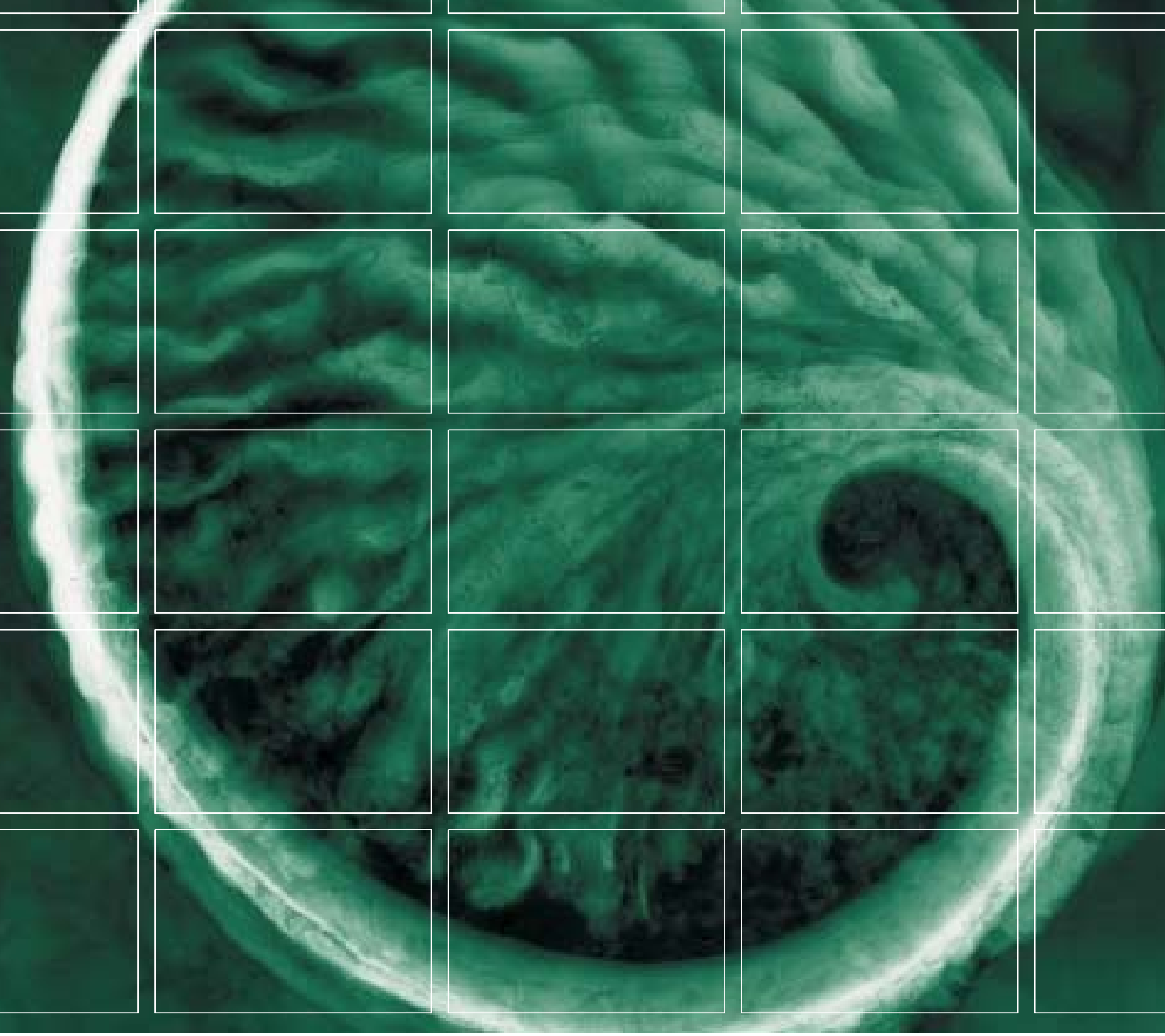

QC LNG Pipeline Component

Landscape and Visual Assessment

For
Queensland Gas Corporation

0094119
June 2009

Delivering sustainable solutions in a more competitive world

ERM

QC LNG Pipeline component

Landscape & Visual Assessment

For

Queensland Gas Corporation

FINAL

June 2009

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QC LNG Pipeline component

Landscape & Visual Assessment

For

Queensland Gas Corporation

June 2009

Reference: Pipeline Components

For and on behalf of
Environmental Resources Management Australia

Approved by: _____ Allan Wyatt

Signed: _____

Position: _____ Partner

Date _____ 11 June 2009

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1 INTRODUCTION

BG Group (BG) and Queensland Gas Company (QGC) seek to further develop existing gas fields located in the Surat Basin, Queensland.

This project forms part of the 'upstream' works associated with the Queensland Curtis Liquefied Natural Gas Project (QC LNG Project), which seeks to construct an LNG Plant on Curtis Island near Gladstone. The LNG Plant will serve both export and domestic gas markets.

The upstream components cover the expansion of QGC's existing Coal Seam Gas (CSG) operations in the Surat Basin and the delivery of this gas to the proposed LNG plant

The Project has been declared a "significant project", for which an Environmental Impact Statement (EIS) will be required.

Environmental Resources Management (ERM) has been commissioned to prepare a Landscape and Visual Impact Assessment (LVIA) which responds to the terms of reference.

The objective of this LVIA to fulfil the obligations set out in the ***Draft Terms of Reference for an Environmental Impact Statement Queensland Curtis LNG Project (BG – QGC).*** The Terms of Reference require that a LVIA be conducted to assess potential landscape and visual impacts and recommend mitigation measures. The sections that are relevant to the LVIA are summarised in Section 1.2

1.1 TERMS OF REFERENCE

The *Draft Terms of Reference for an Environmental Impact Statement Queensland Curtis LNG Project (BG – QGC)* include the following requirements for the Landscape and Visual Impact assessment.

Description of Environmental Values

This section should describe existing landscape features, panoramas and views that have, or could be expected to have, value to the community whether of local, regional, state-wide, national or international significance. In particular, reference should be made to areas of state significance (scenic coastal landscapes) in the Curtis Coast Regional Coastal Management Plan. Information in the form of maps, sections, elevations and photographs are to be used, particularly where addressing the following issues:

- *major views, viewsheds, existing viewing outlooks, ridgelines and other features contributing to the amenity of the area, including assessment from private residences, Curtis Island National Park, the GBRMP and future transport corridors that service Curtis Island;*
- *identification of elements within the proposal and surrounding area that contribute to their image of the town/city as discussed in the any local government strategic plan - city image and townscape objectives and associated maps;*
- *focal points, landmarks (built form or topography), gateways associated with project site and immediate surrounding areas, waterways, and other features contributing to the visual quality of the area and the project site;*
- *character of the local and surrounding areas including character of built form (scale, form, materials and colours) and vegetation (natural and cultural vegetation) directional signage and land use;*
- *identification of the areas of the project that have the capacity to absorb land use changes without detriment to the existing visual quality and landscape character; and*
- *the value of existing vegetation as a visual screen.*

Potential impacts and mitigation methods

This section should also discuss the visual impact of the construction and operation of the Project as it relates to the surrounding landscape on particular panoramas and outlooks.

The assessment should address the local and broader visual impacts of the Project structures. Appropriate simulations to portray the near views and far views of the completed structures and their surroundings from visually sensitive locations should be utilised. The significance of any clearing of vegetation, from a local amenity, landscape and visual perspective should be discussed.

Information should be supplied on the techniques proposed to minimise visual impacts. Special consideration should be given to public roads/ thoroughfares or places of residence, recreation, worship or work which are within the line-of-sight of the Project sites.

Details of the design and colour of any major structures, buildings or fixed plant and proposed screenings either vegetative or material should be described and discussed where relevant to the minimisation of the visual impacts of the Project.

The obstruction of sunlight due to the construction of buildings or alteration of landforms should be considered, as well as major illumination or reflection impacts on adjacent properties or roads.

Existing Light Sources

Determine the existing light sources within the Project site and its immediate surroundings. Of particular interest would be:

- *visual aspect at night in relation to the location of the project in a predominantly rural setting and impacts of the LNG facility on marine usage in Gladstone harbour;*
- *vehicular and rail movements at night within the surrounding area;*
- *impacts on port users in the northern section of the Gladstone harbour, in particular navigation of vessels on the North China bay precinct; and*
- *proximity of existing light sources to significant receptor areas such as fauna habitats, residential and business establishments.*

Potential impacts and mitigation methods

An assessment of potential impacts of lighting of the Project and means for mitigation of these projects should be undertaken both during the construction and operational phases, with particular reference to:

- *alterations to visual impact at night;*
- *potential impact of increase in vehicular and rail traffic in the area;*
- *effects of lighting from night operations and maintenance on residents; and*
- *changed habitat conditions for nocturnal fauna and associated impacts.*

The section outlining the assessment of existing light sources in the landscape and potential mitigation measures refer to localities surrounding the LNG Plant, which is proposed to be located on Curtis Island. Localities around the harbour are also identified. The impacts of night time lighting associated with the LNG Plant are discussed the Landscape and Visual Impact assessment report prepared by ERM for the LNG Plant.

2 METHODOLOGY

This section details the methodology adopted for the LVIA of the proposed Upstream Components of the Project to comply with the terms of reference.

Step 1 – Project Description: Describe the visual components of the Project

A description of the main visual components of the Project during both the construction and operation phases. This will usually include above ground components such as compressor stations, valves, scraper stations, ground excavation and vegetation removal as well as underground elements such as the pipeline.

Step 2- Define the viewshed of the project components that are pertinent to assessing landscape and visual impacts.

The study area includes the pipeline investigation corridor and QC LNG Land tenement areas defined in the project description for the Upstream Components.

The viewshed is used to define the study area for the Landscape and Visual Impact assessment partly based upon the parameters of human vision. The visual impact of a development can be quantified by reference to the degree of influence on a person's field of vision by comparing the extent to which the development would intrude into the central field of vision (both horizontally and vertically). The rationale behind the definition of the viewshed and its relationship to the parameters of human vision is explained in further detail in Annexure A to this report.

Step 3 – Description of Environmental Values within the Viewshed

Environmental values are best described as the Landscape Units which are based on the physical characteristics of the area within the viewshed The characteristics that assist in defining the Landscape Units include vegetation, topography and drainage patterns as well as the extent of man-made modifications and urban development. These take into account focal points, landmarks, gateways and other features contributing to the visual quality of the area.

The sensitivity of the Landscape Units is primarily an assessment of the extent to which the landscape units can accommodate further change. As a general principle, the greater the extent of man-made modification that exists within a landscape unit the lesser the visual sensitivity will be. Definition of the landscape sensitivity and landscape units will be undertaken through a series of viewpoints that have been taken from within the viewshed.

Step 4 - Assessment of potential Impacts from Publicly Accessible Viewpoints

Once the visual components of the Project are described and understood, and the sensitivity of the landscape units within the viewshed assessed, the ability of the landscape units to accommodate the proposed pipeline will be assessed from publicly accessible viewpoints. Visual impact of a development is function of the magnitude of change to a landscape unit's existing character and the sensitivity of the observer at each viewpoint. The magnitude of change is influenced by:

- location of the proposed development in the view;
- compatibility of the development with the surrounding landscape;
- duration of impacts in the construction and operation phases;
- scale of the development;
- reversibility of change; and
- potential blockage of view.

The sensitivity or quality of the viewpoint is influenced by:

- the distance to the development;
- the number of observers present to see the development, i.e., whether the viewpoint has one observer or many observers;
- whether the observer has a permanent or temporary view of the magnitude of change; i.e., from a living room window or a passing car; and
- whether the observer has the opportunity for alternative views in other directions.

The visual impacts are assessed as either negligible, low medium or high. These levels of impact are defined as follows.

Negligible – little or no change from a viewpoint with low, medium or high sensitivity, i.e., minute level of effect that is barely discernable over ordinary day to day effects. The assessment of a "*negligible*" level of impact is usually based on distance. That is, the Project or its relevant components are at such a distance that, when visible in good weather, it would be a minute element in the view across a man-modified landscape. However, sometimes the screening afforded by vegetation can lead to a similar level of assessment.

Low adverse effect – low level of visual impact from a viewpoint with low to medium sensitivity/quality, i.e., adverse effects that are noticeable however, will not cause any significant adverse impacts. If the distance to the Project is great (i.e. towards the edge of the viewshed) then even if the viewer numbers and the landscape sensitivity where high, the overall visual impact would be minor, as the Project would only just be visible in the landscape. If viewer numbers are low (i.e. few people can see the Project from the nominated publicly accessible viewpoint) then even if the Project was close to the viewpoint and the landscape sensitivity was high, the overall visual impact would be minor as the change to the landscape is not seen by many viewers. In a LVIA it is important to differentiate between a "visual impact" and a "landscape impact". Viewer numbers are important in the assessment of a visual impact, for example, if no one sees a particular development then the visual impact is nil, even though there may be a significant change to the landscape and hence a large landscape impact. If landscape sensitivity was low (i.e. within a highly man modified landscape) then even if the Project was in close proximity to the viewpoint and it was visible to a large number of viewers, the overall visual impact would be low. This is, as the viewpoint is not in a landscape of such sensitivity that further change would be unacceptable.

Medium adverse effect – The assessment of a visual effect larger the Low or adverse, will depend on one or all three of the assessment criteria being greater that low. That is, sensitivity of the landscape unit, distance and viewer numbers.

High or unacceptable adverse effect – The assessment of a "high" or "unacceptable adverse effect" from a publicly accessible viewpoint usually requires the assessment of all three elements, viewer numbers, landscape sensitivity and distance to be high. For example a highly sensitive landscape, viewed by many people, with the development in close proximity would be assessed as having an un-acceptable adverse effect or high visual impact. This assessment is also usually based on the assumption that such a view cannot be mitigated. An example may be a well frequented viewpoint within a national park, with infrastructure located in close proximity to a viewpoint that currently overlooks what would appear as a natural, pristine, un-modified landscape. Landscape treatment would block this view and even though it would mitigate the view to the infrastructure, such a treatment would be un-acceptable as it would also block the view. This would therefore mean that there were also no landscape mitigation measures available to reduce the visual impact from such locations from a high level of visual impact to a low.

Step 5 - Mitigation Measures for Publicly Accessible Viewpoints

Mitigation measures are also considered. If required they may be appropriate in reducing the visual impact from publicly assessable viewpoints. For example, roadside planting along a section of a highway may significantly reduce the visual impact of the Project or the incorporation of a landscape buffer around the perimeter of a key piece of infrastructure.

Step 6 - Identification of existing Light sources within the project viewshed

Identification of existing light sources within the defined project viewshed. The terms of reference discuss sensitive areas and receptors such as the Gladstone Harbour, impacts to port users in the northern section of the Gladstone Harbour in particular the areas around China Bay and the proximity of existing light sources to significant receptor areas such as fauna habitats, residential and business areas. This report will identify the potential light sources within the defined project viewshed as well as those proposed as part of this project. Light impacts of sensitive and significant fauna habitats are discussed in the Flora and Fauna Report.

2.1 STUDY LIMITATIONS

This report has been prepared for QGC, to assess the landscape and visual impacts associated with the construction and operation of the pipeline components of the Project. The results of this investigation should not be used for any other purpose than that for which it is specifically intended.

3 PROJECT DESCRIPTION

This section describes the Project location, and the visual characteristics of the Pipeline Project description that are relevant to this LVIA. The project description described in this section is based upon the Project description *2008_10_30_QGCLNG-Pipeline Project Description_RevC* prepared by QGC.

The pipelines being investigated within this LVIA are as follows:

1. **Export Pipeline** – the Export Pipeline will connect the gas fields to the proposed Gladstone LNG Plant. This pipeline will be a underground DN1050 (diameter) steel pipeline and will start at the existing Condamine Power Station, located approximately 9 km east of Miles, and will terminate at the proposed Gladstone LNG plant located on Curtis Island. This pipeline is approximately 480 km in length.
2. **Lateral –** The lateral pipeline may be located approximately midway along the Export Pipeline.
3. **Collection Header –** the collection header is located in the Upstream Infrastructure Corridor (UIC). The collection header will link the QC LNG Gas fields together, prior to connecting to Export Pipeline. There are approximately 200 km of Collection Lateral lines anticipated for this project.

Figure 3.1 shows the proposed layout of the Export Pipeline Line, Lateral line and the Collection Header.

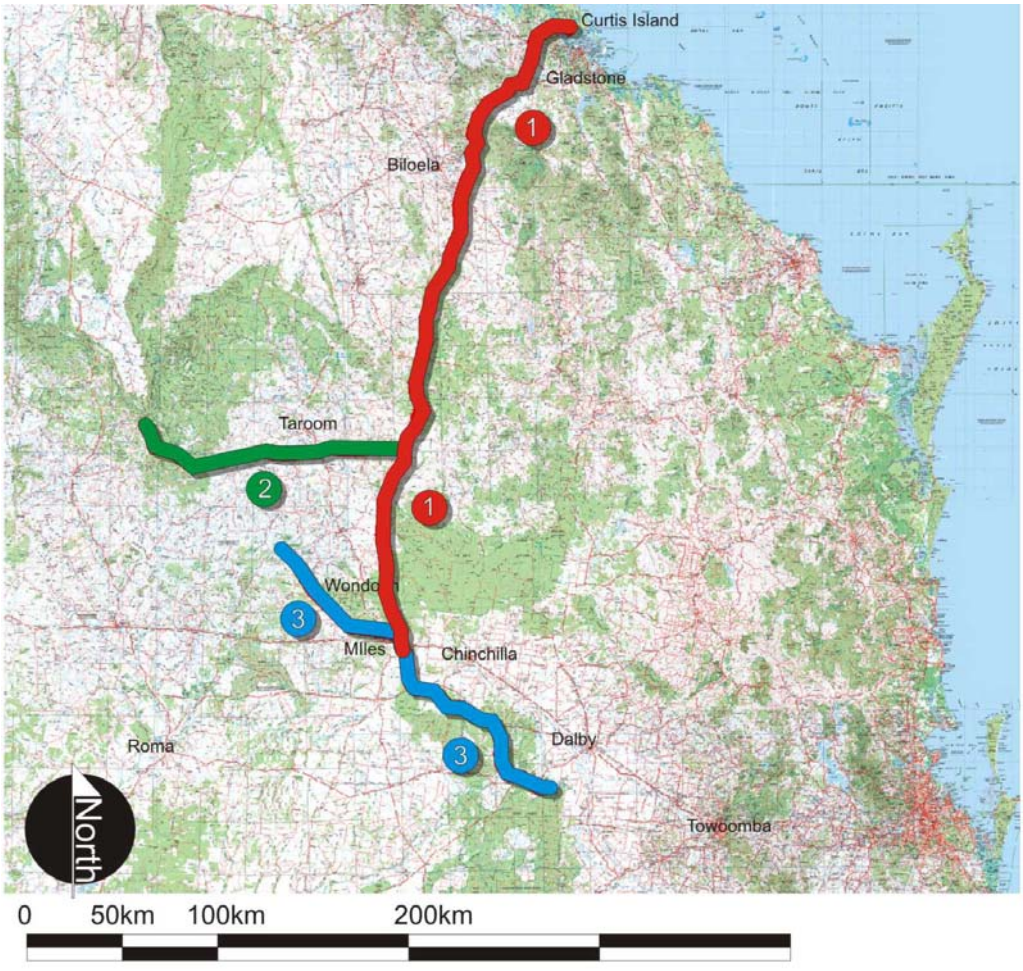

Figure 3.1 Pipeline investigation corridor

The Export Pipeline is approximately 480 km in length and will cross the regional Council areas of Dalby, Banana and Gladstone. There may also be a sub-sea section of approximately 3 km where the Export Pipeline will cross the Narrows, between the mainland north of Gladstone and Curtis Island.

Other pipelines will include:

4. **Collection Lateral –** The collection lateral will connect the Central Processing Plants and Field Compressor stations to the Export Pipeline. There are approximately 2000 km of Collection Lateral lines anticipated for this project.
5. **Gas/Water gathering system –** The Gas/Water gathering system will comprise a network of poly and steel pipes. These pipes will link the gas production wells to the Field Compressor Stations (FCS). A trunk line will connect the Field Compressor Stations to the Central Processing Plants (CPP) and storage ponds. These pipelines are contained within the Upstream Infrastructure Corridor. These components and are considered as incidental activities under the Petroleum & Gas Act.

It is anticipated that all pipelines will be underground.

3.1 VISUAL CHARACTERISTICS OF THE PIPELINE COMPONENT

This section describes the above ground components of the pipeline that will be visible in the landscape.

There is a range of visual impacts that can be expected during the construction and of operation of the QC LNG pipeline project. These impacts will range from temporary or construction related activity to longer term changes associated with the above ground infrastructure and vegetation removal.

The above ground or visible components and activities associated with the Project are as follows:

- Construction activity;
- New roads, road widening and permanent access tracks;
- Mainline Valves;
- Scraper Stations;
- Meter Stations;
- In-line Compressors;
- Marker signs.
- Communication Towers; and

The number and final location of these items has not been determined at the time of writing this report. However their approximate location in the landscape is assessed in the following chapters of the LVIA.

The following section describes the visual characteristics of the above ground project components that will form the basis of this LVIA.

3.2 CONSTRUCTION PHASE

Construction of the Pipeline and associated components will involve the clearing of vegetation and earthworks to create trenches, material lay down areas and site compounds. This will involve the following machinery:

- drill rigs;
- excavators;
- scrapers;
- graders;
- trenchers;
- rock cutters;
- side booms;
- cranes;
- forklifts;
- generators;
- welders;
- compressors;
- water trucks;

- low loaders; and
- Semi- trailers.

Construction of the Pipeline will be undertaken by several construction crews. Each crew will typically undertake the excavation, pipe construction, backfill and reinstatement in a gradually moving construction zone. The construction zone for each crew will move along the pipeline corridor throughout the construction period.

The construction stage has the potential for a high level of visual impact, due to the noticeable visual change associated with the removal of vegetation and presence of construction equipment and infrastructure.

For pipeline easements, visual impact associated with construction may also be more apparent from elevated viewing locations or across open areas with little or no intervening vegetation. This is because elevated viewing locations may able to see longer sections of the pipeline easements and the screening effect of vegetation is less apparent than when viewed from flatter or vegetated areas.

There are no landscape techniques that can be employed to mitigate the visual impacts associated with the construction activities. However construction management practices can be employed to maintain construction areas in a safe, neat and orderly manner.

3.3 *ACCESS TRACKS AND PIPELINE EASEMENTS*

Access tracks will be required for construction and maintenance of the pipeline easements and infrastructure. Where possible, existing roads and farm tracks will be used to limit the amount of new roads and tracks that are required to be constructed.

The majority of the Export Pipeline and Collection Lateral will be located within a 40 m wide easement. The easement width may be widened to 50 m in areas where mainline valves, temporary work areas and truck turn around areas are required. Once construction is completed, these areas will be rehabilitated.

In areas where multiple pipelines to be laid, this easement may be up to 80 m in width.

Construction activities within the pipeline easement will include a haulage road, pipe lay down area, soil and sand stock piles and the trench in which the pipe will be laid. *Figure 3.2* shows a new gas pipeline being constructed in cleared flat farm land.

Figure 3.2 Construction easement – cleared flat farmland

Excess material will be stockpiled on one side of the trench and machinery access will be necessary on the opposite side of the trench. These activities will be undertaken within 40 m wide construction easement described above.

Figure 3.3 shows a view from the same location looking where the pipeline easement has been created in an area of forest.

Figure 3.3 Construction easement - forest

The location of the pipeline easement is more obvious where existing vegetation has been removed.

Rehabilitation of the Pipeline easement

Rehabilitation and reinstatement measures outlined in the project description will be applied to all areas disturbed throughout the construction of the pipeline easement. This includes the Right Of Way areas (ROW), access tracks and any campsites.

Landscape rehabilitation will be undertaken in consultation with the relevant landholder / owner where required.

Rehabilitation and reinstatement involves removal of foreign material, surface contouring, respreading topsoil, respreading vegetation and reseeding. Plant species will be comprise native grass or other approved species. No plant matter is removed from the ROW it is respread over the ROW to assist in both stabilising the ground and re-establishing vegetation regrowth.

Reinstatement is undertaken in accordance with the Australia Pipeline Industry Association Code (APIA) to ensure that:

- Topsoil cover is re-established and all land and waterways disturbed by Project activities are returned to a stable condition as soon as possible after construction;
- Land is returned as close as possible to its previous productivity;
- Stable landforms are re-established to original topographic contours;
- Natural drainage patterns are reinstated;

- Erosion control measures (e.g. contour banks, filter strips) are installed in erosion prone areas; and
- The environment is reinstated to the condition of the surrounding area and disturbed habitats recreated, except in areas where rehabilitation will be limited to grass only.

The aim is to leave the land such that full rehabilitation can be achieved as follows:

- 40% vegetation cover after 6 months;
- 60% vegetation cover after 12 months; and
- 80% vegetation cover after 18 months.

Landscape mitigation will be a key to minimising the visual impacts for the majority of the Pipeline components of the QC LNG Project.

The Roma to Brisbane Gas Pipeline is an existing underground gas pipeline found within the QC LNG land tenements and has been rehabilitated. *Figure 3.4* shows the view looking along the existing Roma to Brisbane Gas Pipeline where it crosses 26 Mile Road.

Figure 3.4 Roma to Brisbane Gas Pipeline corridor – cleared farmland

The only discernable feature of the existing buried gas pipeline at this location is the warning sigs located within the road reserve.

Figure 3.5 shows the view from the same location on 26 Mile Road where the Roma to Brisbane pipeline easement has been constructed in an area of forest.

Figure 3.5 Roma to Brisbane Gas pipeline corridor - Forest

The Roma to Brisbane gas pipeline easement is more obvious in this location due to the removal of vegetation for construction and maintenance of the easement. Even where vegetation removal has been requiring, the warning signs are still the most obvious feature of the gas pipeline. In the absence of such signage, the pipeline easement is visually similar to access and farm tracks. Rehabilitation in forested areas will be limited to grasses only and will not include re-establishment of trees within the pipeline easement.

It is anticipated that there will be up to 2000 km of new access tracks required throughout the construction and operational life of the Project. Access tracks will be approximately 4 m wide, and gravelled where required.

Where possible, existing tracks will be utilised in favour of constructing new roads and tracks. Where new tracks are required, they will be constructed by the QGC in consultation with the individual landowner. The location of new access tracks will be determined when final pipeline route has been established.

3.4 MAINLINE VALVES

It is anticipated that there will be up to eleven Main Line Valves (MLV) associated with the Project.

- Five MLV's located along the length of the Export Line;
- Three along the on the Lateral Collection line; and
- Three on the Upstream Infrastructure Corridor.

The purpose of the MLV's is to enable sections of the pipeline to be isolated in the event of damage or programmed maintenance. MLV's will be located within a fenced and gravelled area of for approximately 300 m/2, and within the pipeline easement.

The body of the MLV's are located within the pipeline and are operated via an above ground structure. *Figure 3.6* shows an example of similar above ground components that could be expected at the location of a MLV.

Figure 3.6 Illustrative view of a Mainline Valve

MLV's will also be located at the inlet to the pipeline and at the delivery point in Gladstone.

Rehabilitation of Main Line Valve enclosures

Rehabilitation and reinstatement measures outlined in the project description will be applied to all areas disturbed throughout the construction of the pipeline easement and associated areas. This includes the main Line Valves. Landscape rehabilitation will be undertaken in consultation with the relevant landholder / owner where required.

Rehabilitation and reinstatement will include removal of foreign material, surface contouring, respreading topsoil, respreading vegetation and reseeding. Plant species will be comprise native grass or other approved species. No plant matter is removed from the ROW it is respread over the ROW to assist in both stabilising the ground and re-establishing vegetation regrowth.

Reinstatement is undertaken in accordance with the Australia Pipeline Industry Association Code (APIA) to ensure that:

- Topsoil cover is re-established and all land and waterways disturbed by Project activities are returned to a stable condition as soon as possible after construction;
- Land is returned as close as possible to its previous productivity;
- Stable landforms are re-established to original topographic contours;
- Natural drainage patterns are reinstated;
- Erosion control measures (e.g. contour banks, filter strips) are installed in erosion prone areas; and
- The environment is reinstated to the condition of the surrounding area and disturbed habitats recreated, except in areas where rehabilitation will be limited to grass only.

The aim is to leave the land such that full rehabilitation can be achieved as follows:

- 40% vegetation cover after 6 months;
- 60% vegetation cover after 12 months; and
- 80% vegetation cover after 18 months.

3.5 SCRAPER STATIONS

It is anticipated that there will be up to eight scraper associated with the project.

- Five scraper stations located along the Mainline;
- Two on the Lateral ; and
- One along the Collection Header

Scraper stations allow the insertion and retrieval of devices known as 'pigs' to clean the internal sections of the pipe. These may also be used to detect damage or metal loss within the pipeline. A typical scraper station will occupy a space of approximately 2000m2.

It is anticipated that there will be a scraper station located at each end and approximately mid way along the Export Pipeline route, as well as at the end and middle of the Upstream Infrastructure Corridor.

The construction, above ground infrastructure and rehabilitation of the Scraper Stations will be similar to the Main Line Valves discussed above.

3.6 METER STATIONS

There will be up to six meter stations associated with the project.

- two meter stations along the Export Line;
- two on the Lateral; and
- two on the Collection Header.

Meter stations will be constructed at sites where gas enters and leaves the pipelines. Meter stations include equipment to measure the volume of gas transferred along a pipeline. The metering stations and hard stand areas occupy a fenced area of approximately 2500m2.

3.7 IN-LINE COMPRESSORS

The Project description anticipates that the LNG plant will require the installation of a boost compressor station. This will be constructed at the inlet to the Export Pipeline, adjacent to the existing Condamine Power Station, to maintain gas delivery pressure at the inlet of the Export Pipeline

Figure 3.7 shows the existing Field Compressor Station located within the Windibrie Camp.

Figure 3.7 Illustrative view of a typical Field Compressor Station.

The project description indicates that there is no requirement for a mid line booster station. Should there be with any increase to the LNG plant load, a mid line compressor may be required to be installed along the Export Pipeline.

The inlet to the Export Pipeline is located at the Condamine Power Station.

Rehabilitation of In- Line Compressors

Rehabilitation and reinstatement measures outlined in the project description will be applied to all areas disturbed throughout the construction of the pipeline easement and associated areas. This includes the In-Line Compressors. Landscape rehabilitation will be undertaken in consultation with the relevant landholder / owner where required.

Rehabilitation and reinstatement will include removal of foreign material, surface contouring, respreading topsoil, respreading vegetation and reseeding. Plant species will be comprise native grass or other approved species. No plant matter is removed from the ROW it is respread over the ROW to assist in both stabilising the ground and re-establishing vegetation regrowth.

Reinstatement is undertaken in accordance with the Australia Pipeline Industry Association Code (APIA) to ensure that:

- Topsoil cover is re-established and all land and waterways disturbed by Project activities are returned to a stable condition as soon as possible after construction;
- Land is returned as close as possible to its previous productivity;
- Stable landforms are re-established to original topographic contours;
- Natural drainage patterns are reinstated;
- Erosion control measures (e.g. contour banks, filter strips) are installed in erosion prone areas; and
- The environment is reinstated to the condition of the surrounding area and disturbed habitats recreated, except in areas where rehabilitation will be limited to grass only.

The aim is to leave the land such that full rehabilitation can be achieved as follows:

- 40% vegetation cover after 6 months;
- 60% vegetation cover after 12 months; and
- 80% vegetation cover after 18 months.

3.8 MARKER SIGNS

Pipeline marker signs in accordance with AS2885 will be installed to indicate the presence of the pipeline to reduce the risk of inadvertent damage by third parties. Marker signs will be installed at:

- both sides of road and rail crossings;
- both sides of significant watercourse crossings;
- all fence lines;
- all utility crossings;
- all bends;
- all above ground facilities; and
- as otherwise required to be visible.

Signs are found along all roads and are used to convey safety messages, way finding and location information. Signage is not an un-common element in the landscape. There will be no visual impact for the proposed signage associated with the Project.

3.9 COMMUNICATION TOWERS

Communications will predominantly be delivered by the existing telephone network and/or mobile and satellite telephones as required. All construction camps will utilise existing services where available and satellite facilities at other times. Some communications towers, for radio communication, will be required during construction and may be retained at completion of this phase for use during operations. Existing facilities will be used as far as practicable.

3.10 SIGNIFICANCE OF THE PIPELINE PROJECT DESCRIPTION

This chapter has described the visual components of the pipeline component of the Project. Where possible, examples of similar infrastructure to the Pipeline component of the Project have been used to demonstrate the range of visual impacts that might be expected through the construction, operation and rehabilitation of the Project.

All new access tracks or pipeline easement will be located to minimise impacts to agricultural land and remnant vegetation. Where possible the new tracks will also be constructed to be beneficial for the landowner. Any tracks that are not required after construction works are complete will be removed and rehabilitated. Once the gas pipeline easements have been created and rehabilitated, they will be visually similar to farm access gates and tracks already found in many rural areas.

This description has shown that where vegetation removal is required to construct and maintain the proposed pipeline easement, the easement location may be a noticeable feature in the landscape.

Where vegetation is required to be removed, the tracks and pipeline easements will be more prominent; however they will be visually similar to other access and farm tracks found in many rural areas.

4 DEFINING THE VIEWSHED

This section defines the viewshed of the project and construction activities.

A viewshed is usually described as the area that can be potentially visually affected by a development. This is also called the zone of visual influence (ZVI). This report will use the term "viewshed". The viewshed is also considered as the study area of the project.

4.1 VIEWSHED FOR THE PURPOSES OF VISUAL ASSESSMENT OF THE PROJECT

As the majority of the pipeline will be underground, other than the landscape rehabilitation and construction phase, there are no above ground components that a potential viewshed can be assigned.

However, it is recognised that due to the presence of vehicles, trucks and earthmoving equipment, there will be some visibility of the pipeline easement through construction. These will be a temporary visual component of the landscape.

There are no landscape techniques that can be employed to mitigate the visual impacts associated with the construction of the Pipeline; however construction management practices would be employed to maintain construction areas to the minimum required.

There will also be a visual impact associated with the removal of existing vegetation in some areas of the proposed pipeline easement.

For these reasons a nominal viewshed of 500 m to either side of the pipeline easement has be assigned to the construction stage of the pipeline easement.

5 DESCRIPTION OF ENVIRONMENTAL VALUES WITHIN THE VIEWSHED

The Terms of Reference seek to determine a description of environmental values understands the impacts and potential mitigation measures of the project. Landscape unit's can be based on areas with similar visual characteristics in terms of topography, geological features, soil, vegetation and land use.

The areas found within the viewshed comprises a mix of highly modified landscapes including large areas of cleared farm land and heavily forested areas such as those of the Braemar State Forest. The landscape of the viewshed also hosts many forms of visible infrastructure including roads, rail, transmission lines, communication towers, power and fence lines, as well as existing gas pipelines.

5.1 TOPOGRAPHY

The majority of the landscape within the pipeline viewshed is flat to gently undulating. There is a short section in the southern section of the pipeline corridor that is influenced by the Great Dividing Range. Similarly the area to the north of pipeline corridor near Biloela is influenced by the Calliope Range, prior to entering Gladstone.

5.2 VEGETATION

Vegetation tends to be a reflection of the past land use and particularly the extensive clearing that accompanied European settlement. The distribution of existing vegetation is shown in *Figure 5.1* and *Figure 5.2.* The proposed pipeline is defined by the yellow outline.

Areas of higher soil quality associated with alluvium deposits and better quality material appear to have been cleared and managed for agricultural use. In these areas, natural vegetation is limited to linear bands along streams, drainage lines and road sides. Similarly hilly areas with limited access or areas of poorer soils were left untouched. It is these areas where the state forests are typically found.

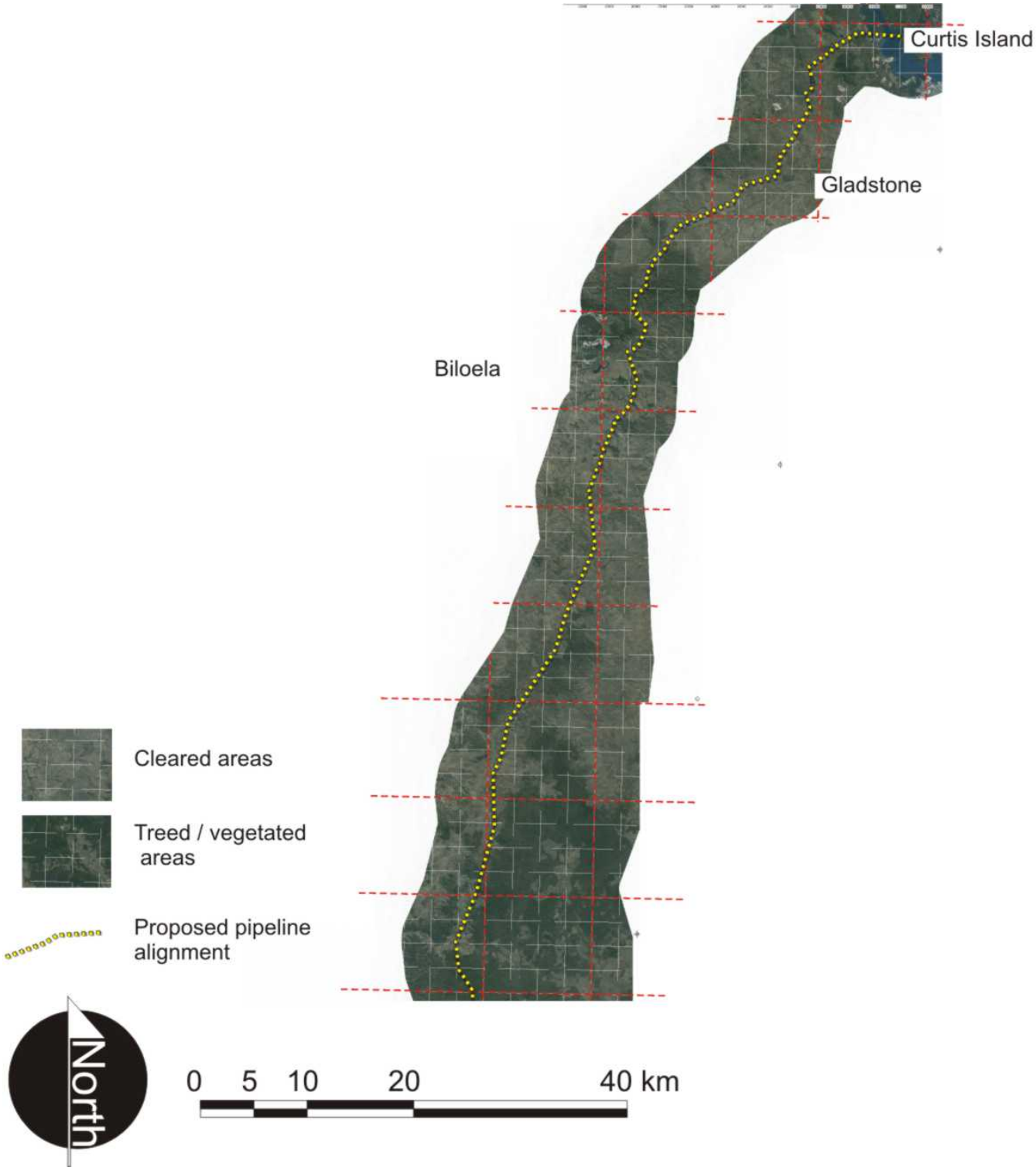

Figure 5.1 Vegetation (Northern section)

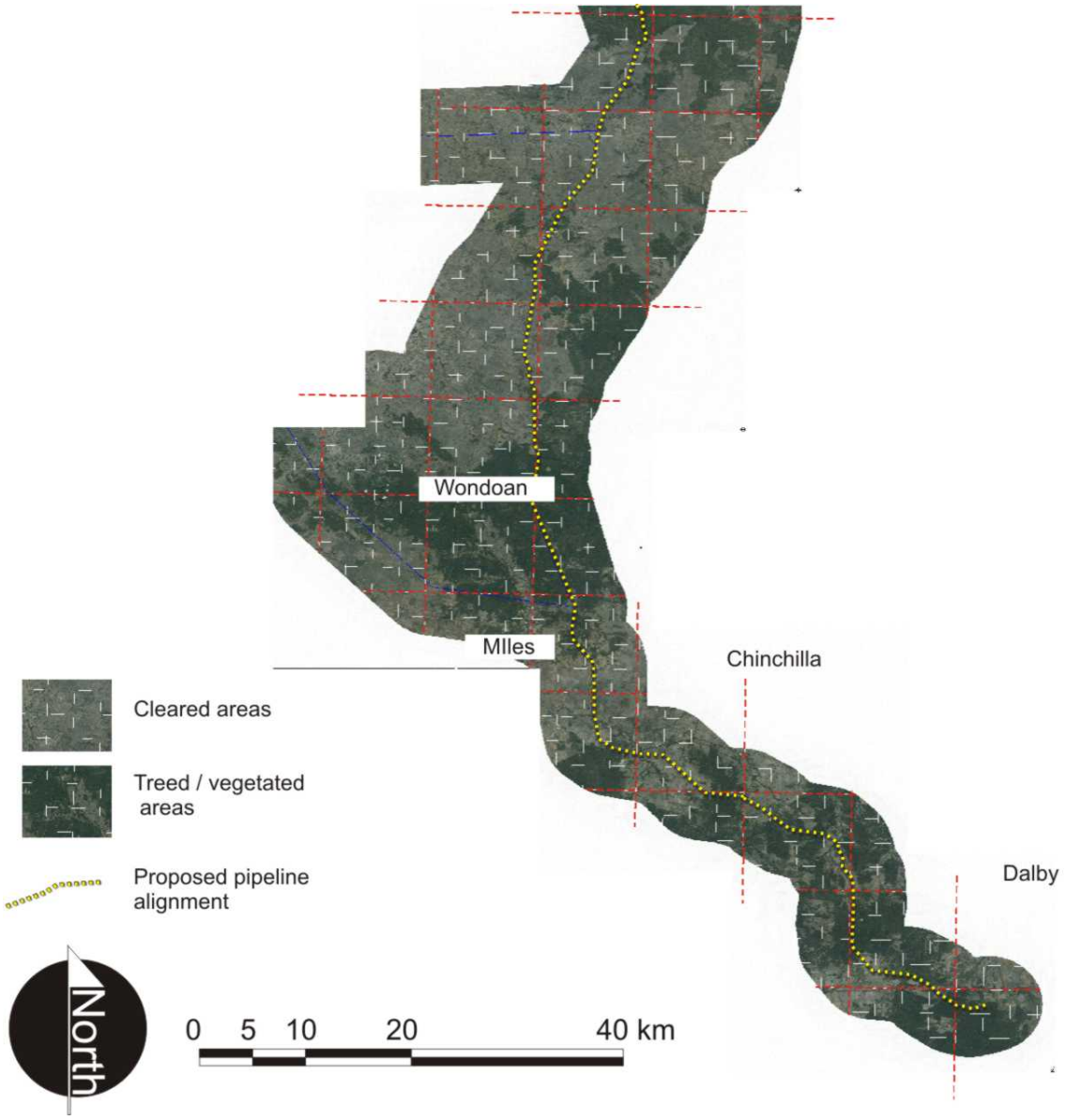

Figure 5.2 Vegetation (southern section)

Areas of existing vegetation are located in areas that tend to be more undulating or of poorer quality soils.

In addition to the existing vegetation found within state forests, there are also linear bands of planted shelterbelts along property boundaries, roads, creeks and fence lines.

5.3 LANDSCAPE UNITS

There are five Landscape Units that can be identified within the viewshed of the pipeline Project. These have been assessed on the basis of topography, and vegetation. These landscape units can be defined as the following:

- Landscape Unit 1 - Flat Farmland;
- Landscape Unit 2 - Hilly Farmland;
- Landscape Unit 3 - Forested areas;
- Landscape Unit 4 - Rural Townships; and
- Landscape Unit 5 – Mangroves.

5.4 LANDSCAPE UNIT 1 – FLAT FARMLAND

Landscape Unit 1 – 'Flat Farmland' is the most common landscape unit within the viewshed. These areas are generally cleared with the remnant in paddocks. These areas contain trees along paddock or property boundaries or along drainage lines. *Figure 5.3* shows an illustrative view of this landscape unit.

Figure 5.3 Illustrative view Flat Farmland Landscape Unit

These landscapes also contain many instances of constructed elements within this landscape type including road and rail networks, farm buildings and fences.

5.5 LANDSCAPE UNIT 2 – HILLY FARMLAND

Landscape Unit 2 – 'Hilly Farmland' describes area of cleared hills used for agricultural practices. Landscapes of this type confined to areas near to the Great Dividing and Calliope Ranges. *Figure 5.4* shows an illustrative view of this landscape unit.

Figure 5.4 Illustrative view of Hilly Farmland Landscape Unit

There are very limited areas where this landscape unit can be found.

5.6 LANDSCAPE UNIT 3 – FOREST

Landscape Unit 3 – 'Forest' occur primarily in State Forests, State Parks, Regional Parks and local reserves. *Figure 5.5* shows an illustrative view of this landscape unit. There are several state forests located within the pipeline viewshed. These include the:

- Braemar State Forest;
- Daandine State Forest;
- Weranga State Forest;
- Condamine State Forest;
- Gurulmundie State Forest;
- Hincheley State Forest; and
- Mt Organ State Forest.

Figure 5.5 Illustrative view of Forest Landscape Unit

Views in these areas are contained to the immediate vicinity due to the dense vegetation restricting views.

Long views are only possible where roads or existing easements run for long distances as seen in *Figure 5.5.*

5.7 LANDSCAPE UNIT 4 – RURAL TOWNSHIPS

Landscape Unit 4 – 'Rural Townships' describes the towns and villages within the viewshed.

There are several rural townships that lie near to the pipeline viewshed. These include:

- Dalby to the east;
- Chinchilla roughly central;
- Miles roughly central;
- Wandoan to the west;
- Biloela to the east; and
- Gladstone to the north.

There are no townships within the pipeline viewshed, nor is any part of the Project proposed to be located in built up areas.

5.8 LANDSCAPE UNIT 5 - MANGROVES

Landscape Unit 5 – 'Mangroves' describes the areas of Mangroves within the viewshed. This landscape unit is confined to narrow bands of vegetation that follow coastal shores. *Figure 5.6* shows an illustrative view of Landscape Unit 5 – Mangroves.

Figure 5.6 Illustrative view Mangroves landscape unit

Views near to these areas are contained to the immediate vicinity due to the dense vegetation restricting views.

The following section assigns a visual sensitivity/quality to each of the four defined landscape units.

5.9 LANDSCAPE SENSITIVITY

Landscape sensitivity can be defined as the ability of a landscape to absorb visual change, and its visual influence thereof on the viewers. While change is an integral part of any landscape, development and infrastructure are significantly different to the natural processes that occur in a landscape. The sensitivity of viewers to change in the previously described landscape units will depend upon a number of factors, such as:

- **Location.** The sensitivity of a potential viewer varies according to location. For example, visitors to a National or State Park where the landscape appears untouched or pristine will be more sensitive to the imposition of new or artificial elements within that landscape. The same viewer travelling along a rural highway, which contains existing examples of modifications and artificial elements, will be less sensitive to the presence of new elements. Modifications or artificial elements are not confined to vertical structures or built form, they also include removal of native vegetation; visibility of roads, tracks, fences and other rural infrastructure all of which decrease the sensitivity of a landscape to further change.
- **The rarity of a particular landscape.** Landscapes that are considered rare or threatened are valued more highly by a particular community with an attachment to the particular landscape.
- **The scenic qualities of a particular landscape.** Landscapes that are considered scenic as a result of dramatic topographical changes, the presence of water, coastlines, etc, may be

extensive, however viewers have greater sensitivity to alterations within these scenic landscapes. As discussed above the presence of modifications or artificial elements including built form, roads, tracks, fences, silos and rail as well as farming practices including land clearing, cropping and burning, all decrease the sensitivity of a landscape's scenic qualities.

The pre-European landscape of the area surrounding the proposed development has been heavily modified through agricultural practices that have included the clearing of native vegetation for cropping and grazing. The resultant cleared landscape is interspersed with agricultural buildings including farmhouses, outbuildings, sheds, stockyards, access roads, silos as well as road and rail networks. Associated with these structures are plantings along roadsides or as shelter belts. This landscape unit is not rare, nor is it high in scenic quality and for these reasons the landscape sensitivity is considered to be low. However, it must be recognised that some people value the appearance of cleared farmland with minimal signs of built form such as houses and farm sheds. For these viewers change may be perceived as a high visual impact due to the presence of large-scale structures in a rural landscape.

Servicing the rural areas are settlements, which in the larger townships also include commercial and public buildings as well as recreational areas. These rural townships are not uncommon, nor are the scenic qualities particularly high, as they often contain many forms of infrastructure and development. However, given the concentration of housing, which is a sensitive land use these have been given a medium sensitivity rating.

The table below rates the sensitivity of the various landscape units within the viewshed of the pipeline Project. These have been based on the analysis discussed in this report.

Table 5.1 Landscape Sensitivity

Landscape unit	Sensitivity
Unit 1 - Flat Farmland	Low This unit is highly modified, contains visible infrastructure, is not topographically dramatic and does not contain large areas of water.
Unit 2 - Hilly Farmland	Low This unit is highly modified, contains visible infrastructure, is not topographically dramatic however is varying and does not contain large areas of water.
Unit 3 - Forests	Medium to High This landscape is attractive due to its association with being a natural, un-modified landscape.
Unit 4 - Rural Townships	Medium The concentration of houses increases the visual sensitivity of this landscape unit.
Unit 5 - Mangroves	Medium to High This landscape is attractive due to its association with being a natural, un-modified landscape and proximity to coastal areas.

6 ASSESSMENT OF POTENTIAL VISUAL IMPACTS OF THE PIPELINE FROM PUBLICLY ACCESSIBLE VIEWPOINTS

The section examines the existing environmental features of the landscapes found within the Project viewshed and discusses the potential visual impacts of the construction and operation of the Project structures. This is achieved through a series of viewpoints that have been selected from publicly accessible locations, and provides a suitable representation of the landscape types and likely range of visual impacts that can be expected through the construction and operation of the pipeline Project.

Figure 6.1 and Figure 6.2 show the viewpoint locations assessed in this section.

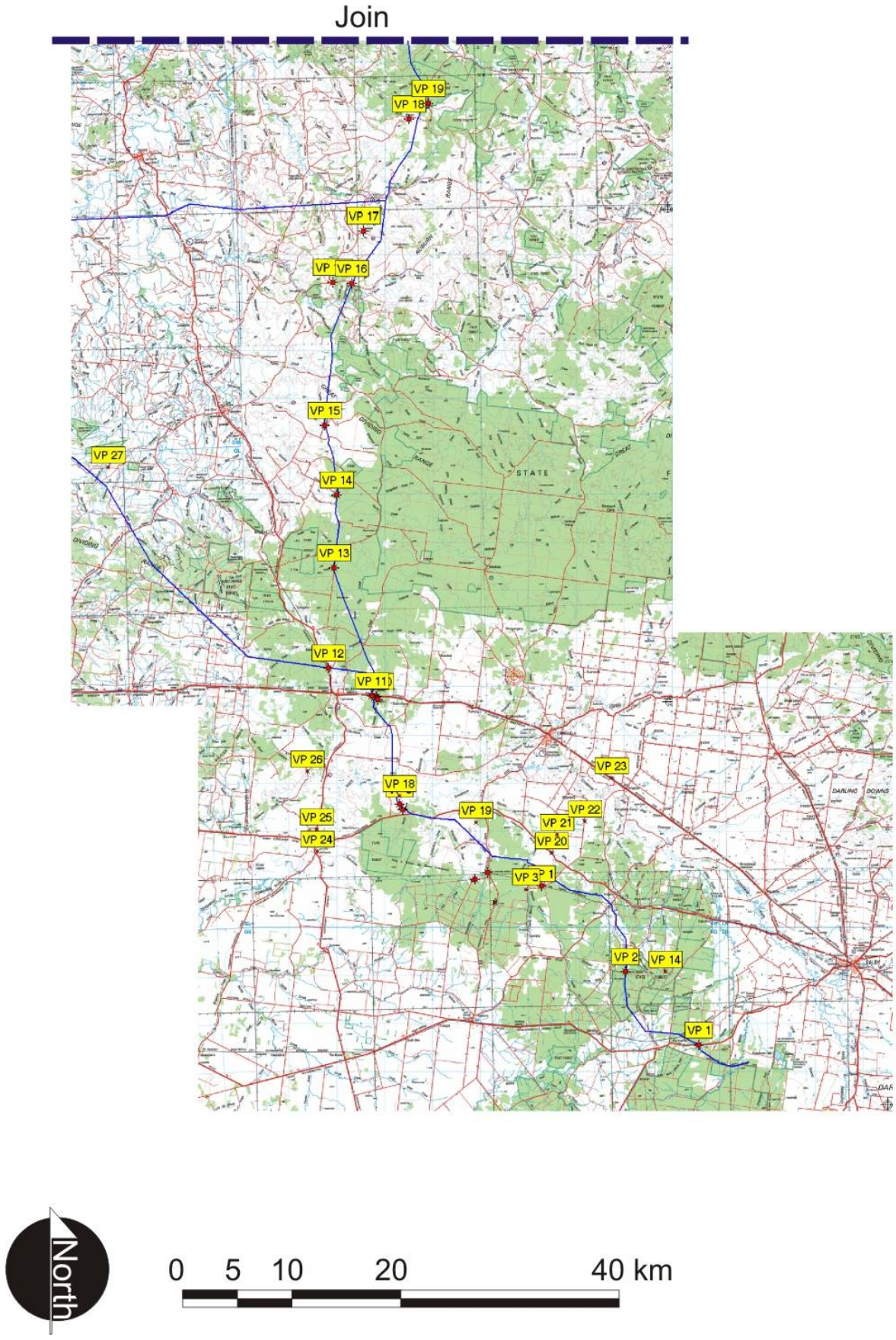

Figure 6.1 Viewpoint Locations south