Australia Pacific LNG Project

Volume 5: Attachments

Attachment 11: Conics Good Quality Agricultural Land Discussion Paper – Gas Fields

Good Quality Agricultural Land

A Discussion

Site: Australia Pacific LNG Tenements

Prepared for: Origin Energy Pty Ltd

Date: January 2010

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QUALITY ASSURANCE STATEMENT				
Revision No.	**Author**	**Reviewer**	**Approved for Issue**	
			Signature	**Date**
0	D. Freebairn H. Rowan	D. Carberry		15/12/2009
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2	D. Freebairn H. Rowan	D. Carberry		15/01/2010

EXECUTIVE SUMMARY

A process is outlined to add value to existing Good Quality Agricultural Land (GQAL) maps. A technique to combine existing map layers, soil profile descriptions, topographic analysis (slope), current land use mapping and local expert opinion was employed. The resulting mapping is more reliable than the low resolution mapping typically available west of the Great Dividing Range. The value of such mapping will remain limited without a clear process to capture new data as it becomes available.

During preparation of GQAL maps, it was clear that detailed soil information is scarce within the study area. As part of many planning requirements, property owners and infrastructure providers collect soil information. Currently this information does not find its way into public databases such as the Australian Soil Resource Information System. This represents a lost opportunity for the community and a waste of resources. Adding to existing data is the main pathway to improving the utility of spatial data as it is unlikely that governments will continue systematic land resource and soil surveys. Soil and landscape data can be valuable in producing better quality soil mapping and benchmark information. It is suggested that large landholders and infrastructure providers could join forces with agricultural industries to encourage government to capture and make this information publically available. Web based technology makes collation of such “community based information” feasible, although the process will need to be initiated by a sponsor, most likely outside of traditional roles. An opportunity exists to create a “Google Earth” style link on a corporate website to demonstrate public goodwill and open information sharing.

Improved natural asset descriptions (soil, water, fauna and flora and indigenous heritage), risk assessment and evaluation protocols can support negotiation with a wide range of “clients” with discussions based on best available information. In growing and large organisations, information needs to actively managed. An integrated Natural Resource Asset Registry (NRAR) is proposed to support identification of relevant natural assets and management issues associated with a particular land area. A database of spatial and point data that can be interrogated for a range of end users would become a corporate information asset. GQAL information would be just one function of such a system.

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1. Introduction

1.1 Background

Origin Energy Pty Ltd is seeking to improve on Good Quality Agricultural Land (GQAL) mapping within the tenement areas to be utilised for the Australia Pacific Liquefied Natural Gas (APLNG) project. Improved mapping will provide more reliable information to Origin's APLNG project to assist with the project's planning process. This discussion paper identifies current GQAL mapping for the region and value adds to the existing mapping through the incorporation of additional data sources. Suggestions are given on how to add value to existing data gathering activities and provide support to operational issues such as environmental assessment.

1.2 Study Area

This discussion paper focuses on the tenements to be utilised within the APLNG project. These tenements occur throughout the south west of Queensland, and incorporate a total of 592,637 ha of land (**Figure 1**). The tenement areas have been divided into 3 distinct areas, identified as northern, central and southern regions for the purpose of this discussion paper.

Currently, existing land use within the northern region is predominantly grazing, however dense cropping occurs throughout the central portion (**Appendix A**). Similarly, grazing is the dominant land use within the central region, with large areas of cropping occurring along the Condamine River plains (**Appendix A**). The southern region is dominated by areas of forestry and grazing, with limited cropping occurring. (**Appendix A**).

While this review focuses on the above tenements, the principles discussed are generally applicable.

1.3 GQAL Legislative Framework

The *Queensland State Planning Policy 1/92 – Development and the Conservation of Agricultural Land* (SPP1/92) outlines the policy principles relating to GQAL. In relation to land conservation and development, the SPP 1/92 outlines the following principles:

- The survival of rural communities depends on a healthy rural economy;
- Development without regard to the need for land conservation and the continuing importance of agriculture would be unacceptable;
- GQAL has a special importance and should not be built on unless there is an overriding need for the development in terms of public benefit and no other site is suitable for the particular purpose; and
- GQAL is a valuable resource that should, in general, be protected from irreversible development.

In conjunction with SPP1/92, the *Planning Guidelines of the Identification of Good Quality Agricultural Land* (Department of Primary Industries & Department of Housing, Local Government and Planning, 1993) defines GQAL as 'land which is capable of sustainable use for agriculture, with a reasonable level of inputs, and without causing degradation of land or other natural resources'. The *Planning*

Guidelines define four classes of GQAL, as outlined in **Table 1.1** and examples of land classes from the study area are shown in **Plates 1 to 4**. It should be noted that the Sustainable Planning Act 2009 outlines the need to re-write State Planning Policies every ten years.

Table 1.1 Description of Good Quality Agricultural Land Classes and photographs from the study area to demonstrate these categories.

Class	Description
A	Crop Land – Land that is suitable for current and potential crops with limitations to production which range from none to moderate levels (**Plate 1**)
B	Limited crop land – Land that is marginal for current and potential crops due to severe limitations; and suitable for pastures. Engineering and/or agronomic improvements may be required before the land is considered suitable for cropping (**Plate 2)**.
C	Pasture land – Land that is suitable only for improved or native pastures due to limitations which preclude continuous cultivation for crop production; but some areas may tolerate a short period of ground disturbance for pasture establishment (**Plate 3)**.
D	Non-agricultural land – Land not suitable for agricultural uses due to extreme limitations. This may be undisturbed land with significant habitat, conservation and/or catchment values or land that may be unsuitable because of very steep slopes, shallow soils, rock outcrop or poor drainage (**Plate 4)**.

Plate 1 Class A GQAL

- Flat topography - low erosion risk;
- Alluvial soils with relatively good nutrient levels and water holding capacity; and
- Good dryland production potential.

Plate 2 Class B GQAL

Poorer class of land for cropping compared to Class A (**Plate 1**). Limitations include:

- Moderate soil nutrient levels;
- Shallower soils;
- Higher erosion potential; and
- Moderate dryland production potential.

Plate 3 Class C GQAL

Land not suitable for cropping, but suitable for grazing. Limitations include:

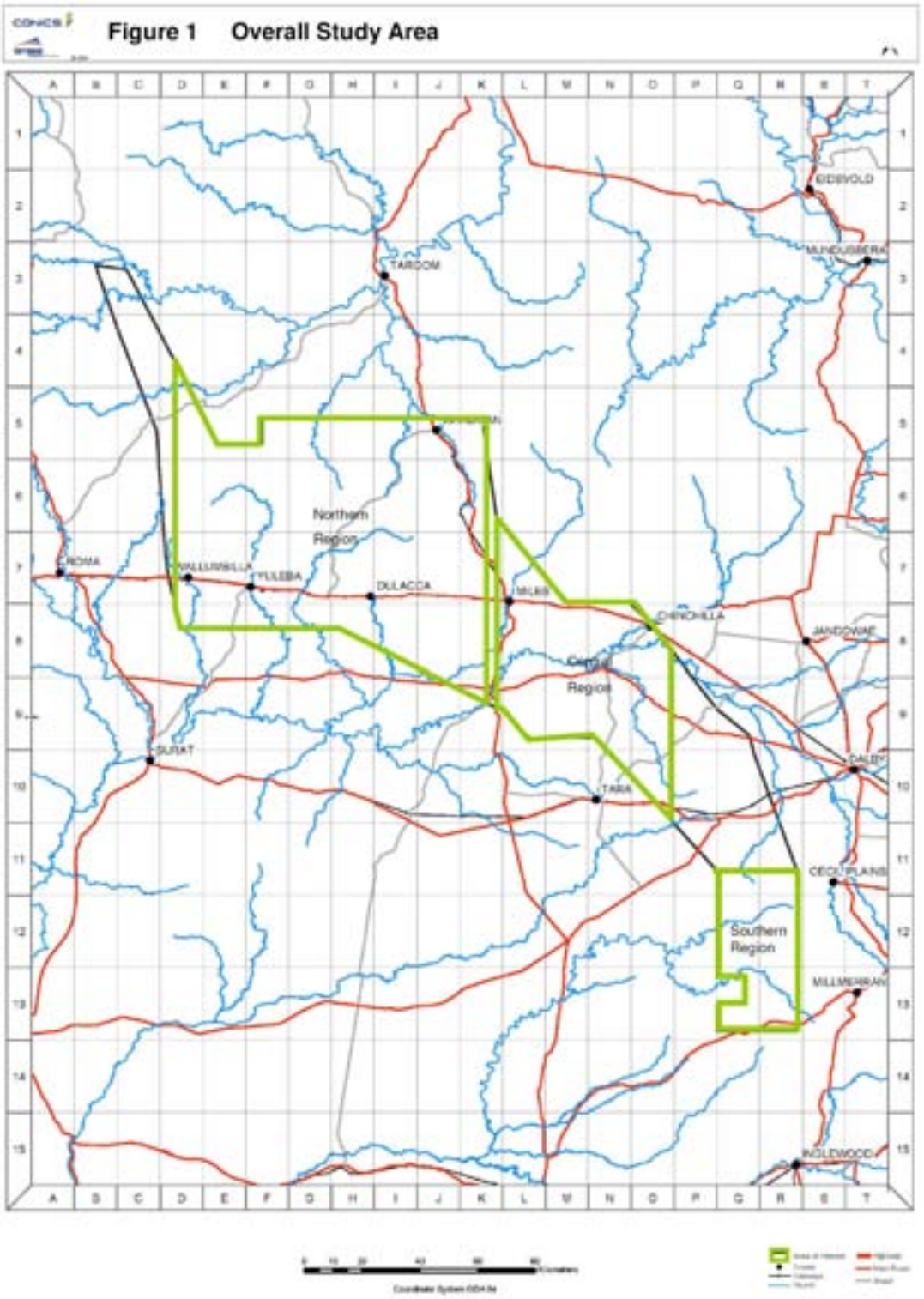
- Evidence of salinity;

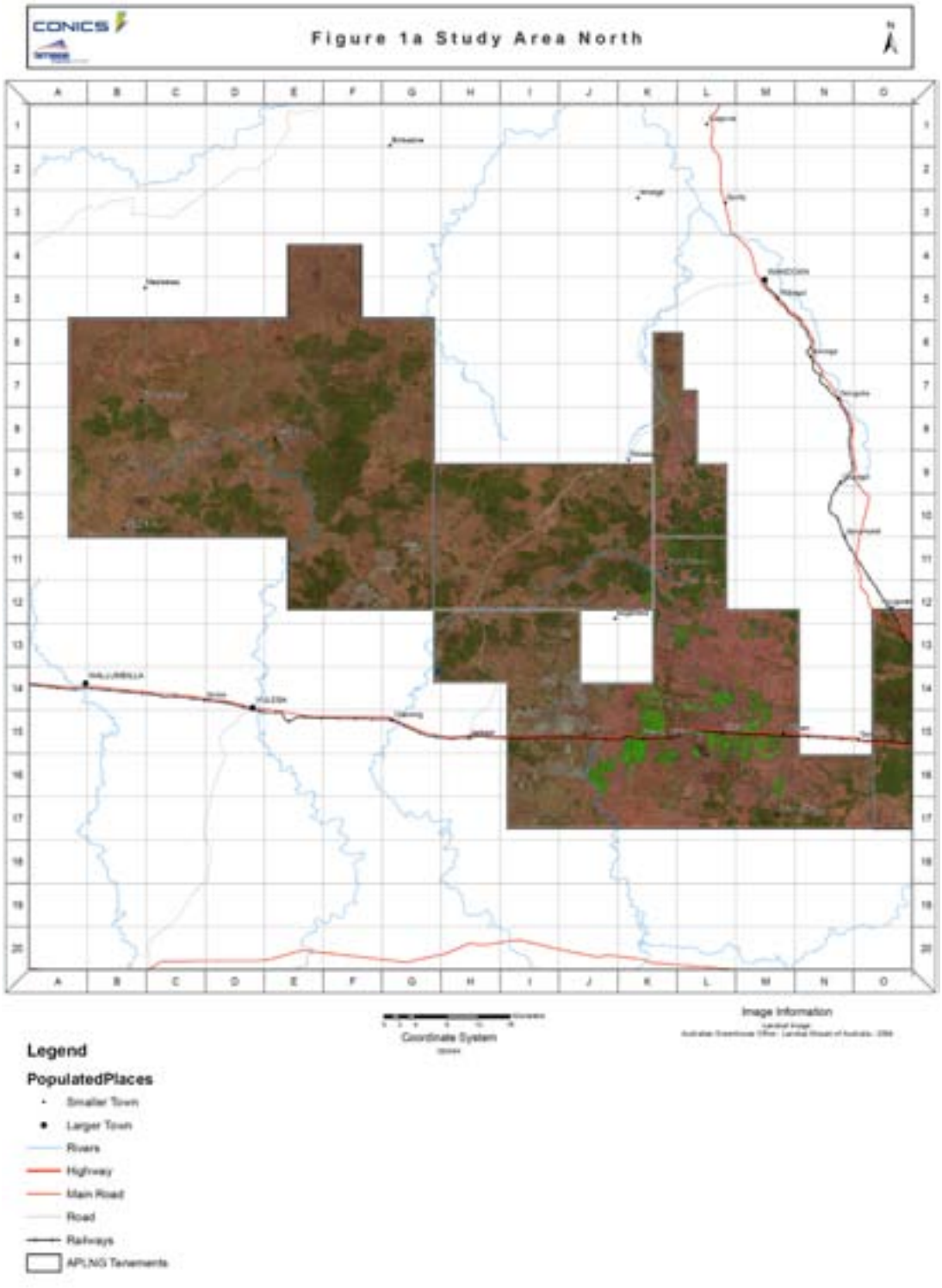
- Poor soil nutrient status;
- Dispersive B horizon soils; and
- Surrounding land not cropped.

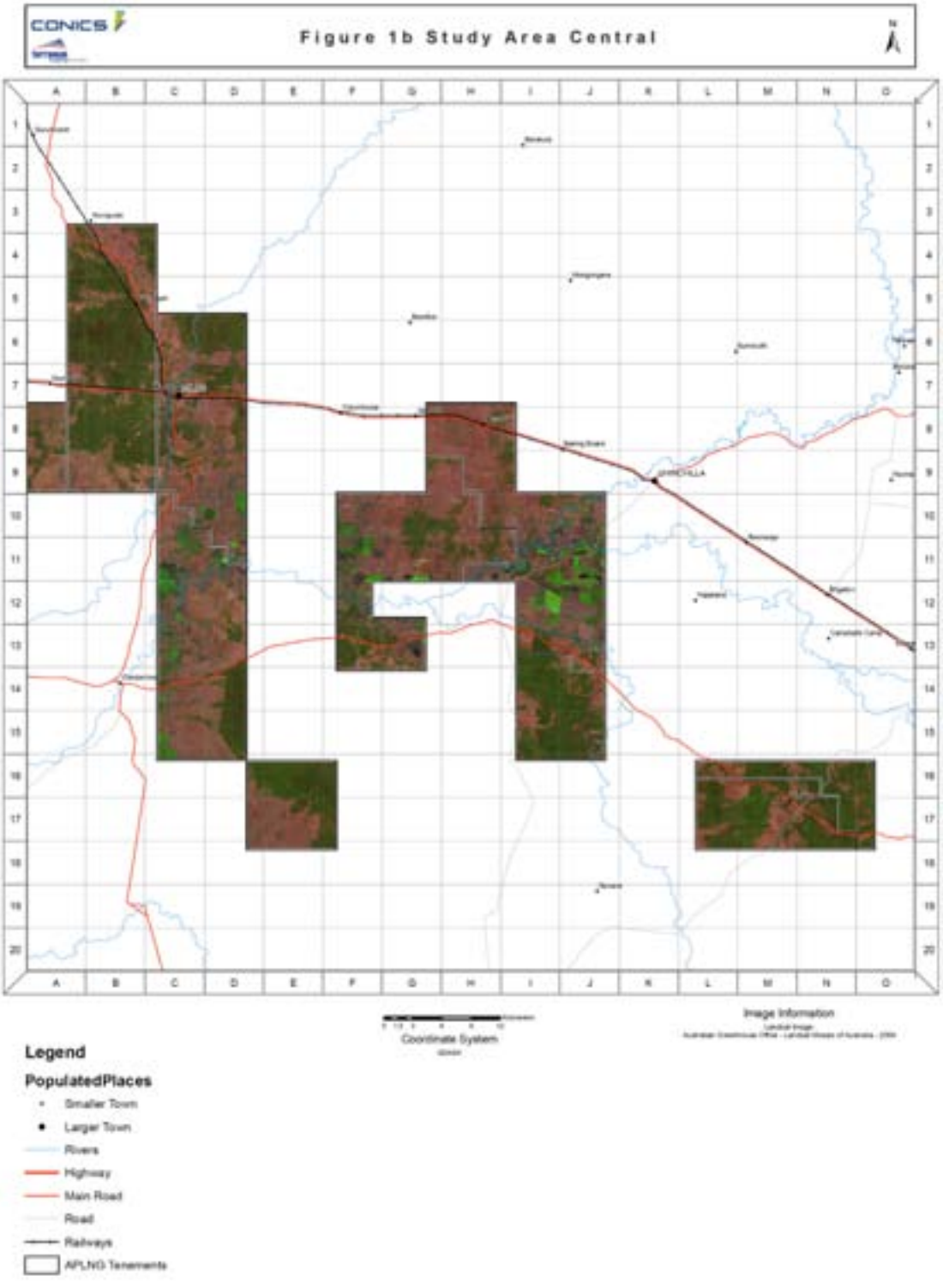
Plate 4 Class D GQAL

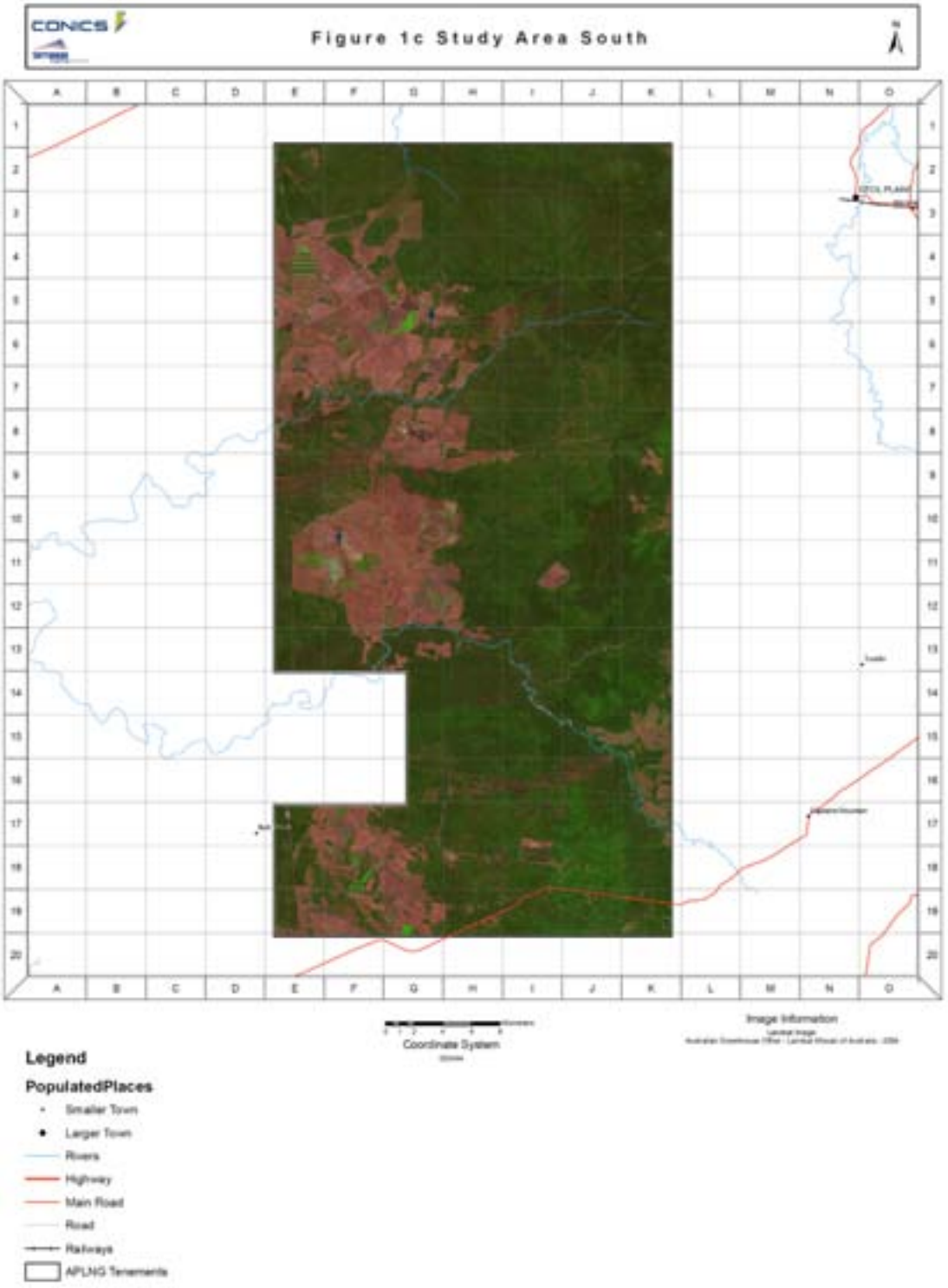
- Non-agricultural land as a result of steep slopes, heavy vegetation cover, and shallow, nutrient deficient soils.

Figure 1 Satellite Imagery of the Study Areas




CONICS
Figure 1a Study Area North
N
A B C D E F G H I J K L M N O
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Coordinate System
Image Information
Legend
PopulatedPlaces
Smaller Town
Larger Town
Rivers
Highway
Main Road
Road
Railways
APLNG Tenements


CONICS
Figure 1b Study Area Central
N
Coordinate System
Image Information
Legend
PopulatedPlaces
Smaller Town
Larger Town
Rivers
Highway
Main Road
Road
Railways
APLNG Tenements


CONICS
Figure 1c Study Area South
Coordinate System
Image Information
Legend
PopulatedPlaces
Smaller Town
Larger Town
Rivers
Highway
Main Road
Road
Railways
APLNG Tenements

2. Current GQAL Mapping

2.1 Current Mapping

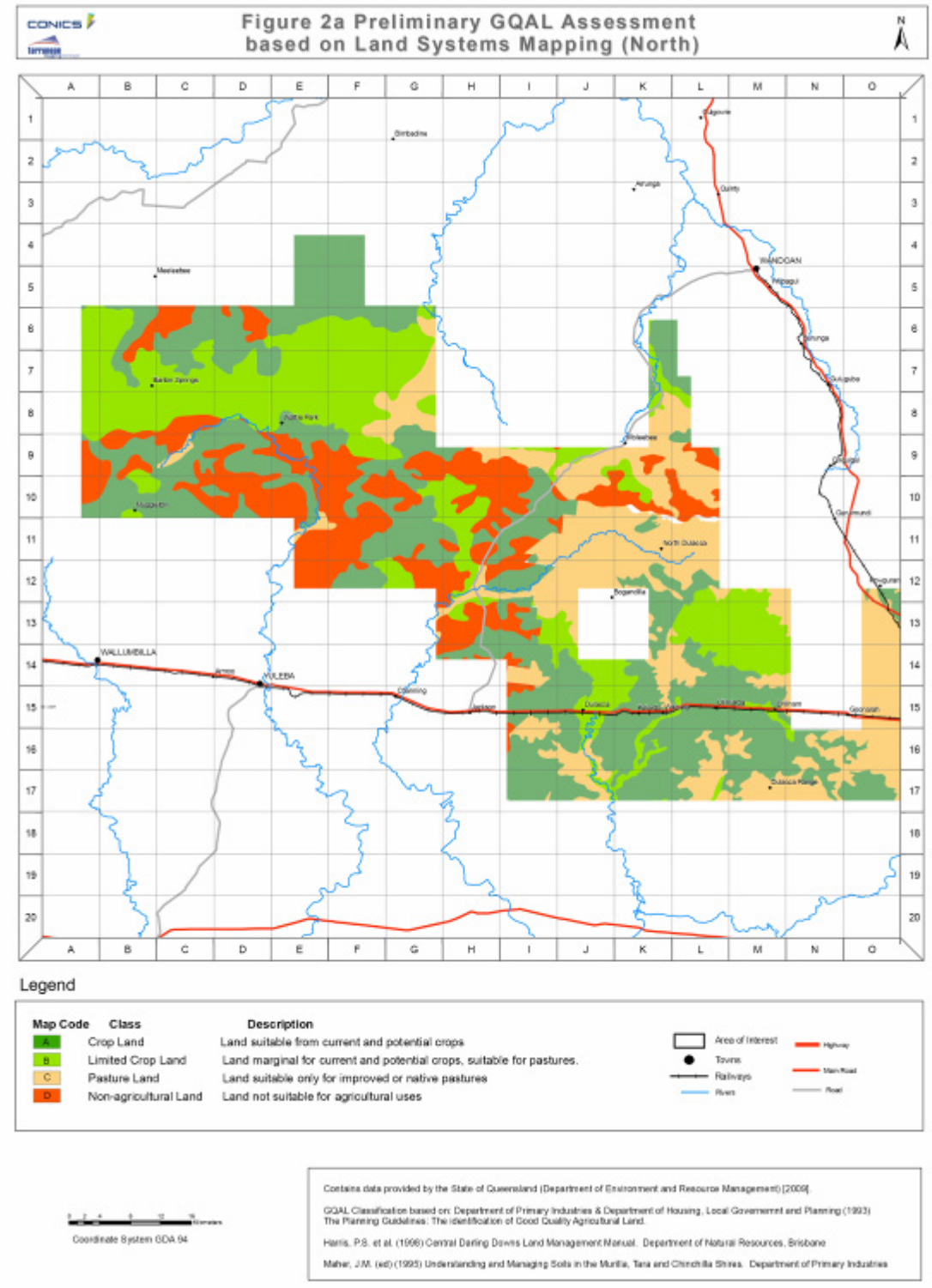
Within the region, a variety of soils and land resources reports and mapping are available via the Queensland Digital Exploration Reports Systems (QDEX). The Planning Guidelines provides a list of the best available land resource information for each local authority and outlines the mapping units considered to be GQAL by the Department of Primary Industries (DPI). While all mapping is available through QDEX, only a limited number of these datasets are available digitally, thus reducing the capacity to manipulate and combine with other data series.

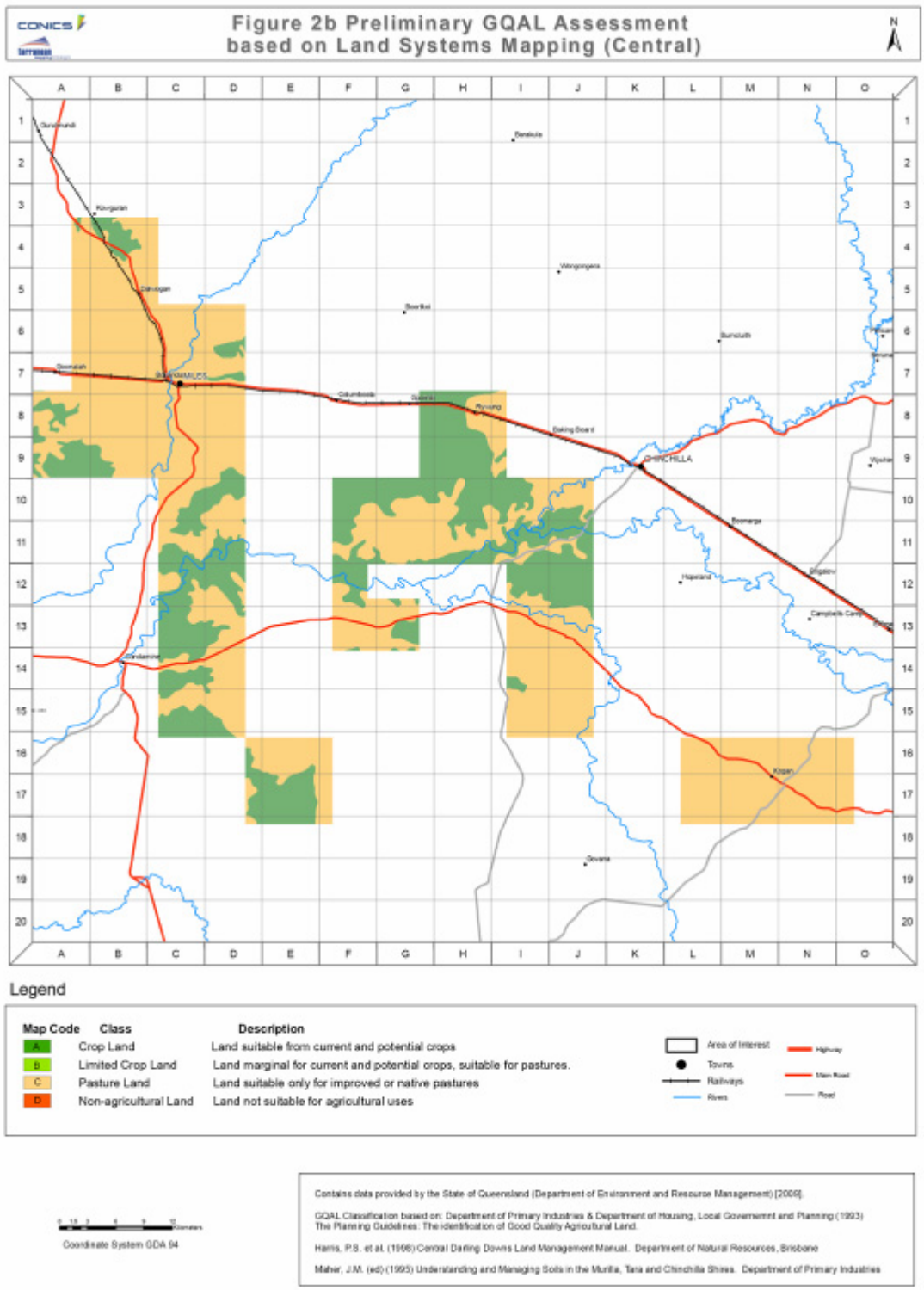
To compile a preliminary GQAL map reflective of current mapping for the area, digital land systems mapping was utilised. In conjunction with their accompanying reports, the digital datasets provide extensive information on the soils, geology, landform and potential land use of each land system within the areas. The digital land systems mapping that covers the study areas are:

- The Dawson – Fitzroy Land Systems Areas (Speck et al., 1968) (**Appendix D**);
- The Murilla, Tara and Chinchilla Land Resource Areas (Maher, 1995) (**Appendix E**);
- The Roma Land Resource Areas (Macnish, 1987) (**Appendix F**); and
- The Central Darling Downs Land Resource Areas (Harris et al., 1998) (**Appendix G**).

The Planning Guidelines provide GQAL classifications for the Roma and Dawson-Fitzroy Land Systems. Using information available within the Murilla, Tara and Chinchilla and Central Darling Downs mapping and reports, combined with local knowledge, each land system within these areas was assigned a GQAL classification in line with the Planning Guidelines classes. Based on this information, a preliminary GQAL map was created for the study areas (**Figure 2**).

Figure 2 Preliminary GQAL Mapping




CONICS
Figure 2b Preliminary GQAL Assessment
based on Land Systems Mapping (Central)
N
CHINCHILLA
Legend
Map Code
Class
Description
A
Crop Land
Land suitable from current and potential crops
B
Limited Crop Land
Land marginal for current and potential crops, suitable for pastures.
C
Pasture Land
Land suitable only for improved or native pastures
D
Non-agricultural Land
Land not suitable for agricultural uses
Area of Interest
Towns
Railways
Rivers
Highway
Main Road
Road
Coordinate System GDA 94
Contains data provided by the State of Queensland (Department of Environment and Resource Management) [2009].
GQAL Classification based on: Department of Primary Industries & Department of Housing, Local Government and Planning (1993) The Planning Guidelines: The identification of Good Quality Agricultural Land.
Harris, P.S. et al. (1996) Central Darling Downs Land Management Manual. Department of Natural Resources, Brisbane
Maher, J.M. (ed) (1995) Understanding and Managing Soils in the Murilla, Tara and Chinchilla Shires. Department of Primary Industries

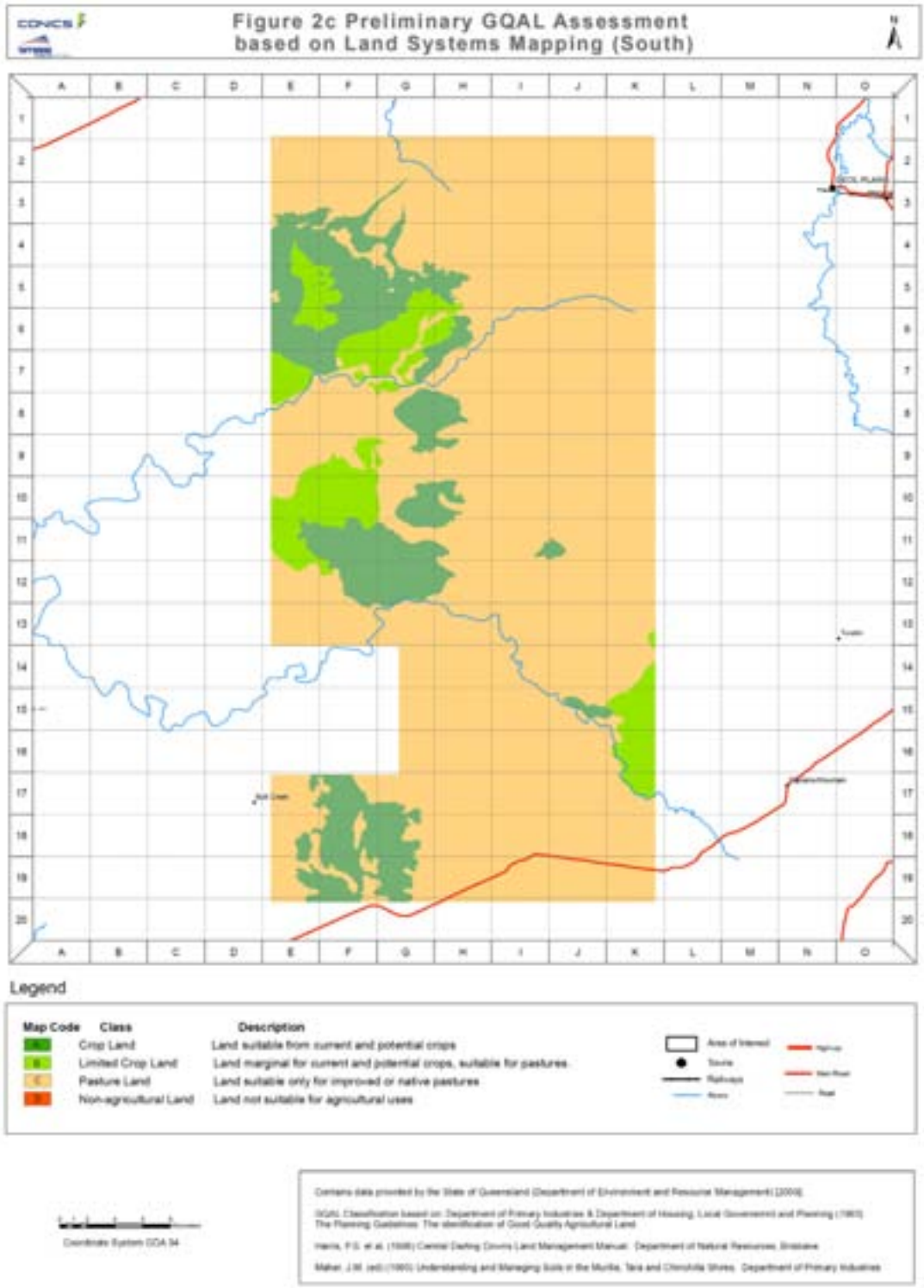


Figure 2c Preliminary GQAL Assessment
based on Land Systems Mapping (South)
Legend
Map Code
Class
Description
Crop Land
Land suitable from current and potential crops
Limited Crop Land
Land marginal for current and potential crops, suitable for pastures
Pasture Land
Land suitable only for improved or native pastures
Non-agricultural Land
Land not suitable for agricultural uses

3. Enhanced Mapping of GQAL

To improve upon current mapping, it was recognised that further information is required. According to the Planning Guidelines, GQAL assessments are based on the limitations imposed by soil, topography and climate.

To improve upon the initial GQAL map, a GIS analysis was undertaken that included the examination of several information sources to identify areas limited by these factors. Information sources that were considered included:

- Satellite imagery (Geoscience Australia, 2004) (**Figure 1**) as a visual check of land use patterns;
- Statewide Landcover And Trees Survey (SLATS) data (Environmental Protection Agency, 2003);
- Queensland Land Use and Mapping Program (QLUMP) data (DNRW 1999) (**Appendix A**);
- Digital Atlas of Australian Soils – Soil Landscapes (Bureau of Rural Science, 1991) (**Appendix B**) ;
- Digital Elevation Models (DEM) and slope (DERM, 2009) (**Appendix C**) as an indicator of erosion potential;
- Regional ecosystems (EPA, 2003);
- Rainfall isohyets (DERM 2009) to guide land valuing ;
- Rainfall and evaporation rates (McClymont, 2008); and
- Shire wheat production yields (DPI, 1995) as a measure of relative productivity.

A combined GQAL classification was derived from the land systems / land resource areas mapping and the above information. Following preliminary mapping of the above factors, a panel of experts helped refine a draft GQAL map. Workshop participants comprised of local experts in the fields of soils, land management and agronomy, all with > 20 years of experience within the study area. These experts were:

- Bill Bryant – ex Natural Resources Management/Soil Conservation Officer with the Department of Natural Resources (DNR), previously located in Chinchilla. Currently a grazier in the Roma area;
- Nev Booth – Vegetation Management Officer and previously Natural Resources Management/Soil Conservation Officer with DERM located in Chinchilla;
- Scott Cawley – Agronomist located in Miles; and
- Lindsay Ward – Consulting Agronomist located in Roma.

The Expert Panel were sent draft maps prior to the workshop and were asked to contemplate and then discuss the following questions at the workshop:

- Where should polygons of GQAL classes on the map be changed;
- Is current landuse a good reflection of land capability;
- What are the main constraints (associated with GQAL) across the landscape and where are these located;
- What is your confidence level (i.e. High, Medium or Low) with the GQAL assessment across the various locations throughout the landscape (based on the information from which it was derived and the associated interpretation);
- If this mapping were to be more useful, what additional data would be required; and
- What are the likely impacts on GQAL (both positive and negative) of the proposed APLNG project?

A 3 day rapid reconnaissance assessment was carried out by David Carberry (Land Resource Scientist) and Scott Cawley (Agronomist) to verify the initial desktop assessment and draft mapping. The desktop assessment began at the northern reaches of the study area, continuing through the portions of the area that received a low confidence rating from the Expert Panel. The assessment continued from Wallumbilla across the study area to Miles and Chinchilla. Key areas inspected were those that received a low confidence rating, issues of importance, and locations with a paucity of data.

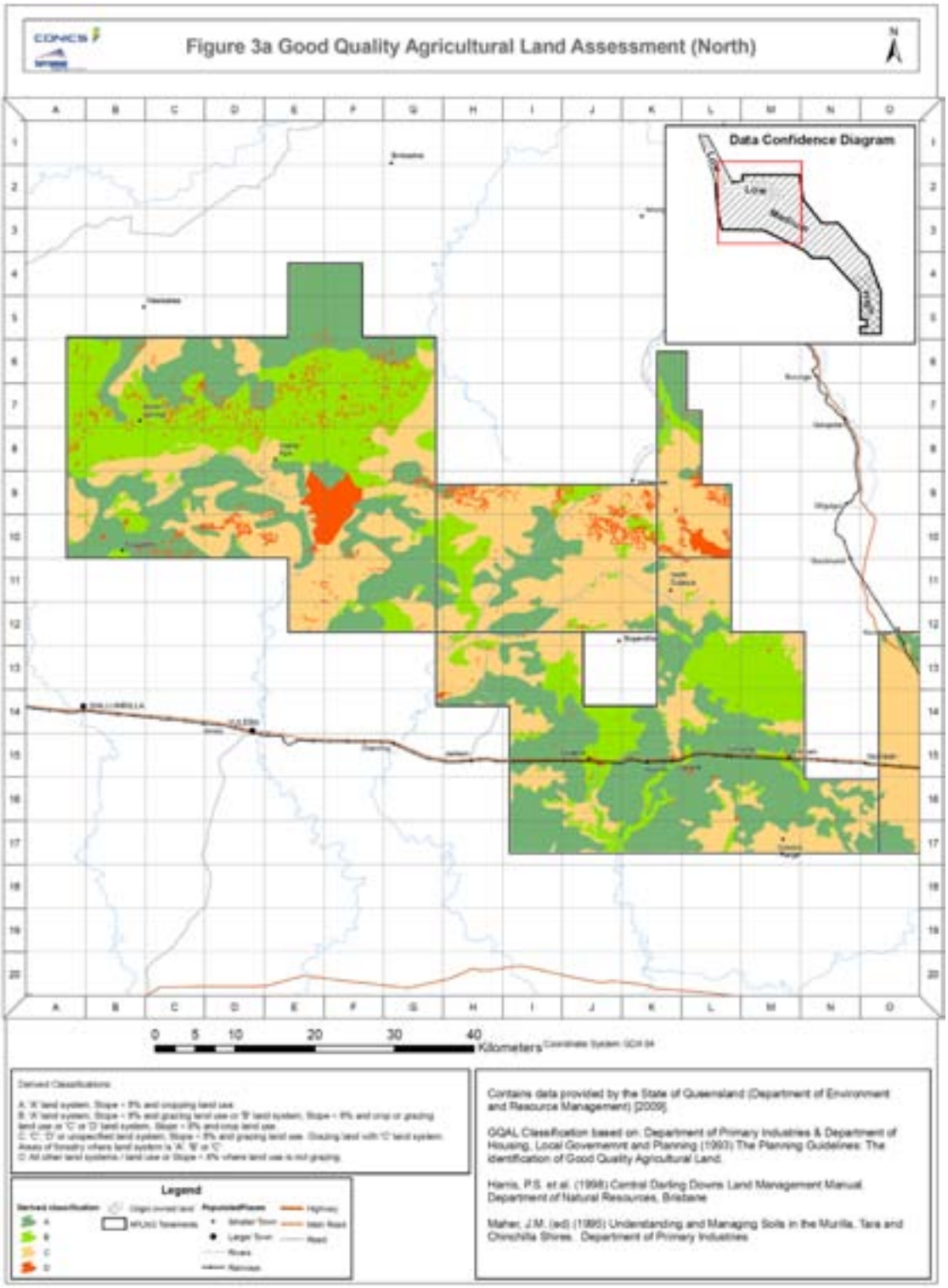
A combined GQAL classification was derived from the land systems / land resource areas mapping and the above information. **Table3.1** outlines the GIS rules used to create a revised GQAL map. The 8% slope trigger was suggested by DERM (A Biggs pers. comm. September 2009) and relates to erosion hazard. Data sources that did not impact on the final mapping were excluded, such as rainfall and shire production yields. The outcomes of the Expert Panel and field assessment were incorporated into the final GQAL mapping (**Figure 3**).

Table 3.1 Revised GQAL Classification Rules employed in the GIS analaysis

Revised GQAL Classification	Description
A – Crop Land	Current 'A' Land System AND Slope <8% AND current cropping / irrigation / grazing land use
B – Limited Crop Land	Current 'B' Land System AND Slope <8% AND Current Cropping / irrigation / grazing land use OR Current 'C' or 'D' Land System AND Slope <8% AND Current Cropping / irrigation land use
C – Grazing Land	Current 'C' or 'D' or 'unspecified' Land System AND Slope <8% AND current grazing land use OR Forestry land use where land system is 'A', 'B', or 'C'

D – Non-agricultural Land	All other Land Systems / Land Use or Slope >8% (where land use is not cropping, grazing or irrigation)

Figure 3 Revised GQAL Mapping



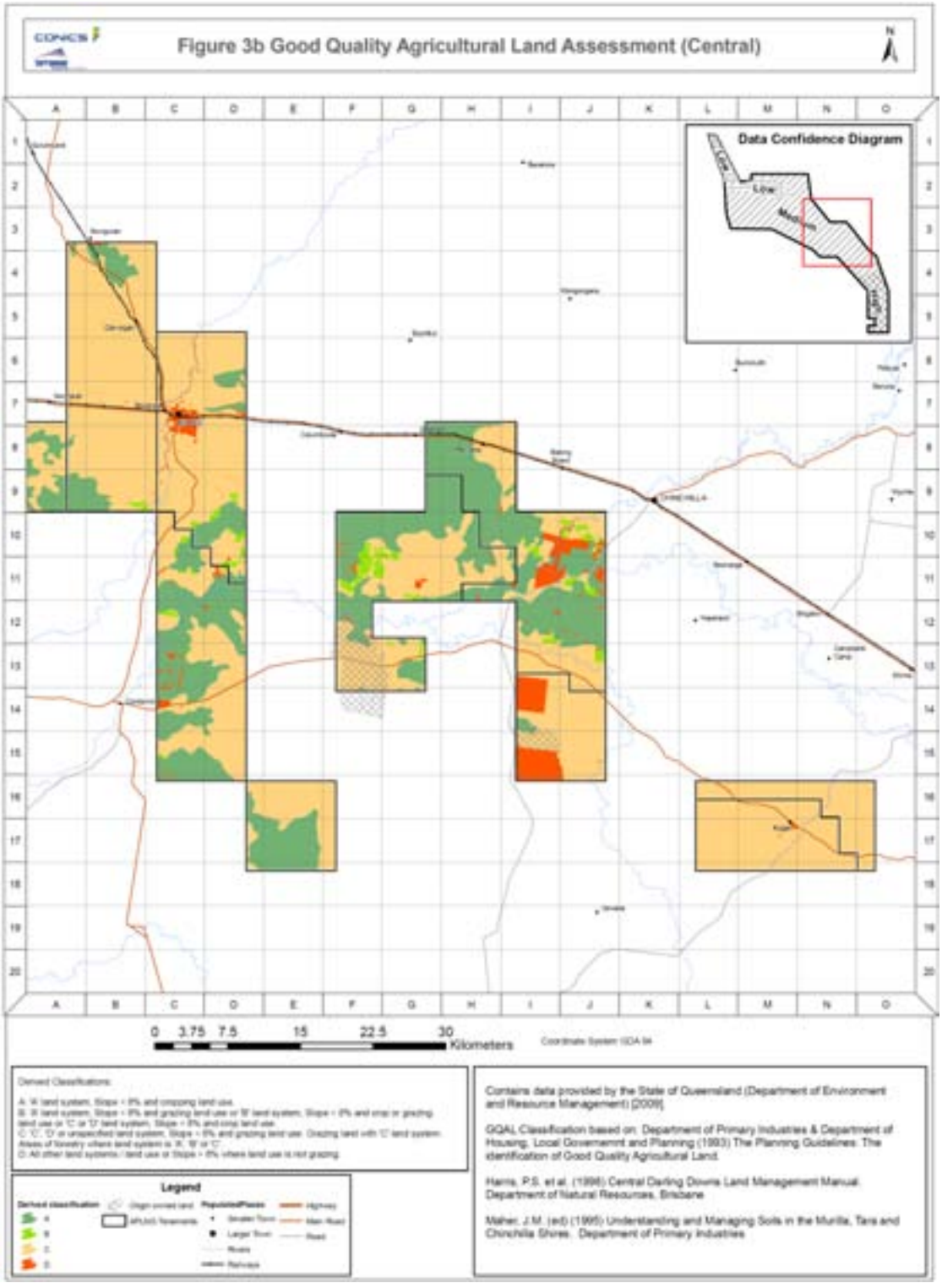


Figure 3b Good Quality Agricultural Land Assessment (Central)
N
Data Confidence Diagram
Low
Medium
High
0 3.75 7.5 15 22.5 30
Kilometers
Legend
Derived classification
Populated Place
Larger Town
Roads
Railways
Main Road
Contains data provided by the State of Queensland (Department of Environment and Resource Management) [2009].
GQAL Classification based on: Department of Primary Industries & Department of Housing, Local Government and Planning (1993) The Planning Guidelines: The identification of Good Quality Agricultural Land.
Harris, P.S. et al. (1998) Central Darling Downs Land Management Manual. Department of Natural Resources, Brisbane
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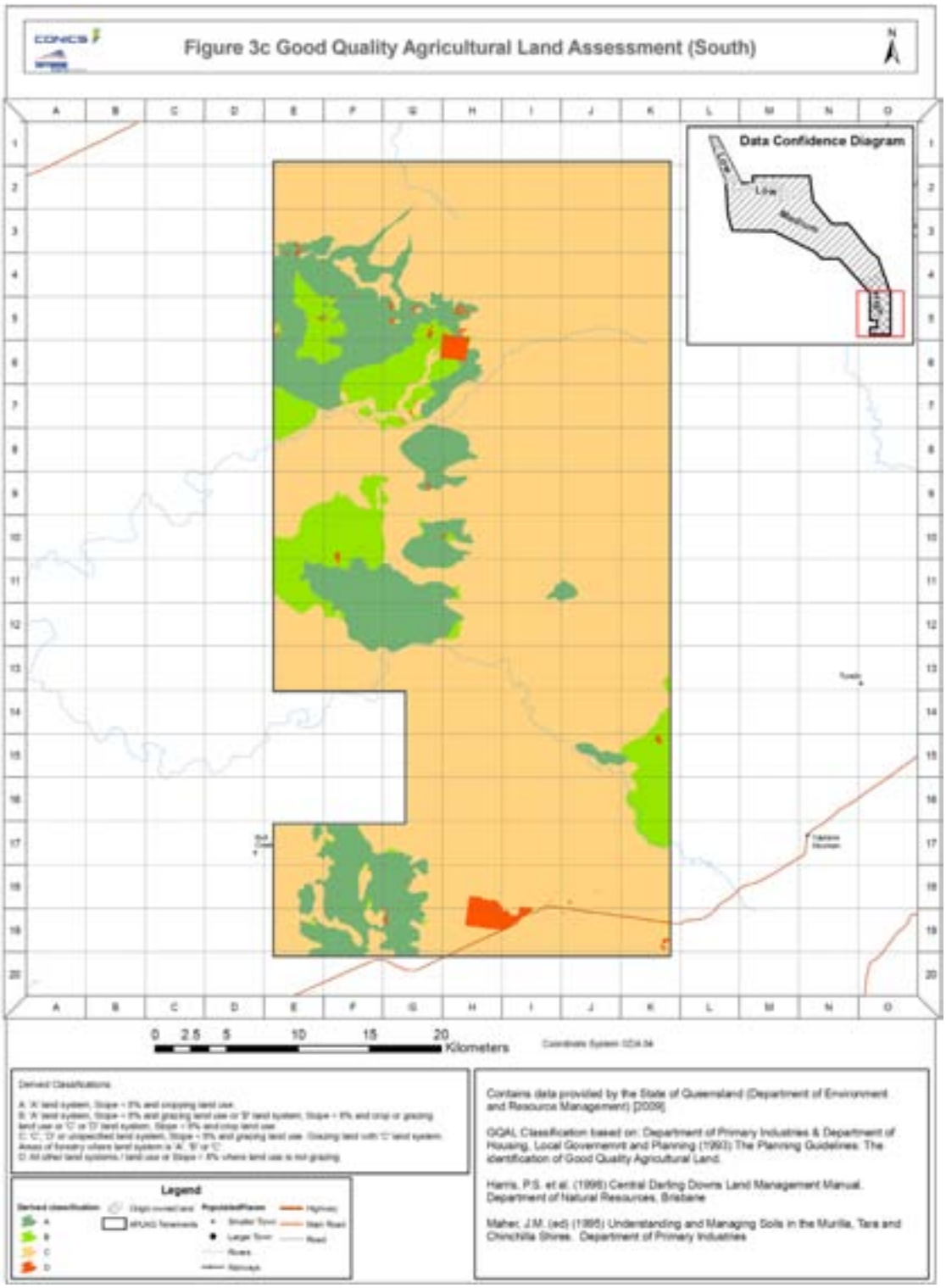


Figure 3c Good Quality Agricultural Land Assessment (South)
Data Confidence Diagram
0 2.5 5 10 15 20
Kilometers
Legend:
Contains data provided by the State of Queensland (Department of Environment and Resource Management) [2009].
GQAL Classification based on: Department of Primary Industries & Department of Housing, Local Government and Planning (1993) The Planning Guidelines: The identification of Good Quality Agricultural Land.
Harris, P.S. et al. (1996) Central Darling Downs Land Management Manual. Department of Natural Resources, Brisbane
Maher, J.M. (ed) (1995) Understanding and Managing Soils in the Murilla, Tara and Chinchilla Shires. Department of Primary Industries

4. Outcomes of mapping

4.1 Changes to GQAL Mapping

A comparison of the final GQAL mapping products and the original classifications based on Land Systems information and *Planning Guidelines* classifications alone indicated that several areas of the mapping have been refined. These amendments are due to the exclusion of areas of high slope and non-agricultural land uses to the mapping. There are no significant changes to the proportions of the study area comprised of Class A and B GQAL as large areas of land that are currently grazed have the potential to be cropped in the future (**Table 4.1**).

The final GQAL mapping product has significant changes to Class 'C' and 'D' GQAL compared to the original classifications based on Land Systems information and *Planning Guidelines* classifications alone. Within the northern region, key changes included reclassification of large areas of land from D class to C class due to the existing grazing land use of the area. Small areas of B and C class land have been reclassified as D class land due to the incorporation of slope. Similarly, the key changes within the central region are the reclassification of areas of D class land to C class due to incorporating current land use. Limited changes have been made to the southern region, however small areas have been reclassified from A and B class land to D class land due to the inclusion of slope and land use data. **Table 4.1** outlined the distribution of GQAL in the original and revised mapping.

Table 4.1 Changes to GQAL Class Distributions

GQAL CLASS	Original mapping	revised assessment
A	31%	30%
B	15%	16%
C	43%	50%
D	11%	4%

The revised mapping has resulted in a more refined mapping product. Value has been added to the mapping as additional data layers have been incorporated. While the revised mapping appears similar to the original mapping and the distribution of GQAL has not significantly changed, there is an increased confidence in the accuracy of the mapping.

Despite the higher level of confidence produced in the refined mapping product, the mapping is still limited by the availability of data. As the revised mapping is based on the original data, it is still a broad scale product that would benefit from the inclusion of additional data sources based on smaller scale studies.

The refined mapping was produced through a fast and efficient GIS process, which can be easily replicated, and adapted for smaller scale studies. The following sections outline the key issues identified within the existing mapping, and how to further improve the current GQAL mapping.

4.2 Key Issues Identified with the Existing Mapping

The following points were raised during preparation of GQAL maps and subsequent refinements with local experts:

- Generally, there is a paucity of data upon which to make assessments, resulting in extrapolation beyond reasonable limits. This results in low confidence;
- Broad scale mapping results in insufficient detail. Too much extrapolation is required to provide definitive advice;
- As there is limited digital data available, amalgamation with related data is difficult;
- Little field assessment occurs. Pockets of more detailed assessment and soil analysis within larger areas occur; and
- A weakness of the GQAL process is that no economic viability assessment occurs (for example Class I soil without reliable rainfall is not viable for cropping).

While the mapping has been refined through the inclusion of several additional data sources, further improvements can be made, such as:

- Include landholders knowledge through semi-structured interviews;
- Site sampling needs to occur, and results from APLNG sampling and other data sets should be incorporated;
- Data capture and management – since data is being collected as a requirement of a range of planning instruments (e.g. Land and Water management Plans, Development Applications) and currently not being captured by government or corporate systems (due to QA concerns and lack of resources to support data systems), the opportunity exists to encourage a range of data "owners" to contribute their data to a common public data pool. There is evidence that such data capture and reuse does not occur within existing corporate systems; and
- Data sharing – make data available and lobby government to include this data in their corporate data systems or develop a simple system and protocol for any party to add their spatial and point data to a distribution site.

5. A proposed system for Integrating natural resource information in operational management

An integrated Natural Resource Asset Registry (NRAR) should provide for the identification of all relevant natural assets and management issues associated with a particular land area. It would be a database of spatial and point data that can be interrogated for a range of end users and with time would become an information asset that a corporation and the community can benefit from. Systematic management of natural asset information is a basic requirement of any body managing land. A functional description of each land unit will support management actions and facilitate capture of information from a wide range of operatives (e.g. land holders, pegging parties, consultants, staff).

A NRAR should be usable for a variety of purposes including:

- Environmental inventory (soil, water, vegetation, fauna and flora, indigenous cultural heritage);
- Environmental risk assessment;
- Engineering requirements e.g. roadway construction, expansive soils;
- Site selection and site suitability analysis;
- Habitat protection;
- Rehabilitation requirements and progression;
- Licence modifications;
- Landscape and neighbourhood analysis e.g. LWMP support; and
- Repository for corporate knowledge of natural assets.

A base function of a NRAR is to capture, store and facilitate retrieval of spatial and point information about natural assets from a range of sources. The registry may store the information or have links to relevant information. In application, a search area would be selected with the choice of all attribute layers that may be relevant to a risk or management question being asked. A search of an area or point location (with buffer) would present attributes graphically. The information presented could include:

- Topography, cadastral information;
- Soil (profile descriptions, subsoil constraints, production capacity, GQAL classification, regolith and geology;
- Surface water and groundwater;
- Essential habitat, threatened fauna, locations and habitats (RE habitat equivalency);

- Vegetation, regional ecosystems, user defined polygons from vegetation surveys and identification of significant ecosystems and threatened plants;
- Referrable wetlands and waterway buffers;
- Cultural heritage sites;
- Built environment (including existing and proposed infrastructure);
- Land use;
- Emission points (dust, noise); and
- Sensitive receptors.

A typical report could provide a spatial representation of risk factors identified from a quick analysis. A report would delineate attribute details and any relevant links within the system or external website to provide the user with additional relevant information. This report will also contain hyperlinks to the relevant summaries of the code or Legislation and the risk assessment for the area defined. An example of the report derived from a GIS system is shown in **Appendix H.**

6. An application of a Natural Resource Asset Registry (NRAR) in land evaluation

In order to demonstrate how a NRAR might support a discussion with a landholder, a set of questions are posed with a brief description of where and how this information might be sought.

6.1 The Situation

A company wishes to negotiate a compensation package with a landholder for use of their land. This will involve alienation of a small parcel of land and some addition areas with small footprints for other infrastructure but basic access and use of land will be retained by the land owner.

What is a fair deal? Company aspiration is to provide a fair deal to all that secures goodwill and represents a defendable acknowledgement of advantages and disadvantages of a development (the basis for compensation).

6.2 Questions and Data Sources

To determine the areas directly and indirectly impacted, maps from a spatial information system that outlines basic infrastructure (e.g. roads, cadastre, water resources, soil types, GQAL designation) should be consulted. The following questions need to be asked:

- Is it GQAL (Class A, B or C);
- Is native vegetation present and is it protected;
- What is the distance to significant infrastructure (town, school, hospital, silos); and
- What is the road quality to nearest town?

Following determination of the above, the production capacity should be identified. In determining production capacity the following questions should be asked:

- What is the soil type? Are there soil constraints (e.g. rocks, acid sub soil, previous erosion);
- How long has the soil been cultivated? (sets soil carbon content);
- What was the original vegetation;
- What is the average crop yield;
- What is the stocking rate;
- What is the availability of watering points for stock; and
- What is the pasture type and time since renovation?

Based on above information the average production potential can be identified, and supported with climate analysis. This information can be combined with recent land sales in the area to calculate a fair compensation package.

The following outlines facilitation notes:

- Provide good quality copies of available information – open access is an essential component of credibility building;
- Customise information for the specific property (even a simple Google map and broad scale soils maps shows the company has good information systems;
- Outline the process clearly so that all relevant stakeholders know the process;
- Decide on what is a fair "windfall factor" for the land holder and stick to it;
- Remember that > 50% of profit from agriculture is made from capital gain and 50% from production, so may need to separate out the impact of development on both capital and production value.

7. Recommendations

The revised GQAL produced in this project has increased rigour in that it has:

a. Applied extra data layers in the assessment;

b. Used expert review and adjustment;

c. Used a rapid field validation; and

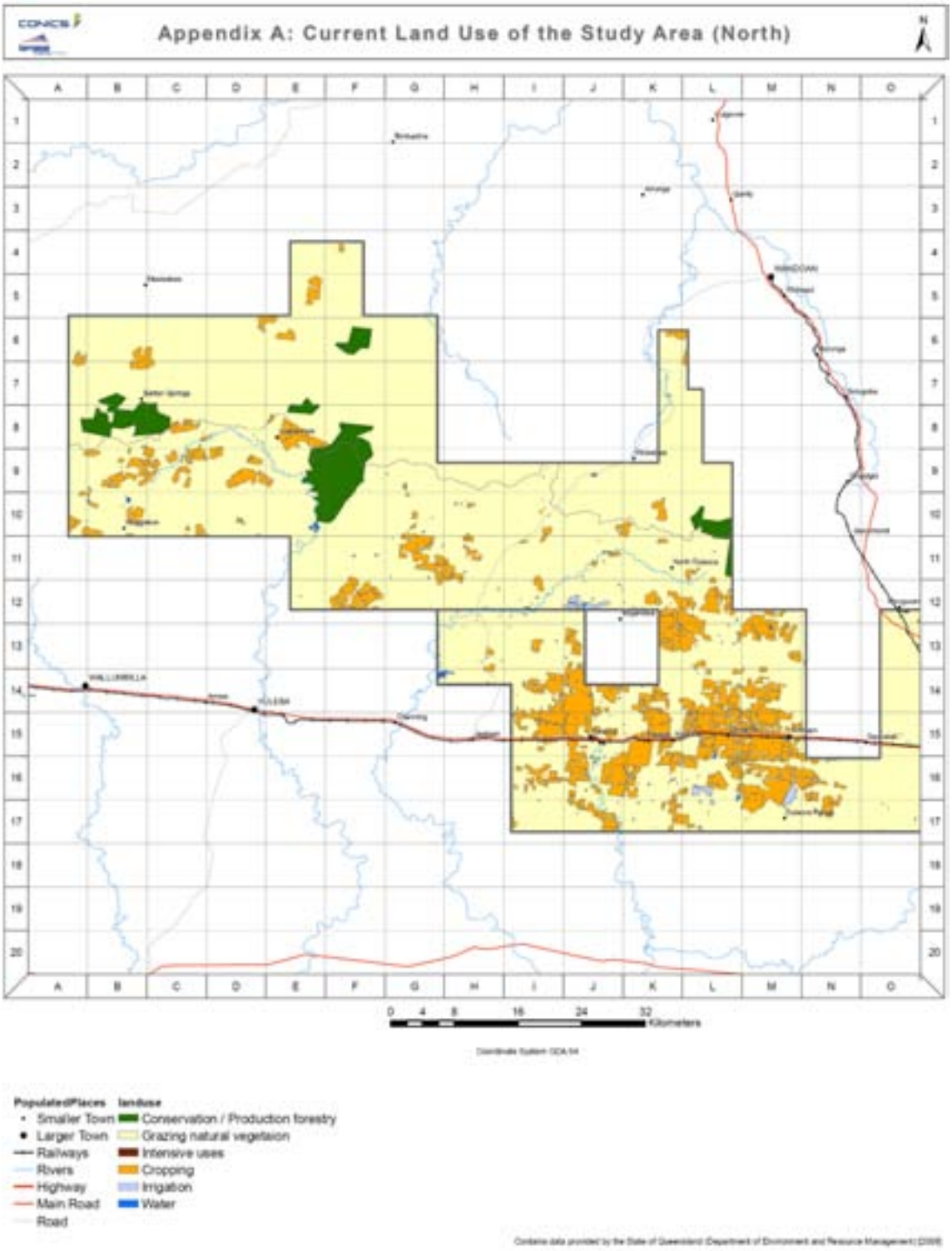
d. Used a process that allows for adding value as more spatial data becomes available.

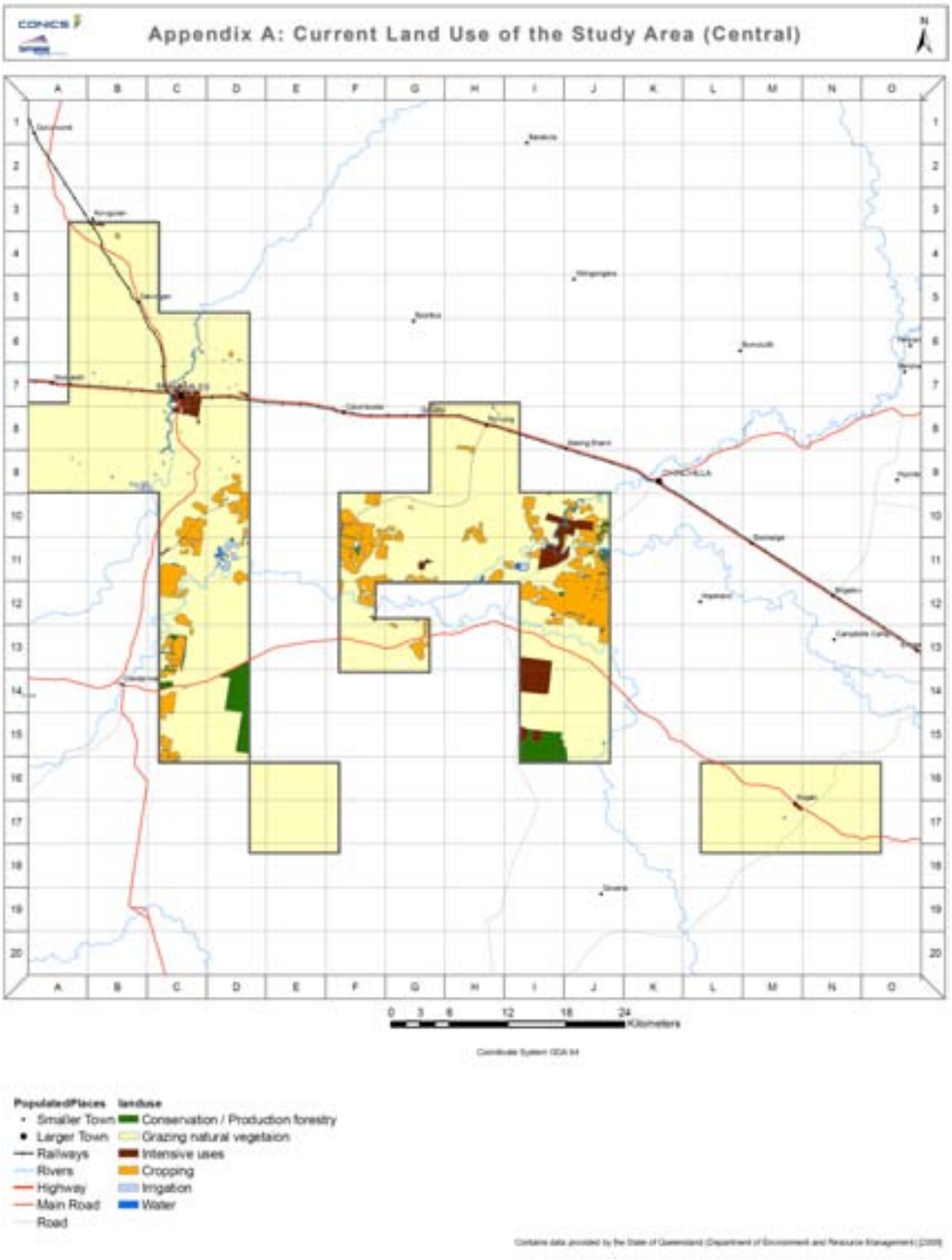
Nevertheless, since the current GQAL mapping is based on broad scale soil assessment, it is unlikely to have application beyond the limits of this base data.

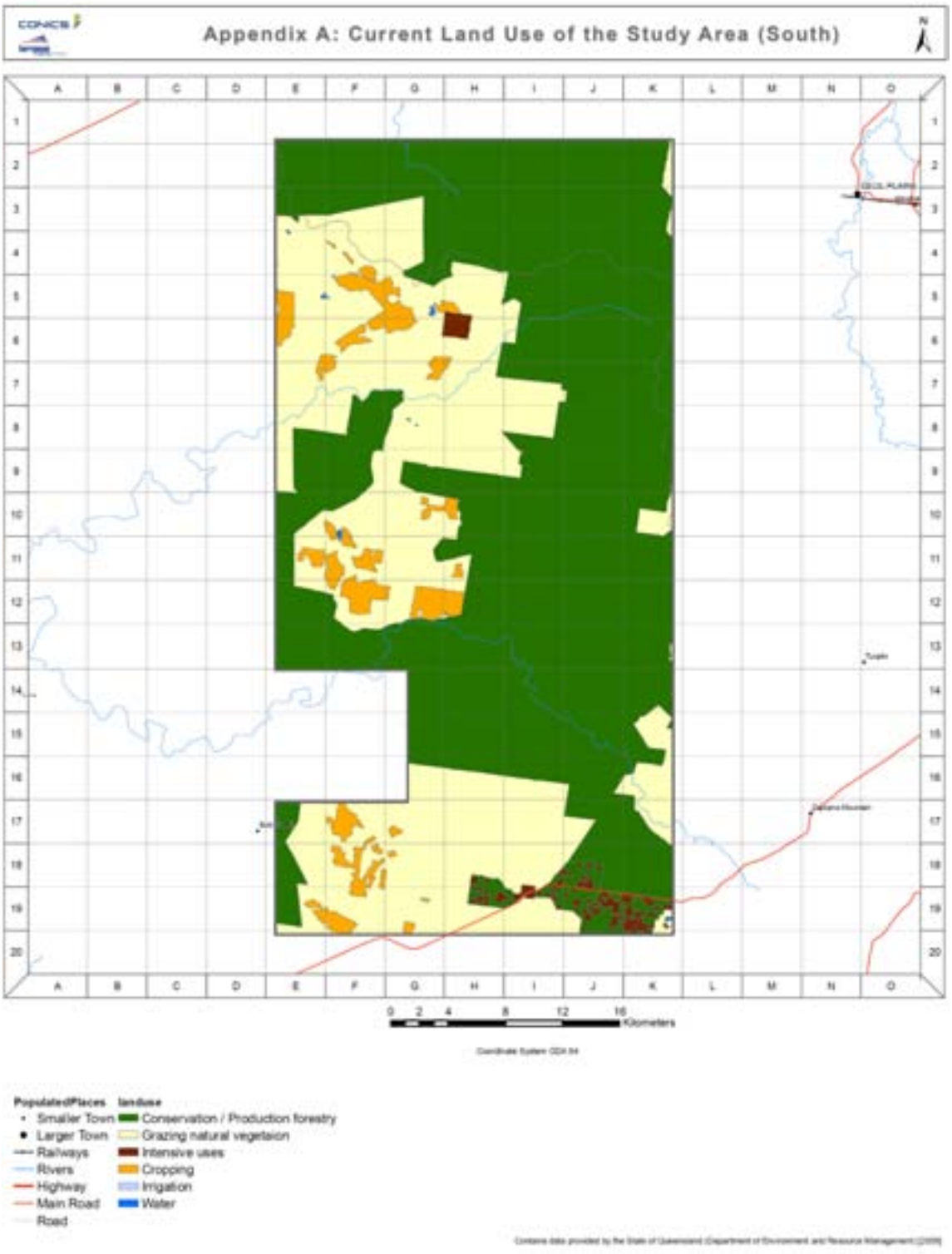
Significant new data are being collected by companies and individuals that are currently not building on existing databases, and as such represent a lost opportunity. It is proposed that a web based system be piloted that captures and "publishes" a subset of this new data. This might take the form of a simple Google Earth based system similar to the Australian Soil Resource Information System) (ASRIS) http://www.asris.csiro.au/index_ie.html

Origin Energy Pty Ltd would benefit from establishing a spatial data system that focuses on its natural assets (soil, water, fauna and flora and indigenous cultural heritage). An integrated Natural Resource Asset Registry (NRAR) is proposed that would become an important corporate asset supporting many operational planning and management activities.

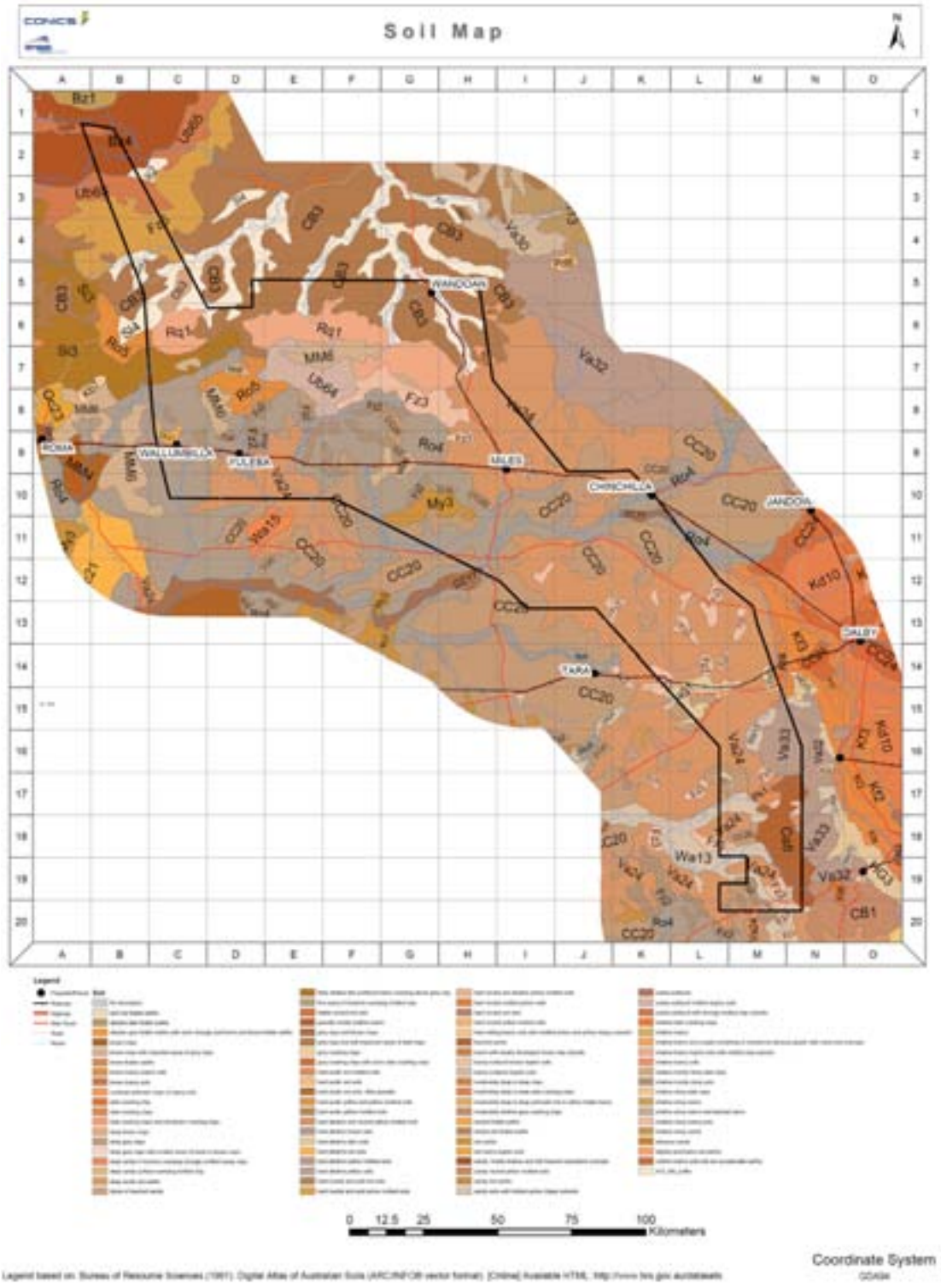
Appendix A Land Use Based on QLUMP Data



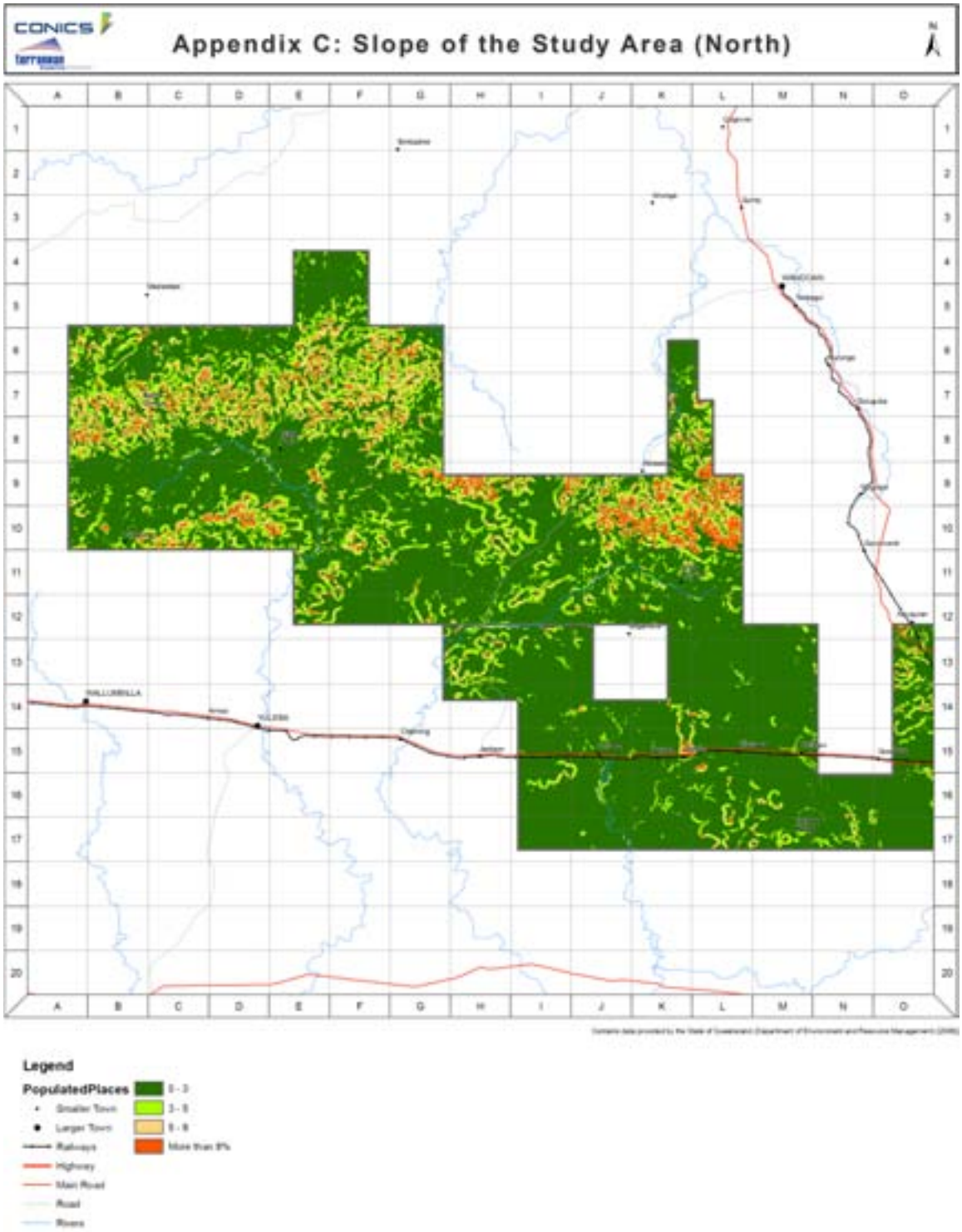

Appendix A: Current Land Use of the Study Area (Central)
N
A B C D E F G H I J K L M N O
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
CHINCHILLA
0 3 6 12 18 24
Kilometers
PopulatedPlaces
Smaller Town
Larger Town
Railways
Rivers
Highway
Main Road
Road
landuse
Conservation / Production forestry
Grazing natural vegetation
Intensive uses
Cropping
Irrigation
Water

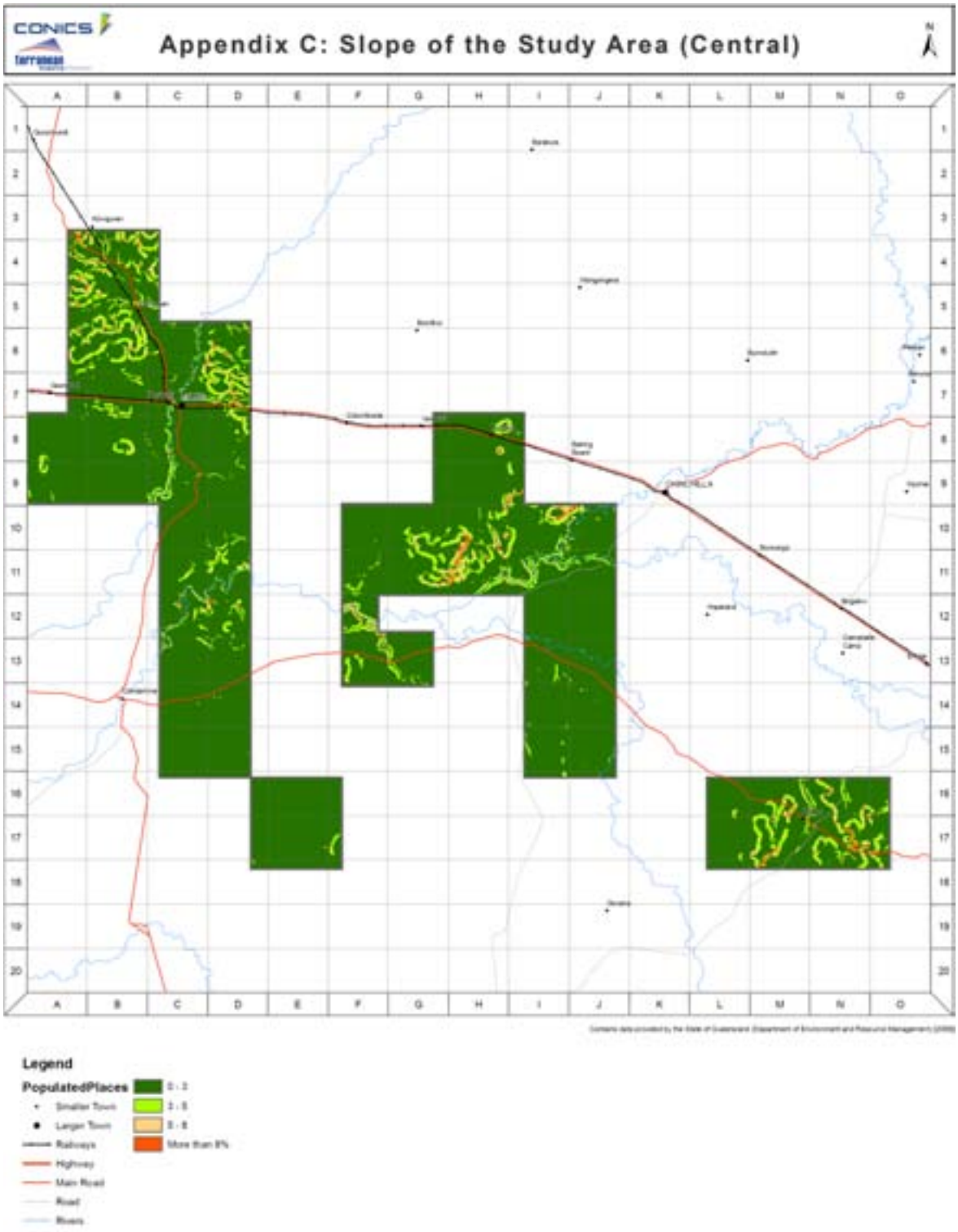

Appendix A: Current Land Use of the Study Area (South)
A B C D E F G H I J K L M N O
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
0 2 4 8 12 16
Kilometers
PopulatedPlaces
Smaller Town
Larger Town
Railways
Rivers
Highway
Main Road
Road
landuse
Conservation / Production forestry
Grazing natural vegetaion
Intensive uses
Cropping
Irrigation
Water

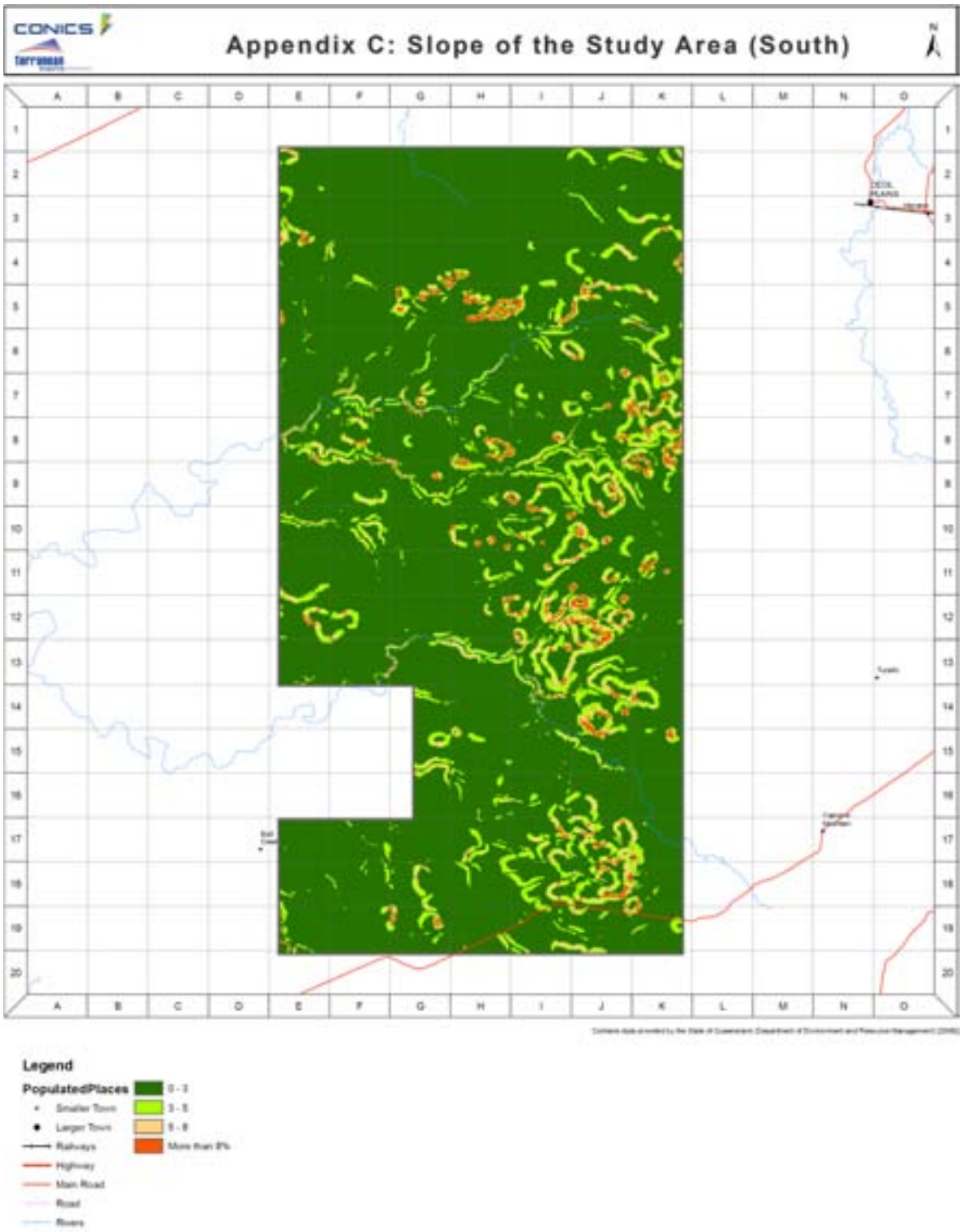
Appendix B Soils Mapping Based on Digital Atlas of Australian Soils



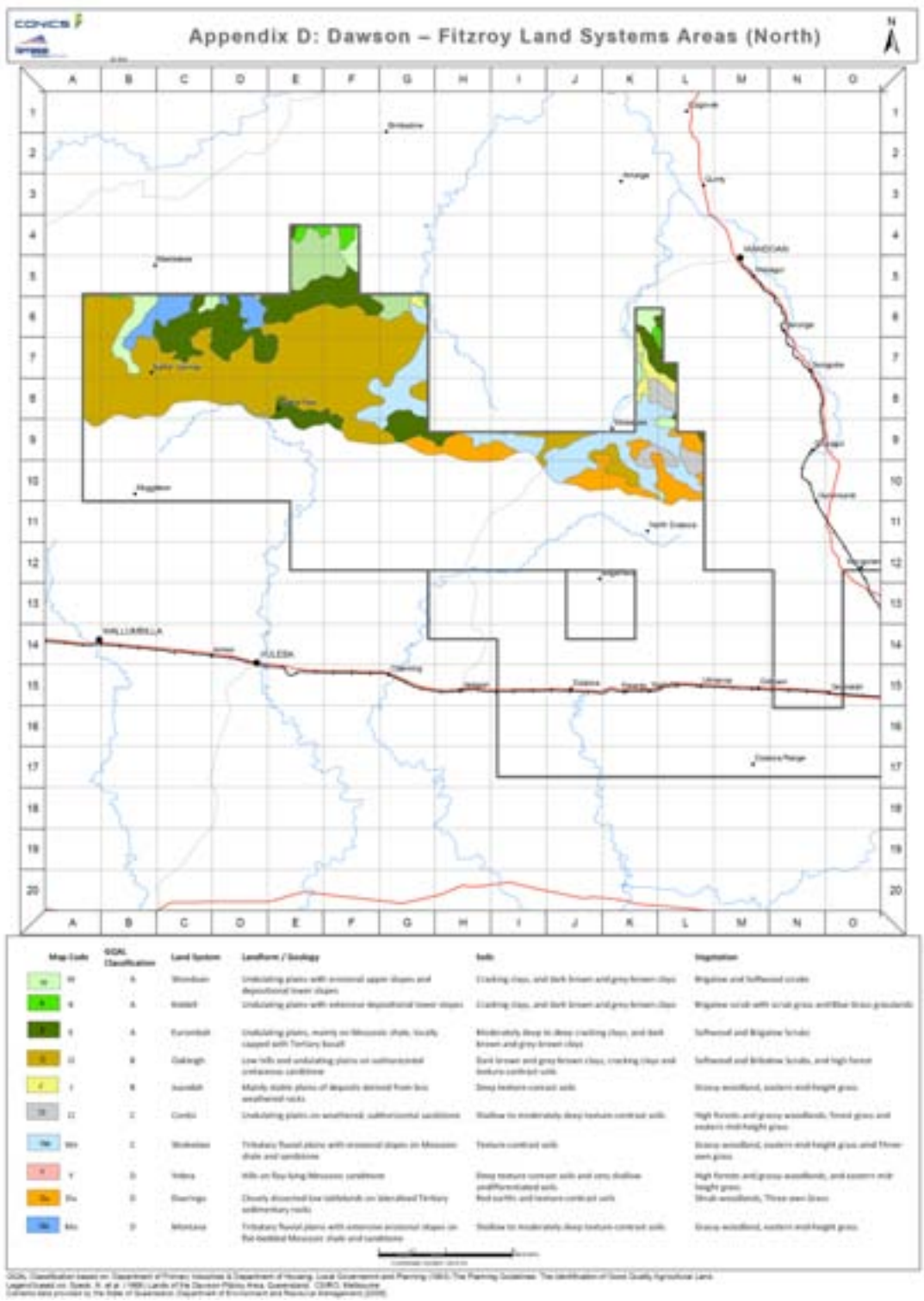
Appendix C Digital Elevation Models



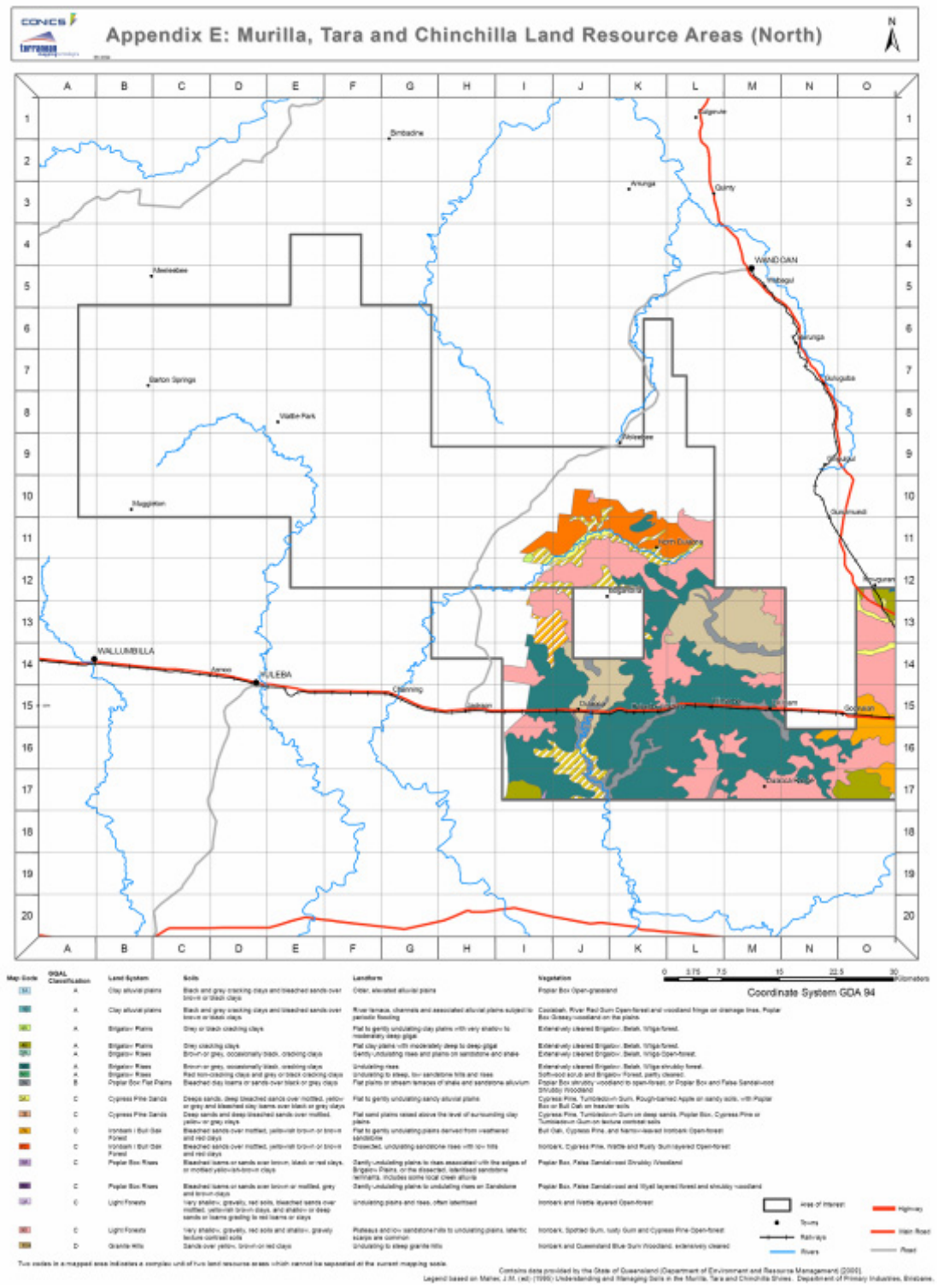

CONICS
Appendix C: Slope of the Study Area (Central)
N
Legend
PopulatedPlaces
Smaller Town
Larger Town
Railways
Highway
Main Road
Road
Rivers
0 - 1
1 - 3
3 - 8
More than 8%

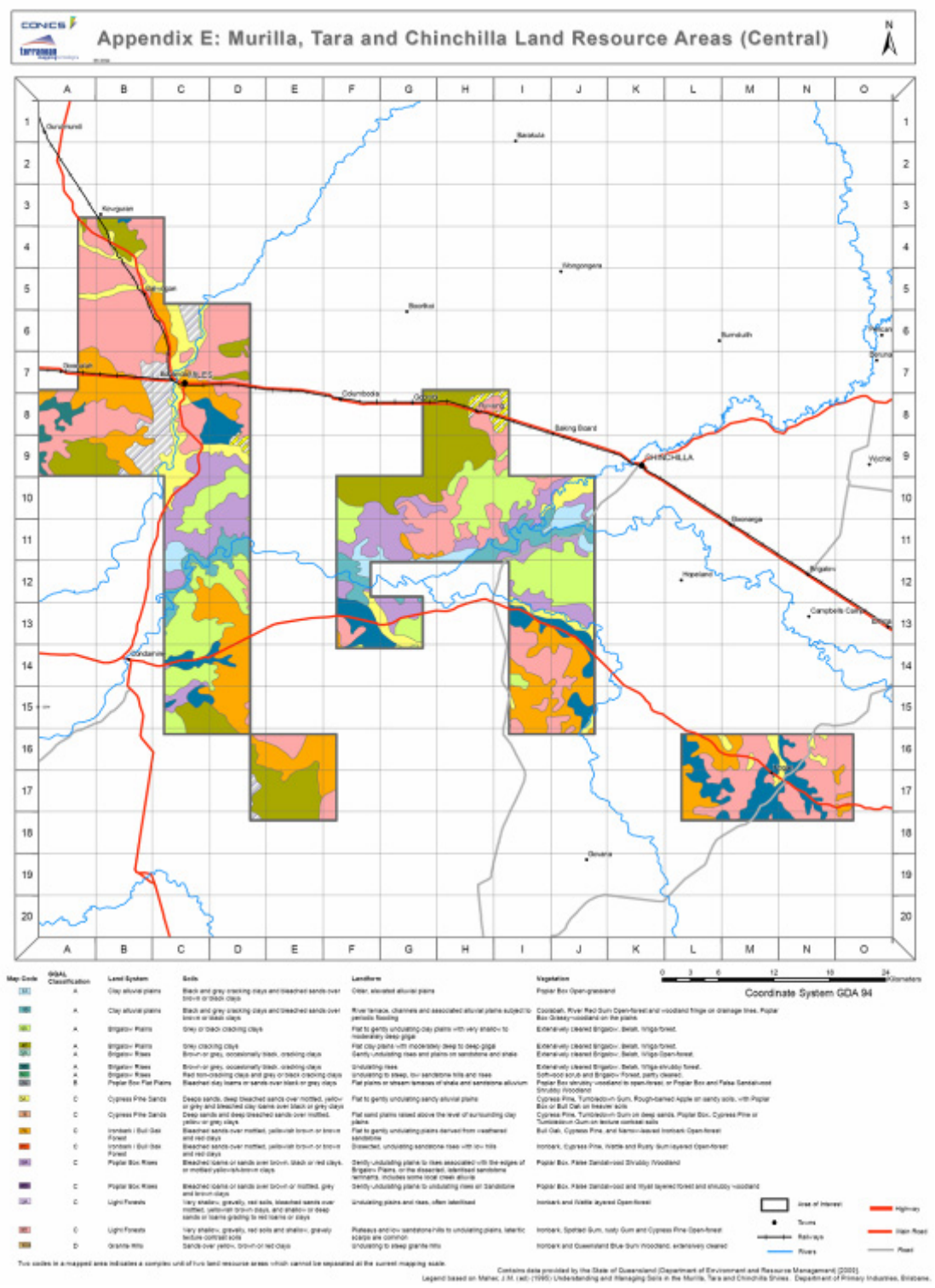

CONICS
Appendix C: Slope of the Study Area (South)
N
Legend
PopulatedPlaces
Smaller Town
Larger Town
Railways
Highway
Main Road
Road
Rivers

Appendix D The Dawson – Fitzroy Land Systems Areas

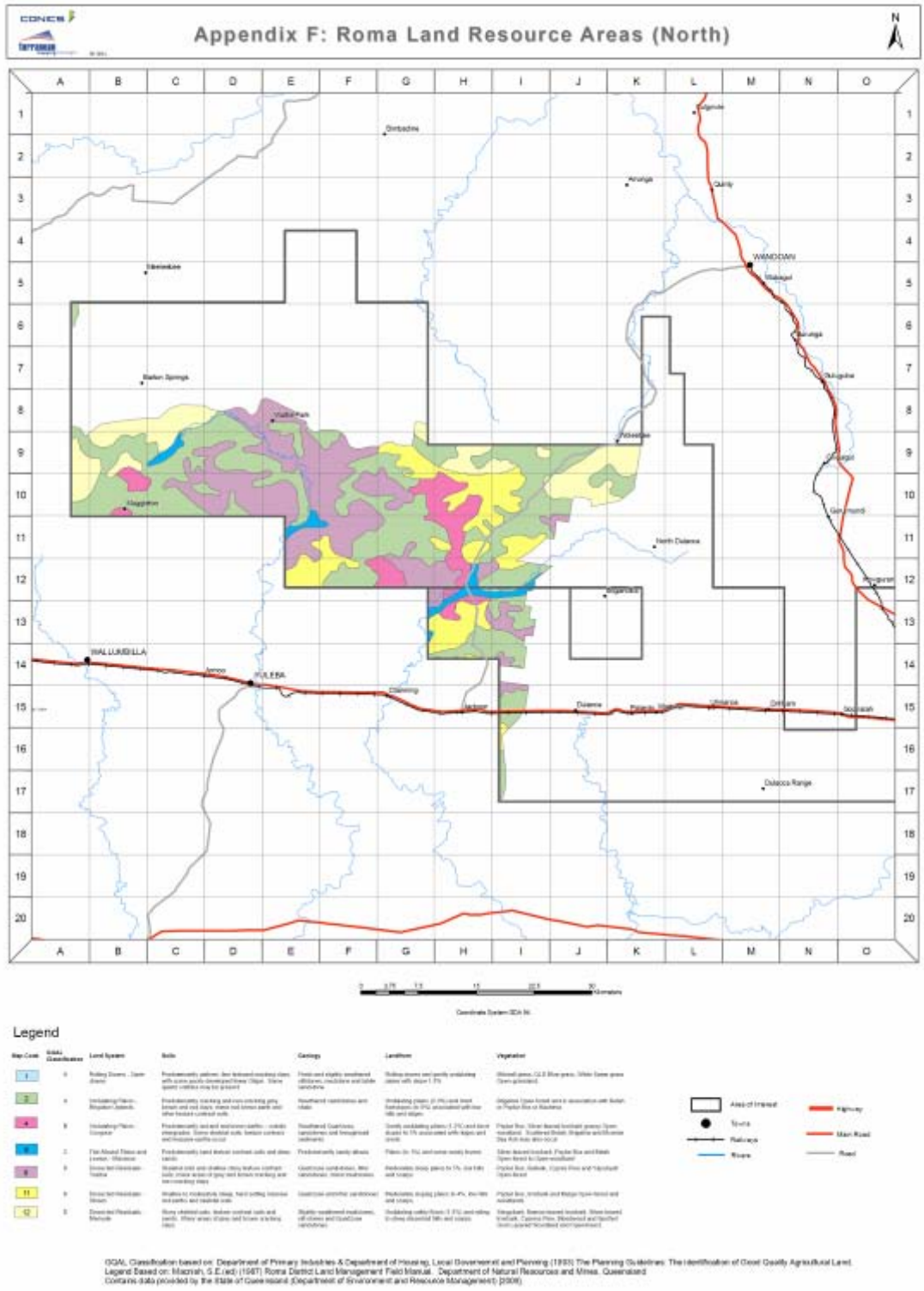


Appendix E The Murilla, Tara and Chinchilla Land Resource Areas

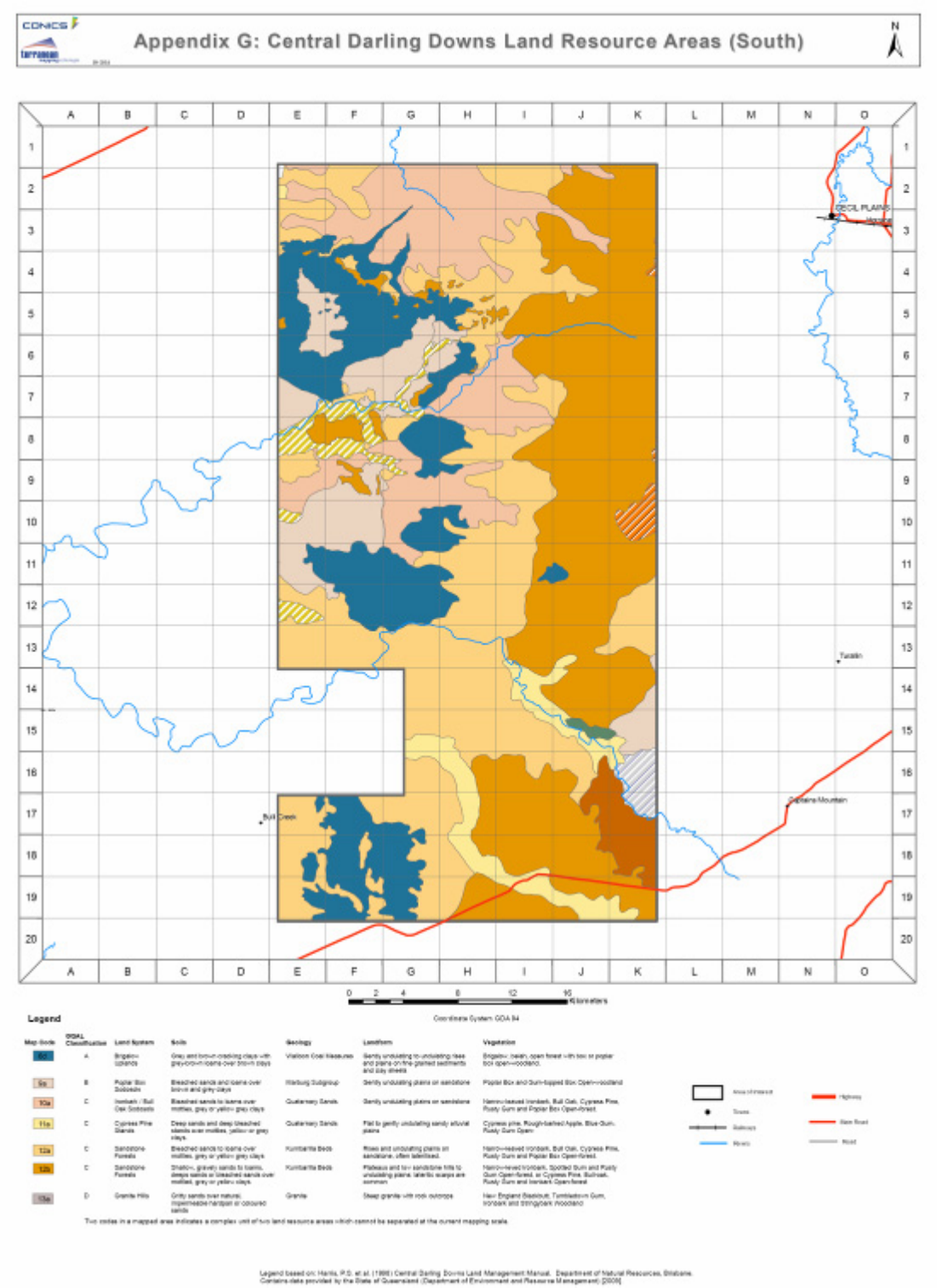



Appendix E: Murilla, Tara and Chinchilla Land Resource Areas (Central)
CHINCHILLA
Columboola
Baking Board
Condamine
Coordinate System GDA 94

Appendix F Roma Land Resource Areas



Appendix GCentral Darling Downs Land Resource Areas



Appendix H Example Asset Value Report

ATTRIBUTE	DETAILS	LINKS
Area of Search User defined area ML 31567	Grid Co-ordinates	Map of Query area
Waterways Stream order 2 in area	Black Snake Creek in area 25 m buffer under VMA	
Soils No Data Available		
Vegetation **Endangered** Regional Ecosystem Threatened Flora identified	RE 11.11.14 :*Acacia harpophylla* open forest on deformed and metamorphosed sediments and interbedded volcanics. Acacia harpophylla	http://www.epa.qld.gov.au/nature_conservation/biodiversity/regional_ecosystems/introduction_and_status/regional_ecosystem_maps/index.html
Fauna No threatened fauna records in area Grey Goshawk No Essential Habitat in area	RE Habitat equivalent in Area	
Indigenous Cultural Values None identified		http://www.epa.qld.gov.au/chims/basicSearch.html
European Cultural Values None identified		
Sensitive Receptors High school nearby	St Johns Private school adjoining ML	
World Heritage Properties None identified		
Contaminated Land Area identified on Contaminated Land Register (CLR)	Service station site in search area	http://www.epa.qld.gov.au/ecoaccess/contaminated_land/searches_notifications/index.html
Meta data Information Data last modified 23/03/09	Update RE version 5.0	