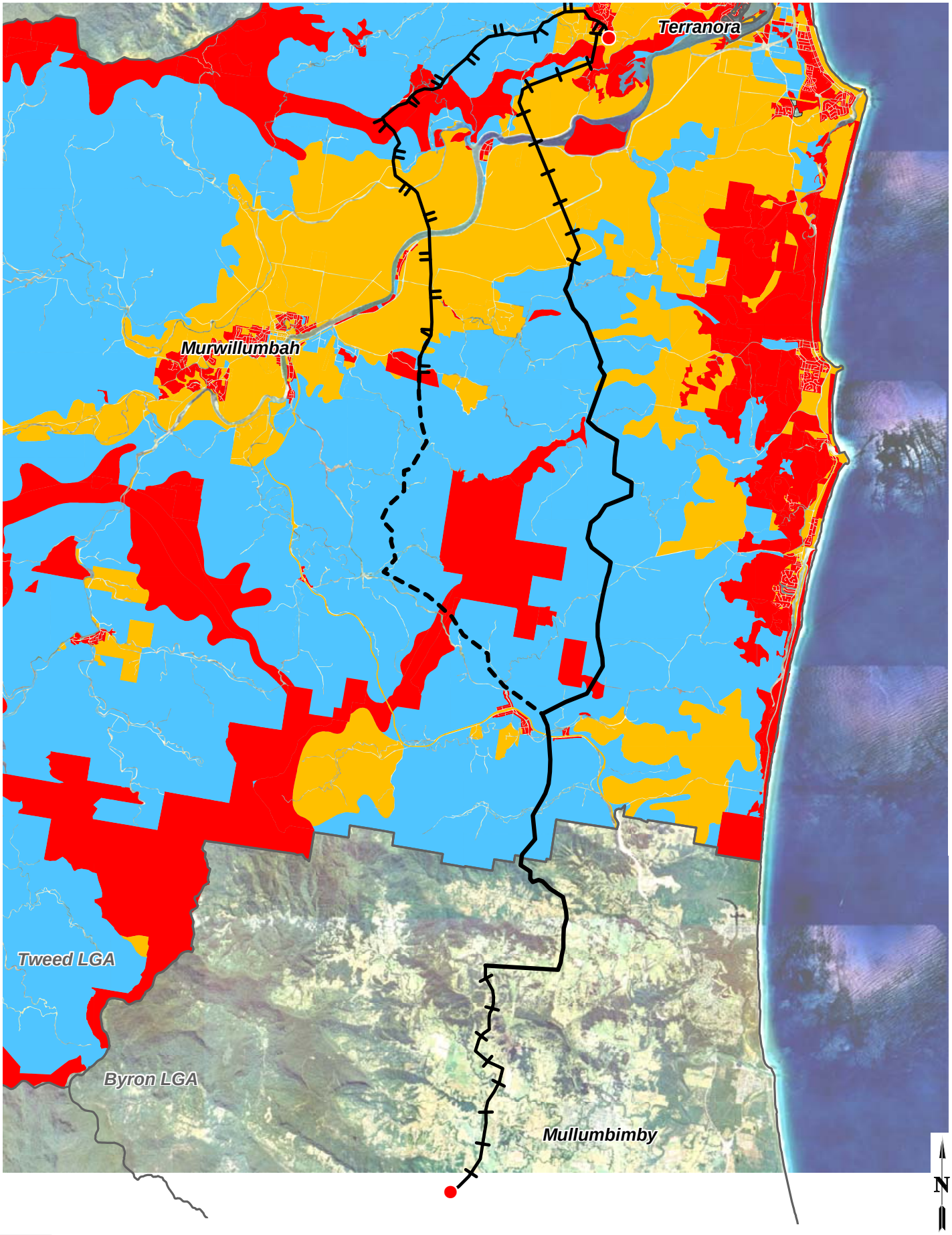


Local Government Area (LGA) Boundary

Substation (Route End Points)

Best Potential Route

Underground

Overhead

Alternate Route

Overhead

Underground

Tweed 2000 LEP
Zoning Constraint Level

Low

Medium

High

URS Australia Pty Ltd

Date Printed: 08/03/2004	Author: CDS
	Approved: MSA
MAP: 12	Status: FINAL

Tweed Shire 2000 LEP

Client: Burns & Roe Worley

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

Location: T:\ProjGIS\50782\002\GIS\Workspaces\Maps\Map 12.WOR

0 2.5 5 kilometers

Projection: MGA Zone 56

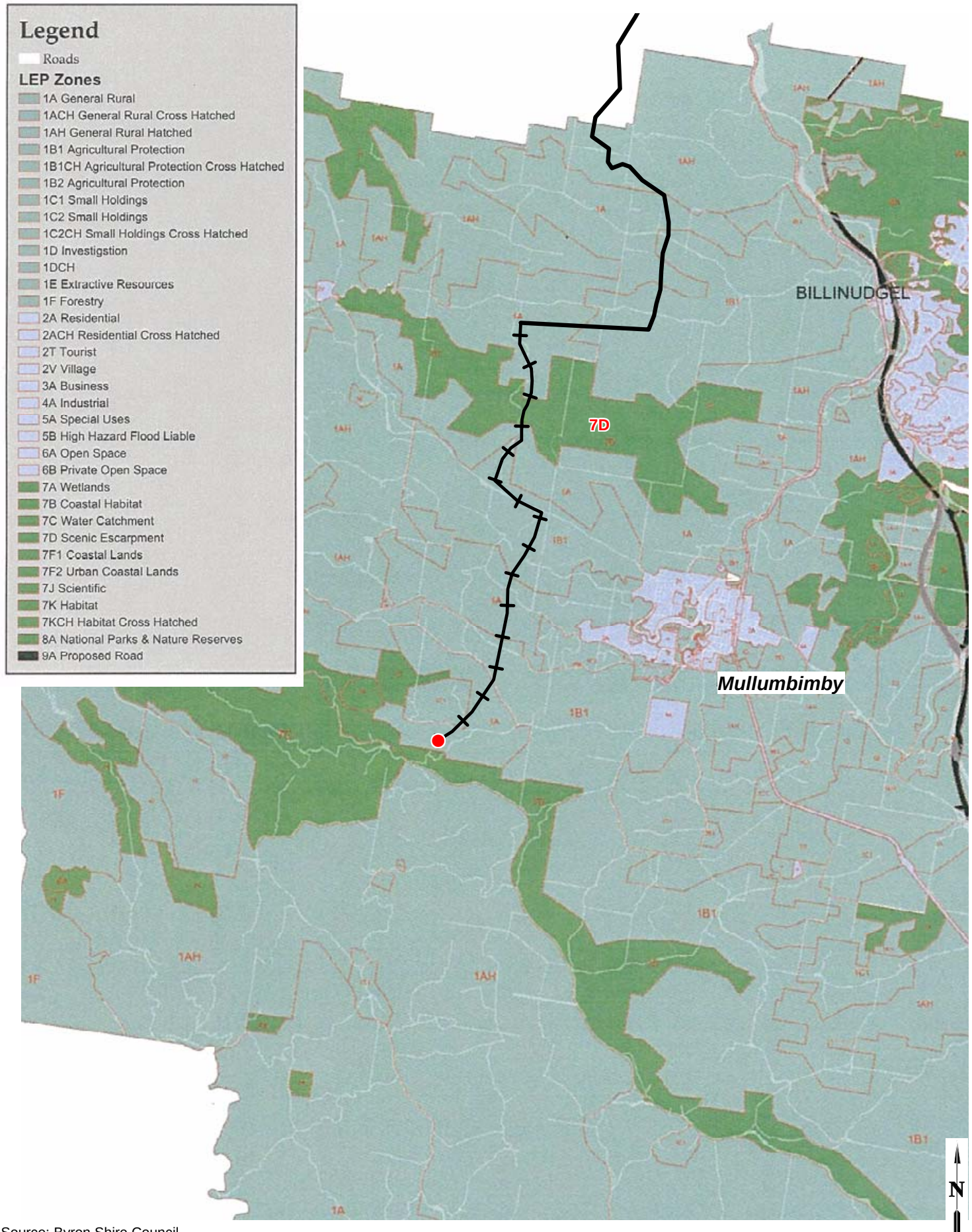
Scale: 1:160 000 @ A4

6.4.3 Byron LEP Zoning

Similarly with Byron LGA, zonings represent a framework within which development and land use decisions can be made. Whilst there are no provisions or development prohibitions against utility provisions in the majority of the zones, the following constraint levels have been assigned to zones reflecting social and environmental implications.

Constraint Level	LGA Zone (See LEP)
Not Applicable	Unzoned Land within the LGA, 1E Extractive Resources.
Low	General Rural 1A, 1ACH, 1AH, 1D Investigation, Industrial 4A, High Flood Hazard 5B, proposed road 9A
Medium	Agricultural Protection 1B1, 1B2, Small Holdings 1C, IF Forestry, Special Uses 5A, Open Space 6A, Private Open Space 6B.
High	Residential 2A, (plus Tourist, and Business), wetlands 7A, Coastal Habitat 7B, Scenic Escarpment 7D, Coastal Lands 7F1, Urban Coastal Lands 7F2, Scientific 7J, Habitat 7K, National Park 8A

The above classification is illustrated in Map 13.



Source: Byron Shire Council

Substation (Route End Points)

Best Potential Route

Underground

Overhead

URS

URS Australia Pty Ltd

Date Printed: 08/03/2004	Author: CDS	**Byron Shire 1988 LEP**
	Approved: MSA	
MAP: 13	Status: FINAL	
Client: Burns & Roe Worley		Project: Directlink 132kV Transmission Line Proposal. Project No.: 50782-002
Location: T:\ProjGIS\50782\002\GIS\Workspaces\Maps\Map 13.WOR	0 1.5 3 kilometers	Projection: MGA Zone 56 Scale: 1:160 000 @ A4

6.5 Visual

6.5.1 Visual Impacts

The visual quality of the landscape of the far north coast of NSW and its hinterland is widely recognised as being among the highest on the east coast of Australia. The dramatic natural landscape character of the region is one of the primary factors attracting large numbers of tourists, holiday makers and residents.

Two natural features that make major contributions to this high visual quality are Mount Warning with its distinctive form and visual prominence, and the Tweed River with its broad alluvial floodplain dominated by sugar cane fields. The northern edge of the Tweed River valley is defined by the visually prominent ridge and escarpment at Terranora, while the southern edge is defined by a system of hills and spurs that increase in elevation as they form part of the major ridgeline along the catchment boundary between the Tweed River and the coastal zone.

The contribution of these landscape resources to the scenic quality of the region has been recognised by Tweed Council which has prepared a visual assessment of the local government area. The significance of the visual resources of this section of coast has also been recognised by the State Government as part of the Comprehensive Coastal Assessment, which is being carried out under the direction of the Department of Infrastructure, Planning and Natural Resources (DIPNR). In order to test the viability of the CCA, the Tweed section of coast has been selected by DIPNR as a pilot area in response to the development pressures that are threatening the natural values of the region. One of the key components of the CCA is an assessment of visual resources of the Tweed region, which was carried out by URS on behalf of DIPNR.

Planning of any major infrastructure development such as high voltage powerlines would be required to thoroughly assess the potential impact on visual resources of the region. URS has therefore drawn on its knowledge of the Tweed region to carry out a desk-top analysis of the likely visual impact of a potential 132kV powerline between Mullumbimby and Terranora sub-stations.

This analysis involved

- Assessment of the visual quality of the area between Mullumbimby and Terranora.
- Determination of the length of potential powerline route that would pass through the various levels of visual quality.
- Identification of sections of the potential route that are likely to require undergrounding in order to obtain agreement from Tweed or Byron Council to the powerline route.

6.5.2 Visual Quality

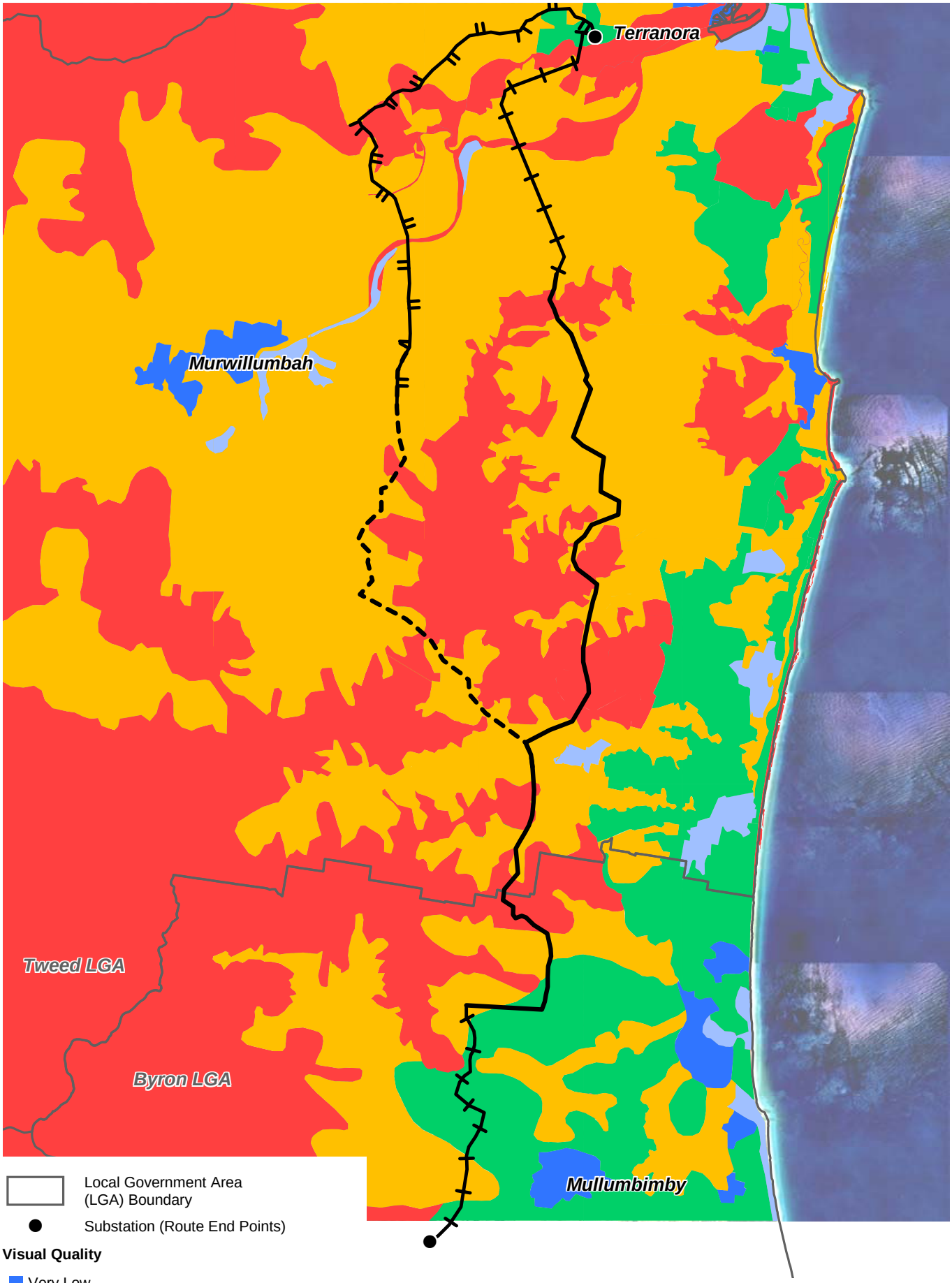
Visual quality reflects the relative scenic quality assigned to a landscape by applying the seven key factors of scenic quality evaluation, which include landform, vegetation, water, colour, adjacent scenery, scarcity, and cultural modifications. Visual quality reflects the condition of the various components that make up a landscape area as well as the extent to which the visual character of the area is well defined, in the sense that:

- the landscape components that are present are not fragmented and are in good condition
- the landscape contains visual diversity but is also a visually integrated whole.

The high scenic quality of the region attracts visitors and new residents to the region, with amenity and lifestyle being identified as critical values for local residents. These values are also recognised by Tweed and Byron councils in their planning policies and by state government (DIPNR) through the coastal assessment, as national parks and through listing of parts of the region on the World Heritage Register. These attributes help frame the basis for an objective assessment of visual quality of the area.

The results of the visual quality assessment carried out by URS for this project are presented on Map 14. Key features of the assessment include:

- Very high visual quality associated with the forest covered ridge system forming the catchment boundary between the Tweed River valley and the coastal foothills and plains.
- Very high visual quality of the Terranora escarpment that is highly visible from the Tweed River valley, rural residential development on the ridges and spurs on the southern side of the Tweed River valley, the Motorway and Pacific Highway.
- High visual quality of the ridgelines associated with the forest covered ridge system forming the skyline for townships such as Mullumbimby and Murwillumbah
- High visual quality of the ridges and spurs at lower elevation around the central ridge system as well as the sugar cane fields on the Tweed River floodplain
- Moderate visual quality associated with areas extensively cleared for agriculture and rural residential development
- Low visual quality associated urban development areas



Local Government Area (LGA) Boundary

Substation (Route End Points)

Visual Quality

- Very Low
- Low
- Medium
- High
- Very High

Best Potential Route

- Underground
- Overhead

Alternate Route

- Overhead
- Underground

N

URS Australia Pty Ltd

Date Printed:	Author: CDS	**Visual Quality**
	Approved: MSA	
MAP: 14	Status: FINAL	
Client: Burns & Roe Worley		Project: Directlink 132kV Transmission Line Proposal. Project No.: 50782-002
Location: T:\ProjGIS\50782\002\GIS\Workspaces\Maps\Map 14.WOR	0 2.5 5 kilometers	Projection: MGA Zone 56 Scale: 1:160 000 @ A4

6.5.3 Visibility

The potential visual impact of an overhead high voltage powerline will be strongly dependent on the extent to which it visible from various view situations. They key view situations were identified by URS on the basis of knowledge of the area and a review of aerial photos.

Table 6.5 - Key View Situations

View Situation	Significance
Motorway	The motorway is one of the major scenic routes on the north coast of NSW carrying high volumes of traffic through high quality rural landscapes the include enclosed valleys, open coastal plain and sugar cane fields on the Tweed River floodplain. Views of the Terranora escarpment with sugar cane fields in the foreground forms a distinctive scenic experience for motorists travelling north. A powerline route across the cane fields and up the escarpment would be highly visible from this section of the highway. Similarly a powerline located alongside the motorway would create a high visual impact due to the relatively undeveloped rural landscape character of the corridor through which the motorway runs.
Pacific Highway	Motorists travelling along the section of Pacific Highway running along the Tweed Valley also enjoy views of Terranora escarpment to the north and tree covered hills and ridges to the south. A powerline route across the cane fields and up the escarpment would be highly visible from this section of the highway.
Scenic roads along ridges	There are numerous roads along the ridges and spurs associated with the central landform between the Tweed River valley and the coastal plains. A feature of the views from many of these roads is the absence of high voltage powerlines and other infrastructure.
Tweed River	Scenic boat trips and recreation boating along the Tweed River is a significant feature of the tourism industry of the region. These views include the Terranora escarpment and sugar cane fields as well as small riverside villages. A powerline route across the cane fields and up the escarpment would be highly visible from the River.
Urban development at Terranora	Extensive residential development is located in the vicinity of the substation at Terranora and the area is subject to continuing urban development. Sections of a high voltage powerline would be visible from extensive areas of this residential development.
Urban development areas at Mullumbimby	Areas of residential are located in the vicinity of the Mullumbimby substation. Sections of the high voltage powerline would be visible from extensive areas of residential development in this area and from potential future urban release areas in the Pocket. The most prominent of these impacts would be associated with the scenic ridge framing the skyline from this town.

View Situation	Significance
Urban development areas at Murwillumbah	Extensive areas of urban development occur at Murwillumbah and surrounding areas in the Tweed River valley. Sections of the high voltage powerline would be visible from these urban areas if the alignment was located near the township
Rural residential development on southern edge of Tweed River Valley	This rural residential development area has panoramic views across the sugar cane fields of the Tweed Valley to Terranora escarpment. A powerline route across the cane fields and up the escarpment would be highly visible from this area

6.6 Electro Magnetic Fields (EMF)

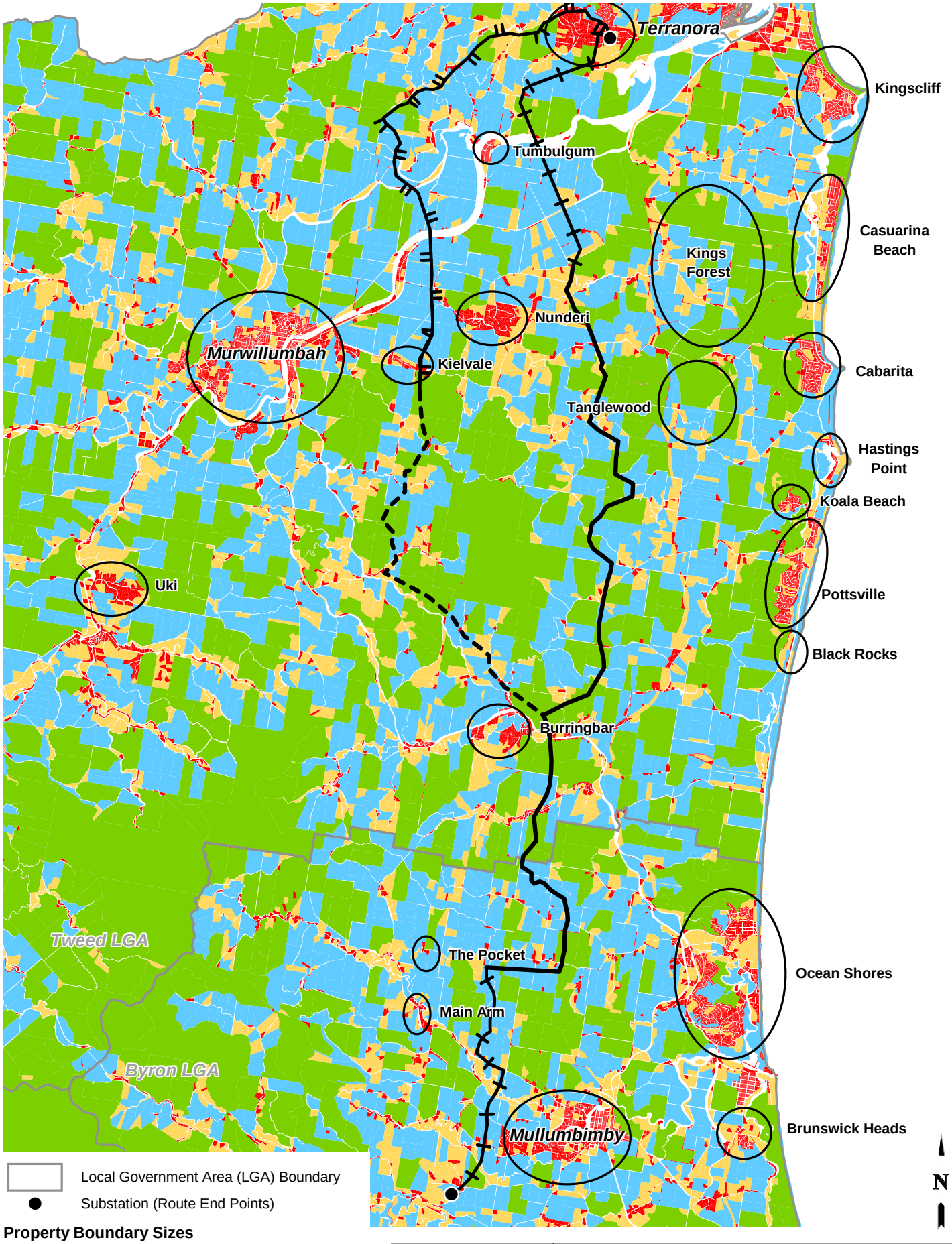
The predicted 132kV magnetic fields strength would be thousands of times lower than the NH&MRC recommendations (see section 4.1.11). In relation to the electric field strengths the values would also be within NH&MRC criteria. However, because of the community perceptions in relation to EMF, an analysis on the cadastre of the two LGA's was undertaken to determine areas of potential higher density development in order to apply the prudent avoidance policy (see map 15). It is assumed that within a corridor, individual residences can be avoided on a case by case application of prudent avoidance.

Constraint Level	Lot Size (ha)
Not Applicable	>40
Low	10-40
Medium	2-10
High	>2

Further, residential release areas are identified during the assessment process are illustrated in Map 15. These include the following:

- The Pocket;
- Black Rocks;
- Pottsville;
- Seabreeze Estate;
- Burringbar;
- Tanglewood;
- Hastings Point;
- Koala Beach;
- Cabarita;
- Casuarina Sands;
- Kings Forest;
- Cudgen;
- West Kingscliff;
- Kingscliff;
- Chinderah;
- Fingal;
- Banora Point;
- Cobaki Lakes;
- Bilambi Heights;
- Terranora Village; and
- Mullumbimby.

In determining the best and alternate routes these areas have been avoided.



Local Government Area (LGA) Boundary

Substation (Route End Points)

Property Boundary Sizes

- < 2 ha
- 2 to 10 ha
- 10 to 40 ha
- > 40 ha

Best Potential Route

- Underground
- Overhead

Alternate Route

- Overhead
- Underground

Future Urban Expansion Areas

URS

URS Australia Pty Ltd

Date Printed: 08/03/2004	Author: CDS	**Lot Size Distribution and Future Urban Expansion Areas**
	Approved: MSA	
MAP: 15	Status: FINAL	
Client: Burns & Roe Worley		Project: Directlink 132kV Transmission Line Proposal. Project No.: 50782-002
Location: T:\ProjGIS\50782\002\GIS\Workspaces\Mapss\Map 15.WOR	0 2.5 5 kilometers	Projection: MGA Zone 56 Scale: 1:160 000 @ A4

7.1 Community Consultation

Early consultation with the local community, industry, councils and government agencies can be of great assistance in making a preliminary assessment of the potential viability of a proposal at a particular site. It can also assist in ensuring that the EIS is focused on those matters which will add value to the decision-making process. In preparing an EIS, URS would as a matter of course advise consultation with relevant government agencies through a planning focus meeting (PFM). In addition to including government authorities that have an approval role, other agencies with expertise in the area, catchment management committees, independent technical experts and community representatives would also be included. For the potential proposal the following organisations and individuals would be recommended:

- Byron Shire Council;
- Tweed Shire Council;
- DIPNR
- RTA
- DEC
- Rail Corp
- NSW Health Department
- Ministry of Energy and Utilities
- Sustainable Energy Development Authority
- Caldera Environment Group;
- Local Aboriginal Land Councils; and
- Other community groups.

DIPNR recommends (Network Electricity Systems and Related Facilities EIS Guidelines, 2002) for major or controversial projects such as this one that a program of community consultation be undertaken as part of the preparation of the EIS. This program would usually include two phases, one seeking to inform the community (for instance involving public meetings, public displays or newsletters) and one seeking to gain input on issues of community concern, to identify community values and to identify and evaluate alternatives (for instance involving community focus meetings, 'issues' workshops and community surveys).

As part of this desktop review, initial discussions have been held with DIPNR, Byron and Tweed Shires. As result of these meetings, these parties have agreed to review this assessment. A number of similar and common issues were raised during the meetings. These issues included:

- the expectation that broad sections of the community would strongly oppose an overhead development;
- that the basis for this opposition would most likely be the impacts on visual amenity, lifestyle and perceived health risks associated with EMF;
- that the visual and environmental impacts of clearing would also be contentious;

- identification of the need for detailed consultation;
- recognition of visual amenity and lifestyle as major attractions and values within the LGAs;
- that urban release areas with the LGAs have requirements from the Councils for underground cabling;
- that previous development proposals in the region have been stalled or abandoned because of the extent of fervent local opposition (eg, Club Med, mobile tower installations, and pacific highway upgrade)
- that the perception of marginal local community benefits would increase this opposition from the local communities with Tweed and Byron councils likely to support constituents opposed to the development.

This initial feedback highlights widespread local community sensitivities associated with potential and/or perceived impacts on visual amenity and lifestyle values. The perception that these values would be eroded by the development would be further increased by the requirement for a 40m cleared easement through remnant native vegetation. Strong, sustained and orchestrated opposition to the development would be expected.

7.2 Data

The maps compiled by URS Australia Pty Ltd use data obtained from various sources, including historical, formal and informal data obtained from third parties. While all care has been taken in their preparation, URS has not verified the accuracy of all such data. Accordingly, URS does not warrant the accuracy of the maps and the maps must be considered indicative only. To the maximum extent permitted by law, URS explicitly excludes any and all responsibility for any injury, loss or damage arising out of any inaccuracy, error or omission contained in the map. The user of the map must, and agrees to, use it only on these terms and conditions.

7.3 Desktop versus Field Assessment

In undertaking a desktop analysis, the scale at which the route selection can be made is limited by the availability of detailed planning information. Such information as the location and significance of legally protected elements of the landscape, such as endangered species, aboriginal cultural heritage or individual property impacts, limits the accuracy to which a selected route can be determined and mapped. Detailed environmental impact assessment would increase the potential constraints on this project to the point that the desk-top routes identified by URS may need to be varied considerably.

Acknowledging that the scale of assessment can affect the outcome of route selection, a broad corridor, approximately one kilometre (1km) wide, has been identified for the selected and alternate routes. It is envisaged that this corridor width will allow scope for detailed planning and design to further refine an appropriate route. It must be noted that these detailed considerations could alter the course of the selected route. The potential for alteration is considered to be relatively uniform along the route.

8.1 General Route Selection

There are a number of broad regional constraints that define the areas available for route selection, these include:

- The western boundaries created by World Heritage Properties and National Parks;
- The step terrain associated with the coastal ranges;
- The complexities and sensitivities of the coastal strip combined with the development pressures (future urban releases) in these areas; and
- Major urban areas such as Murwillumbah, Mullumbimby and Terranora.

As a result the hinterlands (the area between the well vegetated ranges and sensitive coastal zone) with a history of agricultural land use, modified vegetation and sparse settlement pattern presents the most suitable areas to locate transmission line routes within the study area.

Selection of a route corridor does not imply an absence of planning constraints and as such and where appropriate, mitigation measures have been recommended. In others areas, it is the opinion of URS that mitigation methods would not ameliorate the expected impacts and as such has recommended undergrounding of the transmission line.

8.2 Best Route

Map 16 illustrates the 'Best Route' available. This route corridor contains the least number, extent and magnitude of identified constraints as described in the previous sections of this Report. The corridor is approximately 47km long, of which approximately 18km would be underground. Route length calculations have been prepared using GIS, which measures only in one plane, horizontal (i.e. flat) and additional line distance would be anticipated as a result of variations in elevation and for detailed pole placements within the identified corridor.

8.2.1 Basis for selection

Topographical

The route corridor generally avoids extreme topography and slopes in excess of 18 degrees. There are a number of significant crossing points of major rivers and creeks including Brunswick River, Mullumbimby Ck, Burringbar Ck, Lacks Creek, Cudgera Ck and Tweed River. However,

by locating the route corridor high in the catchment of a number of the major creeks, the scale of the crossings has been minimised. While the potential impacts associated with creek crossings has been minimised by this strategy there will be implications for construction due to the steeper topography and side slopes.

Ecological

Due to a concentration of threatened species records, habitat and remnant vegetation on the coastal plain and at higher elevations (dominated by National Parks) within the study area, the selected route traverses the disturbed hinterland between the coastal margins and forested slopes and ridges. As previously stated, the scale at which this assessment was conducted precludes identifying potential impacts on individual species. Such potential impacts and the application of the *Threatened Species Conservation Act 1995* would be expected to alter the proposed route within the broad corridor shown.

As such the route corridor selected attempts to utilise existing cleared and more ecologically disturbed areas. Where it has been necessary to connect cleared areas by traversing forested areas, the shortest possible distance through the forested land has been identified. Based on aerial photography interpretation it is estimated that approximately 15km of the route or a total of approximately 60 hectares (ha) would need to be cleared of native vegetation.

Secondary habitat as identified by the Australian Koala Foundation would be disturbed as a result of this clearing thus triggering the requirement to prepare a management plan, monitoring, studies and protect certain areas under SEPP 44 requirements. There would be no direct impacts on SEPP 14 wetlands or SEPP 26 littoral rainforests. The management of Acid Sulphate Soils (ASS) would be a constraint and management issue on the Tweed River Valley and on the upper segments of five other valley floors along the route.