
Galilee Coal Project (Northern Export Facility)

Visual Impact Assessment Report

Prepared by Tract Consultants Pty Ltd

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Front page images: 1. Landscape image from North of mine site; 2. Machinery at existing Abbot Point coal terminal; 3. Image of riverine environment within mine area; and 4. Aerial of the existing Abbot Point port facility, image by TRACT Consultants.

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1 Executive Summary

This Visual Impact Assessment has been prepared by Tract Consultants Pty Ltd as an appendix to the Environmental Impact Statement (EIS) for the Galilee Coal Project proposed by Waratah Coal Pty Ltd. The project embraces the assessment of the visual impact of the:

- Mine in Central Queensland including open cut and underground mining, coal stockpiles, rail transfer terminal and facilities;
- Dual Rail line and associated works, connecting the mine to the Coal Transfer Terminal within the Abbot Point State Development Area; and
- Coal Transfer Terminal that includes additional coal stockpiles, rail transfer terminal and conveyor to a new loading facility.

The assessment is based on the guidelines for visual assessment published by the Department of Transport and Main Roads (2004) in the Road Landscape Manual.

This study commenced as a desktop research exercise in late 2009 and developed view shed and visual impact maps for each of the project's three components and the project as a whole. This process involved the creation of a digital 3 Dimensional model of the topography of the area covering a region of about 50,000 hectares, then creating a series of view shed points at varying heights above the topography to represent the mine, rail and port. View shed models were then created for each of these points (approximately 500 points in total). These models were then summed for each component to produce the visual assessment maps which were then ranked to account for the viewing distances and visual receptor sensitivity, thus creating the visual impact maps. To 'ground truth' the modelling a 3 day site assessment was undertaken in June 2011. This report has been updated and revised to incorporate the findings for the site assessment and to respond to the Co-ordinator General's comments. The rail corridor assessment was updated once more in July 2011 to accommodate the proposed increase from 60Mtpa to 400Mtpa rail capacity. This increase necessitates the rail track being duplicated with additional passing areas along the length, and four grade-separated crossings at four major roads.

As the majority of the project is located in a remote rural landscape, the project elements under assessment are located away from most towns, allowing for a low visual impact on the assessment region. This general assessment cannot reflect the higher impacts of the areas in close proximity to the mine, rail and port. The mine component, involving the open pits and rail terminal will have a server impact on the present rural area resulting in a high visual impact. This impact reflects the nature of the mining activities and the dramatic changes that are to occur to the area. As the rail project component will increase in capacity over the next 20 years, the expected increase in visibility will create a significantly high impact for those places within the near and foreground of the alignment, but will not significantly visually change those places further away. The coal terminal will have a significant impact on the immediate area although this impact is deemed to be reduced due to the designation and present use of the area as a Abbot Point State Development Area.

This visual assessment does not include detail discussion of the Abbot Point Multi Cargo Facility; the Coal terminal (T4-7) rail alignment and multi-user infrastructure corridor within the APSDA as the visual assessment and impact mapping were undertaken as part of the original report in late 2009 and before these were adopted as a component of this project.

This study covers **visual impact** assessment:

This **visual impact** assessment deals with the potential effects on the visual resources (view) of the setting from changes in the composition and quality of views, people's response to likely changes and the overall effect on visual amenity.

Where as:

It does not include the affects on the quality of the landscape setting, fauna, cultural and ecological values considered as an environmental resource, independent of views of that landscape.

2 Scope of Visual Assessment

2.1 Introduction

This report has been prepared by Tract Consultants Pty Ltd for Waratah Coal Pty Ltd as a component of the Environmental Impact Statement (EIS) for the Galilee Coal Project. This report will evaluate the potential visual effects associated with the construction and operation of the Galilee Coal project. The Galilee Coal project consists of an open cut and underground mine; a rail line with passing bays, road and river crossings; and a new coal terminal within the Abbot Point State Development Area (APSDA). The project spans an area from near Alpha in the central highlands coal district to north of Bowen on the Queensland north/central coast.

2.2 Study Area

The project is divided into three distinct components; mine, rail and coal terminal. Together they comprise the Galilee Coal project and scope for this assessment. These three components are:

1. Open cut and underground mine and facilities on a 36,000 hectare site, approximately 30km north-west of Alpha and north of the Capricorn Highway in Central Queensland;
2. Dual Rail line of 470km linking the mine and new coal terminal, including passing lay-bys, construction camps, access road, several river crossings, road level crossings and road overpasses; and
3. A new coal terminal that is incorporated within the APSDA and independent of the existing infrastructure at the Port of Abbot Point, 22km north-west of Bowen on the North Queensland Coast.

The visual landscape character of the assessment area varies considerably given the scale of the investigation area, spanning about 500km and encompassing approximately 5,000km² or 50,000ha. The study area traverses three bio-regions, which demonstrate a variety of vegetation communities and topographical variations. The mine is located within the "Desert Uplands" region, most of the rail and APSDA are in the "Brigalow Belt North" region and a small section of the rail as it passes through the coastal mountains is in the "Einasleigh Uplands". These regions are as defined by the Queensland Department of Primary Industries and shown in Figure 1.

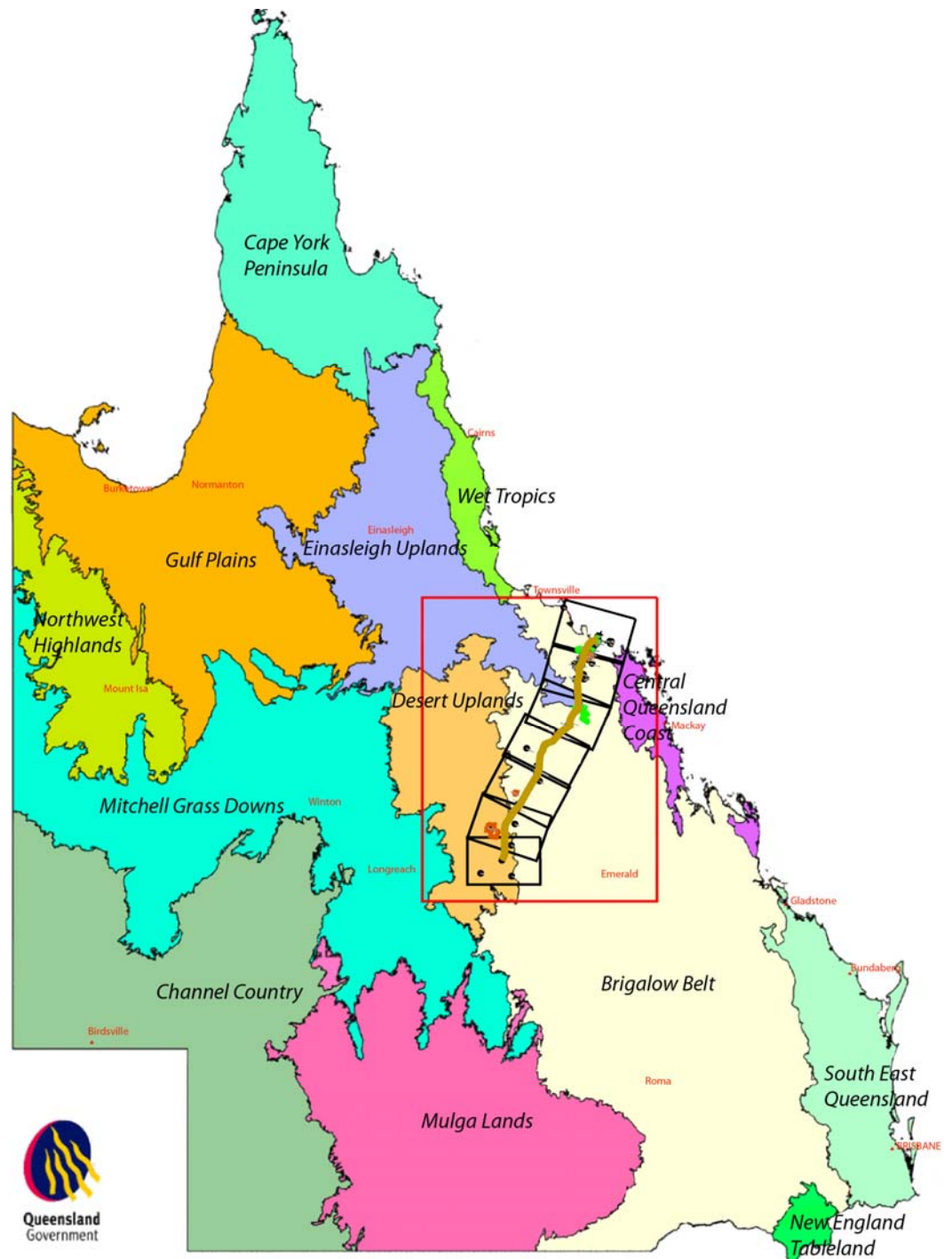


Figure 1: Bioregional map of Queensland sourced from the Department of Environment and Resource Management web site, with study area overlayed

2.3 Risk Management

A formal project risk assessment (to AS4360) has not been conducted for landscape or visual effects as a part of this visual assessment.

The study method systematically evaluates project context, the nature and magnitude of predicted effects, the sensitivity of receptors and the significance of likely impacts for both landscape and visual resources. On that basis, this approach is considered to provide a structured consideration of risk related to landscape and visual effects.

2.4 Community Consultation and Community Values

This project does not include pragmatic research relating to community perceptions and values of visual landscape character, though having the potential to impact on communities in the region. Instead common public preference generalisations were used from the South East Queensland Regional Plan 2005–2026, Implementation Guideline No. 8 (2007).

3 Glossary

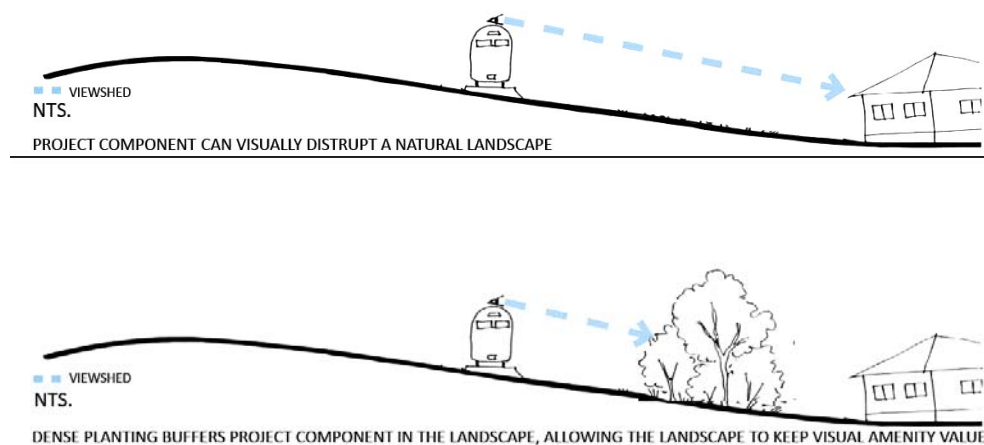
The following definitions and phrases have been used in the preparation of this report.

3.1 Abbreviations

APSDA	Abbot Point State Development Area
DTMR	Department of Transport and Main Roads
DERM	Department of Environment and Resource Management
MCF	Multi Cargo Facility
RLM	Road Landscape Manual Amendment 1 October 2004
CHPP	Coal Handling and Preparation Plant
KPxXX	Kilometre Point along rail line from Coal Terminal to Mine.

3.2 Glossary of Terms

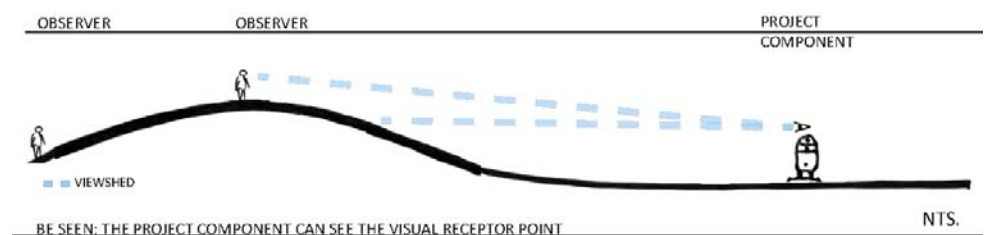
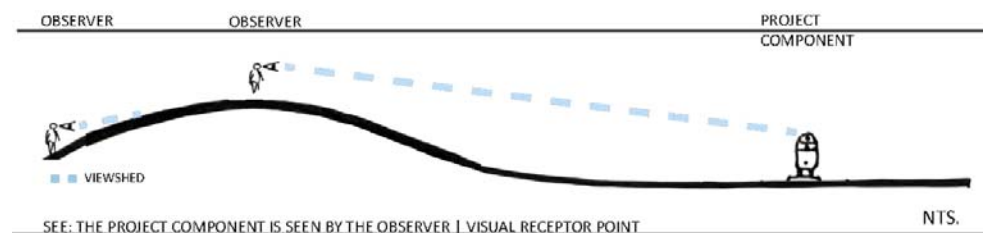
Amenity	A measure of scenic quality.
Analysis	Process of breaking down landscape or visual attributes into component parts to understand how it is made or valued.
Assessment	General term for description, classification and analysis of landscape or visual attributes.
Buffering	Landscape buffering is a mitigation measure aimed at reducing visual impact on an effected landscape view point. (Diagram below)



Bio-region	Large land areas characterised by broad, landscape-scale natural features and environmental processes that influence the functions of entire ecosystems
Classification	A process of sorting the landscape into different types using selected criteria, but without attaching relative values to the different kinds of landscape.

<i>Coal Terminal</i>	The new coal terminal proposed for the APSDA, 22km north-west of Bowen.
<i>Community</i>	A group with shared culture, traditions and activities based within a defined locality.
<i>Community values</i>	Commonly held perceptions and values that the community attach to environmental attributes or qualities.
<i>Cumulative effect</i>	Collective impact of past, present and foreseeable future effects and actions.
<i>Designated landscape</i>	A landscape area formally listed by government as a park, reserve or an area with valuable natural or cultural attributes and specific management requirements.
<i>Effect</i>	A consequence of change.
<i>Enhancement</i>	Landscape improvement through restoration, reconstruction or mitigating action.
<i>Galilee Coal</i>	Waratah Coal project (Northern Export Facility).
<i>Impact</i>	A positive or negative change to the landscape or the visual environment.
<i>Indirect impact</i>	Secondary impacts on the environment that occur away from the development site, as a direct result of the development.
<i>Landscape</i>	A distinct physical area as perceived by people, being the result of the action and interaction of natural and / or human factors.
<i>Landscape assessment</i>	Deals with the potential effects on the quality of the landscape setting, considered as an environmental resource, independent of views of that landscape.
<i>Landscape character</i>	A distinct and recognisable pattern of landscape elements or characteristics that occur consistently in a particular type of landscape.
<i>Landscape condition</i>	Is a measure of the physical status of the area and landscape. This is in line with people's perception of the landscape and less concerned with visual impact.
<i>Landscape quality</i>	A judgment about the relative physical condition of an area, related to its intactness, character and visual, functional and ecological condition.
<i>Landscape sensitivity</i>	The extent to which a landscape can change without unacceptable adverse effects on its landscape character.
<i>Landscape value</i>	The relative value or importance attached to a landscape, which expresses agreed community values because of its quality, scenic beauty, tranquillity, wildness, cultural associations, conservation or other special value.
<i>Loading Facility</i>	Collective name for either the jetty or MCF development providing access from the land to the ship loading facilities.
<i>Magnitude of effect</i>	Combination of scale, extent and duration of an effect.

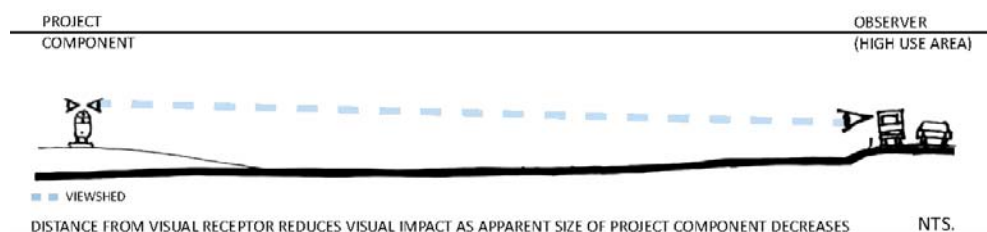
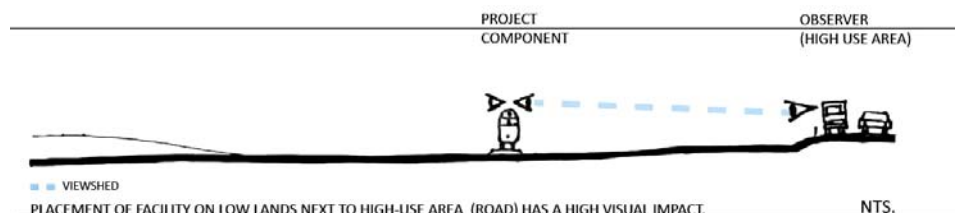
Mine	Galilee Coal Open cut and underground mine and facilities on a 36,000 hectare site, approximately 30km north-west of Alpha and north of the Capricorn Highway in Central Queensland.
Mitigation	Measures to avoid, reduce or compensate for adverse visual effects.
Observers	A person or group of people who are seeing the view
Perception of landscape	The psychology of seeing and potentially attaching value or meaning to a landscape.
Rail	Dual Rail line of 470km linking the mine and new coal terminal, including passing lay-bys, river and road level crossings and road overpasses.
Scenic quality	A relative judgement, based on common community perceptions, about the visual qualities associated with a landscape type or character area.
'see and be seen'	The process of swapping the observer for the observed to allow view shed modeling to project views from the project component to the surrounding area to identify sites and areas that can see the project. (Diagram below)



Sense of place	A relative judgement, based on common community perceptions, about the essential character and spirit of an area.
Significance	A relative measure of the importance of a landscape or visual change against a defined value system.
Study area	Combination of the proposed development site and the surrounding area, typically to a radius of at least 50km.

View Distance

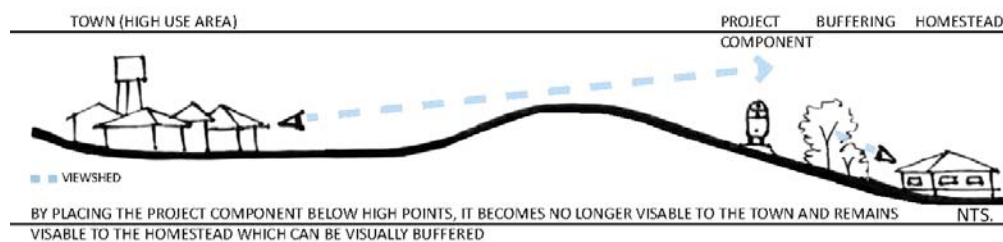
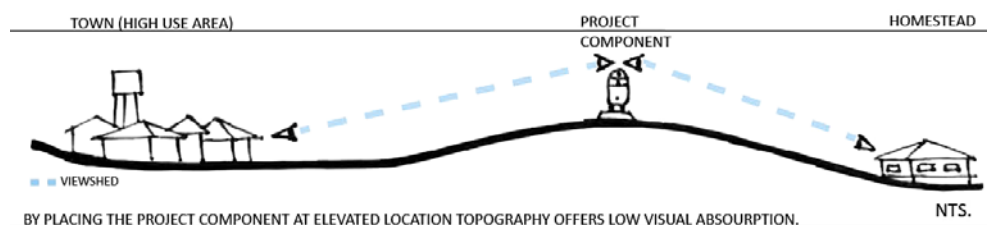
The distance an observer can see, this is influence by weather conditions, vegetation, and elevation. (Diagram below)

**View shed**

An area or region visible to an observer.

Visual absorption Capacity

The ability for the landscape to absorb change. For example one aspect of a hill may have more absorption capacity than another. (Diagram below)

**Visual amenity**

The value of a particular area or view in terms of what is seen.

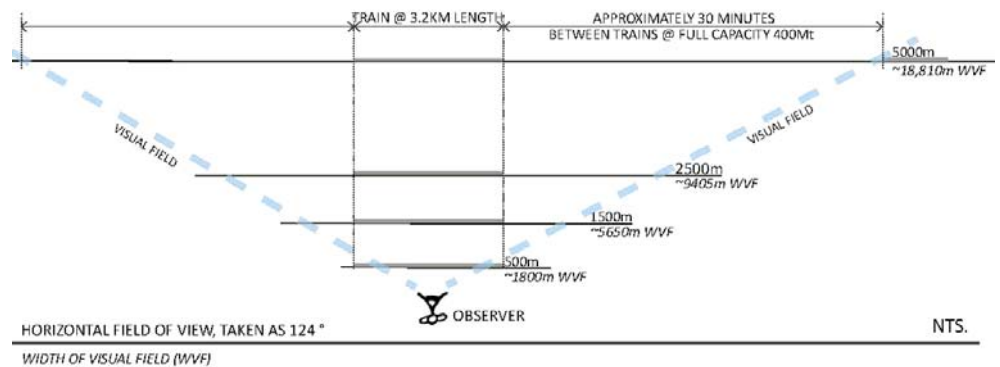
Visual assessment

Deals with potential effects on the visual resources of the setting from changes in the composition and quality of views, people's response to likely changes and the overall effect on visual amenity.

Visual buffering

An effect of mitigation in obstructing the view between the observer and the area being seen.

Visual impact	A positive or negative change to the landscape view of an observer.
Visual receptor	Physical landscape resource, viewer or special element that will experience a visual effect.
Visual sensitivity	The extent to which a landscape can change without unacceptable adverse effects on its visual character or scenic quality.
Visual perception	The human visual field occurs vertically at an angle 46° and horizontally at an angle of 124°, from front of head.



Visualisation	A computer simulation, photomontage or technique to illustrate the appearance of a proposed development.
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4 Visual Assessment Perceptions and Values

4.1 Common Perceptions and Values

Existing studies suggest that there are common visual aesthetic values and factors affecting visual perception that are likely to be consistent across communities.

Visibility	The degree of visibility is determined by whether a view is available and the nature of that view, for example: close or remote, moving or static.
Field of view	A normal binocular field of vision is considered to be 124 degrees, with a zone of visual acuity of 2.5 degrees. The process of recognising and observing an object or scene is complex and involves constant scanning, recognition and refocussing within the field of view; a process that is modified (narrowed) by viewer movement, for example: the speed of the viewer and secondary activities such as driving.
Distance	The greater the viewing distance, the less detail is observable and the more difficult it is to distinguish between the site and its background, diminishing the visual impact.
Relative elevation	Objects viewed against a skyline silhouette or at the edge of a break in slope are likely to have a greater visual impact than objects or changes viewed from an elevated location where features are viewed against a land backdrop.
Size, colour and form	The greater proportion of a view occupied by new features/activity, the greater the impact. Contrasting colours and forms increase the relative visual impact of change.
Activity	Movement of objects, including vehicles and reflection media, will increase impact.
Familiarity	Changes to a familiar visual setting, or where the viewer interacts with the setting, is likely to have a relatively greater visual impact on the viewer than changes to a setting that is rarely seen.
Complexity	Changes to a visually complex field of view with elements of varying scales and form are likely to result in lower visual impact than changes to a relatively uniform field of view.
Context	The extent to which the proposed development is in character with the existing land use and landscape character of the site will affect the perceived level of visual impact.
Weather conditions	The overall clarity of the view will affect visual impact, for example: the angle of the sun and the degree to which skyline silhouettes are masked by clouds.
Change	The degree of change in the view and the process of change will affect the degree of visual impact on the viewer.

4.2 Visual Character and Scenic Quality

Scenic quality relates to landscape character, which is largely determined by the intactness of the landform, vegetation cover and other qualities which are considered to be intrinsic to the location.

In terms of management for scenic quality:

- The visual character of the feature landforms and the visual dominance of the natural setting should be maintained;
- Where possible maintain foreground landform features as visual barriers to valley based development;
- Concentrate development on 'background' valley areas, not elevated ridgelines; and
- Maintain the open vista / large scale of scenic landscape views.

4.3 Visual Impact

Visual impact refers to the extent which a landscape can change without unacceptable adverse effects on its visual character or scenic quality. For the purposes of an impact assessment, visual impact is defined as a combination of the following:

Distance relationship of receptor to source

Distance zones indicate the spatial relationship between site facilities and community receptors. Distance is a measure of the visual intensity of the impact, the degree of detailed information and the experience a viewer is likely to receive. Distance zones are defined according to the nature of the proposal and receptor sites. Within the context of this study, the nature of the changes to the predominantly rural landscape have the potential to be clearly visible from large distances, but particularly foreground and middle ground where the impact of the likely visual change would be most apparent.

The following visual impact assessment measures have been adopted in this study. The distance to the project parameters have been varied between the mine, rail and coal terminal components of the project. These distance zones are based on the DTMR RLM 'Figure A3-3 Visual Sensitivity Matrix', except an additional zone has been established to embrace the broader context around the project, reflecting the scale of the project components and nature of the study area.

Foreground

- Dominant visual change to the landscape and landform characteristics
- Structure likely to be a dominant visual feature
- Clear appreciation of the form and size of corridor and vehicle movement
- Visual recognition of infrastructure
- Landform, vegetation, colours, surface textures and other landscape features are discernible to a detailed level.

Middle ground

- Obvious or dominant visual change to the landscape and landform characteristics
- Structure is a moderate to significant element within the view and may or may not be a dominant feature
- Infrastructure is generally not evident
- Views are more likely to be broken by foreground features
- Landform characteristics and the relationship between landscape features are clearly discernible.

Background

- Minor visual change to the landscape and landform characteristics
- Landform and vegetation silhouettes, overall form and scale is more visually prominent than individual landform features or surface characteristics
- Visual impact is partly dependant on weather, colour contrasts, and light conditions
- Low recognition of form and detail, including vehicle movement.

Context

- Almost no visual change to the landscape and landform characteristics
- Landform and vegetation silhouettes, overall form and scale is more visually prominent than individual landform features or surface characteristics
- Visual impact is highly dependant on weather, colour contrasts and light conditions
- Almost no recognition of form and detail.

In the assessment of the rail facility an extra distance zone has been added for areas immediate to this project component. This extra distance zone and shift of values for other distance zones have been made to account for the narrow width and extreme length of this project component. This additional distance zone is near-ground and covers the 0-500m distance zone for the rail, allowing the distance of 500m-1500m to be valued as 'foreground'.

Near-ground

- Dramatic visual change to the landscape and landform characteristics
- Structure likely to be a dominant visual feature in whole field of view
- Clear visibility of detail of the form, infrastructure, size of corridor and vehicle movement.

Nature of visual receptor

The visual receptors and their sensitivity are based on the DTMR RLM 'Figures A3-4 and A3-5', and have been adapted to include aspects of 'Figure A3-3' in the RLM, to be appropriate to the project, reflecting the scale of the components and nature of the study area.

High level sensitivity

- Designated state level parks, scenic reserves and major recreation trails
- Highways and major tourist routes
- Tourist facilities
- Town centres
- Residential properties (not rural)
- Rural residential properties that are sited to take advantage of existing landscape views.

Moderate level sensitivity

- Large volume regional link roads
- Secondary roads and recreational driving routes
- Major landscape dependant outdoor recreation facilities, i.e. golf courses
- Rural residential properties
- Schools and hospitals.



Low level sensitivity

- Local rural roads
- Farming properties
- Industrial land uses
- Local sports facilities.

5 Method of Study

5.1 Background Research

The visual assessment was compiled through initial desktop research and mapping, followed by a detailed site assessment. This remote research based approach included detailed assessment of aerial imagery and site photographs combined with topographic mapping data to understand the visual impact on the project area.

This visual assessment of the site's character has involved the analysis of electronic data, street directories, digital terrain models and preliminary electronic survey and control line models. This combination of research was intellectually analysed against a virtual 3Dimensional landscape model (created using the Mapinfo computer program) to provide an accurate base for this assessment.

A site assessment inspection was then undertaken to ground-truth the site, using the desktop research as guidance to viewshed and visual points of interest (receptors). This allowed the combining of desktop research; aerial observation of the mine, port and rail alignment and detailed ground observations around the mine site and port facility to be utilised in the preparation of this report.

5.2 View Shed Assessment

View Shed Modelling

To establish a visualisation of the views to the project a digital 3Dimensional model of the landscape was created of the mine, rail and coal terminal project components. This model was then analysed with MapInfo to create a series of view sheds for the mine and coal terminal components at strategic locations and for the rail alignment (at 1 km intervals).

Each of the view shed models were calculated through an inferred 'see and be seen' methodology effectively reverting the observed to be the observer by calculating vistas from the project components (refer to Figure 2.2a). Although this method is highly effective in finding view points to the project components, it should be noted that this method selects all possible view points even where people (observers) are not likely to occur. Understanding that limited numbers of people would access much of the project site, the evaluation of the visual assessment maps was used to identify locations (receptors) which are able to view the project components, which were then assessed in conjunction with site specific information and view points.

The elevation of the view shed source (project component) used was specific for each of the components based on an understanding of the specific machinery, stockpile or structure height. The observer was based on the elevation of the topography with an additional height of 1.6m to represent the average eye level of the observer. The presence of vegetation was not accounted for in this modelling due to limitations of the site survey data.

The individual view sheds for each of the project components were then combined to create the view shed sensitivity maps. In these maps the individual view sheds (what could be seen from each point/source) for each component were summed creating aggregated and combined view shed maps. These maps allowed the assessment corridor to be categorised by the quantity of individual view points that are observable from any location within the corridor.

5.3 Visual Impact Modelling

View Distance

The distance an observer is away from a project component, changes the visual impact due to that persons perception of distance. This is a result of the relative size and

proportion of the observable field of view that the project component fills; this proportion increases the closer the observer is to the project.

The assessment corridor (50 km from the project centre line) was divided into four (mine and port) and five (rail) distance zones representing near-ground (rail), foreground, middle-ground, background and context views. These zones were integrated with the view shed calculations, allowing observer distance to influence the visual impact assessment. This was then applied to the view shed modelling.

It should be noted that the effects of the curvature of the Earth over distance were not calculated into the visual assessment mapping; however this was found to affect views across flat topography and sea. This affect is most apparent over distances of greater than 7km as the horizon line obscures features at ground or a comparable level.



5.3a: This image provides an example of the effects of curvature of the earth and horizon line viewing the Abbot Point Port facility from Cape Upstart. The observer (camera) is at sea level with the port facility over 7 km away, resulting in the base of the object not being visible.

Visual Sensitivity

Visual Sensitivity is a combination of factors that affect how a site may be impacted by a view to a project component. This sensitivity combines the nature of the view source (receptor) with the character of the landscape between the receptor and the project component (source) and the ability for the view to accommodate change (absorption capacity).

Landscape Receptors

Landscape receptor sensitivity is a measure of the direct or indirect effects that the project may have on a landscape locality or place (refer to Appendix 1). Receptors and their sensitivity could include physical elements, landscape features and cultural sites combined with the nature of the activity undertaken at each of these locations and the number and concentration of people influenced. This type of site/receptor may be a National Park or reserve where people would go to observe the visual environment. In this situation, views to the project would have a high impact.

In comparison, a less sensitive landscape receptor could be a place with limited access, which is not visited regularly, or a place where the existing landscape is in keeping with the proposed project. For example, a town with current views towards mining activity would be considered as having a reduced or low impact if a mining-type activity were inserted beyond the existing view.

Visual Landscape Condition

Landscape condition is a measure of the physical status of the area and landscape. This measure is directly in line with people's perception of the landscape, rather than the direct visual impact or ecological values.

The project traverses landscapes that range from cleared grazing land with scattered trees, to wood land and forests, then to coastal plains. These landscapes being so diverse would be perceived differently by different people and communities.

Visual Absorption Capability

Visual absorbency is a measure of the area's ability to accommodate changes while maintaining the existing landscape character. An area with high visual absorption would have mixed land patterning or previous development; this combination would allow changes to be accommodated without a significant reduction in visual quality. If project components were located in an area of low visual absorption then the land patterning would have limited differentiation resulting in any change being apparent.

For example if a rail line were to be aligned through an area of dense expansive woodland the area cleared would be very obvious resulting in low visual absorption, the inverse of this would be a rail line in rural grazing land where there is limited vegetation and roads would define the land pattern, here the rail may appear as a road when viewed from a distance resulting in high visual absorption.

Visual Impact Assessment Process

The View Shed modelling that was prepared based on the 'see and be seen' concept were then refined incorporating the distance and visual sensitivity data to provide a ranking of the areas visible from the project components. This ranking then divided the visible areas into four visual impact zones. The ranking used for the assessment varied between the mine, rail and port due to the differing project components and board landscape types.

5.4 Visualisation of Site

Site Assessment

A site assessment was undertaken in the first week of June 2011 to 'ground truth' the visual assessment plans and data. This site work spanned the whole project scope from the air generally from an altitude of 500m with the port and significant areas at an altitude of 160m. These observations were then checked on the ground at the mine site and port with a GPS recording camera tracking image locations. The actual itinerary is shown below;

Tuesday 31/05

Fly to mine site, overflying area including Alpha and Jericho, recording homestead locations, topography and roads. Land at Emerald and drive to mine site and immediate area; Alpha, highway in front of mine, Bimblebox nature reserve, and selected homesteads at public road access points.

Wednesday 1/06

Fly along full rail alignment - mine to port, making observations and aerial photographs along the route including Collinsville and Alva, Land at Bowen and drive to sites around area; including Queens Beach.

Thursday 2/06

Drive to and conduct observations at; Abbot Point, Bruce Hwy rail crossing point, Cape Upstart National Park then fly back to Brisbane.

5.5 Policy Context and Framework of Report

This visual impact assessment has been undertaken following the DTMR RLM requirements for visual assessment as outlined in Section A-3 Visual Analysis and adapted to the specific requirements of this project. The report has also been structured to comply with the Co-ordinator Generals TOR.

In the process of this assessment assumptions have been kept to a minimum to increase the level of confidence in the process and report. In the case of site inspections only those areas identified in the visual analysis mapping were considered for inspection and

then only those localities or properties that could be assessed in the limited time available were checked. Based on the information gained from the site inspections the accuracy of the assessment mapping was confirmed and assumed to have a high degree of accuracy for the other locations.

As much of a visual assessment is judged on computer view shed modelling combined with assumptions about landscape value, it should be noted that due to limited population within the study region educated assumptions have been used to assess the visual landscape. Known values, and an understanding that this landscape is in moderate to good condition designate that this area be considered as having moderate scenic value that gains additional value as it gets closer to the coast.

The accuracy of the topographic modelling used in the report may have resulted in minor variation and anomalies as the base cell or pixel size was 90m square. This base unit size was based on the level of detail in the project Digital Terrain Model DTM supplied.

6 Regional Landscape Context

6.1 Regional Landscape Setting

The project is classified in the Road Landscape Manual (DTMR, 2004) as being located mostly within the region defined as 'Capricorn Uplands', the mid northern section of rail is within the Dry Tropical Uplands with the northern end of the rail and whole APSDA in the 'Whitsunday Coast' region.



Figure 2: Regional Context Map. Google Earth, 2006, background image with project components overlaid

Capricorn Uplands

This area includes the mine site and a large proportion of the rail corridor from the mine to north of Mt Coolon. The area is mostly cleared undulating grazing land with sparse development with few roads. Vegetation occurs mostly along creek lines or in the hills. Vegetation in this area is mostly sparse open woodlands/forests with a grass based understory and limited middle level shrubs.



6.1a: Capricorn Uplands, image by Tract Consultants, 2011.

Dry Tropical Uplands

This is a narrow section north of the Capricorn Upland that extend to near the Bogie River. This zone is more mountainous with more development and extensive forested areas. Both Collinsville and Scottville are in the section and attract mine and environmentally based tourism. Being more mountainous, the vegetation is taller eucalypt woodlands with isolated patches of rainforest.



6.1b: Dry Tropical Uplands, image by Tract Consultants, 2011.

Whitsunday Coast

This is the coastal region with steep forested hills surrounded by cleared farming land. This area is subject to coastal weather and has the highest density of development and tourism.



6.1c: Whitsunday coast region image by Tract Consultants, 2011.

The DERM Bioregions of Queensland are similar to the DTMR Road Landscape Manual areas comprising Desert uplands in the south-west, Brigalow Belt north around most of the project and a small area of Einasleigh Uplands (Refer to section 2.2).

Spanning almost 500 km the assessment corridor/area is approximately 5,000 square kilometres, the majority of which is sparsely populated. The broad landscape elements define the major visual features that contribute to the regional and sub-regional character of this corridor.

This visual character is shaped by scattered open vegetation, which displays the mosaic of plant types that is characteristic of the topography and soil types, combined with the impacts of low intensity grazing. In the sparsely developed areas that occur, this character is changed subtly with more cleared land patches and cropping patterns typical of rural areas.

The overall landscape is predominantly grazing with forested areas, the exception being the landscape surrounding Collinsville and Scottville (east of KP81) which exhibits the character of a past and continuing mine community. There are also a number of smaller mines scattered along the rail length.

The project area includes potential sensitive receptors both natural and constructed. These include the coastal wetlands near the APSDA, the Bruce Highway, Collinsville, Scottville, Alpha, National Parks, State Forest Parks and Conservation areas, privately owned homesteads and several road and river crossings (see list in Appendix 1). The broad vegetation historic regions are listed in the mapping at figure 3.

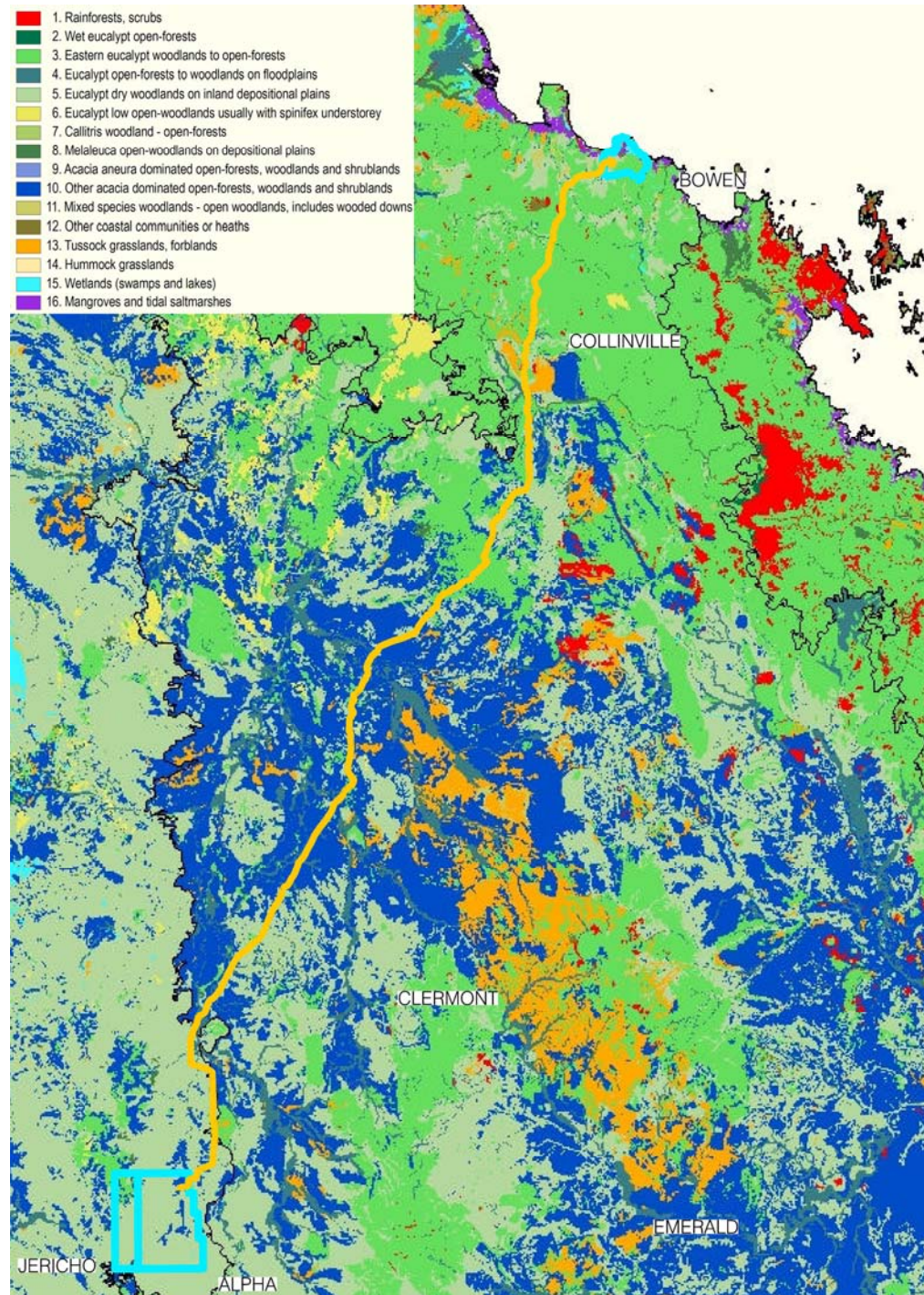


Figure 3: Broad Vegetation Regions – Pre Clearing Map. Queensland Herbarium DERM background image with project components overlaid.

7 Mine Facility

7.1 Visual and Landscape Character

The mine site is located within the Capricorn Uplands (Main Roads) which has a flat to low undulating landscape topographical character. This landscape is dominated by open woodlands, grasses woodlands, and cleared pasture lands. This landscape is punctured with the 'uplands' which include the Nerrien Range National Park to the north-east of the mine and Cudmore National Park, to the north-west.

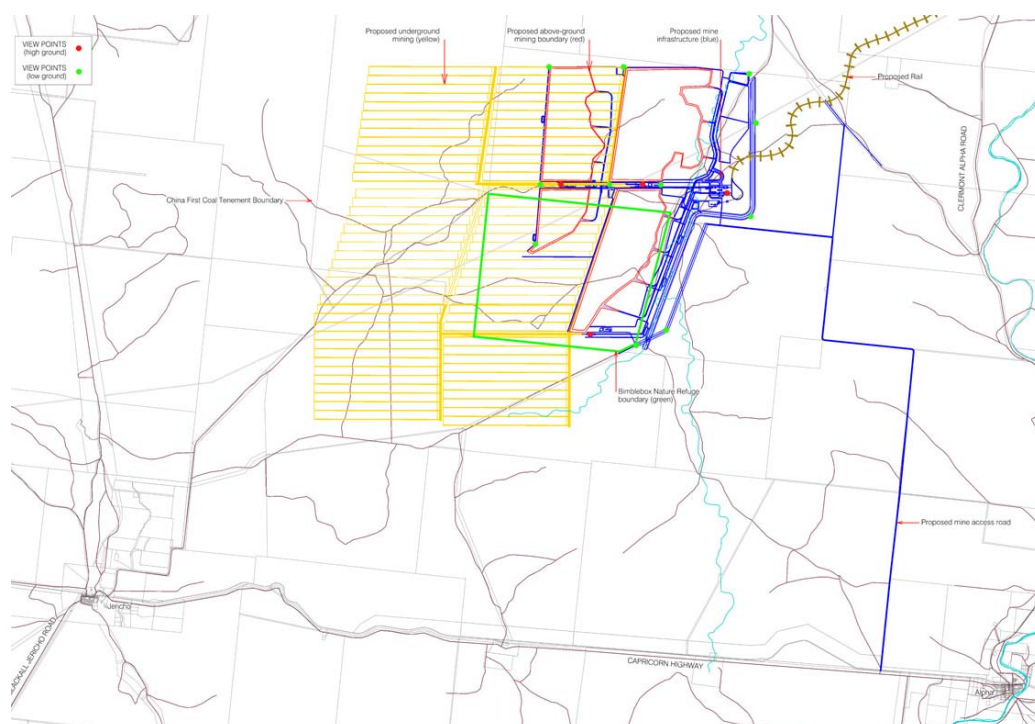
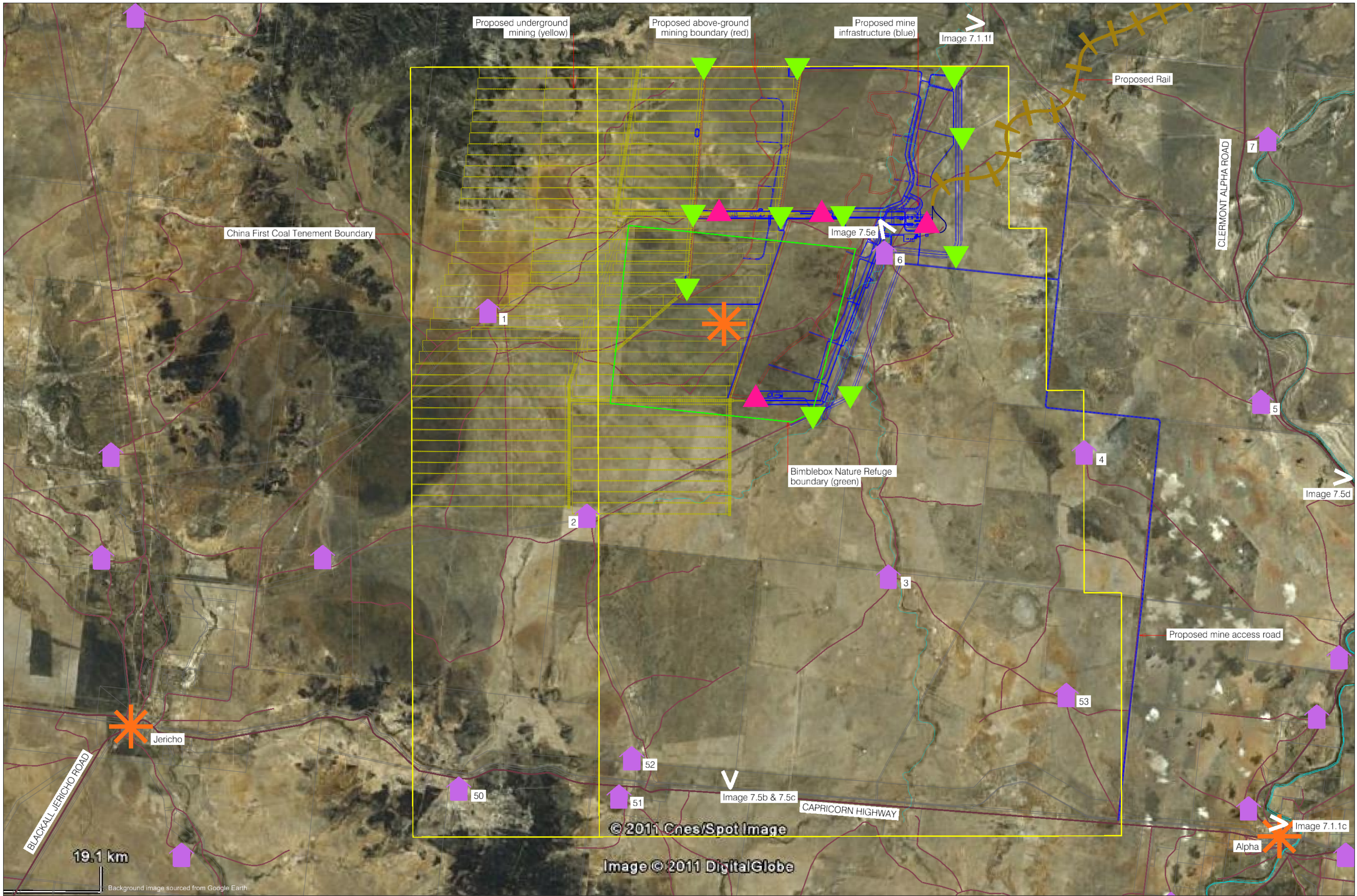


Figure 4: Mine proposed mine tenement with underground, open cut and facilities indicated, refer plan SA001.

The mine tenement is located north of the Capricorn Highway approximately 10km from both Alpha (north-west) and Jericho (north-east). The open-cut section of the mine site and infrastructure is situated 17km north of the Capricorn Highway, approximately 25km of Alpha (north-west) and Jericho (north-east), the 8,000ha Bimblebox Nature Refuge is near the centre of the mining tenement.

The landscape character in the location of the open cut section of the mine, is a combination of cleared pasture (to the north), and low-intensity grazing lands with woodland and intermittent waterways (to the south). The land above the underground section of the mine covers all landscape characters present in the Capricorn Uplands, however as this shall not be seen, this section of the mine is not included in this assessment.

As a vast landscape with few inhabitants, the following locations were identified as being areas of public use and as having the potential of being visually effected by this project component, thus becoming landscape receptor points.



7.1.1 Landscape Receptors

Bimblebox Nature Refuge



7.1.1a: View of north-east corner of Bimblebox Nature Reserve, image by Tract Consultants, 2011.

The land within and surrounding the proposed mine site is predominantly used for low intensity grazing and has been cleared, resulting in a grasslands with some low shrubs and scattered trees. The exception to this is Bimblebox nature reserve which is within the footprint of proposed mine site. Bimblebox Nature Refuge is composed of remnant vegetation of the area and has been reserved for long-term research into a land management practices with low intensity grazing and biodiversity conservation.

Capricorn Highway

Situated approximately 17km south of the mine, the Capricorn Highway is the main transport route from the Northern Territory through Central Queensland to the Central Queensland Coast. It is sparsely vegetated with dry open woodland and pasture on the approach to Alpha from Emerald, which allows for long views and is densely vegetated for most of the distance between Alpha and Jericho allowing shorter views.



7.1.1b Capricorn Highway looking towards mine tenement, image by Tract Consultants, 2011.

The Capricorn Highway east of Jericho and west of Alpha passes over low ridges potentially screening the mine from the towns.

This highway is used by locals to the region, tourists, road trains, mine workers and army convoys.

Clermont Alpha Road

This roadway sits parallel to the east of the tenement and links Alpha to Clermont and Mackay. It is predominantly used by locals of the area to access properties and as a tourist short-cut. At its closest point at the east edge the proposed mine will be situated at approximately 12km from this roadway, over a low ridge.

The road is sealed and just larger than 1 lane in width, with areas of close bushland and open pasture. There has been a recent widening effort, which has offered a vast area of open dirt and mud along both sides of the sealed roadway, leaving the visual character of this road in an obvious process of change.



7.1.1c: Image from edge of Clermont Alpha Road looking towards the mine tenement, image by Tract Consultants, 2011.

Alpha

The small town of Alpha creates a left hand turn on the Capricorn Highway approximately 10km to the south-east of the proposed mine. First settled in 1884, Alpha was settled for beef production and named after the Alpha Pastoral Station. This town grew in size from 1887 when it was connected to Rockhampton by rail and continued to grow until 1954.



7.1.1d: Alpha looking out of the town to the west in the early evening, image by Tract Consultants, 2011.

The major views in this town occur along the major roads which are limited due to each of them curving just outside of the town. The Alpha Creek, with its prone to flooding, provides a mass of vegetation to the north, east and south of the town and a large area of open woodland vegetation along the Clermont Alpha Road to the north-west is visible from the town.

This town maintains a Queensland country town feel with emphasis on its main street, Shakespeare Street, which runs off the Capricorn Highway. This main street maintains this character through wide overhangs to shops, mostly timber structures and the classic two story timber pub (although vacant) existing in the streetscape. Behind the main street housing is predominantly timber and cement sheet with a few brick properties. The wide streets are normally quiet with low volumes of traffic.

Jericho

The town of Jericho sits to the south of the Capricorn Highway and is approximately 25km to the south-west of the proposed mine site. Its settlement dates from 1885 and became the Municipal centre for Jericho Shire in 1917 which included Alpha.

The major views in this town occur along the rail line, with all other views limited by massed surrounding vegetation. The town has a Queensland country-town character and offers a vegetated mass to the north in the larger pasture / open woodland broad landscape character.



7.1.1e: Jericho from above looking east, image by Tract Consultants, 2011.

Homesteads

Within this region there are 38 known existing homesteads, of which 30 occur outside the mine tenement. Two will be directly affected by the open cut mine and rail facilities.

Monklands (Homestead 6)

Monklands sits within the open cut section of the mine tenement, it appears to sit within a bend of a nearby creek.



7.1.1f: Monklands (in left bottom corner) is in close proximity of the Bimblebox Nature Refuge, image by Tract Consultants, 2011.

Hobartville (Homestead 8)

Hobartville homestead is located 5km to the north-west of KP457 It is a cleared house site with woodland to the southern and western edges.



7.1.1g: Hobartville entry gate (to the right back), image by Tract Consultants, 2011.

7.2 View Shed

The visual assessment virtual modelling of the mine was represented using 11 low level view points and 4 high level points which were located at strategic locations within the mine facility plan (refer to plan SA001). These points have been divided into low and high points with the low points (green triangles on plan SA001) located around the perimeter of the open cut batters, staff facilities and rail infrastructure at a level 6m above the topography. The high points (red triangles on plan SA001) have been located at expected stockpiles and loading facilities at a height of 40m above the topography.

View shed models were then created for each of the 15 points, and aggregated to give a total impression of the visual impact area. This assessment allowed areas surrounding the mine (at 1.6m above the topography) to be categorised by the number of the 15 mine view points that could be seen. The viewing shed was calculated to a distance of 50km as the limit of the study corridor.

A two dimensional representation of the view shed model showing the number of visible points from all locations within 50km of the proposed mine is provided in plan SA002. This plan has been produced with a fifteen colour gradation from blue to dark red, which highlight those areas that can see or can be seen by the mine facility, with red representing those area that are the most visible (refer to plan SA002). As a maximum the highest number of points that can be seen from any location is 15 view points, representing the entire mine facility and high visual impact.

7.3 Visual Sensitivity

The mine site has the most significant impact on the landscape but is the least visible of the project components due to the location and isolation while within a wide valley within the surrounding topography, and the nature of the operations.

The features associated with the mine are expected to be large open cut mine pits, various single level facility buildings, coal stockpiles, conveyers, vehicles, and overburden stockpiles. The most obvious feature of the site from outside the mine complex is expected to be the overburden and coal stockpiles that may reach to 40m in height, which is well above the existing tree line.

Dependent on visual buffering, the mine will be of high visual significance within 5km, but would rapidly diminish further from the site. The view shed models use the following distances in assessment.

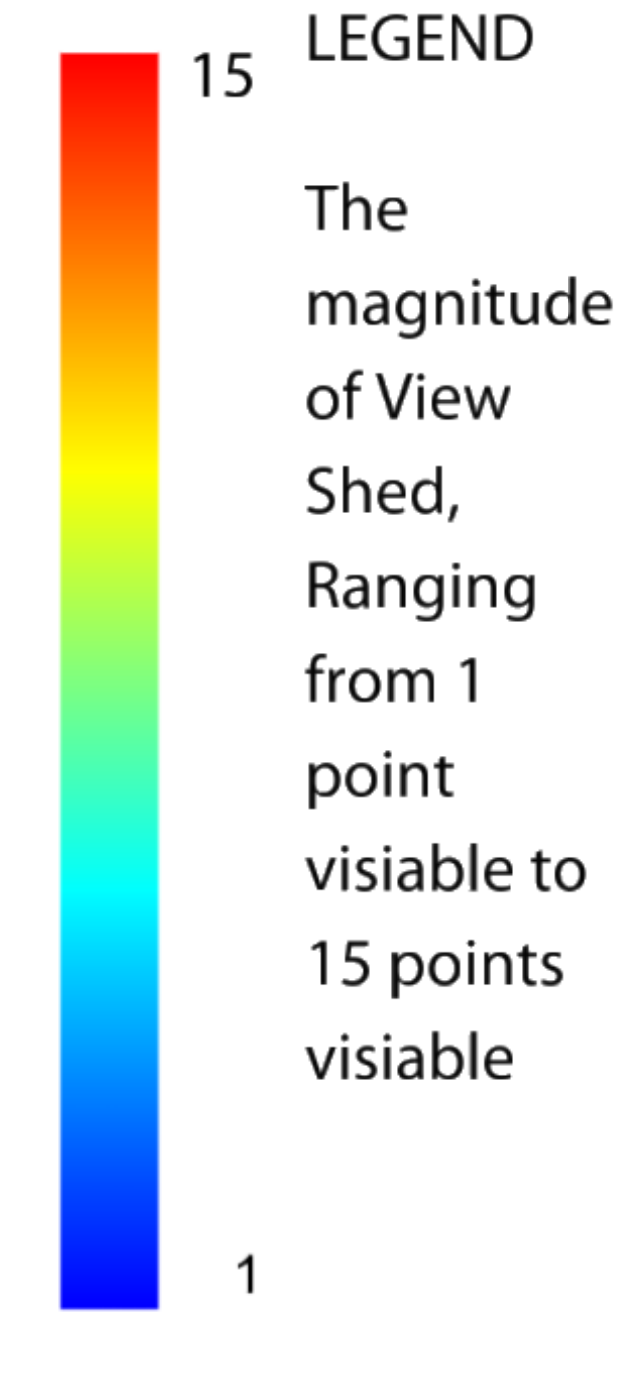
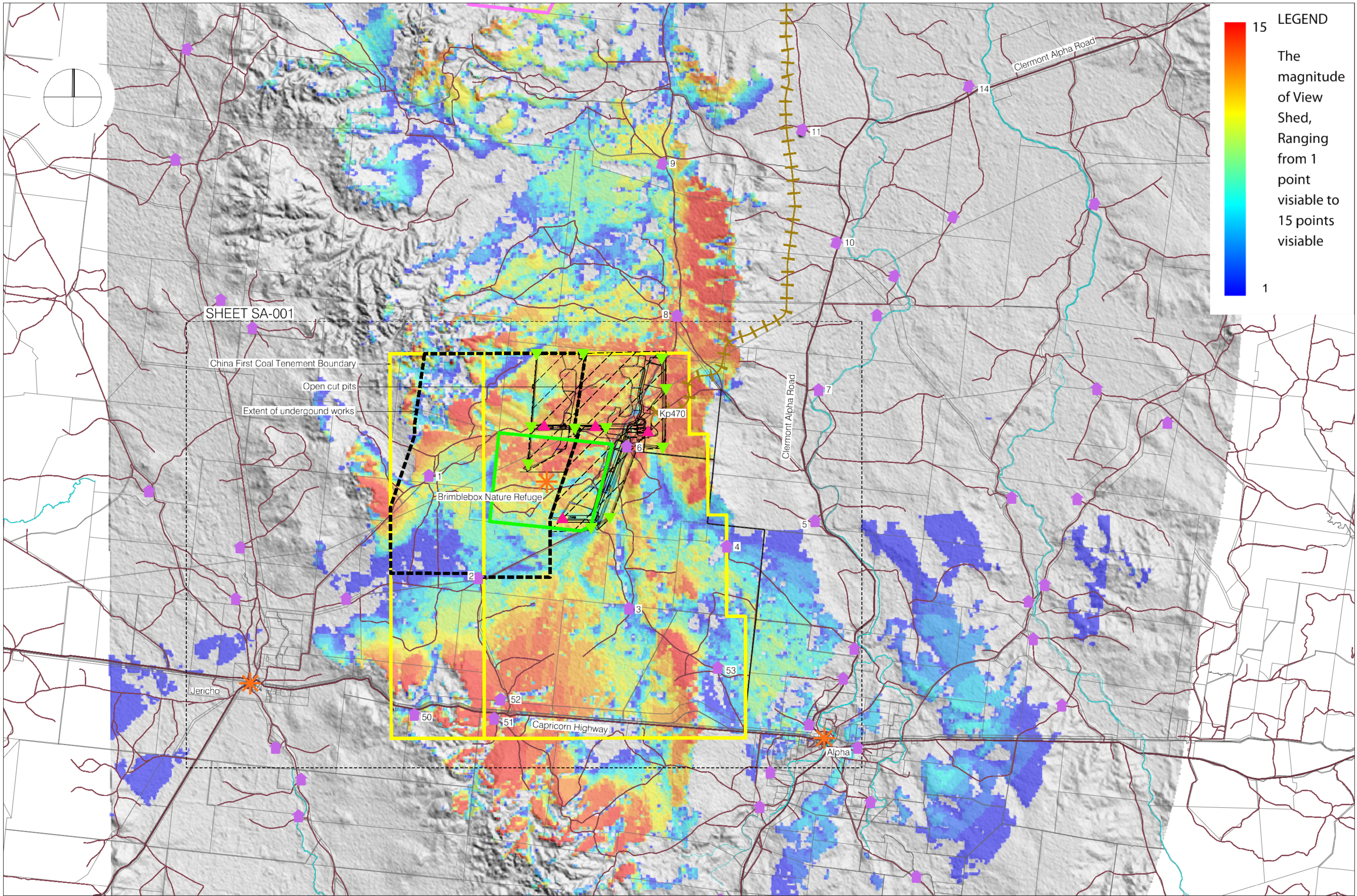
- Foreground.....locations within 5km of the site
- Middle-ground.....locations between 5km and 10km from the corridor
- Background.....locations between 10km and 20km from corridor
- Contextlocations between 20km and 50km from corridor

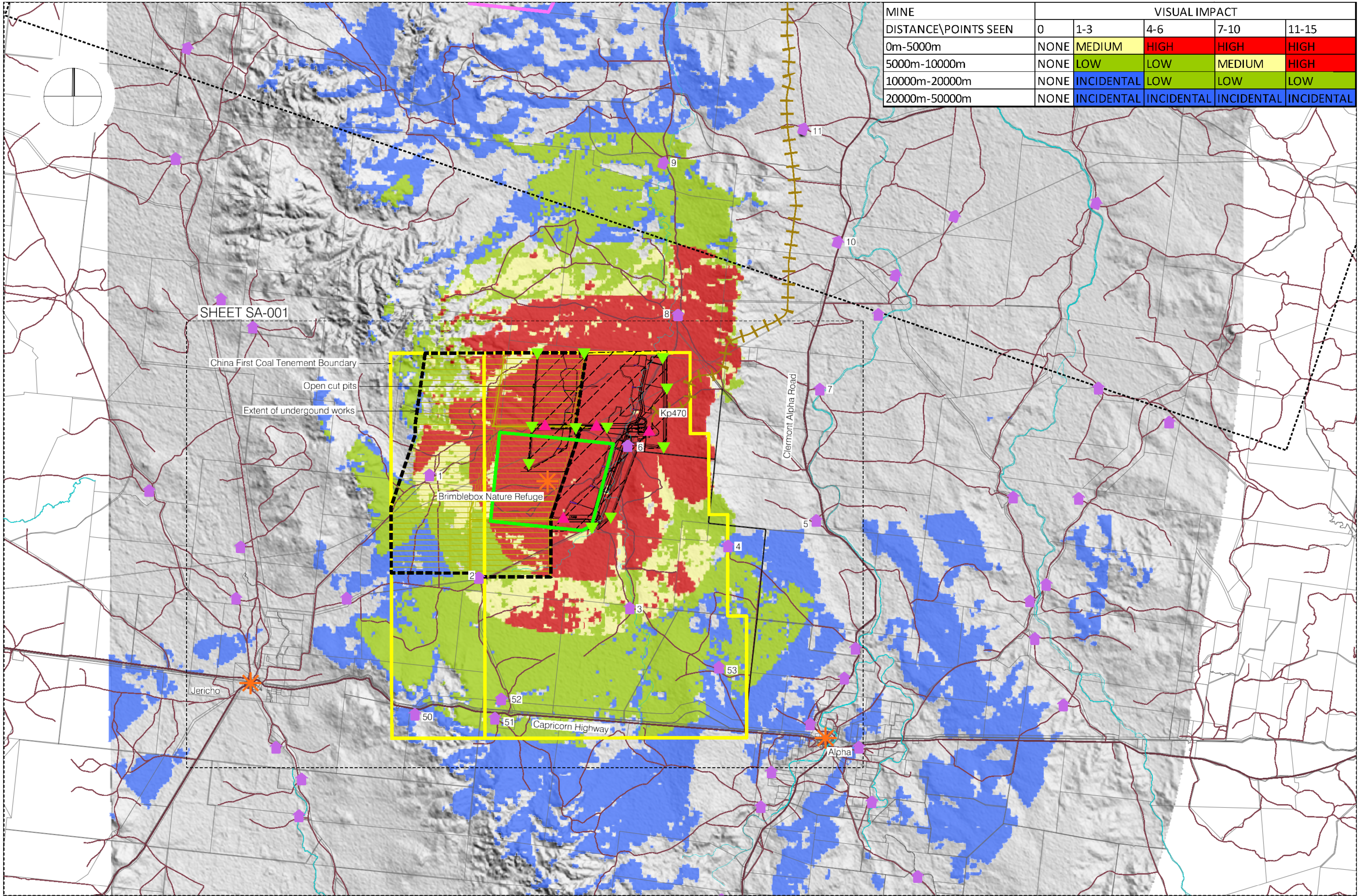
7.4 Visual Impact

To account for the distance from the mine facility and the resulting reduction of the perceived impact, the following distance criteria were used to adjust the visual assessment based on the four distance parameters (discussed in section 3.3.1). Due to the scale of the mine site and infrastructure, the foreground distance was taken as 0km to 5km with the other distances extending from 5km out to 50km (Refer to Plan SA003). The number of points visible has also been considered in compiling the visual sensitivity plan with the resulting impact being a combination of distance and quantity of points seen. Impacts are then coloured on the plan as shown in the table below.

Table 1: Visual Impact of Mine.

MINE DISTANCE/ POINTS SEEN		VISUAL IMPACT			
	0	1 to 3	4 to 6	7 to 10	11 to 15
0km-5km	NONE	HIGH	HIGH	HIGH	HIGH
5km-10km	NONE	LOW	LOW	MEDIUM	HIGH
10km-20km	NONE	INCIDENTAL	LOW	LOW	MEDIUM
20km-50km	NONE	INCIDENTAL	INCIDENTAL	INCIDENTAL	LOW





MINE DISTANCE\POINTS SEEN	VISUAL IMPACT				
	0	1-3	4-6	7-10	11-15
0m-5000m	NONE	MEDIUM	HIGH	HIGH	HIGH
5000m-10000m	NONE	LOW	LOW	MEDIUM	HIGH
10000m-20000m	NONE	INCIDENTAL	LOW	LOW	LOW
20000m-50000m	NONE	INCIDENTAL	INCIDENTAL	INCIDENTAL	INCIDENTAL

7.5 Visual Assessment

The mine is the most isolated component of the project and has the most significant impact on the visual character of the immediate area in which it is placed. The mine components encompassing the open cut mine pits, mine entrances, tailings mounds, rail terminal and infrastructure are all located in a shallow valley being the Galilee basin, with Alpha 30km east, Jericho 25km west and 17km north of the Capricorn Highway (although the full tenement crosses south of the highway).



7.5a: View of the northern edge of the open cut mine site. Northeast corner of Bimblebox Nature Reserve is visible with the Monkland's homestead in the bottom right corner, image by Tract Consultants, 2011.

This component of the project will create significant changes to the visual characteristics of the existing landscape. The current landscape type is of a rural pasture and open woodland which will be totally changed to a character of mining and industry within the facility and open cut section of the mine.

Lighting

The visibility of the mine, including vehicles and processing machinery will be amplified during night-time operations due to lighting. It is assumed that due to the facility, vehicle and security lighting of the whole CHPP could present a high visual impact to the surrounding landscape. Without careful design, this facility could create a light-pollution 'glow' which could be seen from vast distances above the landscape elements that block any visibility of the mine during the day. These impacts could be reduced if lighting is specialist designed and installed to minimise light spill both horizontally and vertically.

Vehicular movement also poses an issue in light pollution, with the increase of vehicles using the area adding to the total light output at night. Mitigation measures, policy for drivers and road routes could be used to alleviate this situation.

National Parks, Refuges and Reserves

The surrounding National Parks and Reserves were found to have incidental to no impact due to their distance from this project component and their limited access and visitation.

The Bimblebox Nature Refuge will have an extreme physical impact from the open cut mine and its associated infrastructure, but also a high visual impact for the remainder of the refuge. It is expected that this refuge will not be able to exist in its full capacity of ecological/pastoral research if this project occurs in its current form. Even with the shifting of the open cut section of this project component, this refuge would experience a high visual impact.

Roads and Rail

Along the Capricorn Highway it is expected that incidental to no visual impact will occur. This is evaluated using the visual assessment modelling which indicates low to incidental impact, combined with the 'ground truthing' exercise which established that vegetation, views north of the highway are limited. In situations where low impact could occur, such as along cleared sections of the roadway, mitigation measures could be used without diminishing visual character.



7.5b: Roadside vegetation along the Capricorn Highway, image by Tract Consultants, 2011.

A low range of hills to the west, results in the mine facility infrastructure (as the major component) being the most visible to people using the Capricorn Highway east of Jericho. This view would offer a low to incidental visual impact on the existing landscape visual character due to the distance at which this view is gained. This impact is expected due to the area being low to flat grasslands with scattered trees allowing for

only low to medium visual absorption, and is expected to result in incidental to no visual impact.

The major visual impact along roadways is expected to be confined to the mine entry roadways, and along access road from the Capricorn Highway where vehicular movement is expected to increase dramatically and road widths increased to allow for this increase. Through increasing width and sealing these country roads the visual landscape character of these places would be impacted.



7.5c: Manipulated image of roadside vegetation along the Capricorn Highway with background vegetation deleted and mine infrastructure inserted (taken at 17km distance). Due to massed low to mid-canopy vegetation infrastructure cannot be seen, original image by Tract Consultants, 2011.



7.5d: Manipulated image of roadside from Clermont-Alpha Rd where limited vegetation occurs. Mine facilities could be viewed against the horizon if techniques of visual buffering are not utilised, original image by Tract Consultants, 2011.

Towns

Although found to have incidental to no visual impact, the country towns of Alpha and Jericho will have significant indirect visual impact to their existing visual character. It is expected that with greater numbers of people from the mine passing through, using and settling for the short term in the town, these towns would experience a 'boom' creating a situation of development and change.

Homesteads

Several homesteads are directly affected by this project component and will be visually impacted by both direct visual access to the mine, and visibility of the vehicles moving to and from the site. Of the 46 homesteads within the mapped region, ten were found to experience a visual impact.

Monklands (Homestead 6)

This homestead will be severely impacted by the proposed development and it is expected that this homestead will need to be relocated due to its location in the landscape. If it were to stay in its existing location, it is expected that mitigation measures would be unable to reduce the high visual impact created by the mine.

Hobartsville (Homestead 8)

At 3km north of the mine site, 'Hobartsville' would have a high visual impact from the mine proposal, however through mitigation measures this place could have a much reduced visual impact.

'Cavendish' (Homestead 1) was found to have a medium impact, and seven homesteads (Appendix 1) would have a low visual impact. Each of these places are expected to have a much reduced impact with the use of mitigation.

General

The mine site component poses another form of visual impact in the form of dust-clouds produced from normal mine operations. This form of impact is almost impossible to quantify due to the wind considerations and the effectiveness of environmental management measures on site.

Another landscape feature which adds to the overall visual landscape character is the presence, colour and movement of fauna. It is assumed that birds occur throughout the site due to the permanent water supplies of the surrounding creeks system. It is expected that the changes in the landscape character shall have an affect on the fauna populations therefore affecting the visual impact.



7.5e: Semi-permanent water way within the suggested open cut mine site was found to have a high value landscape character and offer habitat for many bird species, image by Tract Consultants, 2011.

8 Rail Facility

8.1 Visual and Landscape Character

The rail corridor passes through a range of landscape and vegetation types embracing the Capricorn Uplands (R1 – KP470 to KP175), Dry Tropical Uplands (R2 – KP175 to KP48) and the Whitsunday Coast (R3 – KP48 to KP0). This 470km journey, has been divided in to these three sections to define the topographic and land use changes that occur between the mine and APSDA. (The mine is at KP470 and coal terminal at KP0)

8.1.1 Capricorn Uplands (R1 - KP470 to KP175)

Capricorn Uplands region is mostly flat to low undulating grasslands, woodlands and forests. Limited mining activities occur in this region combined with various levels of grazing. Also present are several National Parks, reserves and refuges.

In this section the corridor passes through predominantly rural land with flat to gently undulating topography. Due to the topography the line will be visible to the largest geographical area but also the least inhabited area.



8.1.1a: A Flat to low undulating landscape typical of the landform near the proposed mine site, image by E3 consultants at KP415.

8.1.2 Dry Tropical Uplands (R2 – KP175 to KP48)

The Dry Tropical Uplands region features undulating to mountainous grasslands and sparse forests. This basalt gorge country has a rural landscape character with mining interests within the area. This bioregion consists of a series of ranges, plateau, valleys, containing nature reserves and eight national parks.

As the rail alignment passes through both mountainous sites and nature reserves, it becomes open to views and potentially negative visual impacts from these sites. However, as many of the nature reserves are National or State Parks dedicated to fauna/flora protection they have limited visitation, reducing the magnitude of any visual impact.

8.1.3 Whitsunday Coast (R3 – KP48 to KP0)

The Whitsunday Coast region has a wet coastal landscape with forested hills, mountains and scenic offshore islands. This region possesses extensive natural areas with coastal towns and tourist developments.

The rail line curves around Mt Roundback, before crossing under the Bruce Highway which will be raised on an overpass structure. It then turns south-east to the coal terminal component, bisecting the North Coast Rail line. In this area the rail will be seen by the greatest number of people especially from the Bruce Highway and North Coast Rail.

8.1.4 Landscape Receptors

This is the largest project component section which offers a huge potential for visual access, however, due to the location and alignment, this section does not offer many landscape visual receptors. The following places were identified as having a possible visual impact from the proposed rail component.

Cudmore National Park (KP402)

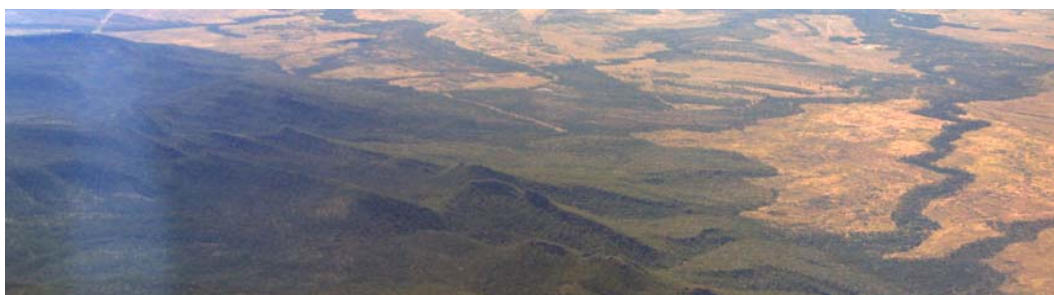
Cudmore National Park is situated north of the proposed mine, and 20km west of the rail component of the project. This national park is noted as a place of visitation by bird watchers (Birds Australia, 2010), however there is no formal visitor accommodation infrastructure or access to water which restricts the visitor numbers to the site. The park's topography is higher than the surrounding landscape, through vegetated with rocky escarpment the topographic character and dense vegetation would inhibit views from the site.



8.1.4a: Looking to Cudmore National Park, landscape visual character indicates rocky terrain, image by Tract Consultants, 2011.

Narrien Range National Park (KP417)

Narrien Range National Park sits approximately 35km to the east of the proposed project site and is a distinctive topographical feature of the surrounding landscape. This site is described as having poor public access and limited accessible water, and is not listed as a popular recreation or tourist destination. DERM has also noted that it shall not be promoting the park's recreational use in the future.



8.1.4b: From above Narrien Range National Park looking towards the mine tenement site, image by Tract Consultants, 2011

Clermont Alpha Road (KP470)

The proposed rail alignment sits at approximately 3km to the west and runs parallel to its path for about 20km of this rural roadway. The landscape character along this section includes wide pastures, native vegetation and regrowth vegetation. Sections of this road have existing vegetation buffers measuring from 0 – 300m.

Gregory Development Road (KP285)

Gregory Development Road connects the Gregory Highway in Central Queensland (starts at Emerald) to Charters Towers in North Queensland. This road is to cross the proposed rail component of the project as an overpass just north of Pelican Lagoon at KP285. As the major central route from north to south in central Queensland it is travelled by locals, tourists and road trains.

The landscape surrounding the crossing point of the Gregory Development Road is of open woodland and cleared pastures offering vast views.



8.1.4c: Gregory Development Road (in front bending to right) with Pelican Lagoon in background, image by Tract Consultants, 2011

Suttor Development Road (KP202)

The Suttor Development Road links the Bowen Development Road (to the north) at Mt Coolon with Peak Down Highway (to the south). The proposed rail alignment will intersect this roadway and create an overpass approximately 10km from Mt Coolon, at KP202. It is understood that this road is predominantly used by locals to the area.



8.1.4d: Suttor Development Road sits within an open landscape (image taken at rail crossing point), image by Tract Consultants, 2011

The visual landscape surrounding the crossing point is dominated by grasslands with small scatterings of trees and topography that is of low rolling hills. This landscape allows for large views at the crossing site to the wider area. Movement of the trains and the overpass will be obvious at this location.

Mount Coolon (KP200)

With a population of 75 Mt Coolon, the town sits 9.2km north-west of KP200. As the town has a long history with Gold mining, it is part of the “Bowen Coalface towns” which was recently listed by the Queensland Heritage Council with an aim to conserve it as a living museum and tourist attraction. The Town of Mt Coolon is also associated with Collinsville and Scottsville, both of which are in the rail section R2. The three towns are collectively marketed as a heritage mining tourist experience.



8.1.4e: Mount Coolon from above, image by Tract Consultants, 2011

Bowen Developmental Road (KP168)

Bowen Development Road is situated between the Gregory Development Road and the Bruce Highway, travelling over 200km from Central Queensland to the Central coast and linking the towns of Mt Coolon and Collinsville. It crosses the rail component of the project as an overpass at KP168 just north of Bulgonunna Peak and about 35km from Mt Coolon.

The land surrounding the rail/road overpass is extensively vegetated and gently undulating. The road is unsealed and used by locals and tourists.



8.1.4f: Bowen Development Road above proposed rail crossing point (between bend and dam), image by Tract Consultants, 2011

Collinsville and Scottsville (KP81)

The town of Collinsville was first settled in 1861 and opened for pastoralists and cattle stations. The first coal was discovered in 1866 with the mining industry growing resulting in the government in the 1920's designing the town to service the developing coal industry in the area. The town of Scottsville was originally established as a company town for the coal industry in 1920.



8.1.4g: Collinsville and Scottsville (both left top corner) looking from proposed rail site over separating mine image by Tract Consultants, 2011.

As the rail continues north, it passes the regional town of Collinsville (Population 2063) located approximately 12km west of KP80, and the small mining town of Scottsville approximately 11km south-west of KP81 (just past Collinsville).

Both Collinsville and Scottsville are listed as “Bowen Coalface Towns” by the Queensland Heritage Council.

Bruce Highway (KP5)

The Bruce Highway is the major link between North and Southern Queensland and crosses the rail component of the project near Splitters Creek. It is understood that the highway will cross the rail as an overpass. This being the major road in the region is extensively used by locals, tourists and freight vehicles.

At the crossing point, the visual landscape consists of open grasslands with scatterings of woodland vegetation with views to mountains and rocky outcrops.



8.1.4h: The Bruce Highway (grey strip from top left, to mid-side right) at the rail crossing point which occurs just left of the creek (in white/silver), image by Tract Consultants, 2011



8.1.4i: Vista from Bruce Highway driving within the APSDA, (towards Bowen) at location of rail crossing overpass, image by TRACT Consultants, 2011.

Homesteads

There are 25 known homesteads within this project component area to be visually effected, however only six within the 1.5km “foreground” boundary, and only one within the ‘near-ground’.

Surbiton (Homestead 11)

The rail will pass 1.4km to the west of this property and be clearly visible across the low-lying terrain. This property will be separated, by the rail alignment, from its north-west access road and a large dam along this road.

Mirabilla (Homestead 18)

Passing 1km to the west of this homestead, the rail will sever a number of the properties informal access roads, but also the Laglan Pioneer Road which sits to the north of this property and connects to the closest neighbouring homesteads (Homestead 15 and 17). This property is part of the larger property ‘Riverview’ (Homestead 19).

Homestead near to McGregor Peak (Homestead 60)

Nestled at the base of McGregor Peak, this homestead would share its valley with the rail alignment, which would be situated 300m to the west. This property has its main entry way to the north-east of the main house which connects to Strathalbyn Road which will be crossed by the rail alignment.

Homestead near to Mt Mackenzie (Homestead 61)

This homestead is located approximately 10km from the peak of Mount Mackenzie and within 1.5km of the proposed rail alignment. It is surrounded by a predominantly cleared landscape, with little vegetation scattered to the south where a river meanders. Glenore Road, the main access to this property, shall be intersected by the rail.

Salsbury Plains (Homestead 45)

Situated within the Abbot Point State Development Area, the Salsbury Plains Homestead sits within 1km of the rail ‘loop’ opposite the proposed coal stockpiling facility.

Caley Valley (Homestead 48)

Covered in Port section ‘Visual Receptors’

8.2 View Shed

The visual sensitivity plans were calculated to highlight the areas around the rail alignment that can be seen from the corridor. Viewing points were made along the alignment at a height of 5.1m (combined locomotive and rail profile), looking to a level 1.6m, (average eye-height), above the topography for every 1km along the 470km rail line. At the four major roads crossing overpasses the viewpoints were adjusted to a height of 9m above the topography to represent the level of the bridge deck and vehicle passing over the rail.

View shed models were then created for each of the points and aggregated to give a total combined impression of the view shed. This assessment allowed areas to be categorised from high to low visual impact from the number of view points seen along the alignment length, this translates as the amount of alignment that can be seen from the surrounding landscape. The viewing distance was limited to a distance of 50km for the purposes of the study being the extent of the study corridor.

Due to the length of the rail alignment and flat to undulating topography, making allowance for the curvature of the earth was considered. In assessing the view shed maps this data adjustment was not used, as it was found to incorrectly account for the existing topography and view heights.

8.3 Visual Sensitivity

The rail assessment possesses the narrowest corridor of visual sensitivity with the alignment passing predominantly through un-vegetated areas. The majority of the alignment is expected to have low visual impact as for the majority of the time it is a low profile line that follows the topography with occasional vertical elements being signals, level crossings and bridges. These features are not expected to be highly visible and therefore have only a significant impact for those developments very close to the line.

When trains are passing along the rail, through the landscape the visual impact will increase. At close proximity the view will be significantly changed while from a distance the movement will be most apparent.

In the view shed models the following distances were used:

- Near-ground locations within 500m of the corridor
- Foreground locations between 500m – 1500m of the corridor
- Middle-ground locations between 1500m – 2500m from the corridor
- Background locations between 2.5km – 5.0km from corridor
- Context locations between 5.0km and 50km from corridor,

and the following sensitivities were attributed to view receptors:

- High red shading
- Medium yellow shading
- Low green shading
- Incidental blue shading.

8.4 Visual Impact

The duration or size of a feature affects the visual sensitivity and perception of the viewer to the visual impact. In this case the feature most visible would be the rail line where exposure could range from a single point of visibility, to spanning the whole visual field.

The rail view shed has been calculated at 1km intervals along the alignment and then combined to yield the visual impact (refer to plans SA004 – SA010). These plans have been produced with a colour gradation from blue to dark red, which represent those areas that can see the alignment. As a maximum, the highest number of points along the rail that can be seen from a location along the corridor is 88 points (KP's) representing 88km of exposure. This impact of sensitivity, although expressed as a single distance, may be broken into multiple segments.

The presence of trains will increase the visual impact but only for a short duration 134 times a day at full capacity (as outlined below). This indicates that unless the visual receptor is located in the near-ground or foreground of the track there will be limited visual impact experienced from the movement of these trains across the landscape.

In the information provided the train movements at the 400MtPa Maximum capacity are assumed to be:

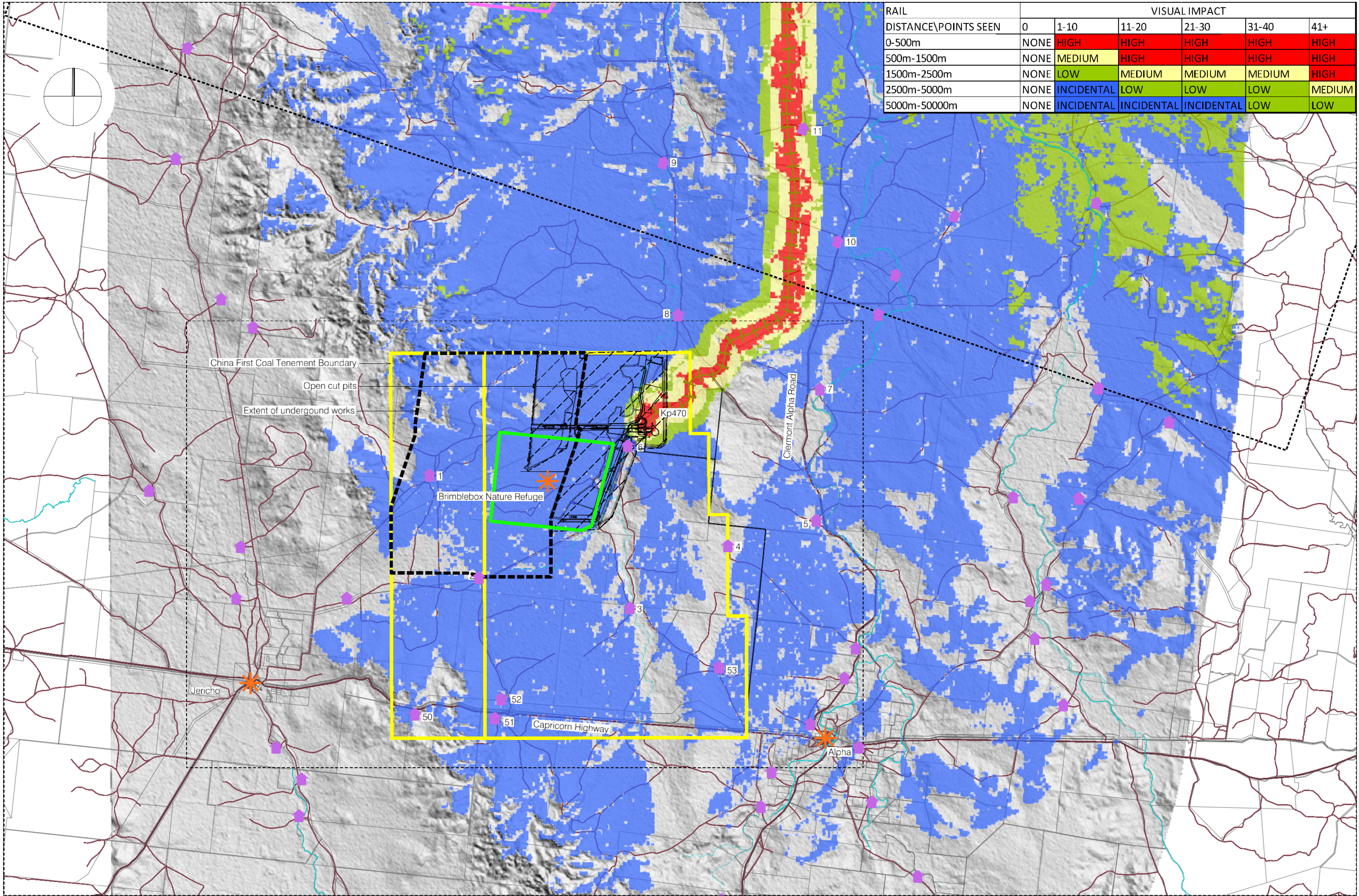
- 2 parallel rail lines each carrying both full and empty trains,
- 67 trains each way, assuming 300 days operation,
- A maximum of 16 passing loops,
- Passing bays of at least 3.5km long,
- Each train being approximately 3.2km in length,
- Trains travel at a maximum of 80km/h (loaded), and 100km/h (empty),
- This relates to 134 trains a day with a train passing any point every 22 minutes.

Each train will take approximately 1.5 minutes to pass.

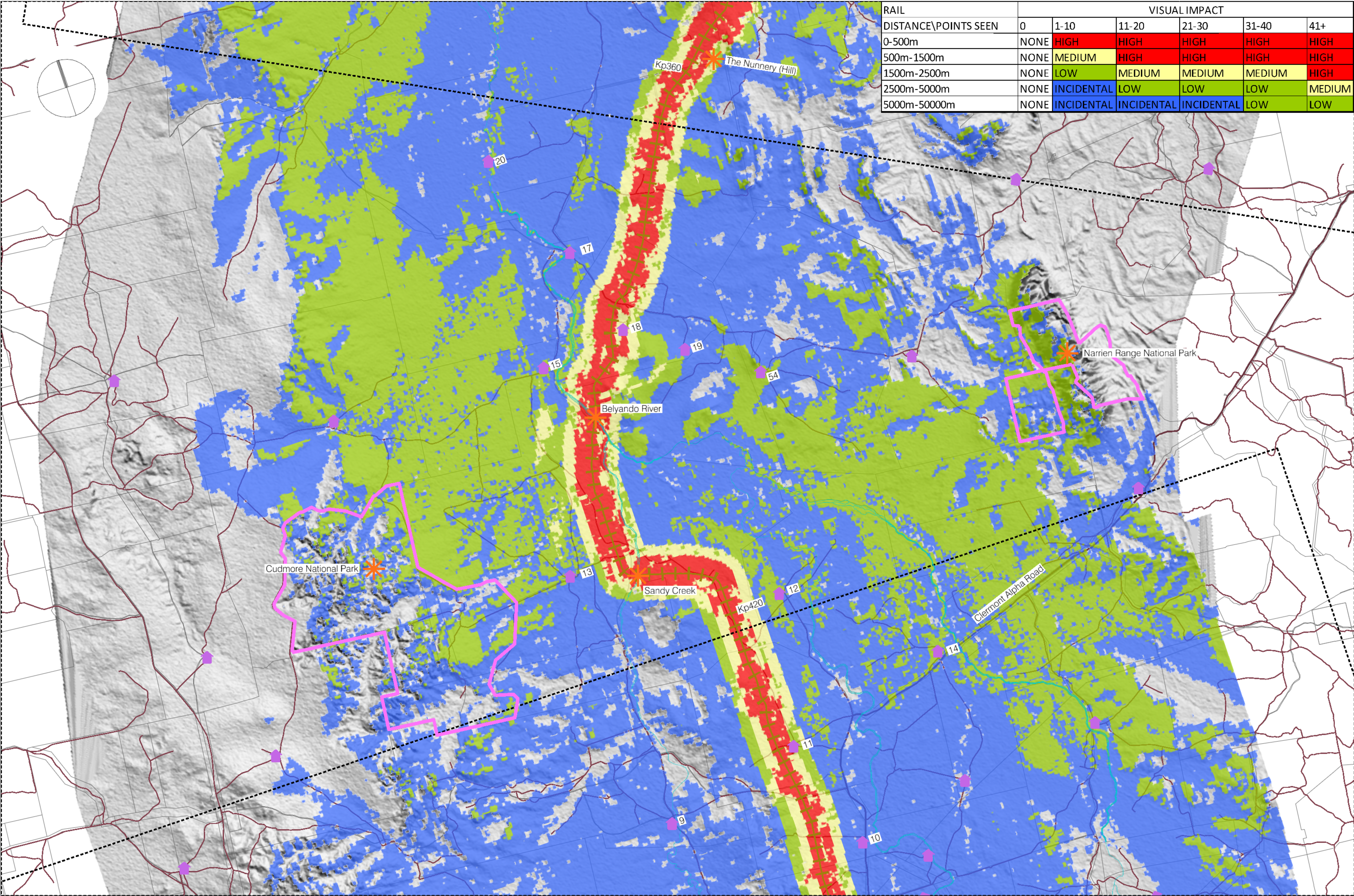
Although the rail and train structures are the main project feature of this section, the landscape clearing necessary during construction is expected to be 100m which reduces during operation to 80m. This poses the greatest impact to the visual landscape.

Table 2: Visual Impact of Rail alignment

RAIL DISTANCE/ POINTS SEEN	VISUAL IMPACT					
	0	1-10	11-20	21-30	31-40	41+
0-0.5km	NONE	HIGH	HIGH	HIGH	HIGH	HIGH
0.5km-1.5km	NONE	MEDIUM	MEDIUM	HIGH	HIGH	HIGH
1.5km-2.5km	NONE	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH
2.5km-5km	NONE	INCIDENTAL	LOW	LOW	LOW	MEDIUM
5km-50km	NONE	INCIDENTAL	INCIDENTAL	INCIDENTAL	LOW	LOW

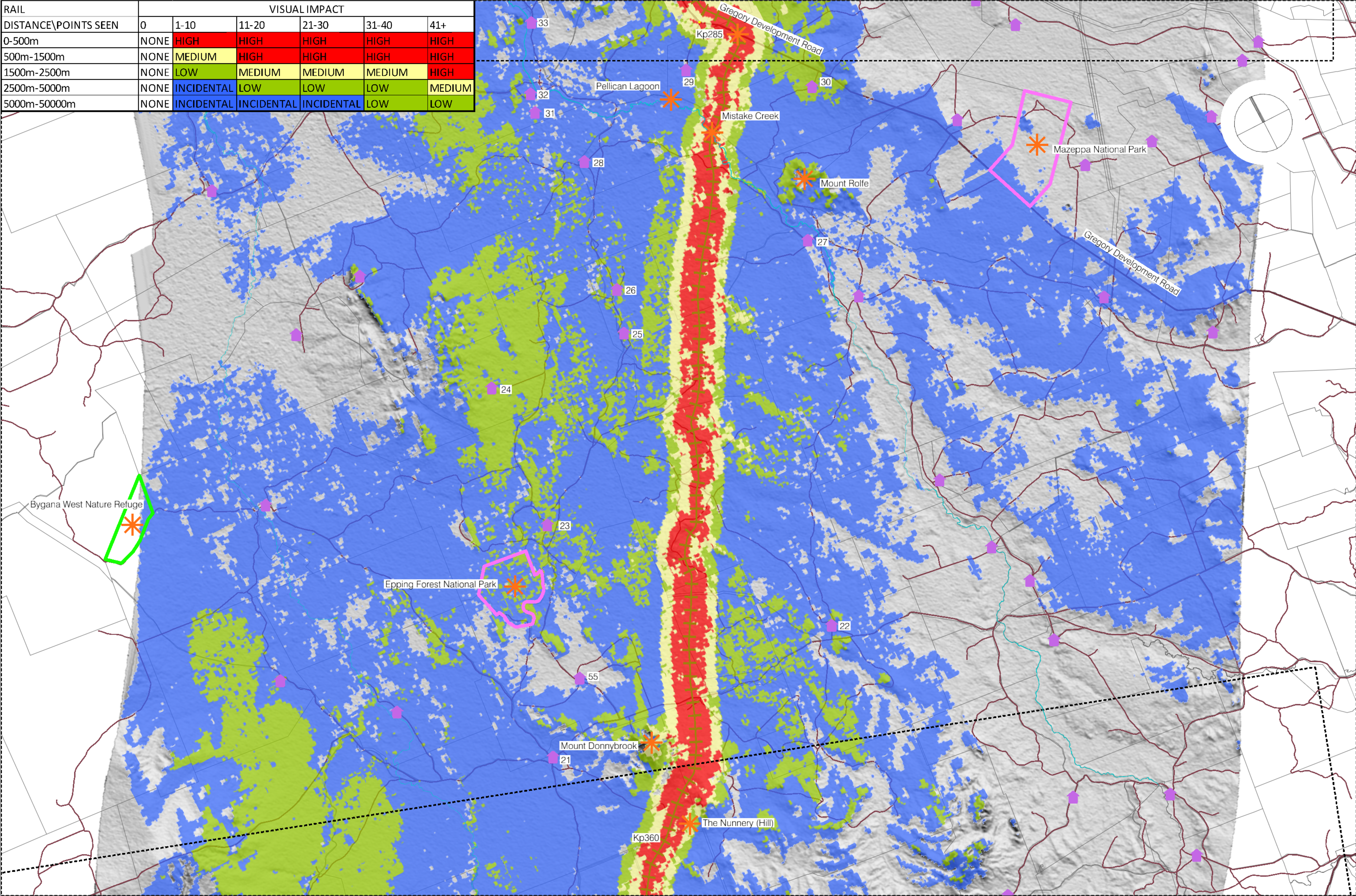


RAIL DISTANCE\POINTS SEEN	VISUAL IMPACT					
	0	1-10	11-20	21-30	31-40	41+
0-500m	NONE	HIGH	HIGH	HIGH	HIGH	HIGH
500m-1500m	NONE	MEDIUM	HIGH	HIGH	HIGH	HIGH
1500m-2500m	NONE	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH
2500m-5000m	NONE	INCIDENTAL	LOW	LOW	LOW	MEDIUM
5000m-50000m	NONE	INCIDENTAL	INCIDENTAL	INCIDENTAL	LOW	LOW

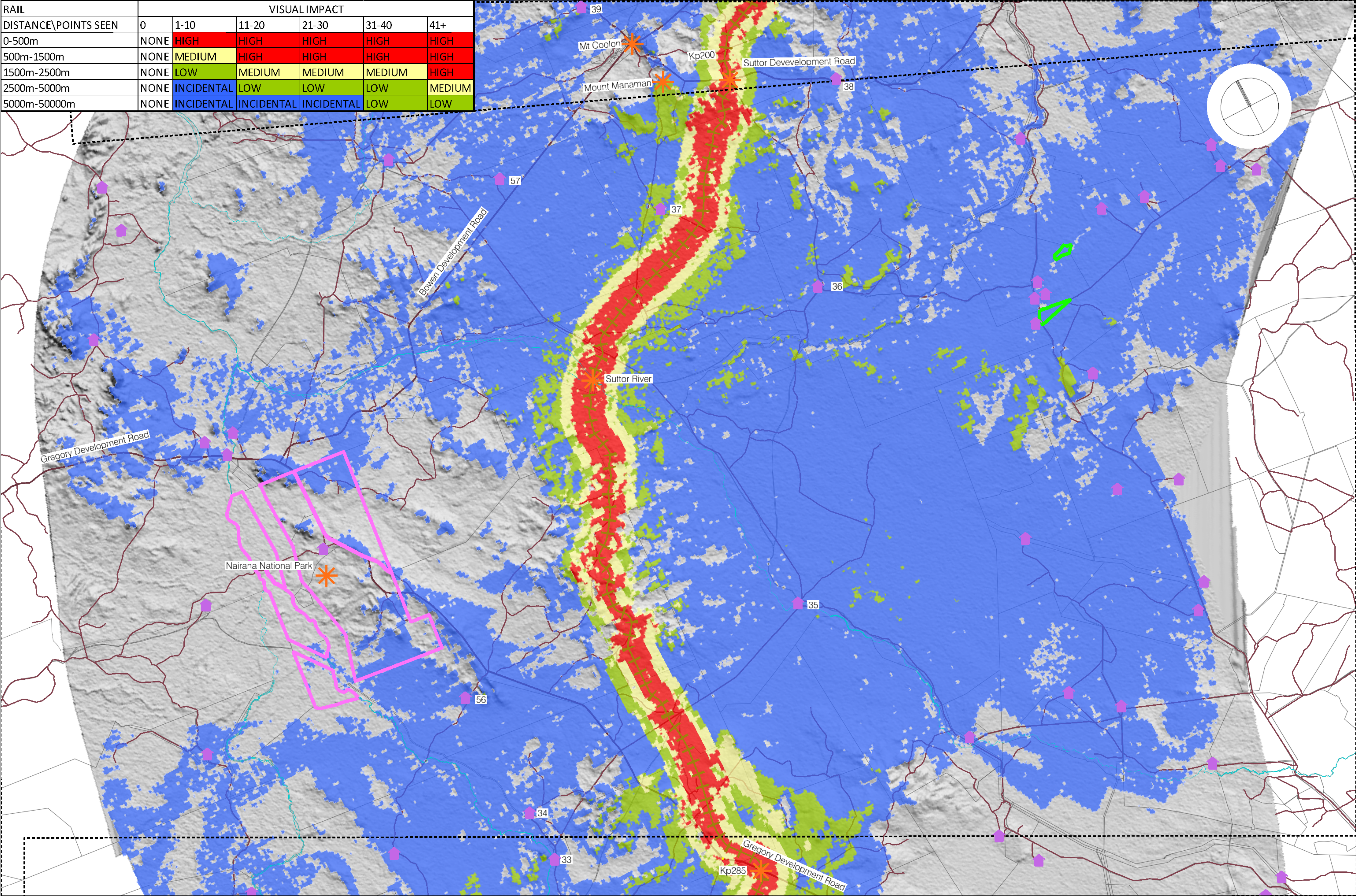


RAIL DISTANCE\POINTS SEEN	VISUAL IMPACT					
	0	1-10	11-20	21-30	31-40	41+
0-500m	NONE	HIGH	HIGH	HIGH	HIGH	HIGH
500m-1500m	NONE	MEDIUM	HIGH	HIGH	HIGH	HIGH
1500m-2500m	NONE	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH
2500m-5000m	NONE	INCIDENTAL	LOW	LOW	LOW	MEDIUM
5000m-50000m	NONE	INCIDENTAL	INCIDENTAL	INCIDENTAL	LOW	LOW

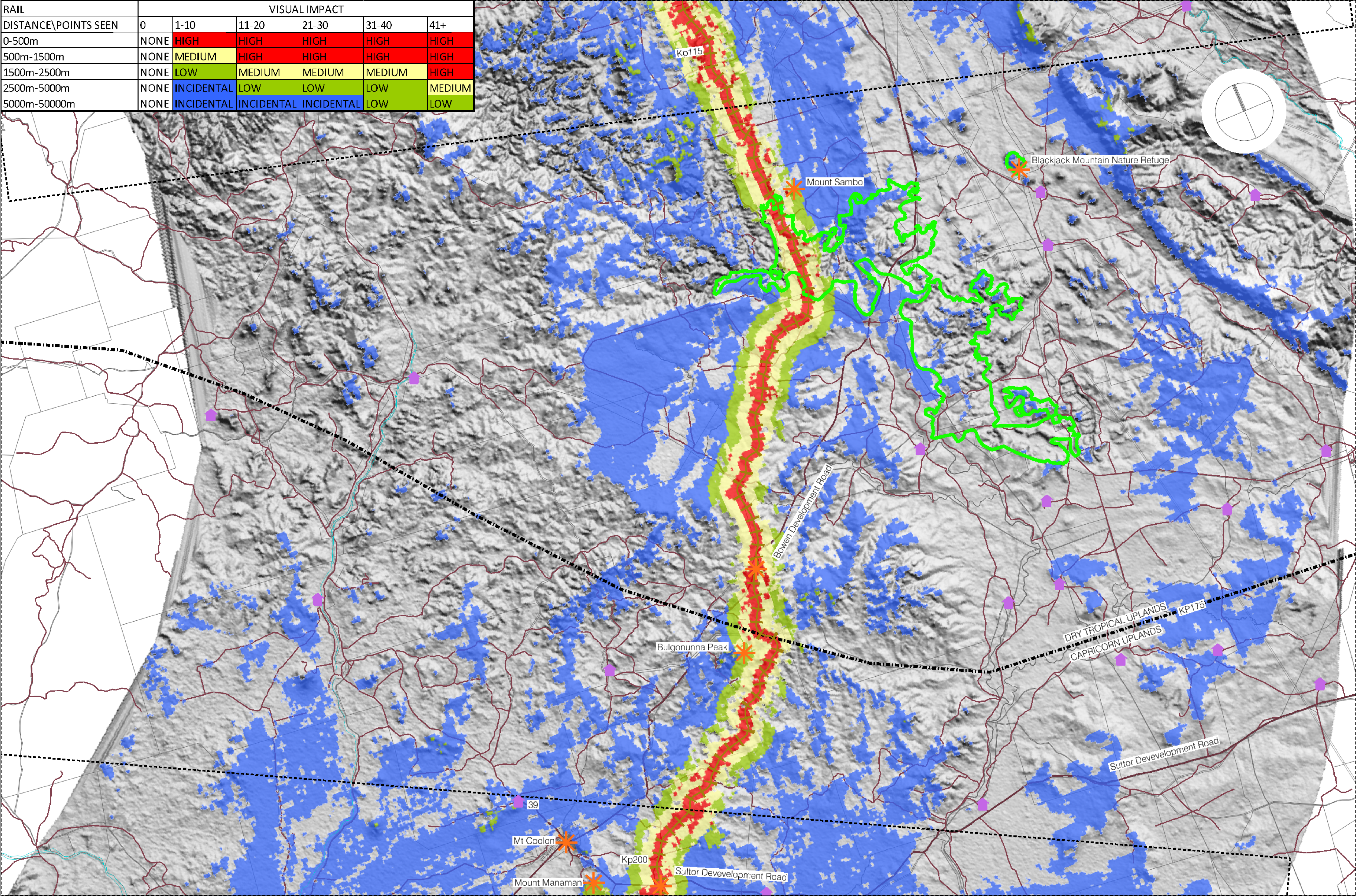
RAIL	VISUAL IMPACT					
DISTANCE\POINTS SEEN	0	1-10	11-20	21-30	31-40	41+
0-500m	NONE	HIGH	HIGH	HIGH	HIGH	HIGH
500m-1500m	NONE	MEDIUM	HIGH	HIGH	HIGH	HIGH
1500m-2500m	NONE	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH
2500m-5000m	NONE	INCIDENTAL	LOW	LOW	LOW	MEDIUM
5000m-50000m	NONE	INCIDENTAL	INCIDENTAL	INCIDENTAL	LOW	LOW



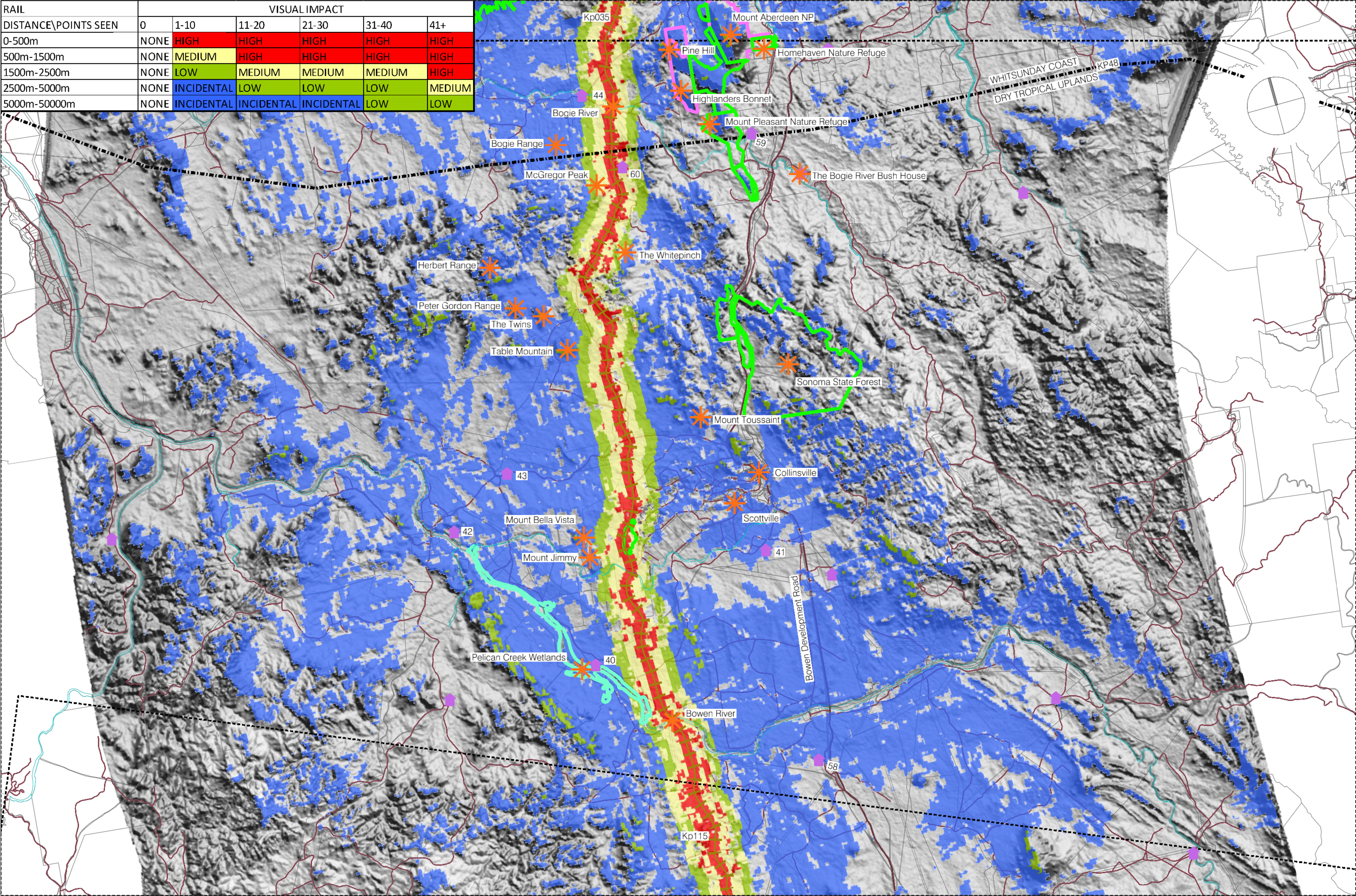
RAIL	VISUAL IMPACT					
DISTANCE\POINTS SEEN	0	1-10	11-20	21-30	31-40	41+
0-500m	NONE	HIGH	HIGH	HIGH	HIGH	HIGH
500m-1500m	NONE	MEDIUM	HIGH	HIGH	HIGH	HIGH
1500m-2500m	NONE	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH
2500m-5000m	NONE	INCIDENTAL	LOW	LOW	LOW	MEDIUM
5000m-50000m	NONE	INCIDENTAL	INCIDENTAL	INCIDENTAL	LOW	LOW



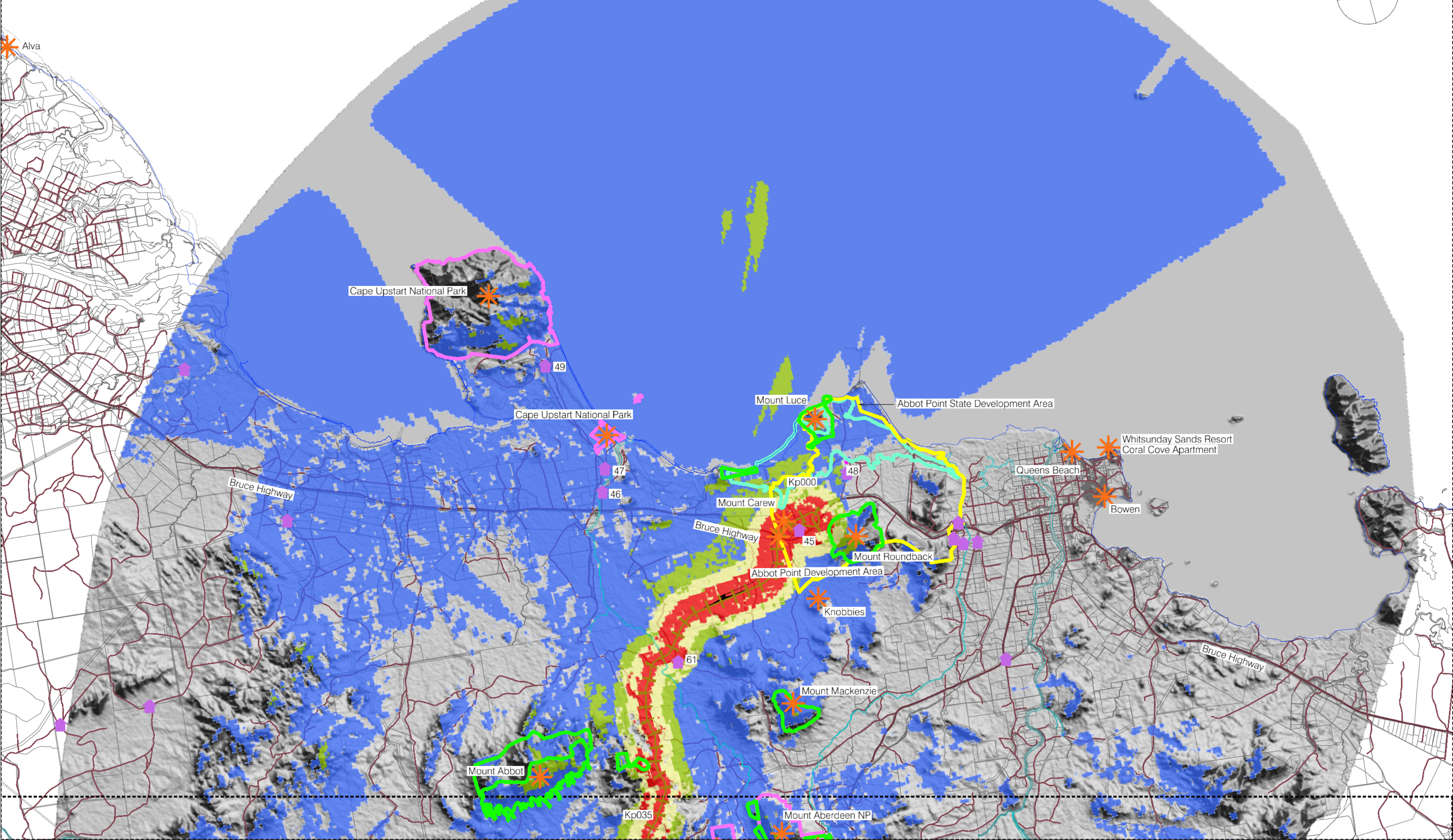
RAIL	VISUAL IMPACT					
DISTANCE\POINTS SEEN	0	1-10	11-20	21-30	31-40	41+
0-500m	NONE	HIGH	HIGH	HIGH	HIGH	HIGH
500m-1500m	NONE	MEDIUM	HIGH	HIGH	HIGH	HIGH
1500m-2500m	NONE	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH
2500m-5000m	NONE	INCIDENTAL	LOW	LOW	LOW	MEDIUM
5000m-50000m	NONE	INCIDENTAL	INCIDENTAL	INCIDENTAL	LOW	LOW



RAIL	VISUAL IMPACT					
DISTANCE\POINTS SEEN	0	1-10	11-20	21-30	31-40	41+
0-500m	NONE	HIGH	HIGH	HIGH	HIGH	HIGH
500m-1500m	NONE	MEDIUM	HIGH	HIGH	HIGH	HIGH
1500m-2500m	NONE	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH
2500m-5000m	NONE	INCIDENTAL	LOW	LOW	LOW	MEDIUM
5000m-50000m	NONE	INCIDENTAL	INCIDENTAL	INCIDENTAL	LOW	LOW



RAIL	VISUAL IMPACT					
DISTANCE\POINTS SEEN	0	1-10	11-20	21-30	31-40	41+
0-500m	NONE	HIGH	HIGH	HIGH	HIGH	HIGH
500m-1500m	NONE	MEDIUM	HIGH	HIGH	HIGH	HIGH
1500m-2500m	NONE	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH
2500m-5000m	NONE	INCIDENTAL	LOW	LOW	LOW	MEDIUM
5000m-50000m	NONE	INCIDENTAL	INCIDENTAL	INCIDENTAL	LOW	LOW



8.5 Visual Assessment

The rail alignment is 470km in length with considerable lengths visible in the landscape, yet avoiding most areas of development, residential places and tourist facilities. The presence of the twin rail lines, passing bays, maintenance areas and marshalling yard will have a high visual impact at close proximity, due to the track profile and close interval between trains. A significantly high impact is expected along the Bruce Highway and North Coast Rail. At the marshalling area west of the highway the twin tracks expand to a possible 15 parallel tracks, with large shed and staff facilities.

It can be seen in the visual assessment modelling that the rail component of this project appears to follow a line of least resistance through the landscape, weaving around the many hills, mountains and ranges along its route.

Vistas across the landscape in its current form allow a view which would reach from view point to horizon, only broken by topography, dams, the few homesteads and roads. In situations where the whole landscape is viewed from a visual receptor, the initial disruption of clearing for building will become an obvious visual impact as the cleared zone would stretch the full extent of the viewer's perspective.

Due to the rail alignment it is assumed that there will be minimal visual impact on the topography in its working state. Depending on the mitigation measures and strategies undertaken, the initial building phase of the rail could pose the most obvious visual impact.

The visual availability of this rail to visual receptors is variable. In situations where the landscape is described as being of an open grassed character the rail would create a high visual impact within close proximity, yet may blend into the landscape features from a higher point further away. In contrast, when moving through a landscape which is highly vegetated the project component would seem to be a low visual impact nearby (beyond the near ground), and an obvious impact from afar. In the building phase of the rail, these distinctions could create a high impact to both the immediate and far landscapes.

Some of the visual receptors along the rail have a visual character which is of significant historic and continuing association with the mining industry. This new mining activity therefore would be deemed as having moderate to low visual impact to these places as the existing landscape character and associated value could absorb this 'like' development. In the more natural landscape types include woodland, pastures and hilly terrain; the rail development could either have a high or low visual impact depending on the proximity treatment and condition of the surrounding landscape.

Lighting

Trains will run 24 hours a day, 6 days a week, and so lighting along the rail length and the guiding lights at the front of trains will pose a significant visual impact to this landscape during the evening and night. The potential for this component of the project to blend into its surrounds during the day is great, however, the lighting of the trains and level crossings at night would create a high impact to any point in the landscape the rail line is visible. Mitigation for this impact is possible, such as planting of vegetation buffers along section of the rail and train light direction; however these actions would not diminish this impact totally.

In the building stage of this project, light pollution could become a high impact at construction camps if not managed. Through the use of well designed lighting and / or minimal ground lighting, these camps could have incidental impacts in the visual environment.

National Parks, Reserves and Refuges

The presence of the sensitive receptors of National Parks, Nature Reserves, Biological Research Land and potential look-out points would suggest a detrimental visual impact along this route. However, as many of the nature reserves and National Parks are aimed at fauna/flora protection, or have restricted access, with limited visitation, the visual exposure and (therefore) visual impact, is minimised.

Cudmore National Park was noted as a place of bird watching, yet further investigation found that topographic variation within the park, vegetation and distance from the rail would reduce the impact to incidental.

Roads and Rail

The rail alignment crosses four primary roads being the Bruce Highway, Bowen Development Road, Sutter Development Road and Gregory Development Road and in-numerous local and informal roads between the mine and port facilities. This alignment is also parallel to meet the North Coast Rail for a short section near the port.

It is expected that the changes made to these primary transport routes will open the rail to being seen by the greatest number of people offering the greatest impact.

The positioning of the rail loop and transfer facility between the Bruce Highway and North Coast Rail Line increases the impact to both these major transport routes.

The raising of the Bruce Highway over the rail alignment at the crossing will increase the view into the coal terminal. The raised highway over the rail will increase the visual impact of the project from the highway and the existing landscape.

Although the rail line will be highly visible from the Bruce Highway overpass, the traffic speed of both the North Coast Rail and the existing alignment of the Bruce Highway, combined with the low nature of the surrounding landscape could allow the rail-line to become part of the Highway / North Coast Rail experience. With sensitive handling such as community consultation, artworks, landscape treatments and thorough understanding of expectations for all users (tourists, locals, regional commuters and miners) this raised crossing has the potential to contribute character to the local area. Without sensitive handling, this crossing could become a negative impact in the visual landscape.

The Gregory, Suttor and Bowen Development Roads which are all crossed by the rail line are to be elevated as road overpasses allowing continuous vehicular movement. The raising of the road structures in these locations will greatly heighten the visual impact to the surrounding low-lying landscape.

The numerous other rural roads crossed by the rail line will all be impacted due to the concentration of level crossings and frequency of the passage of trains. The level crossing locations by necessity are required to be visible for safety and this will heighten the visual impact of the rail line to road users. Where the rail is beside the roads the visual impact will be greatest when trains are passing as these roads carry limited traffic and the duration of greatest exposure is short the impact to the road users is low.



8.5a: Manipulated image of Gregory Development Road with the proposed rail alignment inserted. . (Refer image at 8.1.4c for original).

Towns

The regional towns of Collinsville, Scottsville and Mt Coolon have all been recently added to the Queensland heritage register to be preserved as living museums for tourist attraction. Although the rail will have visual impact on these sites, they have been preserved for their mining character and the 'living' infrastructure of the rail could blend into the existing environments of these places.



8.5b: Manipulated image showing the location of Collinsville (C) and Scottsville (S) with the proposed rail alignment inserted at the lower edge of the image. (Refer image at 8.1.4g for original).

Mt Coolon is the closest of the three towns, and is indicated in the visual assessment modelling as having incidental impact from the rail due to its south-east aspect. As the visual modelling has not accounted for vegetation and the east-south-east surrounds of the town have an existing vegetation band, it is assumed that the continuation of this vegetation band north could mediate any adverse visual impact.

Homesteads

Of the various homesteads found along the 470km alignment, 20 will experience visual impact of high to low severity.

Six of these 20 homesteads such as: Surbiton (Homestead 11), Mirabilla (Homestead 18), the homestead near to McGregor Peak (Homestead 60), the homestead near to Mt Mackenzie (Homestead 61), Salsbury Plains (Homestead 45) and 'Caley Valley' (Homestead 48) will experience significantly high visual disruption (see SA003 and SA011).

Surbiton (Homestead 11)

This homestead was found to have a high visual impact due to its proximity to the rail and the aspect of the terrain which it is located. The occupiers of this place will also experience a visual impact in their daily activities on the property.

Mirabilla (Homestead 18)

The closeness of this property to the rail suggests that the visual impact will occur within the foreground of this places vista across the greater landscape. It is expected that this place will experience a high visual impact from this project component.

Homestead near to McGregor Peak (Homestead 60)

The rail will have a moderate to high visual impact on this place. This homestead will experience visual impact for the whole of the north-west quadrant of the 360 radius of the property, however is understood to have a much reduced impact with intervention such as visual buffering.

Homestead near to Mt Mackenzie (Homestead 61)

This homestead will have a high visual impact with the rail passing only 300m to its west. Even with mediation, the total visual impact of this project component in the daily activities of the occupants of this place would be extremely high.

Salsbury Plains (Homestead 45)

Sitting within the 1.5km distance from the rail and within a flat grassed dominated surrounding landscape the 'Salsbury Plains' homestead is expected to experience a high visual impact from the rail and a low to incidental visual impact from the mine facilities which are located on the opposite side of the rail.

Caley Valley (Homestead 48)

See Port Section Impact Assessment.

A further two homesteads, homesteads 1 and 60, (see view shed location maps) will have medium visual impact from the rail alignment and 14 homesteads, 9, 12, 13, 14, 15, 20, 23, 24, 25, 26, 30, 37, 44, and 54 would have a low visual impact. These homesteads could have a much reduced visual impact through mediation methods.

The various other homes found in the surrounding region are located in areas indicated as having incidental or no view of the project. Although these properties will not be visually affected by the rail, it is assumed that many of these residents will experience this project component as they move through their daily routine, thus mediation of landscape vistas, road crossing and public places, shall need to be considered.

All homesteads listed, will have direct visual impact from the rail line during the night, as train lighting will potentially be the only lights in the surrounding night landscape. However this light will be moving, can have mediating measures inserted and visible only for brief periods from within the homesteads, reducing this visual impact.



General

In the short term (approximately three years), the visual impact of the temporary workers villages could prove significant. These villages are expected to occur at 100km intervals along the rail alignment, and accommodate 1500 workers (Waratah Rail Description). These construction villages, if located in open or existing use areas (and with vegetation screening) will have less impact than if forested areas were cleared for work camp sites.

9 New Coal Terminal

9.1 Visual and Landscape Character



Figure 5: New Coal Terminal, showing current arrangement, see full plan SA011 incorporating assessed arrangement.

The coal terminal consists of the rail transfer facility that is located between the Bruce Highway and the North Coast Rail Line; the coal stockpiles north of the North Coast Rail; a conveyor and access route to the coast by Mt Luce across the Kaili Wetland, and the jetty/MCF to the west of the existing jetty.

The Whitsunday Coast region, where the new coal terminal shall be located, has a predominantly wet coastal landscape with forested hills, mountains and scenic offshore islands. It possesses extensive natural areas with coastal towns and tourist developments. This area is referred to as 'the dry tropics' due to the low rainfall.

Towns and locations along this section of coast include, Alva Beach (80kms north-north-west) (beyond the scope of this study), Cape Upstart National Park (30km north-west), Camp island (17km north-west) Holbourne Island National Park (30km north-east), Gloucester Island National Park (40km east-south-east), and the Queens Bay Point area of Bowen (23km south-east), each have potential visual access to Abbot Point.

The existing Northern Queensland Railway Corridor passes between the rail transfer facility, the coal stockpiles while the Bruce Highway passes south of the coal facility and is to be realigned around the southern edge of the rail loop.

There are two existing homesteads located to the east and south of the rail loop and in very close proximity to the project. Both of these places occur within the Abbot Point State Development Area.

9.1.1 Abbot Point State Development Area Landscape Character

The coastline is comprised of beaches, beach ridges, mangrove estuaries, salt pans and brackish coastal swamps. These strikingly visually different zones consist of:

- Wetlands, including lush green mangrove forests in estuarine areas;
- Low, flat and pale samphire communities associated with salt pans; and
- Wet lush looking places of waterlilies, sedges, grasses and paperbark forests associated with freshwater wetlands.



9.1.1a: Coastal wetlands on north-east edge of Mount Luce (where proposed jetty to land, image by E3 Consultants, 2008)



9.1.1b: Samphire and sedge wetland, image by E3 Consultants, 2008



9.1.1c: Paperbark forests, image by E3 Consultants, 2008

These vegetation types allow for an open landscape view with scattered patches of open woodland and lines of vegetation following some of the private roads, and small topographical features as the only restrictions on visibility. Along the coastal margins, the beaches and ocean offer expansive views, with headlands and sections of dune mangroves inhibiting full view perception.

An existing coal port facility currently exists in the Abbot Point area, with a jetty of similar length as the project; the existing facility has its stockpiles, rail head and facilities located closer to the actual port and on the coastal side of the wetland, so is separated from the proposed facilities.

9.1.2 Landscape Receptors

Cape Upstart National Park

Cape Upstart National Park is approximately 20km north-west of the proposed new coal terminal. The cape rises from the surrounding swamp lands to become the highest point to the west of the development, and offers views of the existing jetty and coal terminal as well as the western side of Mount Luce and Point Abbot wetlands. Access is limited to visitors by boat as the only land access is via privately owned property.



9.1.2a: Cape Upstart National Park, image by Tract Consultants, 2011



9.1.2b: Existing view from south-east of Cape Upstart National Park towards APSDA, image by Tract Consultants, 2011

Camp Island / Silver Shores Lodge

A privately owned island, Camp Island is approximately 17km from the proposed new coal terminal. This island shares views of Cape Upstart National Park; however these views are experienced at a much closer distance. Silver Shores Lodge is a small resort complex on the south-eastern edge of the island, (the resort is presently for sale).



9.1.2c: View from Camp Island looking east-south-east to mainland, image by: Silver Shores Lodge

Bruce Highway

The Bruce Highway is the major link between North and Southern Queensland and is located less than 1km to the south of the new coal terminal. This is a main highway that carries significant traffic each day and will offer a high visual impact with estimated facilities reaching 40m in height in close proximity to the road.



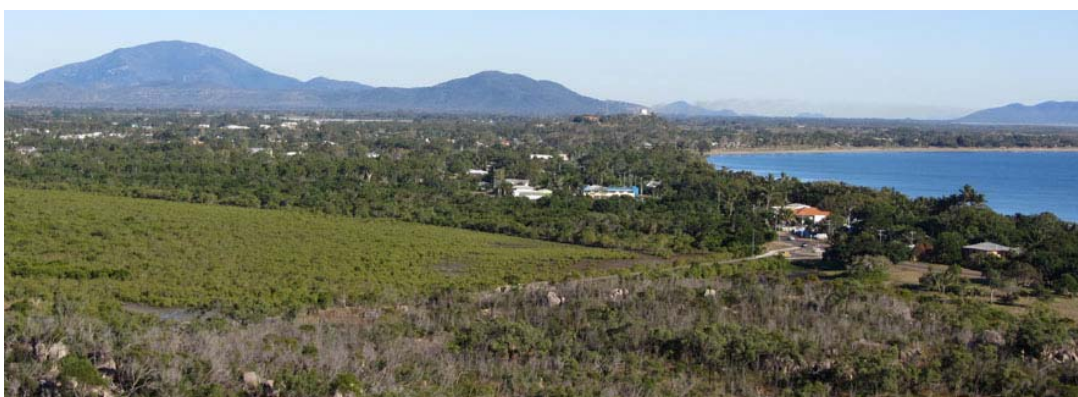
9.1.2d: The Bruce Highway looking into the APSDA from the APSDA western boundary, image by Tract Consultants, 2011



9.1.2e: Existing vista from Bruce Highway towards coal terminal site, image by Tract Consultants, 2011

Bowen and Queens Beach

The town of Bowen is located to the south-east of the new coal terminal and is shielded from the new works by the existing coal jetty and by Mount Luce.



9.1.2f: Bowen, view across Queens Beach towards coal terminal, image by Tract Consultants, 2011

Bowen was first proclaimed in 1865 due to its harbour and surrounding pastoral lands with the population growing slowly. The town went through several stages of development with the surrounding areas used for vegetable, beef and sugar production.

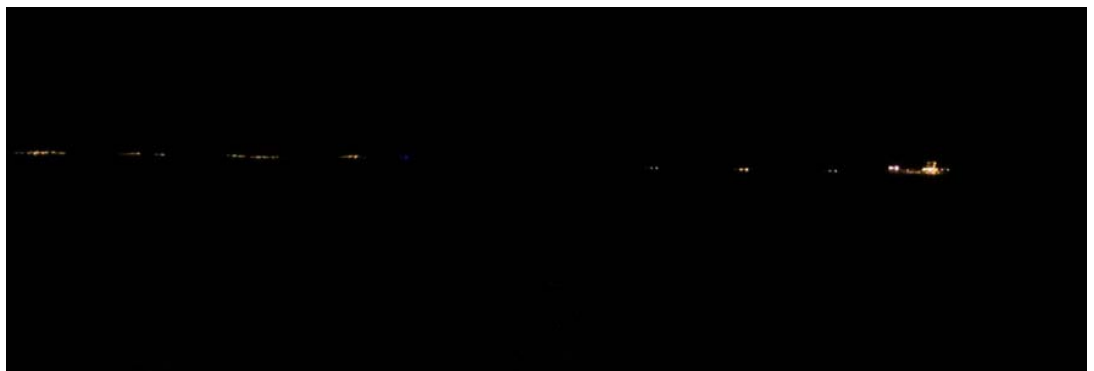
The visual character of Bowen is of high scenic quality, with its dramatic bright blue ocean, rocky outcrops, vegetated coastal lands and mountain ranges in the background.



9.1.2g: Image from Cape Edgecombe look out towards Abbot Point, image by Tract Consultants, 2011



9.1.2h: Image from Coral Cove Apartment to Abbot Point in early evening, image by Tract Consultants, 2011



9.1.2i: Enlarged image from Coral Cove Apartments towards Abbot Point after dark, image by Tract Consultants, 2011,

Abbot Point



9.1.2j: Looking from above towards Abbot Point jetty, image by Tract Consultants, 2011

Abbot Point will be significantly impact by this project component due to the projects location beside the highway, crossing the wetland and the new loading facility out from the point. Vegetation on Abbot Point consists of low grasslands, samphire swamp lands, wetlands and taller scrubby woodlands. The existing coal port facility dominates the north-northeast aspect of the site.

Mount Luce (seen to the left of above image) is situated within the APSDA and so party to its requirements. The new coal stock piles and rail terminal are to be located on existing grazing land. The conveyers to move the coal to the coast are to cross the Kaili Valley Wetlands with the loading terminal near Mount Luce. This coal will then be transported out to a new facility launching from the right of Mount Luce.

9.2 View Shed

The visual sensitivity of the new coal terminal was calculated through an inferred 'see and be seen' methodology effectively reverting the observed to the observer by calculating vistas from the facility. Viewing points were established at coal stockpiles and buildings near the highway, mid-points on the conveyor across the wetland and at the start, end and 'T' of the jetty (based on 2009 arrangement). There were four points at the proposed coal terminal, two at 6m (the lower level) for the rail loop and builds and two for the coal stockpiles, located at height of 27m (being the height of a coal stacker); the jetty and connecting conveyor/access across the wetland were identified by two points at 6m while the actual loading facilities at the end of the jetty was represented by two points located 27m above sea level (height of a coal loader). This allows for the proposed coal terminal to be represented by eight view points.

View shed models were then created for each of the eight points and aggregated to give a total impression of the view shed (refer to plan SA12). This assessment allowed areas to be categorised by the number of view points seen from the proposed coal terminal, allowing views of the facility to be calculated. The viewing distance was calculated to a distance of 50km for the purposes of the study being the study corridor.

9.3 Visual Sensitivity

The coal terminal will be a highly visible component, however, due to the current coal stockpiling, jetty and loading facilities on site the actual impact of the new works will be reduced.

The facilities for this area are divided into two components with the rail retrieval station, coal stockpiles, conveyors and single level facility buildings located between the wetlands and the Bruce Highway and bisected by the North Coast Rail Line. These are connected to the coal berths across the wetland by elevated conveyors to a loading facility extending 4.5km out from Abbot Point into the Coral Sea.

The proposed coal terminal facilities near the Bruce Highway, irrelevant of buffering will be visible from along the highway, north coast rail line and any look-out facilities that may be existent or established on Mount Roundback (refer to plan SA13).

In the view shed models the following distances were used.

- High sensitivity locations within 5km of the site
- Moderate sensitivity..... locations between 5km and 10km from the corridor
- Low sensitivity locations between 10km and 20km from corridor
- Incidental sensitivity..... locations beyond 20km from corridor

9.4 Visual Impact

The scale, view interval and view duration of features that are visible affect the visual sensitivity and perception of the viewer.

To assess the magnitude of visibility, each of the eight coal terminal view sheds has been combined to yield an impact value. The plan illustrating this assessment utilise a colour gradation from the blue to red spectrum to identify visible impact (refer to plan SA12). As a maximum, the highest number of points that can be seen from any study area location is all eight representing the entire facility. The magnitude of sensitivity although expressed as a single unit may be via multiple sightings. The plans do not include visual issues relating to the MCF and associated infrastructure corridor.

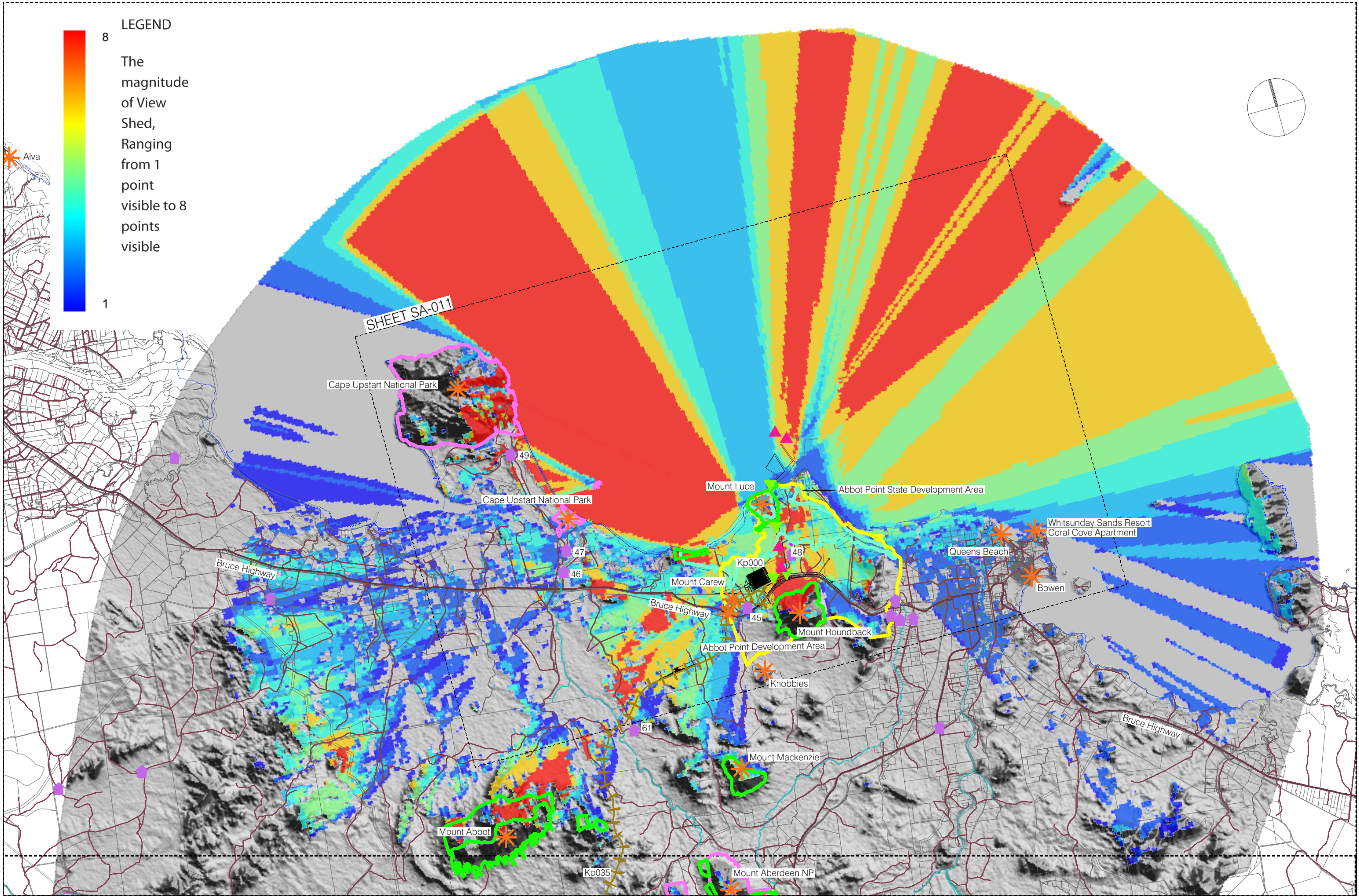
Table 3: Visual Impact of proposed coal terminal assuming no prior development.

PORT - EXISTING DISTANCE/ POINTS SEEN	VISUAL IMPACT				
	0	1-3	4-5	6-7	8
0-5km	NONE	MEDIUM	HIGH	HIGH	HIGH
5km-10km	NONE	LOW	MEDIUM	MEDIUM	HIGH
10km-20km	NONE	INCIDENTAL	LOW	MEDIUM	MEDIUM
20km-50km	NONE	INCIDENTAL	INCIDENTAL	LOW	LOW

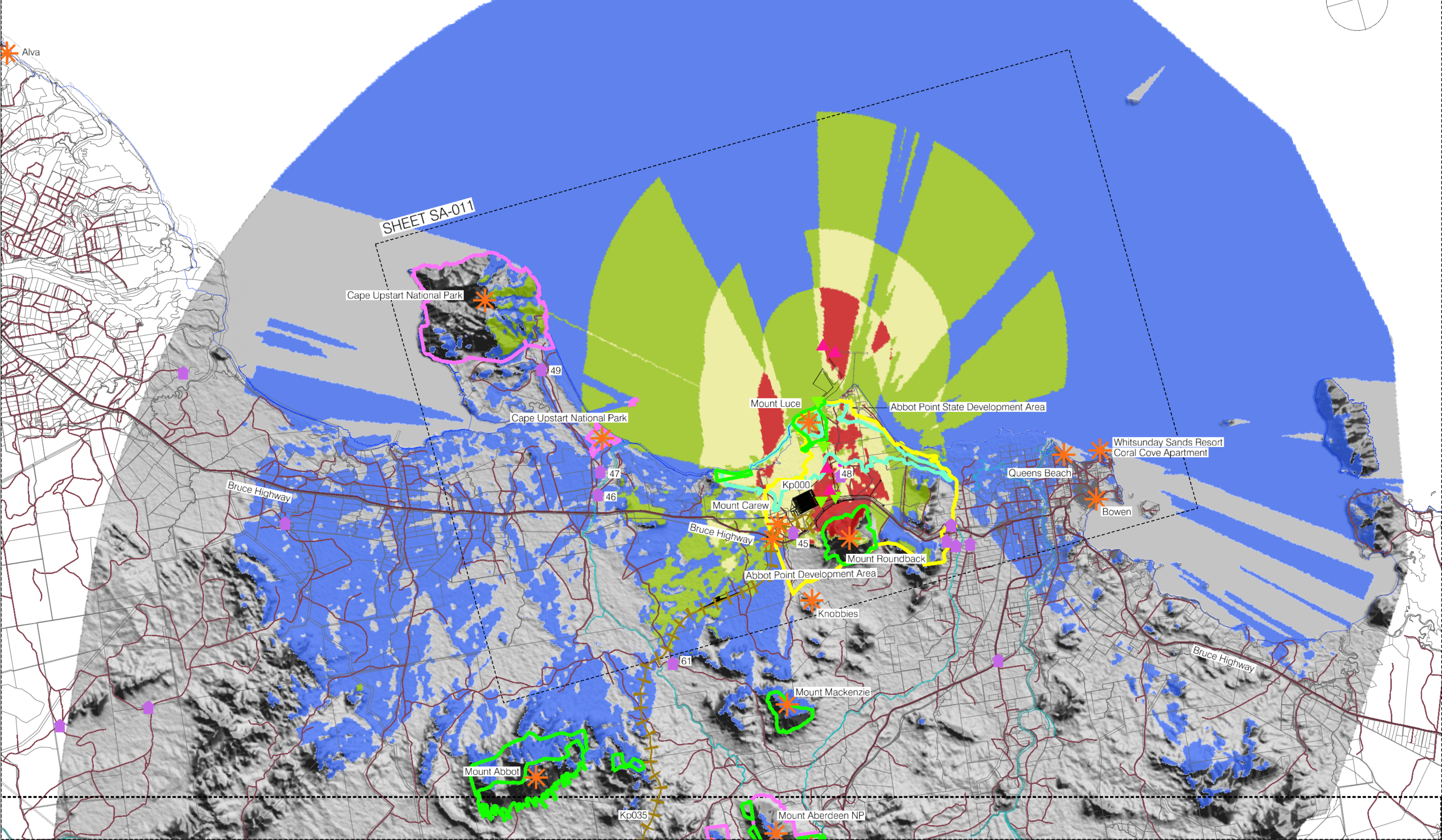
Table 4: Adjusted Visual Impact of proposed coal terminal accounting for existing port facilities.

PORT - ADJUSTED DISTANCE/ POINTS SEEN	VISUAL IMPACT				
	0	1-3	4-5	6-7	8
0-5km	NONE	LOW	MEDIUM	HIGH	HIGH
5km-10km	NONE	INCIDENTAL	LOW	MEDIUM	MEDIUM
10km-20km	NONE	INCIDENTAL	INCIDENTAL	LOW	MEDIUM
20km-50km	NONE	INCIDENTAL	INCIDENTAL	INCIDENTAL	LOW





PORT - ADJUSTED	VISUAL IMPACT				
DISTANCE\POINTS SEEN	0	1-3	4-5	6-7	8
0-5000m	NONE	LOW	MEDIUM	HIGH	HIGH
5000m-10000m	NONE	INCIDENTAL	LOW	MEDIUM	MEDIUM
10000m-20000m	NONE	INCIDENTAL	INCIDENTAL	LOW	MEDIUM
20000m-50000m	NONE	INCIDENTAL	INCIDENTAL	INCIDENTAL	LOW



9.5 Visual Assessment

The coal terminal has the greatest impact along the coastal margin and islands. This is due to the high visual access from these places to the coal loading facilities and low lying nature of the land where the coal storage facilities are located. The most visual component of this facility will occur along the Bruce Highway, as these can be seen from many view points and by a large number of people. Although this facility is in line with the APSDA, it will only be particularly screened from surrounding visual landscape, and the vast perception of this place may not be of its proposed industrial nature.



9.5a: Existing view to proposed site of the coal terminal, image by Tract Consultants 2011.



9.5b: Google Earth view to proposed site of the coal terminal with proposed coal port terminal facilities mapped in white, image from Google Earth, 2005 with overlay of CAD mapping.

The conveyor system that links the stockpiles to the loading facility if constructed as an extended bridge style structure will be visible from the north (Cape Upstart area and Camp Island) but due to the relatively low height in comparison to the surrounding landform and horizon, the visual impact would be low. If this access is built as a solid embankment with limited opening for the wetland then the visual presence of the link will be significantly more, even accounting for the view distance and horizon line.

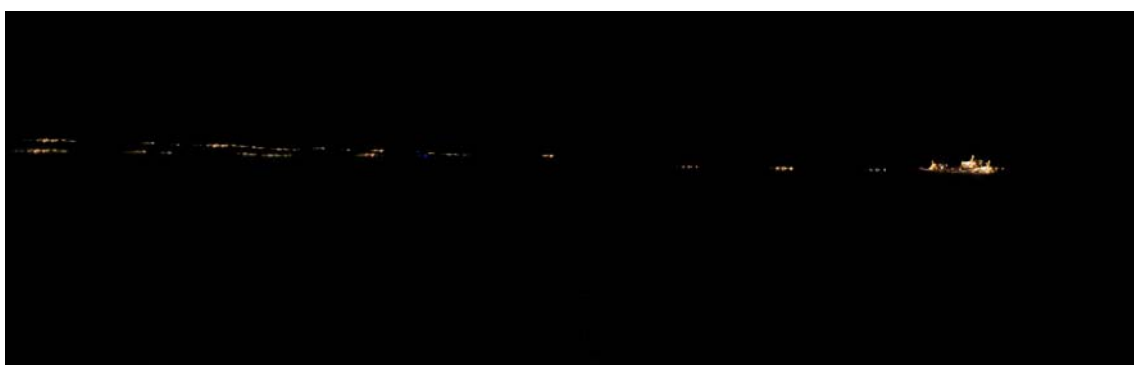
The loading facility being beside the existing jetty structure will reduce the visual impact. As the facility is now to be the MCF then the bulk of the facility and structures to be built out from the point will be expected to significantly increase the visual impact compared to the assessed 2009 option.



9.5c: Existing jetty off Abbot Point, images shows Mount Luce to left and Mount Roundback centre, image by E3 Consultants, 2009

Lighting

The visual impact of lighting of this component of the project shall be reduced to the east (Bowen) due to the extent of the existing coal port and jetty's illumination. It is assumed that the impacts associated with this vista would seem like the brightening of the lights associated with the existing port. If the loading terminal is to be the MCF option the additional lighted area beyond the existing point would be expected to intensify creating a much higher impact to the surrounding visual receptors. To the west (Cape Upstart and surrounds) lighting of the proposed Kaili Wetland conveyor link behind Mount Luce would become a significant impact.



9.5d: Manipulated and enlarged image of night lighting of Abbot Point from Cape Edgecombe with present lighting intensified, (original image at 9.1.2i)

The proximity of the new coal terminals storage site to the Bruce Highway and Northern Rail will produce a significant impact to road and rail users. This would need to be design to minimise glare to vehicles on the Bruce Highway. The lights on the coal trains moving

around the loop at night also have the potential to directly impact approaching vehicles on the highway. This would need to be mitigated for both safety and visual impact.

National Parks, Reserves and Refuges

The coastal localities of, Cape Upstart National, Camp Island, Park, Holbourne Island National Park (30km NE), Gloucester Island National Park, and the Queens Bay Point area of Bowen are all impacted by the proposed coal terminal; although most of these only experience an 'incidental' level impact mostly due to their distance from the site.

During the day these places may be able to see the facility especially the loading facility (depending on weather conditions and observer elevation). This limited view potential is expected to be increased in the evening and nightscape especially if there is night operation as this has the potential to detract from the natural scenery promoted by Queensland tourism.

Roads and Rail

Vistas from the Bruce Highway and the northern rail line are significant and although reduced by the speeds of 100km, the facilities shall pose a significant impact due to their proximity to both the highly used North Coast Rail and Bruce Highway.

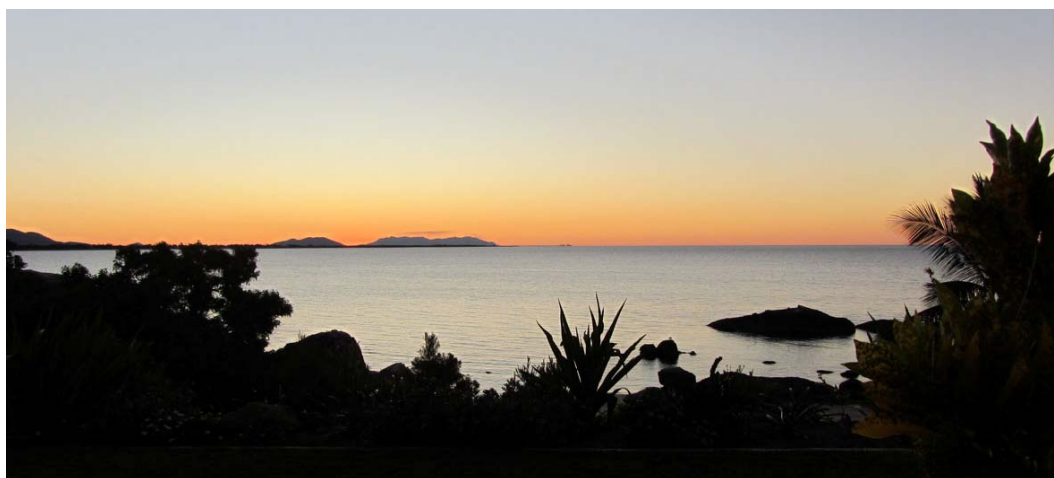
As the location of the coal terminal is on the outside bend along the Bruce Highway, views to the facility are maximised as both directions of traffic see it within their visual perception. As the highway and the North Coast Rail are close to the facility and the size of the stock piles and infrastructures are large, the terminal will be obvious, and impact high.



9.5e: Manipulated image with port stockpile infrastructure, from Bruce Highway vista, (original image at 9.1.2e)

Towns

The town centre of Bowen is unable to see the development on Abbot Point but the area is visible from Cape Edgecombe. The Port facilities are over 22km from Cape Edgecombe with the Coral Cover Apartments and a few other features around the point having a view to the present jetty. The port facilities are not visible from Queens Beach which is hidden by the coastal landscape.



9.5f: Manipulated image of Abbot Point with addition jetty loading facilities in the early evening from the Coral Cove Apartments, (original image at 9.1.2h)

The small beach side town of Alva is located 78km north-west of Abbot Point and due to the alignment behind Cape Upstart National Park only has the potential to see the coal loading facility. Due to the horizon and curvature of the earth combine with the distance (over three times that of Cape Edgecombe, Bowen) Alva will have no visual impact from the facilities.

Homesteads

Salsbury Plains (Homestead 45)

See Rail Section Visual Impact Assessment.

Caley Valley (Homestead 48)

The Caley Valley homestead located next to the rail turn-around point will experience significant visual impact, not only from the rail alignment, but also from the coal stockpiles. It is assumed that in this project alignment this homestead will need to be acquired.

Both these, and other houses within the APSDA are expected to be visually effected by this development, however as this is a designated area it is expected that the community perception will absorb much of the impact from this place.

General

The coal terminal component poses another form of visual impact in the form of dust-clouds from the coal stockpiles. This form of impact is almost impossible to quantify due to the wind considerations and the effectiveness of environmental management measures on site.

Fauna associated with the Kaili Wetland is a non-landscape character which adds to the overall visual landscape character due to the presence of, colour and movement. Disturbance around this wetland from the work could have an affect on the fauna and most significantly the bird life that can become a feature of this style of visual landscape character. Birds occur throughout the site due to the semi-permanent water body and coastal marshlands. The presence of the conveyor across the wetland depending on the design could have a significant affect on the bird life in the area especially if built as an almost 250m wide earth embankment that may affect the health of the wetland.

10 Visual Impact Assessment

10.1 Values

The proposed project embraces a range from rural to woodland areas, grassed plains and hills to coastal plains. The combination of land forms creates the situation where there is potential for significant views to the alignment but the project has been situated in an area where there is limited view potential (refer to plans SA014 and SA015 for the total view shed and visual impact of the project). Even though this project has limited viewing perception of the significance of its visual impact will differ between communities and amongst members of a public due to varying community values.

Land owners and visitors are likely to be highly sensitive to visual changes that alter the perception of a natural landscape dominated setting although this represents only a small proportion of the overall project.

There are also significant coastal views with perceptions varying between tourists/tourism operators, residents and mine workers. Each of the perception categories listed in Section 4 (Visual Assessment Perceptions and Values) are relevant to this proposed development.

10.2 Mine

The mine is the most isolated component of the project and has the most significant impact on the local landscape, the facility and its location within the tenement will facilitate negative visual perceptions, and permanently change the visual character of the area including the towns of Alpha and Jericho.

Alpha and Jericho are equally at a distance and topographical situation that allow the mine to have only limited visual impact beyond the boundaries of the tenement. These towns will have a high indirect impact from the mine development even without visual access.

The vegetation around the mine site varies from cleared grazing and to woodlands with grass based understory. This development will have a high impact on the landscape, however, due to limited visual access to the site and small number of people in the area, the visual impact during the day will be minimal. During the night however, the visual impact could become significant in the region. A light pollution glow could be viewed from vast distances even when the actual facility was not in sight. This poses an unknown visual impact; however, this impact may be easily controlled.

As dust-clouds could be generated from the normal operations of the mine, this visual impact could be managed with best-practice environmental dust control and so is deemed as being of low impact.

The National Parks and Nature reserves in the area are deemed as being too far from the proposed mine site to create a significant visual impact. Bimblebox Nature Refuge is the anomaly to this and is significantly impacted with clearing of about 50% of the present area. The visual impact of this clearing for the mine facility will have a high impact locally, but will not be seen by the masses, due to existing vegetation, land form, and road positions. However, this impact creates the greatest visual impact perception, as the two cannot co-exist. The open cut section of the mine and facilities are not likely to be viewed by many in the population, but the clearing of this refuge will result in a substantial visual impact in the public and environmental perceptions of the community.

The impacted view points would occur from the Capricorn Highway and smaller local and mine access roads which could be visually buffered, indicating that this facility would pose a low visual impact to its surrounds. Existing vehicle access roads however, would have a deferred impact in the widening measures to allow for the increased traffic.

Of the 46 known existing homesteads in the area, two are deemed to have significantly high visual impacts from this mine site. It is expected that there cannot be any form of buffering which could lower the visual impacts to these places.

10.3 Rail

The 470km length of this infrastructure will result in the perception of having a major visual impact on the landscape. It was found, however, that this component of the project was for the majority having low visual impact in the existing landscape due to its considerable length avoiding most areas of development. A large proportion of the areas within 0-1500m would experience high visual impact that would be difficult to buffer, however for the majority this project zone is sparsely populated with limited observers. The movement of each 3.2km train, 134 per day, at 22 minute intervals will greatly increase the visual impact of the rail to any observer point along its path.



10.3a: QR National Coal train (Dawson Mine) gives an indication of length of train in the visual landscape, Image by QR National, Coal 2010.

Vegetation clearing required during construction and operation of the rail is expected to have a greater impact on the broad landscape than the actual rail of trains. This corridor width and the presence of construction camps, passing bays and the train maintenance facility will all add to the rail corridor and vegetation loss which will increase the visual impact. The visual impact of the temporary workers villages could prove to be the highest impact along the rail alignment.

There is not expected to be any permanent lighting to the rail corridor except for the train lights which would also prove a significant impact at visual receptors points and across high point vistas.

Sensitive receptors such as National Parks, Nature Reserves, Biological Research land and look-out points which could potentially have wide vistas of this project component, were found to be restricted for visitation or at such a distance from the rail alignment that the impact was rendered insignificant.

Major transportation routes, such as the Bruce Hwy and North Coast Rail-line, will expose this component to the greatest number of people. This exposure is affected by, movement of vehicles and surrounding vegetation allowing the visual impact in these

places to be less significant. In locating the train loop between the North Coast Rail line and Bruce Highway the visual impact in this area is increased and hard to buffer, and so a high impact.

The creation of overpasses over the rail at Bowen Development Road, Gregory Development Road and Suttor Development Road increases the impact of these crossings in the greater landscape by creating elevated structures in a predominantly low topography. Though the visual impact of the rail on users of these roads is vastly reduced by this separation, due to the vegetation batters and buffering expected to be used in their design.

Other roads existing along this route would have moderate to high visual impact due to the level crossings and frequent train movement, although this could be visually buffered to reduce detrimental views, except at level crossings where clear sight lines are required.

It was found that the impacted towns of Collinsville, Scottsville and Mt Coolon, being historic mining towns would not be adversely affected by this project component and were rendered to have a low to incidental impact.

Of the six homesteads found to be highly impacted by this project component, each would be severely affected, with the rail stretching across the entirety of their visual horizon, and in some cases, being just on the doorstep. Due to their proximity to the project, any buffering for these homesteads would be impossible to implement. The further twenty homesteads effected (refer to section 8.5) with medium to low visual impact should be able to be visually buffered from the rail component. It should be noted that as this project is implemented, the potential for more homesteads found within the visual field is high.

10.4 Coal Terminal

The coal terminal has a significant impact along the coastal margin and islands and also the greatest visual perception of impact as it is the highest-use area of all the components.

Vistas from the Bruce Highway and the Northern Rail-line have the potential to be significant; however this impact could be moderated by use of visual buffering and through sensitive detailing of the new components. The realignment of the Bruce Highway with careful mitigation measures could reduce the visual impact of the coal terminal and stockpiles from this vantage point, and possible speeds of 100km/h of both the rail and highway are expected to limit view opportunities to the proposed component. This visual receptor poses the highest impact for this component as the existing landscape, although part of the APSDA, is open and naturalistic.

Coal loading facilities by nature are of large scale; however, from the most populous view point to the south of Point Abbott, the background horizon is of Cape Upstart National Park, allowing distance and landmass to visually absorb the new components. As the loading facilities are to be the T4-7 corridor and MCF even though they are beside the existing jetty, the visual impact of the works will be significantly larger and impact increased compared with the jetty option incorporated in the assessment and impact plans.

The present topography of Abbot Point (with Mt Luce) allows the new facilities to have a lesser impact to the south than to the north. As the loading facility will be the main feature visible from Bowen (and Cape Edgecombe just north of Bowen) it is understood that due to its location behind the existing jetty, the visual impact will be minimal. From the north the impact is thought to be reduced due to the distance, low levels of habitation and limited visitation between Abbot Point and Cape Upstart. The one site along this section of coast that would be expected to be most visually impacted is Camp Island and the Silver Shoal Lodge which has a direct view to Abbot Point State Development Area.

An increase to lighting will be the highest impact to the north of the APSDA, with the increased lighting along the conveyer belt potentially creating a light pollution scenario. This impact will be most obvious from Camp Island where facilities appear to directly view the Kaili Wetlands which this conveyer belt will cross. Light will also potentially pose an issue for the Bruce Highway from the Coal Transfer Terminal which could also create a high impact. All lighting from this project component could be mitigated.

The one homestead located at the rail/proposed coal terminal junction will have significant visual impacts from this project component. It is expected that this homestead will not be able to remain under the proposed scheme, and if so, mitigation measures would be ineffective in reducing the impact.

10.5 Galilee Coal Project Assessment

The combined project spanning about 500km with major infrastructure at both ends being the mine and coal terminal has the potential to have a high visual impact but due to the nature of the landscape, the location of the vast extent of the project, and proximity of areas of habitation the actual impact is greatly reduced. The project is located in areas of moderate to high scenic quality, with extensive areas of native vegetation but with low visitation rates and visitor access.

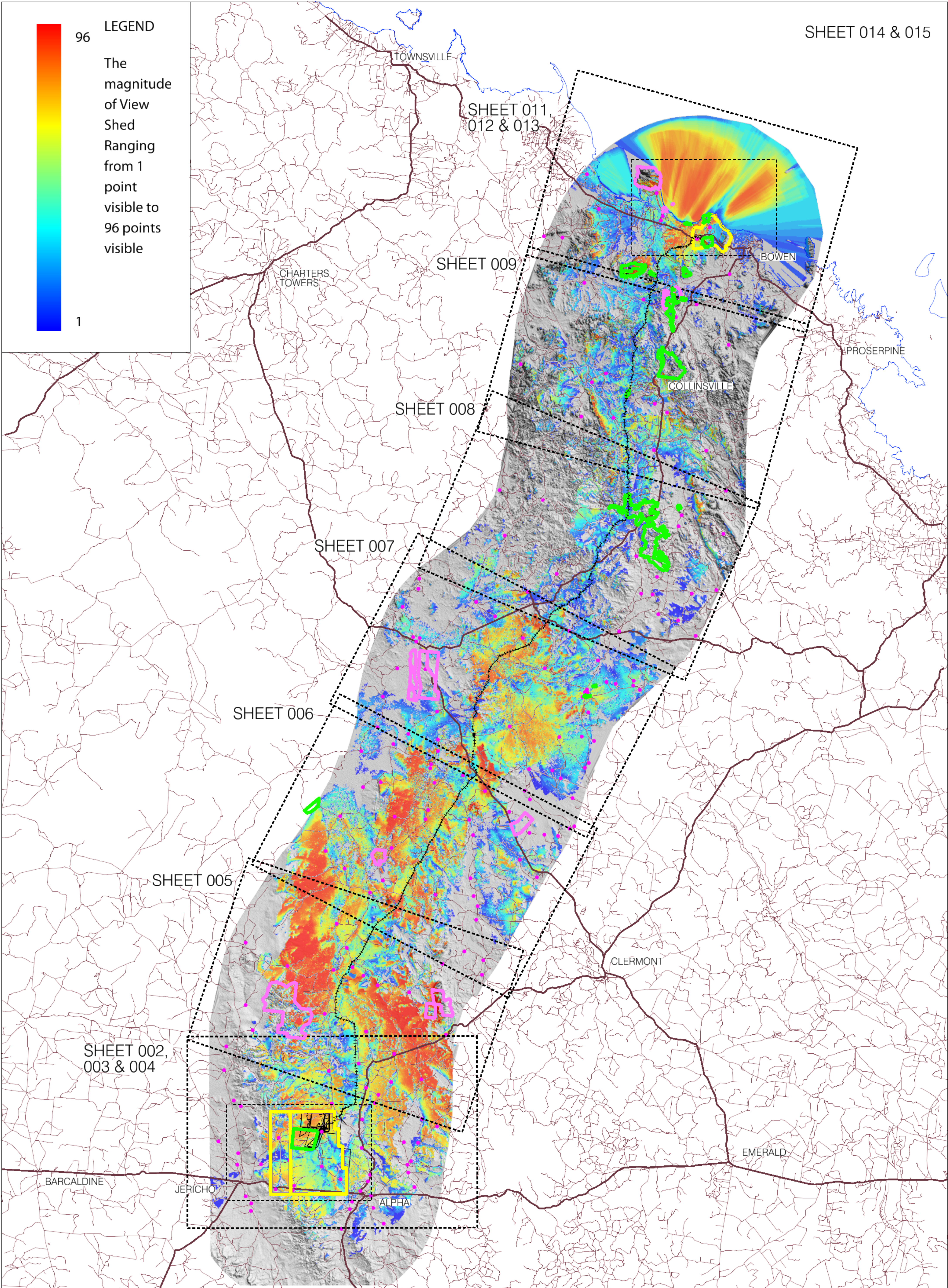
The proposed development of mine, rail and coal terminal facilities in the Galilee Coal project, is expected to have a high visual impact in the near-ground and foreground (less than 1.5km from project components) and a minimal visual impact in middle, background and context (areas beyond 1.5km), due to the regional nature of its location. With the exception of several properties, small towns, and roads, it is believed that the large extent of this project will have little exposure to the population. Of those areas of exposure, clever use of mitigation could reduce the visual impact.

LEGEND

96

The magnitude of View Shed Ranging from 1 point visible to 96 points visible

1



LEGEND TO PLAN FEATURES

- HOMESTEAD
- SELECTED WATER COURSES
- NATIONAL PARKS
- STATE FORESTS, CONSERVATION AREAS AND REFUGES
- WETLANDS
- POTENTIALLY SENSITIVE RECEPTORS
- RAIL ALIGNMENT
- ROADS MAIN & PRIMARY
- ROADS SECONDARY & TRACKS



SCALE 1: 700,000 @ A1

DISCLAIMER
TRACT CONSULTANTS has endeavoured to ensure accuracy and completeness of the data. TRACT CONSULTANTS assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within these maps.

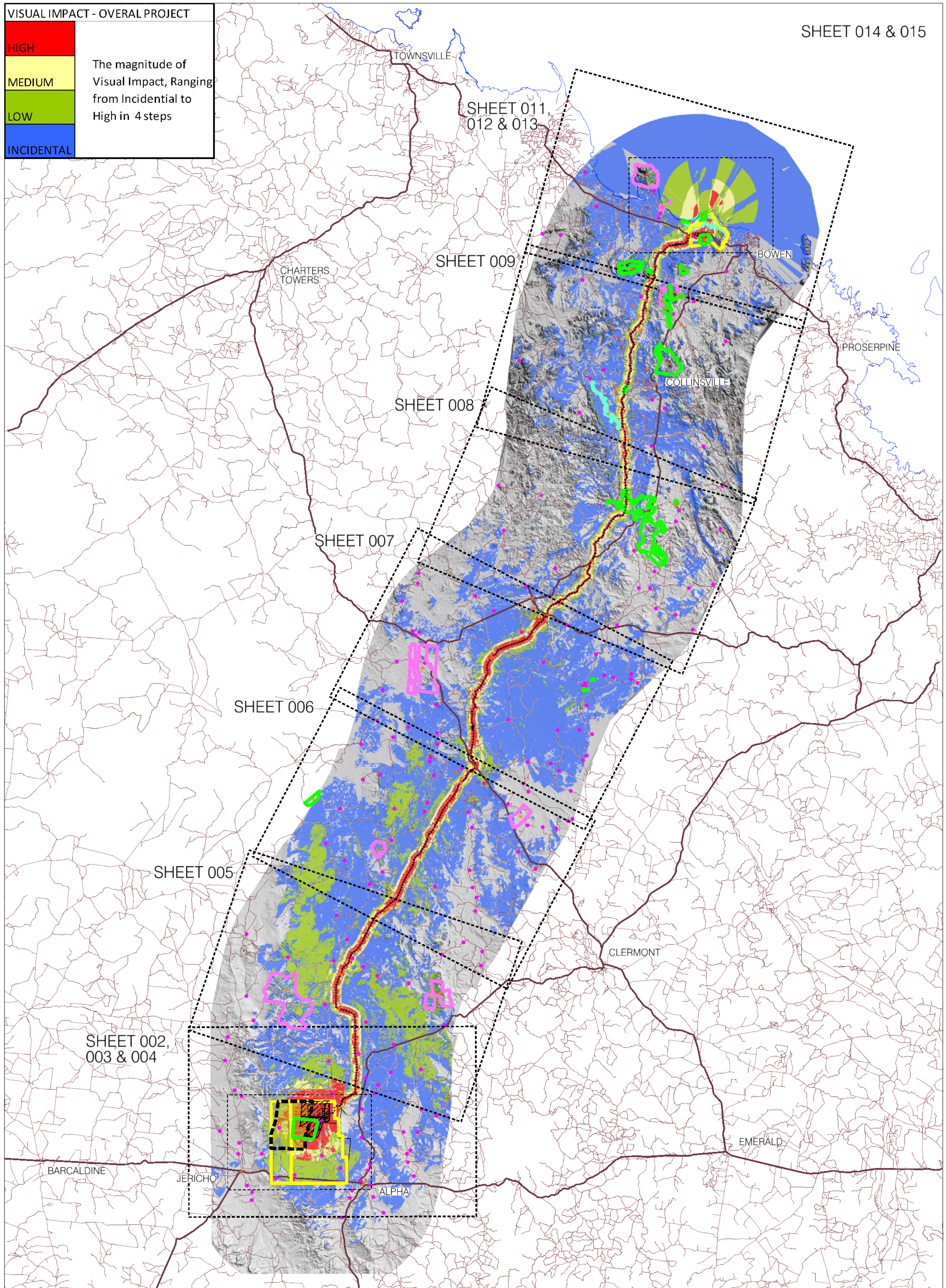
VISUAL ASSESSMENT - OVERALL PROJECT - VIEW SHED
GALILEE COAL - EIS



TRACT CONSULTANTS - LANDSCAPE ARCHITECTS & PLANNERS
JULY 2010 Job No. 0711-023-03 Plan: LD-SA-014 r 6

INCIDENTAL

The magnitude of Visual Impact, Ranging from Incidental to High in 4 steps



ROADS SECONDARY
& TRACKS

GALILEE COAL - EIS



SCALE 1: 700,000 @ A1

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Plan : LD-SA-015 r 6

11 Mitigation and Enhancement Measures

11.1 Objective

The objective of mitigation is to avoid, reduce, remedy or offset any significant adverse affects on the visual environment arising from the proposed development. Mitigation may also compensate for unavoidable effects, residual impacts and impacts which may preclude opportunities for future land uses.

Mitigation measures may potentially involve modifications to intrinsic and periphery elements of the proposed development design, or other measures, including off-site changes that reduce negative impacts.

11.2 Mitigation Measures

11.2.1 Vertical Alignment

As the project is mostly designed to follow the existing topography the level of the alignment will not have a significant bearing on the landscape and visual impact. As a general premise, if the corridor is located at ground level, buffering becomes more achievable. If created above ground on embankments or structure the impact is increased and depending on the height, buffering and mitigation measures are less effective. The inverse of this is if components are located below ground level or in cuttings the scar on the landscape increases although the visual impact of the component is reduced and depending on scale of component, mitigation measures may be effective.

11.2.2 Horizontal Alignment

The proximity of various components of this project to existing features (homesteads) present high visual impact that may be reduced or minimised if the alignment of the rail and arrangement of other components could be adjusted to allow more acceptable separation and reducing the impact. This would reduce the impact most notably to homesteads but also may be able to reduce other impacts. This is most apparent at the 'Homestead near McGregor Peak' (Homestead 60) where the rail is aligned 300m west of the house. In this situation, the horizontal realignment could be organised to provide a better outcome for the property.

11.2.3 Screening

Where planting is used to provide screening of any project component especially the mine site it may be best to provide the screening closer to the view source than the project facilities. This would allow a reduction of the visual impact from the height of structures better than if the buffering were provided around the facility. Screening employed at impacted homesteads could provide a positive contribution for property owners and offer greater mitigation than more extensive screening at the source of the impact.

Plant species used in any screening operations will need to be indigenous to the actual location; otherwise this mitigation measure may have an undesirable impact on the vista and visual landscape character of the area in the long term. This planting would be best propagated from vegetation that is to be cleared to make way for the project components. Where possible, relocation of existing plant species should be undertaken prior to project commencement, with the support of local environmental groups. Actual plant species are not listed in this report due to the scope of the visual impact assessment, however to ensure that the visual landscape character is maintained, these environments will have to be re-established after use and left in the same or better environmental state then found.

In using indigenous plant species, which for the most have fine form, screening would be most effective if created on mass along visual receptors.

11.2.4 Colour and Form

To assist the project to harmonise with the surrounding landscape character the colour and form of structures should be carefully considered. To assist this building form would be best to mimic current homesteads and farm shedding. Colours should be chosen to integrate with the surrounds and highly reflective surfaces should be minimised.

11.2.5 Lighting

The visibility of the mine, rail and port during the night could have a significant impact to the existing landscape. Due to the isolated nature of these three sites, the contrast between the dark landscape and the lights associated with the project components could create a high visual impact. These impacts can be mediated through best practice lighting design, limiting light escape, and task focused lighting for operations.

11.3 Mine Site Mitigation

Due to the scale of the landscape changes and magnitude of the mine site there are limited visual mitigation measure that would be effective. The most practical would be to establish an extensive vegetation buffer to 1km width around the facility and beside any known and found visual receptors. The present vegetation beside the Capricorn Highway needs to be maintained to ensure that the effective screen is intact. Soil stockpiles from the mine, although uncharacteristic of the area, can be vegetated and arranged to provide screening at the most critical locations. To reduce impact for visual receptors which will view the mine infrastructure, it is suggested that infrastructure be coloured in shades of non-reflective, pale grey in an attempt to blend into the sky and horizon.

Existing vehicle access roads would have a deferred impact through the widening measures to allow for increased traffic. Restricted widening and effective revegetation to road edges could reduce the visual impact on the roadways rural landscape character. Any new access roads that are constructed will blend with the present landscape by complimenting the existing road character and arrangement.

To reduce the visual impact of dust generated by works and of site access roads, these should be asphalt sealed or regularly watered. Vegetation buffering the surrounds of these dust-producing places could also mitigate this impact.

Mitigation of town 'boom time' changes to the visual character of Jericho and Alpha may be embraced by the community, however understanding and maintaining the qualities of the towns visual character is important to maintain their visual identity. Mitigation measures may include strategic plans for the towns to ensure that mains streets are maintained and that town's character is preserved.

The non-landscape characteristic noted of the constant fauna movement through the landscape will need to be understood to preserve the visual characteristics of the landscape into the future. As was noted on site that this fauna was most prevalent around water ways, this impact could be mitigated by ensuring that waterways within the effected site are maintained where possible or similar area replaced or redirected where possible.

Specialised lighting design needs to be designed for the site and implemented to reduce impacts of light pollution and light spill on surrounding areas. The impact of site lighting is expected to be the highest impact around the mine site due to the lack of lighting in the surrounding area. Lighting should be task orientated and could include 'no spill' lighting such as that which is used around airports to reduce light pollution.

11.4 Rail Facility Mitigation

To minimise the visual impact of the construction and operation of the rail line, vegetation clearance needs to be kept to a minimum as the rail corridor will be more obvious than the rail line infrastructure. Where possible cuttings and embankments need to be minimised as these can become sites for erosion and increase in visual impact. Vegetation buffering to around 1km width and screening could be effectively used along the rail corridor for visual receptors in close proximity to the rail; however this measure would not effectively screen this project component from views further away.

Movement through the landscape of the trains will increase the impact and is more difficult to mitigate due to their length of 3.2km and high frequency. Vegetation buffers are not practical or appropriate for the whole rail component, however for high impact areas within the 1.5km 'foreground' could be effective in separating homesteads and views from parallel roads to the project.

The visual impact of the temporary workers villages could prove to be the highest impact along the rail alignment. To reduce the visual impact in the long term, these sites would need to be located in existing cleared areas and be given strict site limits to ensure existing vegetation and geology remains visually intact. In areas where clearing would need to take place, effective mitigation could include the removal and storage of existing vegetation to be replaced onto site once work is complete, alternatively and environmental assessment of each site could be prepared and mix of plants removed to be replaced. To assist these camps in harmonise with the surrounding landscape character the colour and form of structures should be carefully considered. To assist this, the building form would be best to mimic current homesteads and farm shedding. Colours should be chosen to integrate with the surrounds and highly reflective surfaces should be minimised.

Lighting from these camps in the short term, and from the rail in the long term could pose an impact to the visual landscape. Screening and buffering could be utilised on both sites to reduce headlight glare from trains, and from camps to specific visual receptors. Lighting used in these places could consist of only task orientated down lighting and ground lighting to allow for visibility for the workers and onto the rail line (train) but to ensure that light escape does not occur. A lighting specialist should be consulted to adequately reduce this impact.

In locating the train loop between the North Coast Rail line and Bruce Highway the visual impact in this area is increased and more difficult to mitigate. Also in relocating the Bruce highway, the existing view is dramatically changed, however the visual landscape character viewed can still be maintained. Dense planting within the rail loop to the Coal Terminal area could reduce some of the impact to the Bruce Highway and the Northern Rail.

At the intersection of the rail line and Bruce Highway, the raising of the Highway over the rail line increases the impact due to the elevation of the road users getting a more distant view that will be more difficult to mitigate.

The rail alignment needs to be further investigated where it is unacceptably close to homesteads. In these situations horizontal alignment changes should be considered to allow for best visual outcome for both property owner and rail alignment. A separation of minimum 1.5km would reduce impact and allow for visual buffering. Other homesteads in the region to be visually impacted could have the impact mitigated with visual buffering to screen this component of these properties.

11.5 Coal Terminal Mitigation

Measures that can be taken to reduce the visual impact of the port facilities include vegetation screening to the nearby homesteads and between the Bruce Highway/North Coast Rail and the Coal Transfer Terminal. As this project component will be the most visually accessible, and the height of the facility infrastructure will not be able to be totally mitigated it is understood that the impacts will be high, even accounting for community perception of the APSDA.

Buffering along the Bruce Highway will not be able to mask the facility infrastructure, but colour of all facilities could be used to lessen the visual impact against the horizon. The limited buffering possible beside the Bruce Highway could provide a screen to give an effective barrier from night lighting, provided lighting is directional to site area and light spill has been limited.

Lighting of the facility needs to be shielded and controlled so as not to impact on road users, and surrounding areas, this includes the directional lighting of trains moving around the loop at night. Although the loading port facility would occur beside the existing Abbot Point jetty and lighting would essentially duplicate the existing, this increase in light could be significant depending on the size of the port. This lighting would need to be kept to the minimum using previously stated lighting techniques, however is in keeping with the APSDP and an accepted impact.

An unacceptable visual impact would be experienced at Camp Island, where port lighting, conveyer lighting and coal stock pile lighting would become a dramatic impact in the visual landscape. Mitigation for this site would be difficult as any works that cross the Kali Wetland will be visible. The most effective options for the reduction of impact would be through lighting controls, structure colour and reflection reduction. Planting buffers and topographical buffering may reduce some of the impact from the coal stockpiles due to the existing land elevation.

To mitigate the visual perception expected by tourists to the area an opportunity exists to establish a coal interpretation centre at the Coal Transfer Terminal due to its proximity to the Bruce Highway. If this were to occur this site could become a positive visual experience for tourism, linking the "Bowen Coalface towns" in the region to this major tourist route.

11.6 Recommendations

- Where effected topography changes need to be minimal and or returned to the existing at the end of the project to maintain visual character.
- Existing topsoil from the site should be stripped and placed into temporary vegetated stockpiles prior to construction.
- Overburden stockpiles should be re-vegetated with native pioneer species as soon as stockpiles have been moved, using retained topsoil. Where possible these should be incorporated into buffering schemes.
- Existing vegetation needs to be maintained where possible and added to in areas where visual buffering has been identified as being needed.
- Buffering vegetation should be made-up of species endemic to the site which have natural screening form.
- Visual buffering vegetation should not be a monoculture. In situations where species do not have a natural screening form, massed planting of many species should be planted. Along parallel roadways this should be of width of 1km.
- Planting buffers should be established and maintained prior to project component being built as standard practice over the entire development. In situations where visual receptors are found during construction, mitigation measures should be investigated for that place and buffered immediately.
- The working rail corridor should be limited to the 80m (or less) stated, and any clearing outside this width in development should be revegetated with existing plant species.
- Access roads to project components should follow existing routes and revegetate road edges to maintain area's character. All rail work camps should be located along existing roads.
- Rail work camps should be located on existing cleared land, or in areas where fast revegetation may occur, such as grasslands.
- Best practice re-vegetation techniques need to be used to ensure the return of the visual landscape character in areas needing to be cleared.
- Best practice environmental controls should be utilised to ensure the minimising of the visual impact of dust around the project component areas.
- Site lighting for each of the project components should be designed by a lighting expert to ensure that surrounding areas do not experience light pollution from the project components. It is also suggested that the lighting is specific for project tasks and that lighting in camps be the absolute minimum.
- Colour should be used on mine facilities to best blend into the horizon and existing landscape character. Non-reflective materials should be used in all infrastructures to reduce glare impact.
- Waterways within the effected site should be maintained where possible or redirected to ensure fauna movement in the visual landscape.
- Small towns, such as Jericho and Alpha, which would be indirectly effected by this project, should produce a local character and infrastructure plan to ensure that these changes have a positive effect.
- Homesteads identified as having high visual exposure and little option in remediation, be relocated to a less sensitive location at least 1.5km from the project facilities; or rail moved to a less impacting area.
- The establishment of an interactive coal centre at APSDA / the beautification of the Bruce Highway overpass over the rail should be seriously investigated to reduce the impact from community perceptions about this development.

12 Appendix 1 – Potentially Sensitive Receptors

These sites are features identified around the project corridor and located relative to the rail line KP points with distances as derived from the project CAD Model and Google Earth. These places are indicated on the plans. Refer plan SA050.

Homestead	Number	Distance (km)	Direction from project	Co-ordinates	Impact refer to plans
'Cavandish'	1	10	W #	23.43265 146.2854E	MEDIUM
'Lambton Meadows'	2	5	SSW #	23.51715 146.3293E	LOW
'Eureka'	3	7	S #	23.54245 146.4638E	LOW
'Saltbush'	4	11	E #	23.49145 146.5513E	NIL
'Gadwell'	5	18	E #	23.47055 146.6301E	INCIDENTAL
'Monkland'	6	1.6	W #	23.40905 146.4622E	HIGH
'Tressillian'	7	14	E #	23.36255 146.6332E	NIL
'Hobartsville'	8	3.3	N	23.30145 146.5070E	HIGH
'Windarae'	9	11.2	W	23.17625 146.4940E	LOW
'Burtie'	10	4.1	E	23.24125 146.6490E	INCIDENTAL
'Surbiton'	11	1.4	E	23.14855 146.6186E	HIGH
'Eulimble'	12	4.7	E	23.02575 146.6498E	LOW
'Forrester'	13	5	W	22.95715 146.4792E	LOW
'Kingston'	14	1.6	E	23.11265 146.7669E	LOW
'Degulla'	15	5	WNW	22.78845 146.5166E	LOW
'Albro'	17	5.4	WNW	22.70525 146.5717E	INCIDENTAL
'Mirabilia'	18	1	FSF	22.77955 146.5941E	HIGH
'Riverview'	19	7	ESE	22.81125 146.6403E	INCIDENTAL
'Lestree Downs'	20	15	WNW	22.61285 146.5292E	LOW
'Laglan'	21	12	NW	22.49215 146.667E	INCIDENTAL
'Beresford'	22	13	ESE	22.50245 146.9389E	INCIDENTAL
'Epping Forest'	23	13	WNW	22.32135 146.7575E	LOW
'Tumbarumba'	24	19	WNW	22.20055 146.77E	LOW
'Khartoum'	25	7	WNW	22.21095 146.8956E	LOW
'Waminda'	26	8	WNW	22.17655 146.908E	LOW
'Durdham'	27	10	ESE	22.21315 147.0722E	INCIDENTAL
'Middle Creek'	28	11	WNW	22.07115 146.9347E	INCIDENTAL
'Laurel Hills'	29	2	W	22.04315 147.0513E	INCIDENTAL
'Willesby'	30	9	ESE	22.10195 147.1428E	LOW
'Urella'	31	16	WNW	22.01675 146.9161E	INCIDENTAL
'Elgin Downs'	32	17	W	22.00145 146.9202E	INCIDENTAL
'Twin Hills'	33	15	W	21.94995 146.9498E	INCIDENTAL
'Old Twin Hills'	34	15	W	21.90665 146.9493E	INCIDENTAL
'Avon Downs'	35	15	E	21.8565 147.2436E	INCIDENTAL
'Glenavon'	36	12	SE	21.63325 147.3876E	INCIDENTAL
'Warregal'	37	4	NW	21.51715 147.2566E	LOW
'Glen Eva'	38	10	SE	21.48875 147.4859E	INCIDENTAL
'Bungobine'	39	13	NW	21.34005 147.3168E	INCIDENTAL
'Birralee'	40	4.7	W	20.67095 147.6639E	INCIDENTAL
'Sonoma'	41	12	ESE	20.61675 147.8666E	INCIDENTAL
'Strathbowen'	42	17	WNW	20.53485 147.5755E	INCIDENTAL
'Strathmore'	43	11	WNW	20.50005 147.6333E	INCIDENTAL
'Eton Vale'	44	3	WSW	20.21675 147.7833E	LOW
'Salisbury Plains'	45	1	SE	19.98385 147.9998E	HIGH
'Wyoming'	46	12	NW	19.91245 147.8537E	INCIDENTAL
'Ness Vale'	47	13	NW	19.89555 147.8608E	INCIDENTAL
'Caley Valley'	48	1	E #	19.93875 148.051E	HIGH
'The Cape'	49	22	NW	19.80785 147.8359E	INCIDENTAL
'Colorado'	50	22	SW #	23.62925 146.2718E	INCIDENTAL
'Betanga'	51	19	SSW #	23.63265 146.3433E	LOW
'Corn Top'	52	17	SSW #	23.61695 146.3490E	LOW
'Oakleigh'	53	17	SE #	23.59115 146.5431E	INCIDENTAL
'Trelawney'	54	14	FSF #	22.84845 146.6974E	LOW
'Waltham'	55	10	NW	22.44505 146.7201E	INCIDENTAL
'Disney'	56	16	W	21.79845 146.9461E	INCIDENTAL
'Kenilworth'	57	16	NW	21.43425 147.1839E	INCIDENTAL
'Havilah'	58	11	E	20.79405 147.8298E	INCIDENTAL
'Mount Pleasant'	59	13	E	20.28335 147.9167E	NIL
'Homestead near McGregor Peak'	60	0.6	WNW	20.27915 147.7826E	MEDIUM
'Homestead near Mount Mackenzie'	61	0.3	SE	20.03845 147.8889E	HIGH

National Parks & Reserves	Chainage (KP)	Distance (km)	Direction from project	Comment	Visitation	Note	Impact refer to plans
Bimblebox Nature Reserve	KP470	0	- #	Nature Reserve	moderate ongoing research	Bimblebox Nature Refuge is an 8000 hectare sanctuary with number of long-term research projects. It's location within and adjacent to the mine site means the physical and visual impact will be extremely high.	HIGH
Cudmore N.P	KP402	20	W	NP and Bird watching site	minimal	Cudmore National Park covers an area of around 20,000 hectares. It is not a popular recreation destination and is primarily for nature conservation and restoration.	LOW TO INCIDENTAL
Narrien Range National Park	KP417	35	E	NP	minimal	Narrien Range National Park is not a popular recreation or tourism destination because of its isolation and poor public access. It's primary purpose is for flora and fauna conservation	LOW TO INCIDENTAL
Epping Forest N.P.	KP337	15	WNW	Northern Hairy-nosed Wombat conservation zone	Restricted access for research and Conservation	Epping Forest is a scientific research park and access by permit is only available to scientists, rangers and research and conservation volunteers.	LOW TO INCIDENTAL
Bygana West Nature Reserve	KP334	50	WNW	Nature Reserve	Restricted access	Privately owned Nature Reserve as part of Bygana Station.	INCIDENTAL
Mazeppa National Park	KP293	28	ESE	NP	moderate	Camping is not permitted in Mazeppa National Park due to the sensitive nature of the gidgee and brigalow scrub. There are no constructed walking tracks in this park. Boundary tracks are accessible to walkers.	INCIDENTAL
Nairana National Park	KP250	25	NW	NP	minimal	Nairana National Park covers an area of around 17,000 hectares. It is not a popular visitor destination due to lack of facilities.	INCIDENTAL
Blackjack Nature Reserve	KP136	21	E	Nature Reserve	Restricted access	Blackjack Mountain is a 200Ha privately owned reserve established with the Stanbroke pastoral Company. The Nature refuge supports populations of vulnerable flora and fauna species.	INCIDENTAL
Sonoma State Forest	KP72	15	E	State Forest	minimal-moderate	Sonoma is an 8500Ha area consisting of rocky rugged outcrops and steep hills of natural and scenic value. It is a significant koala habitat and is visited by koala spotters.	INCIDENTAL
Mount Pleasant Nature Reserve	KP46	8.9	ESE	Nature Reserve	Restricted access	Mount Pleasant is an 813Ha privately owned reserve linking Mount Aberdeen NP and the Boogie River, and Aberdeen and Homehaven Nature Refuges	INCIDENTAL
Mount Aberdeen NP	KP38	10	SE	National Park	minimal	Mount Aberdeen has significant bioregions and relic ecosystems of important natural and scientific value. There is little access to the public other than self-reliant walkers and climbers. The park can be seen from the Collinsville Bowen Road.	LOW TO INCIDENTAL
Homehaven Nature Refuge	KP35	14	E	Nature Refuge	Restricted access	Homehaven is a 181Ha privately owned nature refuge conserving several regional ecosystems of eucalypt and dry vine forest. The site adjoins Mount Aberdeen NP, adding to habitat for several rare flora species.	NIL
Cape Upstart National Park	KP-10 (port)	28	NW	NP	minimal	Cape Upstart is an imposing granite headland surrounded by white beaches. There is no vehicle access within the park. Self-sufficient bush camping is permitted at Coconut Beach which is only accessible by boat. The port facility will have a moderate visual impact on the small number of visitors.	LOW
Hills and Mountains	Chainage (KP)	Distance (km)	Direction from project	Comment	Visitation	Note	Impact refer to plans
The Nunnery (Hill)	KP358	1.5	SE	Locality Hill			MEDIUM
Mount Donnybrook	KP351	4	NW	Mountain			MEDIUM
Mount Rolfe	KP298	8	SE	Mountain			LOW
Mount Manaman	KP204	5.6	NW	Locality Hill			LOW
Bulgonunna Peak	KP174	2.3	SW	Locality Hill			LOW
Mount Sambo	KP127	2.5	E	Locality Hill			LOW
Mount Jimmy	KP85	3.8	W	Mountain			LOW TO INCIDENTAL
Mount Bella Vista	KP84	4	WNW	Locality Hill			INCIDENTAL
Mount Toussaint	KP74	6	E	Locality Hill			INCIDENTAL
Table Mountain	KP65	3	WNW	Locality Hill			LOW
The Twins	KP61	4.5	SW	Locality Hill			INCIDENTAL
Peter Gordon Range	KP60	6.1	WSW	Locality Hill			INCIDENTAL
Herbert Range	KP60	9	NW	Locality Hills			INCIDENTAL
The Whitepinch	KP55	2	SE	Locality			LOW
McGregor Peak	KP49	1.2	WNW	Locality Hill			MEDIUM
Bogie Range	KP46	8	WNW	Locality			INCIDENTAL
Highlanders Bonnet	KP42	6	SE	Locality Hill			INCIDENTAL
Pine Hill	KP35	5	E	Locality Hill			INCIDENTAL
Mount Abbot	KP32	10	W	Mountain		Area recommended as National Park by WWF for purchase by the QLD government to be opened for visitation (Treasures for Humanity, 2008)	LOW
Mount Mackenzie	KP27	9	SE	Locality Hill			INCIDENTAL
Knobbies	KP97	4.6	SSE	Locality Hill			INCIDENTAL
Mount Carew	KP4	0.4	SSE	Locality Rock outcrop			LOW
Mount Roundback	KP1	4	S	Locality Hill			HIGH TO INCIDENTAL
Mount Luce	PORT	0.5	W ###	Locality Hill			MEDIUM
Roads and Highways	Chainage (KP)	Distance (km)	Direction from project	Comment	Visitation	Note	Impact refer to plans
Capricornia Highway		16.5	S	Parallel Highway	High	Sealed. Average vehicles per day between Blackwater and Emerald - 2,361 with 18.7% commercial/heavy vehicles (DMR 2004)	LOW
Clermont-Alpha Road	KP450-433	4	W	Parallel (Secondary) Road	Minimal	Partially sealed road that may be closed to 2WD traffic	LOW
Gregory Development Road	KP285			Road (Principal) crossing	Moderate	Currently being upgraded from single lane bitumen to an 8m wide bitumen road. Mostly used by road trains. Services the mining and agricultural regions.	HIGH
Suttor Development Road	KP202			Road (Secondary) crossing	Minimal	Partially sealed road that may be closed to traffic, two lane gravel road that transverses east to west	HIGH
Bowen Development Road	KP168			Road (Secondary) crossing	Minimal	Unsealed sections of the road may be closed to 2wd traffic.	HIGH
Bruce Highway	KP5			Highway crossing	Very High	Sealed. Average vehicles per day north of Bowen Developmental Rd - 4,036 with 15.6% commercial/heavy vehicles (DMR 2004)	HIGH
Towns	Chainage (KP)	Distance (km)	Direction from project	Comment	Visitation	Note	Impact refer to plans
Alpha	MINE	27	SE ##	Town		Small Town on Capricorn Highway	NIL
Jericho	MINE	31	SW ###	Town		Small Town on Capricorn Highway	NIL
Mount Coolon	KP200	9.2	NW	Town		Small Town on Bowen Development Road	NIL
Collinsville and Scottville	KP81	12	ESE	Towns		Towns on or near Bowen Development Road	INCIDENTAL
The Bogie River Bush House	KP46	17	SE	Tourist accommodation		Tourist accommodation	NIL
Alva	PORT	80	NNW ##	Town		Small coastal Town	INCIDENTAL
Queens Beach	PORT	23	SE ###	Town		Northern Beach area of Bowen	INCIDENTAL
Bowen	PORT	23	SE ##	Town		Regional Town and centre	INCIDENTAL
Rivers and Creeks	Chainage (KP)	Distance (km)	Direction from project	Comment	Visitation	Note	Impact refer to plans
Sandy Creek	KP410			Creek crossing			HIGH
Belyando River	KP394			River crossing			HIGH
Mistake creek	KP294			Creek crossing			HIGH
Sutter River	KP234			River crossing			HIGH
Bowen River	KP103			River crossing			MEDIUM
Pelican Creek Wetland	KP97	4	W	Wetland			LOW TO INCIDENTAL
Bogie River	KP43			River crossing	YES	Area recommended as National Park by WWF for purchase by the QLD government to be opened for visitation (Treasures for Humanity, 2008) Strathbogie GS 120005B Lat 20.09 S Long 147.34 E GZ 18.126m Datum ASS AMTD 44.8kms C_Area 1031.0sq.km Data Commence 01/10/1967 Cease 01/10/1990 Region AYR Bogie River	MEDIUM

NOTES:

- 1/ DIRECTIONS STATED IN THE TABLES ABOVE AND THE REPORT ARE FROM THE PROJECT FEATURE TO THE VISUAL RECEPTOR;
2/ DISTANCES ARE FROM THE NEAREST RAIL POINT;
3/ # DISTANCES ARE FROM THE NEAREST MINE VIEW POINT;
4/ ## DISTANCES ARE FROM THE NEAREST PORT VIEW POINT

DISCLAIMER
TRACT CONSULTANTS has endeavoured to ensure accuracy and completeness of the data. TRACT CONSULTANTS assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within these maps.

VISUAL ASSESSMENT - POTENTIAL VISUALLY SENSATIVE RECEPTORS - APPENDIX 1
GALILEE COAL - EIS



TRACT CONSULTANTS - LANDSCAPE ARCHITECTS & PLANNERS

JULY 2010

Job No.: 0711-0232-03

Plan: LD-SA-050 r 3

13 Appendix 2 - References

The following resources have been used in the preparation of this report.

Technical reference

Photographs and photo montage images included within this report were taken and prepared in accordance with the following guideline.

Background

The photographic and imaging techniques adopted for this study are intended to produce visual representations that:

- Are as geometrically and aesthetically accurate as possible to permit decision makers, after suitable field inspections, to make a reasonable, balanced judgement of the effects of a proposed change.
- Are based on a transparent, structured and replicable procedure, to allow others to confirm the accuracy of the information presented.
- Are intended to present findings in a manner that is easily understood by non technical people.

Note: photographic images and simulations cannot provide the visual experience that a human observer would receive in the field. The detailed technical assessments and judgements presented in this study have been made on the basis of site inspections, modelling, visualisations and a range of other information.

Selection of viewpoints

The viewpoints identified within this study and represented within the photomontage images meet the following criteria:

- Potential viewpoints, likely visual effects and visual impact issues were initially identified through a preliminary study that included ZVI mapping and development of photomontage images.
- Detailed ZVI mapping was prepared to identify the theoretical extent of visibility for existing conditions and each stage of the development.
- Representative view points were selected. These viewpoints are intended to be representative of the range, style and magnitude of likely impacts, including 'worse case scenarios'.

People involved

Mark Shurey: Dip App Sc (Hort), M.L.Arch, RLA MAIH,
Associate, Landscape Architect Tract Consultants

- ☐ Field assessment, analysis & report preparation
- ☐ Management of all graphic outputs

Rob Choucroun: B Sc (Comp. Maths)

Senior GIS Analyst, Tract Consultants

- 3D Modelling of site development
- Visual Assessment and Impact mapping

Rebecca Stephens: B Design, L.Arch (Sust Plan)

Landscape Architect, Tract Consultants

- ☐ Photography & report preparation
- ☐ Management of photomontage process

Cameras

- Canon EOS 5D Digital SLR – Full frame CMOS sensor with 40mm lens setting
- Canon PowerShot SX230 HS Digital Camera with GPS with variable zoom settings

Printed image resolution

- Report plans printed as A3 standard, but capable of enlargement to A1

Preparing the Photomontages

- Adobe Photoshop CS3 was used to combine the 3D render with the existing photo. Proposed vegetation was illustrated in the form of cylinder objects to give an indication of regrowth heights.
- Adobe Photoshop CS3 was used to prepare the photomontage images.

Software

Microsoft Word

Microsoft Excel

Bentley Microstation V8i

Map Info

Adobe Photoshop.

Google Earth

DTM and alignment files supplied by E3 Consultant

Reports

South East Queensland Regional Plan 2005–2026, Implementation Guideline No. 8: Identifying and protecting scenic amenity values, September 2007

North Queensland Bulk Ports Corporation, Port of Abbot Point: T4-7 Capacity Allocation, March 2011

BMT WBM, Baseline Profile for the Kaili Valley Wetlands, September 2010

Department of Employment, Economic Development and Innovation, Preferred T4 rail corridor working option, May 2011

Various back ground reports and flyers supplied by E3 Consult.

Bioregion mappings, from Department of Environment and Resource Management, <http://www.derm.qld.gov.au/vegetation/bioregions.html>

Previous Landscape and Visual Assessments undertaken by Tract Consultants

Department of Transport and Main Roads, 2004, Road Landscape Design Manual, Queensland Government

Epping Forest; Mt Aberdeen; and Narrien Range National Park Management Plan from, www.derm.qld.gov.au

“Coal experience” tourist information, at <http://www.coalfaceexperience.com.au>

Ports Corporation of Queensland, Abbot Point Port Handbook, North Queensland Bulk Ports (NQBP).

Birds Australia: <http://www.birdsaustralia.com.au>

Bimblebox Nature Refuge: <http://bimblebox.org>

Centre for the Government of Queensland UQ; <http://queenslandplaces.com.au/>

Images

FIGURES

Figure 1: Bioregional map of Queensland sourced from the Department of Environment and Resource Management web site, with study area overlayed

Figure 2: Regional Context Map. Google Earth background image with project components overlayed

Figure 3: Broad Vegetation Regions – Pre Clearing Map. Queensland Herbarium DERM background image with project components overlayed

Figure 4: Mine proposed plan extents, see full mapping SA001

Figure 5: New coal terminal, see full mapping SA015

TABLES

Table 1: Visual Impact of Mine. Refer to Plan SA-0003.

Table 2: Visual Impact of rail alignment. Refer to plans SA-0003 to SA-0009.

Table 3: Visual Impact of port. Refer to plans SA-0010 and S-0A011.

Table 4: Revised Visual Impact of port accounting for existing facilities. Refer to plans SA-0010 and SA-0011.

IMAGES (and simulations)

5.3a: This image provides an example of the effects of curvature of the earth and horizon line viewing the Abbot Point Port facility from Cape Upstart. The observer (camera) is at sea level with the port facility over 7km away, resulting in the base of the object not being visible.

6.1a: Capricorn Uplands, image by Tract Consultants, 2011.

6.1b: Dry Tropical Uplands, image by Tract Consultants, 2011.

6.1c: Whitsunday coast region image by Tract Consultants, 2011.

7.1.1a: View of north-east corner of Bimblebox Nature Reserve, image by Tract Consultants, 2011.

7.1.1b Capricorn Highway looking towards mine tenement, image by Tract Consultants, 2011.

7.1.1c: Image from edge of Clermont Alpha Road looking towards the mine tenement, image by Tract Consultants, 2011

7.1.1d: Alpha looking out of the town to the west in the early evening, image by Tract Consultants, 2011.

7.1.1e: Jericho from above looking east, image by Tract Consultants, 2011.

7.1.1f: Monklands (in left bottom corner) is in close proximity of the Bimblebox Nature Refuge, image by Tract Consultants, 2011.

7.1.1g: Hobartville entry gate (to the right back), image by Tract Consultants, 2011.

7.5a: View of the northern edge of the open cut mine site. Northeast corner of Bimblebox Nature Reserve is visible with the Monkland's homestead in the bottom right corner, image by Tract Consultants, 2011.

7.5b: Roadside vegetation along the Capricorn Highway, image by Tract Consultants, 2011.

7.5c: Manipulated image of roadside vegetation along the Capricorn Highway with background vegetation deleted and mine infrastructure inserted (taken at 17km distance). Due to massed low to mid-canopy vegetation infrastructure cannot be seen, original image by Tract Consultants, 2011.

7.5d: Manipulated image of roadside from Clermont-Alpha Rd where limited vegetation occurs. Mine facilities could be viewed against the horizon if techniques of visual buffering are not utilised, original image by Tract Consultants, 2011.

7.5e: Semi-permanent water way within the suggested open cut mine site was found to have a high value landscape character and offer habitat for many bird species, image by Tract Consultants, 2011.

8.1.1a: A Flat to low undulating landscape typical of the landform near the proposed mine site, image by E3 consultants at KP415.

8.1.4a: Looking to Cudmore National Park, landscape visual character indicates rocky terrain, image by Tract Consultants, 2011.

8.1.4b: From above Nerrien Range National Park looking towards the mine tenement site, image by Tract Consultants, 2011

8.1.4c: Gregory Development Road (in front bending to right) with Pelican Lagoon in background, image by Tract Consultants, 2011

8.1.4d: Suttor Development Road sits within an open landscape (image taken at rail crossing point), image by Tract Consultants, 2011

8.1.4e: Mount Coolon from above, image by Tract Consultants, 2011

8.1.4f: Bowen Development Road above proposed rail crossing point (between bend and dam), image by Tract Consultants, 2011

8.1.4g: Collinsville and Scottsville (both left top corner) looking from proposed rail site over separating mine image by Tract Consultants, 2011.

8.1.4h: The Bruce Highway (grey strip from top left, to mid-side right) at the rail crossing point which occurs just left of the creek (in white/silver), image by Tract Consultants, 2011

8.1.4i: Vista from Bruce Highway driving towards Bowen (and APSDA) with the small rise of Mount Carew left of the highway, image by Tract Consultants, 2011.

8.5a: Manipulated image of Gregory Development Road with the proposed rail alignment inserted.

- 8.5b: *Manipulated image showing the location of Collinsville (C) and Scottsville (S) with the proposed rail alignment inserted at the lower edge of the image.*
- 9.1.1a: *Coastal wetlands on north-east edge of Mount Luce (where proposed jetty to land, image by E3 Consultants, 2008*
- 9.1.1b: *Samphire and sedge wetland, image by E3 Consultants, 2008*
- 9.1.1c: *Paperbark forests, image by E3 Consultants, 2008*
- 9.1.2a: *Cape Upstart National Park, image by Tract Consultants, 2011*
- 9.1.2b: *Existing view from Cape Upstart National Park towards APSDA, image by Tract Consultants, 2011*
- 9.1.2c: *View from Camp Island looking east-south-east to mainland, image by: Silver Shores Lodge. <http://www.campislandresort.com/index.htm> Silver Shores Lodge)*
- 9.1.2d: *The Bruce Highway looking into the APSDA from the APSDA western boundary, image by Tract Consultants, 2011*
- 9.1.2e: *Existing vista from Bruce Highway towards coal terminal site, image by Tract Consultants, 2011*
- 9.1.2f: *Bowen, view across Queens Beach towards coal terminal, image by Tract Consultants, 2011*
- 9.1.2g: *Image from Cape Edgecombe look out towards Abbot Point, image by Tract Consultants, 2011*
- 9.1.2h: *Image from Coral Cove Apartment to Abbot Point in early evening, image by Tract Consultants, 2011*
- 9.1.2i: *Enlarged image from Coral Cove Apartments towards Abbot Point after dark, image by Tract Consultants, 2011,*
- 9.1.2j: *Looking from above towards Abbot Point jetty, image by Tract Consultants, 2011*
- 9.5a: *Existing view to proposed site of the coal terminal, image by Tract Consultants 2011.*
- 9.5b: *Google Earth view to proposed site of the coal terminal with proposed coal port terminal facilities mapped in foreground, image from Google Earth, 2005 with overlay of CAD mapping*
- 9.5c: *Existing jetty off Abbot Point, images shows Mount Luce to left and Mount Roundback centre, image by E3 Consultants, 2009*
- 9.5d: *Manipulated and enlarged image of night lighting of Abbot Point from Cape Edgecombe with present lighting intensified, image by Tract Consultants, 2011*
- 9.5e: *Manipulated image with port stockpile infrastructure, from Bruce Highway vista, image by Tract Consultants, 2011*
- 9.5f: *Manipulated image of Abbot Point with addition jetty loading facilities in the early evening from the Coral Cove Apartments, image by Tract Consultants, 2011*
- 10.3a: *QR National Coal train (Dawson Mine) gives an indication of length of train in the visual landscape, Image by QR National, Coal 2010, <http://www.qrnational.com.au/MediaCentre/MediaImages/Pages/default.aspx?page=1>*
- Machinery at Port Waratah, www.jcdau.com.au**
- Front page images: 2. Machinery at existing Abbot Point coal terminal
- Townsville Bulletin**
- 7.1d: *Existing coal stock-piles located at Abbott Point. (Image from Townsville Bulletin http://www.townsvillebulletin.com.au/article/2009/10/23/88491_business.html)*

