tweed LEP requires the consent authority to be satisfied that a development would not have an unacceptable cumulative impact on the community, locality or catchment that will be affected by its being carried out or on the area of Tweed as a whole (s8(1)(c)). For a development to be granted consent it needs to satisfy the consent authority that (s8(2)(a)):

- (i) it needs to be in the locality in which it is proposed to be carried out due to the nature, function or service catchment of the development,
- (ii) it meets an identified urgent community need,
- (iii) it comprises a major employment generator, and
- (b) there is no other appropriate site on which the development is permitted with consent development (other than as advertised development) in reasonable proximity, and
- (c) the development will be generally consistent with the scale and character of existing and future lawful development in the immediate area, and
- (d) the development would be consistent with the aims of this plan and at least one of the objectives of the zone within which it is proposed to be located.

The Tweed LEP also contains a special use zone (Zone 5) which identifies land which is developed or is proposed to be developed, generally by public bodies, for community facilities and services, roads, railways, utilities and similar elements. In addition it also has the objective to provide flexibility in the development of the land, particularly if it is not yet or is no longer required for the relevant special use. Any use authorised by or under the *Forestry Act 1916* for the purpose of State forests is also permissible within this zone. There are also specific development control provisions within the LEP that relate to development applications in the proximity to electricity line easements (s37). These provisions allow for adequate public and supplier notice and consideration of any representations received.

Part 6 of the LEP (Environment And Resource Provisions) set out particular controls on vegetation clearing, excavation, drainage works and other development on land in the Environmental Protection zones. Most land in the 7(a) Environmental Protection (Wetlands and Littoral Rainforest) zone would also be subject the provisions of State Environmental Planning Policies 14 or 26. The matters that Council must consider when determining a development application on land within the 7(a) zone also apply to the development of land adjacent to the 7(a) zone.



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Most development in the 7(f) Environmental Protection (Coastal Lands) zone requires the concurrence of the Director of the Department of Urban Affairs and Planning. Council must also consider any relevant “Plan of Management” that applies to the land (generally applicable only to land owned by the Council or the Crown).

The comments of the National Parks and Wildlife Service and NSW Fisheries must be sought for most development in the 7(l) Environmental Protection (Habitat) zone. Council must consider any effects of a proposed development on flora and fauna; and a plan of management for mitigation measures when determining development applications on land within or adjacent to the 7(l) zone. Some of the requirements also apply to the development of land adjacent to the 7(a) and 7(l) zones.

There are also flooding (s34), Acid Sulphate Soil (s35), and high water mark protection (s31) considerations within the LEP. Of note is that the tree protection order (s54) exempts clearing for maintenance of transmission lines.

### 4.1.10 Byron Local Environmental Plan

The Byron LEP has a similar structure and zoning descriptions to the Tweed LEP (within which the majority of the line development is situated. There appears to be no conflicting land use or zoning prescriptions between the two LEPs. There are a number of development controls that relate to the proposed development and they are outlined below.

Zone 7(j) of the LEP does not allow utility installations within these areas. In all other zones, with the exception of Forestry and National Park that require permission, utility installations require development consent.

Section 18 of the LEP contains the provisions relating to the protection of heritage items within the shire. Heritage items are listed in Schedule 2.

The LEP contains a development control that relates to development on ridge lines and it specifies that:

- “s31 The council shall not consent to the erection of a building or the carrying out of other development on or near any ridgeline on land to which this plan applies unless no alternative location for the building or other development is available, in which case the following objectives to lessen the impact are to be considered before consent is granted:
- (a) whether there will be adequate existing or proposed landscaping, trees or other vegetation which assist or are likely to assist in mitigating visual impact; and

- 
- (b) whether the proposed building design elements, materials of construction and proposed colours will mitigate potential adverse visual impact, including the reflectivity of materials to be used.”

There are also strong development controls for development adjacent to wetlands contained in (s36), open spaces (s46), tree preservation (s52), and acid sulphate soils (s63).

### 4.1.11 Guidelines and Policies

#### ***NSW Coastal Policy***

The NSW Coastal Policy is designed to guide coastal zone management, planning and conservation in NSW. The focus of the policy is on reconciling rapid growth currently experienced in coastal areas while conserving ecosystems. The policy has a strong emphasis on ecologically sustainable development and encourages the use of ecological sustainable development (ESD) principles to guide decision-making. The policy applies to a wide definition of coastal zone that includes tidal waters of coastal rivers to the limit of mangroves or the tidal limit. The key actions promoted in the policy have implications for this proposal.

#### ***Electro Magnetic Fields – ‘Prudent Avoidance’.***

It has not been established that power frequency electric and magnetic fields have any adverse health effects on the community but the possibility can not be ruled out. Several review panels and public inquiries have recommended ‘prudent avoidance’ as an appropriate response to the present state of scientific uncertainty. The most widely accepted maximum exposure criteria are the National Health and Medical Research Council (NH&MRC) criteria. The exposure limits recommended by NH&MRC are based primarily on established or predicted effects related to the flow of electric current within the body. Given the existing uncertainty regarding the link between EMF exposure and health effects, the limits (Table 4.1) are not intended to define safe limits for possible health effects from fields.

**Table 4.2: NH&MRC Guidelines**

<b>NH&amp;MRC Limit</b>	<b>Electric Field Strength (kV/m)</b>	<b>Magnetic Flux Density (mG)</b>
<b>Occupational Exposure</b>		
Whole Working Day	10	5000
Short Term	30	50,000
For Limbs	N/A	25,000
<b>General Public Exposure</b>		
Up to 24hrs/day	5	1000
A few hrs/day	10	10,000

### 5.1 Constraint Layers

In determining the ‘best’ possible route and an alternative for a potential transmission line within the study area, the planning constraints potentially impacting on the proposed development have been identified in Table 5.1 below. The constraints correlate to the environmental law requirements outlines above and community and social demands.

**Table 5.1: Planning Constraints**

<b>Feature</b>	<b>Constraint</b>	<b>Origin</b>
<b>Topographical</b>	Slope	<i>Soil Conservation Act 1938</i> and line feasibility
	Drainage, Streams and Rivers	<i>Rivers and Foreshores Act 1948</i>
<b>Ecological</b>	Threatened Species	<i>Threatened Species Conservation Act 1995</i> and <i>Environment Protection and Biodiversity Conservation Act (EPBC Act)</i>
	Koala Habitat	SEPP 44 ( <i>EP&amp;A Act</i> )
	Littoral Rainforest	SEPP 26 ( <i>EP&amp;A Act</i> )
	Wetlands	SEPP 14 ( <i>EP&amp;A Act</i> )
	Acid Sulphate Soils	NSW Coastal Policy
<b>Heritage</b>	World Heritage	EBPC Act
	National, State & local heritage values	REP and LEPs
<b>Zoning/Land Use</b>	National Park	<i>National Parks and Wildlife Act 1974</i>
	North Coast REP Zoning	<i>EP&amp;A Act</i>
	Tweed LEP Zoning	<i>EP&amp;A Act</i>
	Byron LEP Zoning	<i>EP&amp;A Act</i>
<b>Visual</b>	Visual Quality and Visibility	REP and LEPs
<b>EMF</b>	Electro Magnetic Fields	Prudent Avoidance Industry Policy

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**5.1.1 Gradients of limitations for each planning constraint**

Within each of these planning constraints there are degrees or grades of impact that can be determined objectively. Grading criteria have been developed for each individual constraint in the section 6: Planning Constraints (page 6-1). The grading within each constraint assists in assessing the extent or degree of limitation on the proposal at a particular location. The generic approach used for this criteria assessment is outlined below in Table 5.2.

**Table 5.2: Generic criteria applied to each planning constraint**

<b>Constraint Level</b>	<b>Explanation</b>
<b>Not Applicable</b>	The planning constraint is not relevant to the parcel of land in question
<b>Low</b>	Any potential impacts would be of a nature/scale/complexity as to not significantly degrade the environment or could be mitigated by standard construction or operational practices.
<b>Medium</b>	There is a high probability that the development assessment would be required to undertake more detailed investigation, planning and/or site remediation in order to mitigate potential impacts.
<b>High</b>	The known impacts would not be deemed to be acceptable.

### 6.1 Topographical

#### 6.1.1 Slope Constraints

Slope is a major factor influencing the feasibility of transmission line construction. It can also have implications for construction methods and maintenance requirements (ie: may need to be by helicopter). Further, slope can be used as an indicator of slope stability and erosion hazards.

There are three major topographical impediments, namely:

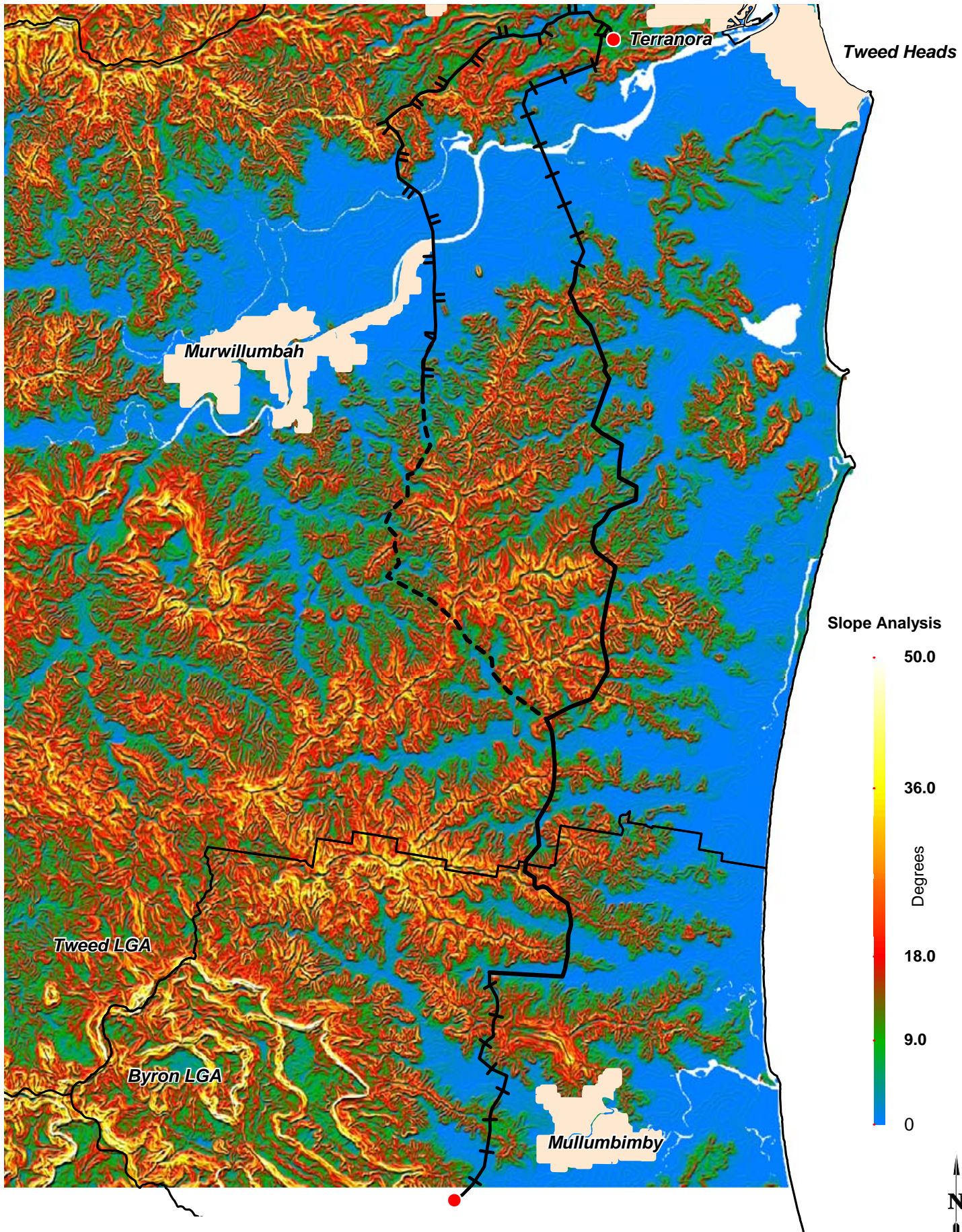
- the Mount Warning Range (generally running to the west of the Pacific Hwy in a north south direction);
- the ridgelines from this sequence running down to the coast (generally east to west); and
- the escarpment rising from the Tweed River to Terranora.

Slope was classified using a digital elevation model (DEM) for the study area. The classification of the slope gradients were:

<b>Constraint Level</b>	<b>Degree Slope (°)</b>
Not Applicable	0-5°
Low	5-10°
Medium	10-18°
High	>18°

This planning constraint is illustrated in the digital elevation model shown in Map 2.





### Slope Analysis

50.0

36.0

Degrees

18.0

9.0

0



- Local Government Area (LGA) Boundary
- Substation (Route End Points)
- Built-up Area

#### Best Potential Route

- Overhead
- Underground

#### Alternate Route

- Overhead
- Underground

# URS

## URS Australia Pty Ltd

Date Printed: 08/03/2004  
Author: CDS  
Approved: MSA

MAP: 2  
Status: FINAL

Client: Burns & Roe Worley  
Location: T:\Proj\GIS\50782\002\GIS\Workspaces\Maps\Map 2.WOR

### Slope Analysis

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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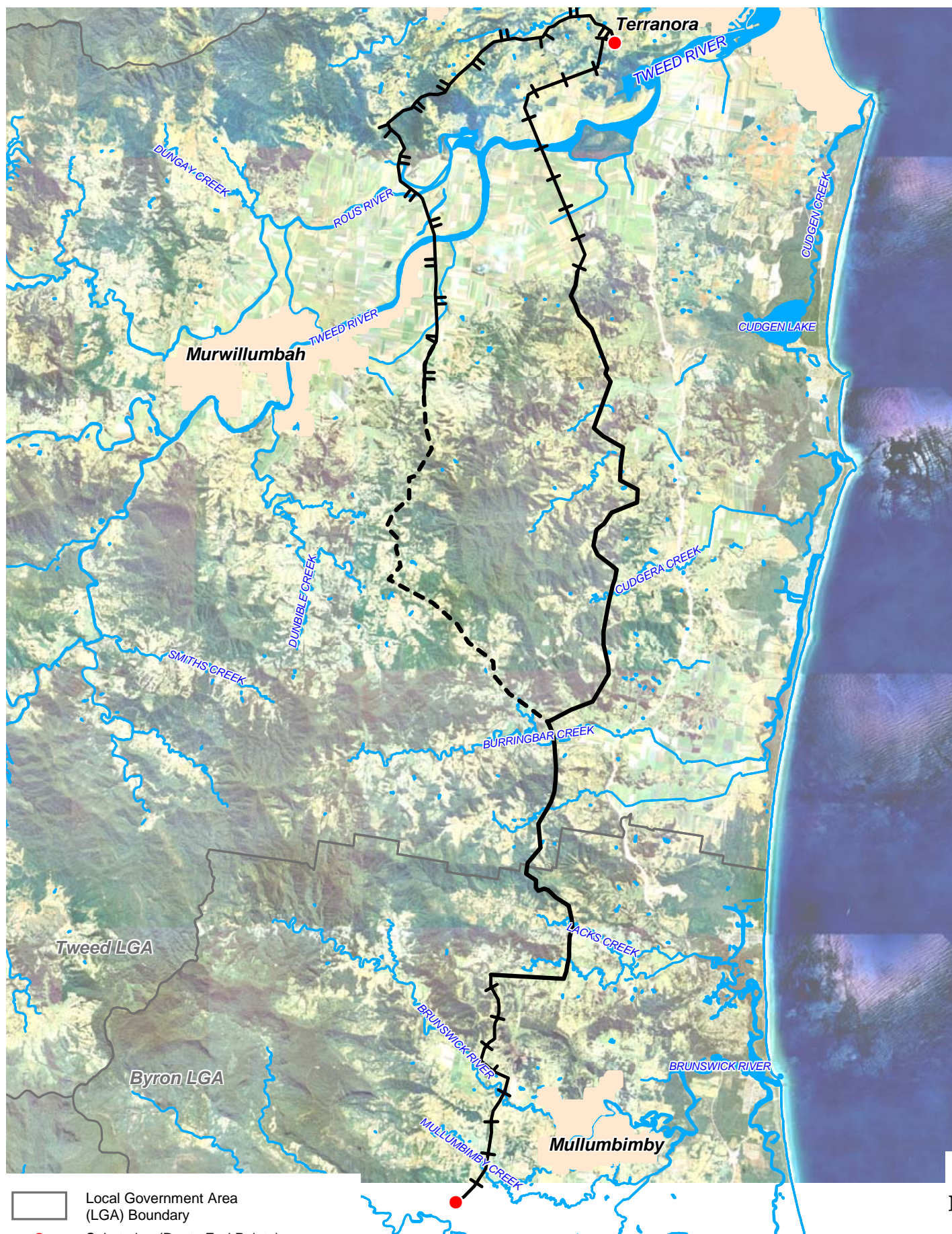
### 6.1.2 Drainage, Streams and Rivers






As the study area receives the highest rainfall in NSW, there are a number of rivers and streams draining the coastal ranges and dissecting the coastal hinterlands and plains. Development proposals that are within 40m of a stream, river or waterbody are required to obtain section 3A approval under the *Rivers and Foreshores Improvement Act 1948*. Whilst this planning constraint typically does not have an impact on feasibility, there may be some additional design and construction works associated with larger river crossings such as the Tweed River.

Drainage data was obtained at a 1:25,000 scale derived from map sheets, aerial photography and modelling by the NSW Department of Lands. This planning constraint is illustrated in Map 3. Due to the requirements under the *Rivers and Foreshores Improvement Act 1948*: that any works within 40m of a stream requires a Part 3A approval, a 40m buffer has been placed on all waterbodies in the LGAs.



It should also be noted that flooding constraints have not been examined although the Tweed River valley is subject to major flooding events. Map 3 illustrates areas where water and erosion management issues would need to be considered in conjunction with engineering feasibility requirements for water crossing.







-  Local Government Area (LGA) Boundary
-  Substation (Route End Points)
-  Drainage Line (including 40m buffer)
-  Water Body
-  Built-up Area

#### Best Potential Route

-  Overhead
-  Underground

#### Alternate Route

-  Overhead
-  Underground

**URS**

**URS Australia Pty Ltd**

Date Printed: 08/03/2004  
Author: CDS

MAP: 3  
Approved: MSA

Client: Burns & Roe Worley  
Status: FINAL

Location:  
T:\Proj\GIS\50782\002\GIS\Workspaces\Maps\Map 3.WOR

## Drainage

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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## **6.2 Ecological**

### **6.2.1 Threatened Species**

As stated in section 2.1, there are a diverse and large number of threatened species recorded in the study area. Appendix 2 lists the threatened species recorded in the study area under the *Threatened Species Conservation Act 1995* and the *Environment Protection and Biodiversity Conservation Act 1999*. The data supplied by NSW National Parks and Wildlife Service (NPWS) gives known threatened species locations within the two LGAs within a one kilometre grid square. This limits the accuracy of constraint mapping. As a result a 500m radius buffer has been created around the records and key habitat mapping from the NSW NPWS was used to provide a secondary classification for this planning constraint. Known native vegetation has also been utilised in order to predict where more detailed field assessment would be required.

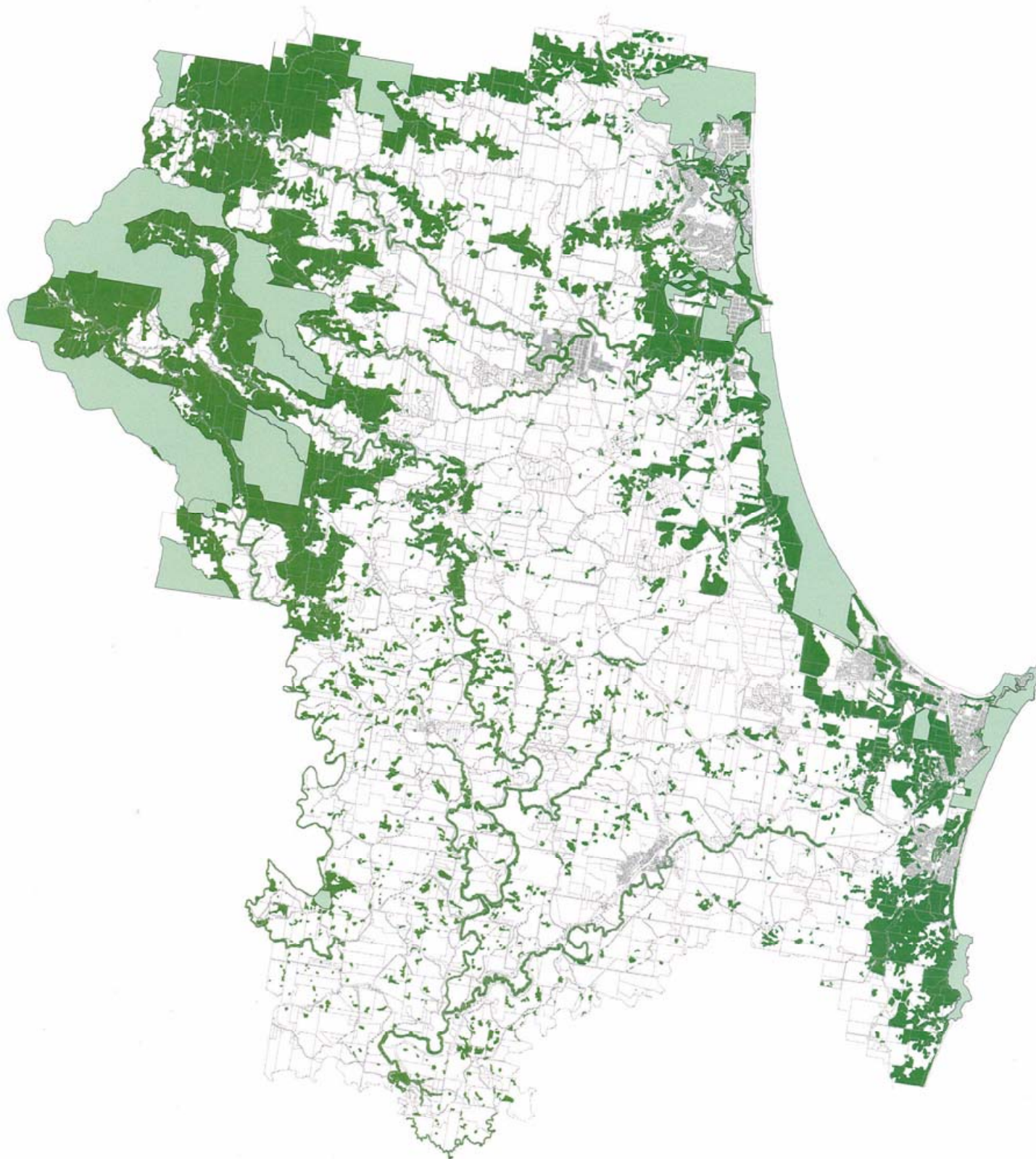
<b>Constraint Level</b>	<b>Value</b>	<b>Map</b>
Not Applicable	No records/data	
Low	Native Vegetation (Separate mapping for Byron and Tweed LGAs)	4a1 (Byron) 4a2 (Tweed)
Medium	Fauna Key Habitats	4b
High	Records of Threatened Species	4c

Individual threatened species habitat requirements have not been investigated and as such it would be expected that the *Threatened Species Conservation Act* requirements for this proposal would be far more onerous than that which has been mapped as a constraint. Detailed field investigation could also alter the proposed routes. Within an environmental impact assessment process (as opposed to a desk top study) each section of easement would need to be assessed for its habitat values and likely significant impacts on threatened species. Such assessments are more rigorous when vegetation types are described and mapped and corresponding likelihood of threatened species occurrence can be gauged. These considerations and limitations are of considerable importance given the high diversity and number of threatened species recorded in the study area.

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It should be noted that other linear development proposals have generally utilised generic threatened species protocols (GTSPs) and individual species protocols (ISPs) to help mitigate against potential impacts.





NPWS Estate  
 Cadastre  
 HCV Ranking >High  
 Very Low Ecological Value  
 Low Ecological Value  
 Medium Ecological Value  
 High Ecological Value  
 Very High Ecological Value  
 Extremely High Ecological Value

**URS**

**URS Australia Pty Ltd**

Date Printed: 08/03/2004  
 Author: CDS  
 Approved: MSA  
 MAP: 4a1  
 Status: FINAL

**Byron Shire Remnant Vegetation**

Client: Burns & Roe Worley  
 Location:  
 T:\Proj\GIS\50782\002\GIS\Workspaces\Maps\Map 4a1.WOR

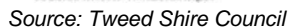
Project: Directlink 132kV Transmission Line Proposal. Project No.: 50782-002

0 2.5 5  
 kilometers

Projection: MGA Zone 56  
 Scale: 1:160 000 @ A4



## July 1999



Date Printed: 08/03/2004	Author: CDS
	Approved: MSA
MAP: <b>4a2</b>	Status: FINAL
Client: Burns & Roe Worley	
Location: T:\ProjGIS\50782\002\GIS\Workspaces Maps\Map 4a2.WOR	

0 5 10  
kilometres