

# Dumaresq Substation to Lismore Substation 330kV Transmission Line Project

Constraints Identification and Preferred Corridor  
Recommendation

Landscape and Visual

*Prepared for:*

**URS**

September 2009

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## Constraints Identification

### 1.1 Introduction

A landscape and visual constraints analysis has been prepared by Green Bean Design for URS Australia Pty Ltd (URS) and on behalf of TransGrid, for the Far North NSW transmission line project. The visual constraints analysis forms one element of a process that will assist TransGrid to assess and determine a preferred corridor and subsequently an alignment for the proposed 330kV transmission line between Lismore and Dumaresq in the far north of New South Wales.

A desk top study was undertaken by reference to 1:25,000 topographic maps as well as aerial photographs together with general information relating to the study area provided by URS. A field inspection was undertaken in July 2009, with the general extent of landscape characteristics observed and recorded from public roads only. Further and more detailed field inspections will be carried out prior to the completion of the Landscape and Visual Impact Assessment to be submitted as part of the Environmental Assessment.

A primary objective of the visual constraints analysis was to describe and determine the nature of key landscape characteristics within the study area (shown in URS Figures 2-2 and 2-3), including landform, landcover/landuse and the distribution of settlements and individual residential dwellings. In addition to the physical landscape characteristics, the constraints analysis also considered the visual receptor category likely to occur within the study area. Recommendations are provided to assist TransGrid in determining an alignment for the proposed transmission line.

### 1.2 Previous Studies

The Dumaresq to Tenterfield 330kV Transmission Route Feasibility Study prepared by Connell Wagner in July 2006 highlighted the potential for visual impacts to occur along sections of road corridors and at residential dwellings located within the study area.

Whilst noting the strategy to use publicly owned corridors where practical, the Feasibility Study noted a preference to avoid major roads, but in some instances preferring to create visual impacts along short sections of road corridors in order to avoid locating the transmission line through steep or vegetated land.

The Study Area Options Report prepared by TransGrid in July 2009 recognised the potential for visual impact to be associated with the transmission line infrastructure. An initial assessment of visual impact that may be expected for each of the study area options was presented in the Summary Graph of Constraint Data presented in Appendix C of the TransGrid Study Areas Options Report.

### 1.3 Constraints Analysis

#### *Components*

In order to assess and evaluate the landscape in a clear and consistent manner, the study area has been broken down into a number of component areas (C1 to C9). The components areas are illustrated in URS Figures 2-2 and 2-3. Each component area has been assessed in relation to the distribution and pattern of key elements that occur consistently within them.

The key elements include:

- Landform;
- Land cover; and
- Settlement patterns and human influence.

An evaluation of the key elements identified within each component, both singularly and as a combination, gives rise to the landscape's overall robustness and the extent to which it could visually accommodate the transmission line.

#### *Visual Receptor Categories*

In addition to components the constraints analysis also considers the sensitivity of the visual receptor categories and the disbursement of receptors within the study area. Visual receptor categories and their relative level of sensitivity within the study area may include:

Receptor Category	Sensitivity
<b>Residential Properties</b>	<b>Highest Sensitivity</b>
Pedestrians (recreational)	▽
Public Recreational Space	▽
Rural employment/farming	▽
Motorists	▽
Business (commercial)	▽
Industry	Lower Sensitivity

It is important to note that the visual constraints analysis is not a landscape and visual impact assessment that identifies individual receptors and the potential degree of visual impact that may result from the construction of the transmission line, although the identification of key physical elements within the study area landscape is a component of the landscape and visual impact assessment.

A landscape and visual impact assessment will be undertaken for the Far North NSW transmission line project and presented in the Environmental Assessment.

## 1.4 Constraints Matrix

Study Area Component	Physical Characteristics			Receptor Categories	Constraints
	Landform	Landcover	Settlement		
<b>C1</b>	<ul style="list-style-type: none"> <li>Spurs and low undulating landform;</li> <li>Sloping land; and</li> <li>Flatter agricultural land toward river and road corridor.</li> </ul>	<ul style="list-style-type: none"> <li>Dense timbered and scattered tree cover; and</li> <li>Open cultivated farmland.</li> </ul>	<ul style="list-style-type: none"> <li>Dispersed and small groups of rural residential, along Dumaresq River and Bruxner Highway.</li> </ul>	<ul style="list-style-type: none"> <li>Rural Residential within or adjoining study area;</li> <li>Motorist; and</li> <li>Rural employment.</li> </ul>	<p>There is likely to be some degree of visibility toward the proposed transmission line from residential dwellings and local roads where views extend across flatter and open farmland or where the transmission line crosses spurs and drainage lines, including the Beardy River.</p> <p>The degree of visibility will be largely dependent on the selection of a final alignment and the extent or screening potential of surrounding topography and vegetation.</p> <p>The degree of visibility and a determination of potential visual impact will be assessed in the Landscape and Visual Impact Assessment.</p>
<b>C2</b>	<ul style="list-style-type: none"> <li>Series of spurs and low ridgelines crossing creeks and</li> </ul>	<ul style="list-style-type: none"> <li>Dense timbered and scattered tree cover</li> <li>Open cultivated</li> </ul>	<ul style="list-style-type: none"> <li>Very low number of residential dwellings located within study</li> </ul>	<ul style="list-style-type: none"> <li>Rural Residential;</li> <li>Motorist (Gibraltar Road and local access</li> </ul>	<p>There is likely to be some degree of visibility toward the proposed transmission line from a very small</p>

Study Area Component	Physical Characteristics			Receptor Categories	Constraints
	Landform	Landcover	Settlement		
	gullies.	farmland <ul style="list-style-type: none"> <li>• River corridor (Mole River).</li> </ul>	area located east of Mole River.	tracks); and <ul style="list-style-type: none"> <li>• Rural employment and farming.</li> </ul>	number residential dwellings and local roads including the Bruxner Highway. Visibility may also be higher where the transmission line crosses drainage lines and the Mole River.  Subject to final alignment, the transmission line may pass through timbered areas covering sloping land rising to low ridgelines (between landscape components 2 and 4).  The degree of visibility and a determination of potential visual impact will be assessed in the landscape and visual impact assessment.
<b>C3</b>	<ul style="list-style-type: none"> <li>• Ridgelines;</li> <li>• Spurs;</li> <li>• Gullies and drainage lines; and</li> <li>• Mole River corridor</li> </ul>	<ul style="list-style-type: none"> <li>• Dense timbered and scattered tree cover</li> <li>• Open cultivated farmland</li> <li>• River corridor (Mole River)</li> </ul>	<ul style="list-style-type: none"> <li>• Dispersed rural residential dwellings located within study area.</li> </ul>	<ul style="list-style-type: none"> <li>• Rural Residential;</li> <li>• Motorist (Gibraltar Road and local access tracks); and</li> <li>• Rural employment and farming</li> </ul>	The degree of landscape or visual constraint is generally limited by the small number of receptors within this landscape component although views toward the transmission line may be available from sections of the Bruxner

Study Area Component	Physical Characteristics			Receptor Categories	Constraints
	Landform	Landcover	Settlement		
					Highway.
<b>C4</b>	<ul style="list-style-type: none"> <li>Ridgelines;</li> <li>Spurs; and</li> <li>Gullies and drainage lines.</li> </ul>	<ul style="list-style-type: none"> <li>Dense timbered and scattered tree cover</li> <li>Open cultivated farmland</li> </ul>	<ul style="list-style-type: none"> <li>Dispersed rural residential dwellings located within study area.</li> </ul>	<ul style="list-style-type: none"> <li>Rural Residential;</li> <li>Motorist from local road and access tracks including sections of the Bruxner Highway.</li> <li>Rural employment and farming.</li> </ul>	<p>There is likely to be some degree of visibility toward the proposed transmission line from a small number of rural residential dwellings as well as sections of the Bruxner Highway.</p> <p>The degree of visibility will be largely dependent on the selection of a final alignment and the extent or screening potential of surrounding topography and vegetation.</p> <p>The degree of visibility and a determination of potential visual impact will be assessed in the Landscape and Visual Impact Assessment.</p>
<b>C5</b>	<ul style="list-style-type: none"> <li>Low undulating landform crossing spurs and drainage lines.</li> </ul>	<p>Timbered slopes and scattered tree cover</p> <p>Agricultural (pasture?)</p>	<ul style="list-style-type: none"> <li>Small number of residential dwellings located within study area</li> </ul>	<ul style="list-style-type: none"> <li>Small number of rural residential;</li> <li>Motorist on local roads and access tracks; and</li> <li>Rural employment and</li> </ul>	<p>There is likely to be some degree of visibility toward the proposed transmission line from a small number of residential dwellings and sections of the Bruxner Highway along the northern</p>

Study Area Component	Physical Characteristics			Receptor Categories	Constraints
	Landform	Landcover	Settlement		
				farming.	edge of the study area.  The degree of visibility and a determination of potential visual impact will be assessed in the Landscape and Visual Impact Assessment.
<b>C6</b>	<ul style="list-style-type: none"> <li>Relatively level to gently undulating land; and</li> <li>Gentle slopes and spurs.</li> </ul>	<ul style="list-style-type: none"> <li>Agricultural (pasture); and</li> <li>Open and scattered timbered areas.</li> </ul>	<ul style="list-style-type: none"> <li>Dispersed rural residential dwellings; and</li> <li>Tenterfield Township to south west and south.</li> </ul>	<ul style="list-style-type: none"> <li>Rural Residential;</li> <li>Motorist on local road and access tracks, including sections of the New England Highway, Bruxner Highway, and Mount Lindesay Road; and</li> <li>Rural employment and farming.</li> </ul>	<p>C6 has a relatively high density of rural residential dwellings located within the study area.</p> <p>The rural residential dwellings to the north and north east of Tenterfield from which the transmission line may be visible.</p> <p>The transmission line would also cross a number of local road corridors including the New England Highway.</p> <p>The degree of visibility and a determination of potential visual impact will be assessed in the landscape and visual impact assessment.</p>

Study Area Component	Physical Characteristics			Receptor Categories	Constraints
	Landform	Landcover	Settlement		
<b>C7</b>	<ul style="list-style-type: none"> <li>• Relatively level to gently undulating land;</li> <li>• Steep sided slopes;</li> <li>• Gullies and creek lines; and</li> <li>• Prominent ridgeline and hilltops.</li> </ul>	<ul style="list-style-type: none"> <li>• Agricultural (pasture);</li> <li>• Open and scattered timbered areas; and</li> <li>• Dense, closed timbered areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Dispersed rural residential dwellings; and</li> <li>• Tenterfield Township to north-west and north.</li> </ul>	<ul style="list-style-type: none"> <li>• Rural Residential;</li> <li>• Motorist on local road and access tracks, including New England Highway; and</li> <li>• Rural employment and farming.</li> </ul>	<p>C7 includes a number of visually prominent and timbered ridgelines and crosses a section of the New England Highway to the south of Tenterfield.</p> <p>This component has been considered by TransGrid and deemed to be not feasible and is included for completeness only.</p>
<b>C8</b>	<ul style="list-style-type: none"> <li>• Portions of relatively level and low undulating land alongside and above Tenterfield Creek line.</li> <li>• Low spurs and gullies;</li> <li>• Gentle slope and drainage lines with distinct undulating landform pattern (west of landscape</li> </ul>	<ul style="list-style-type: none"> <li>• Cultivated agricultural land;</li> <li>• Open and scattered tree cover; and</li> <li>• Livestock pasture.</li> </ul>		<ul style="list-style-type: none"> <li>• Rural Residential;</li> <li>• Motorist on local road and access tracks, including sections of New England and Bruxner Highway; and</li> <li>• Rural employment and farming.</li> </ul>	<p>There is likely to be some degree of visibility toward the proposed transmission line from a small number of rural residential dwellings as well as sections of the Bruxner Highway.</p> <p>The degree of visibility will be largely dependent on the selection of a final alignment and the extent or screening potential of surrounding topography and vegetation.</p> <p>The degree of visibility and a determination of potential visual impact</p>

Study Area Component	Physical Characteristics			Receptor Categories	Constraints
	Landform	Landcover	Settlement		
	component).				will be assessed in the Landscape and Visual Impact Assessment.
<b>C9</b>	<ul style="list-style-type: none"> <li>Flat and generally open agricultural land in riverine environment;</li> <li>Gently undulating landform;</li> <li>Ridgeline spurs falling to river corridor and creek lines; and</li> <li>Steep sided slopes rising to hilltop and ridgeline areas.</li> </ul>	<ul style="list-style-type: none"> <li>Cultivated agricultural land;</li> <li>Scattered tree cover;</li> <li>Livestock pasture; and</li> <li>Timbered areas (including State Forest).</li> </ul>	<ul style="list-style-type: none"> <li>The study area passes to the south of Casino before connecting to the TransGrid substation south of Lismore.</li> <li>There are a small number of rural villages located alongside or within the proximity of the Bruxner Highway.</li> <li>Grouped and individual residential dwellings occur alongside an extent of the total study area.</li> </ul>	<ul style="list-style-type: none"> <li>Rural Residential;</li> <li>Motorist on local road and access tracks, including sections of Bruxner Highway; and</li> <li>Rural employment and farming.</li> </ul>	<p>C9 currently accommodates an existing 132kV transmission line between the Lismore and Tenterfield substations. As the proposed 330kV transmission line would replace and follow the alignment of the existing transmission line, there are unlikely to be any significant constraints; however, it is acknowledged that the design and scale of structures associated with the 330kV transmission line may result in greater visibility of the transmission line.</p> <p>The level of visibility and degree of visual impact will be determined in the visual impact assessment.</p>

## 1.5 Constraints Analysis – Summary

Although a large extent of the alignment may be screened (principally sections between Lismore and Tenterfield), there is likely to be a range of visual receptor categories that may have views toward the proposed transmission line, including rural residential dwellings, motorists as well as people working the land.

The degree of visibility and resultant visual impact will vary between, and within, the receptor categories and be largely influenced by the key physical landscape elements described in this report, including landform, landcover and the distribution of settlements within the landscape.

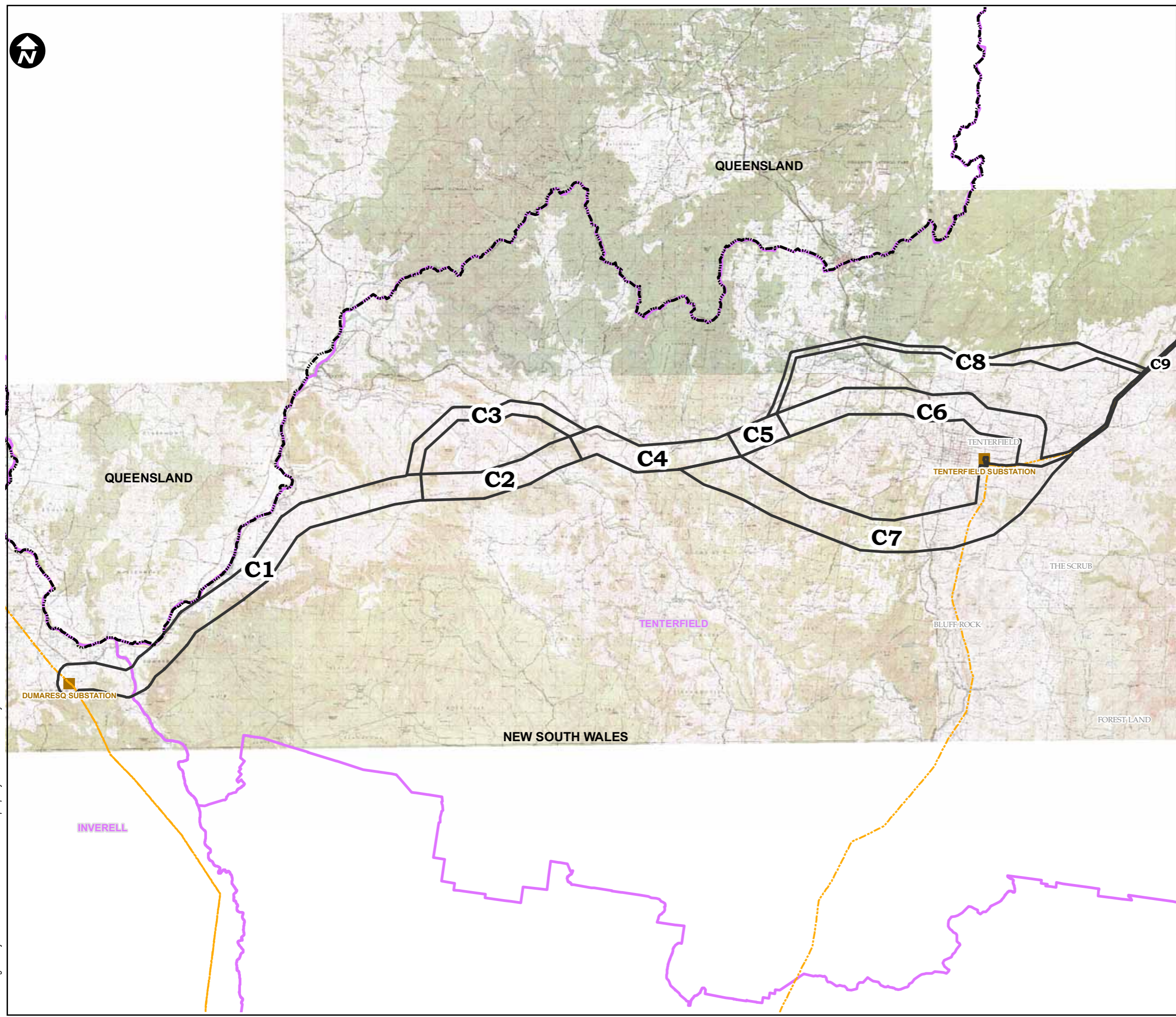
The identification of a preferred corridor, in which the alignment will be located, should, where practicable, consider the following issues as part of an overall strategy to mitigate and/or minimise potential visual impact associated with the construction of the 330kV transmission line.

*Skyline views* – where possible locate transmission line structures to minimise potential visibility against the sky, or above the skyline, from scenic vantage points, including road corridors or public lookouts. The avoidance of skyline views should also take into account the locations at which the corridor would need to cross ridgelines, and the orientation of the corridor in relation to surrounding receptor locations.

*Visual clutter* – where possible avoid views from receptor locations toward the proposed 330kV transmission line that also include views toward existing electrical infrastructure to reduce potential cumulative visual impact.

*Background* – where possible make use of landscape backgrounds (principally topographic features and vegetation) to visually accommodate elements of the transmission line. The identification of the corridor should also consider potential visual impacts associated with the removal of vegetation for the provision of easements and maintenance access tracks.

*Screening* – where necessary introduce appropriate planting strategies to mitigate the visual impact of the transmission line, either between a receptor location and the transmission line (to screen a view), or beyond the transmission line to provide a background against which elements of the transmission line may be accommodated or absorbed.



### Legend

- C9 Study Area Components
- - - Existing Transmission Lines
- Existing Substation
- Local Government Area



Source: TransGrid

Drawn: AJW	Approved: CB	Date: 8/09/2009
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Client	TransGrid
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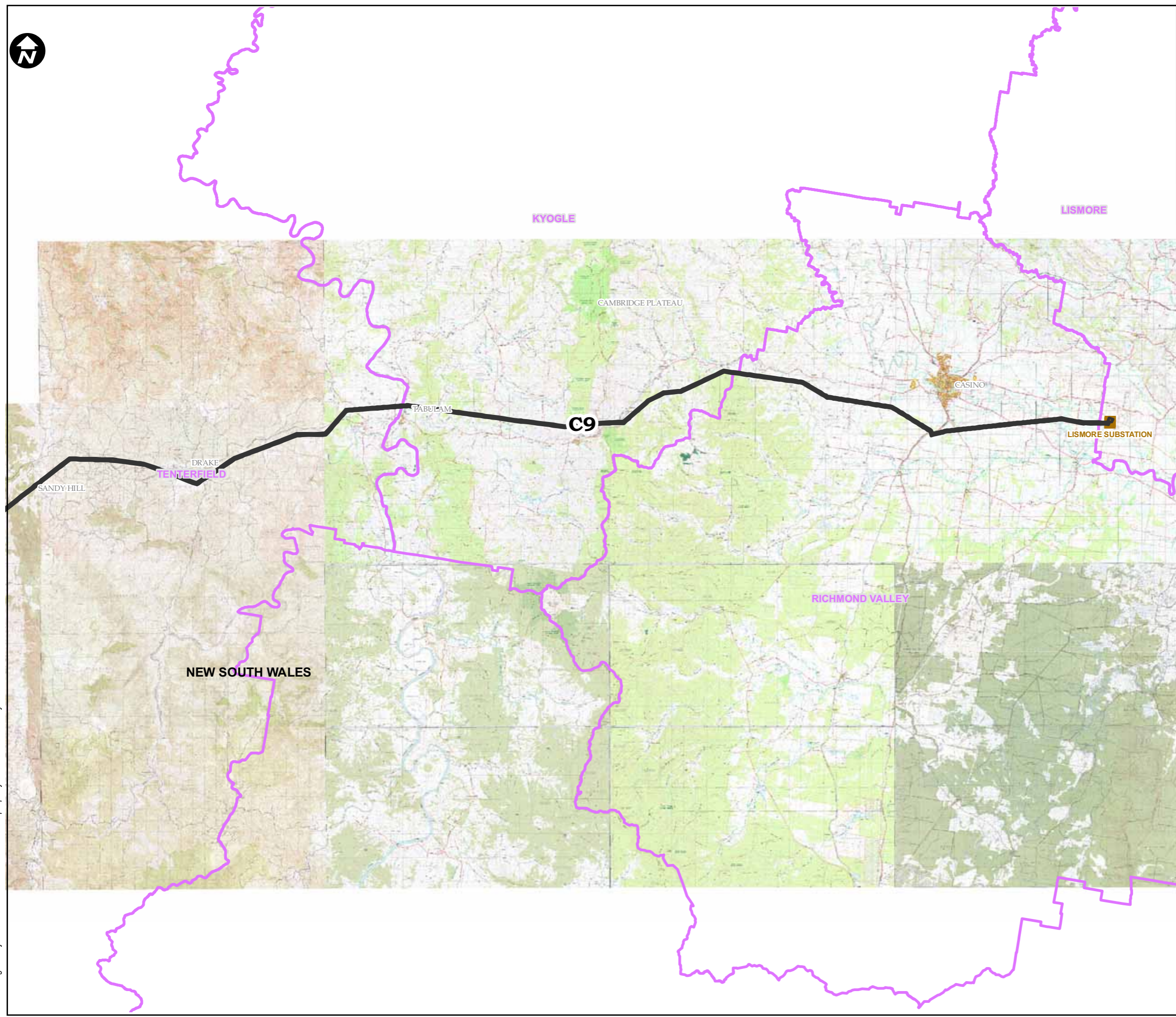
Project	DUMARESQ SUBSTATION TO LISMORE SUBSTATION 330 kV TRANSMISSION LINE
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Title	STUDY AREA COMPONENTS (WEST)
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Figure: 2-2



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### Legend

- C9 Study Area Components
- Existing Transmission Lines
- Existing Substation
- Local Government Area



Source: TransGrid

Drawn: AJW	Approved: CB	Date: 8/09/2009
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Job No.: 43177662	File No.: 43177662.046.mxd
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Client	TransGrid
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Project	DUMARESQ SUBSTATION TO LISMORE SUBSTATION 330 kV TRANSMISSION LINE
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Title	STUDY AREA COMPONENTS (EAST)
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Figure: 2-3



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