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ENVIRONMENTAL ASSESSMENT

Newcastle Gas Storage Facility Project

Major Project Application Number 10-0133

Volume 4: Appendices 8 – 13

May 2011

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Appendix 11

Visual Impact Assessment

terras
landscape architects

visual impact assessment

Newcastle Gas Storage Facility Project
5 Old Punt Road
Tomago

PROJECT NO: 8641.5
DATE: 11.05.2011
REVISION: H

1 EXECUTIVE SUMMARY

This Visual Impact Assessment (VIA) was undertaken as part of the environmental investigations required for the proposed Newcastle Gas Storage Facility Project (the Project) by AGL Energy Limited (AGL). The Project comprises the following main components:

- Gas plant site.
- Access road and utility corridor from Tomago Aluminium Company (TAC) Northern Access Road to the gas plant site.
- Hexham receiving station, linking the Project to the existing NSW gas network.
- Natural gas pipeline connecting the gas plant and receiving station.

The proposed gas plant site, access road and pipeline access corridor are on land to the north of the Tomago Aluminium Smelter and can be collectively referred to as the “primary project area” (PPA).

The scope of this VIA includes the PPA, in addition to the Hexham receiving station and the pipeline connecting the two sites. The objective of the assessment was to document the landscape and visual quality, identify potential impacts and provide recommendations for mitigation. The gas plant site analysis was based on the taller proposed structures, the flare stack and the liquefied natural gas (LNG) storage tank, as the remaining structures are smaller low profile buildings that cannot be seen due to the surrounding taller canopy vegetation height.

This VIA has identified the areas considered to be affected by the proposed development. The visual quality was assessed in relation to the sites local environment and existing surrounding development.

The PPA is positioned within an extensive area of bushland generally located north east of the Hunter River and south of Raymond Terrace. The locality to the south-east south-west includes mainly industrial and light industrial-warehouse type businesses, principally the extensive Tomago Aluminium smelter with some semi-rural residential properties further to the east along Tomago Road.

The main vehicular routes accessed by the public include the Pacific Highway to the west and Tomago Road to the south, both approximately 1.5km from the gas plant site.

Whilst the surrounding topography is generally flat and the digital viewshed analysis undertaken shows that there is an extensive area in which to obtain views to the PPA, the surrounding landscape vegetation limits the actual extent of the sites visual exposure.

The VIA includes photographic viewpoint assessment sheets for 21 different locations, of which 5 were adjacent to residential areas. Only one of these viewpoints had an unobstructed close proximity view to the PPA. This location was an unsealed access track to the back of a disused industrial allotment not commonly accessed by the general public and not within a residential area [Viewpoint 17]. One of the closest viewpoints was located to the east of the botanic gardens on the edge of their bushland walking trail. The site assessment was undertaken on the edge of the cleared transmission line easement, however no views of the marker balloons were possible. Follow-up images were taken from selective locations where it was estimated the flare tower may be visible at night.

Two viewpoints were taken in close proximity to the proposed Hexham receiving station. Whilst the final layout of this site is unconfirmed, the proposed works shall be located to the rear of the site and the existing building to be retained at the front of the site will obstruct views to new works proposed at the rear of the site.

In summary, the gas plant site and the proposed LNG storage tank and stack structures are very difficult to see from areas 1-2km radius from the site due to the screening of vegetation both distant and proximal, limited viewing locations and extent of surrounding bushland. Distant views [2km+] provide views to the site and generally appear as distant elements on the skyline. The extent of the Tomago Aluminium Smelter structures of similar height but more numerous, and covering a much larger area, mean that the effect of the proposed new tank and flare stack are minor incremental changes and have a low visual impact. The proposed works at the Hexham site shall be slightly visible from Old Maitland Road, however it shall be set back within the site and shall also be viewed within an established industrial context.

Considering the low visual impacts of the project, no recommendations regarding the minimisation of visual impact are provided, with the exception of the following:

- Additional screen planting to the front and site boundaries of the Hexham receiving station site. This will be subject to the final site layout, the location of underground service lines and the possible requirement for visual access for security surveillance.

2 INTRODUCTION

2.1 Preamble

Coffey Environments commissioned Terras Landscape Architects (TLA) on behalf of AGL, to prepare a Visual Impact Assessment for the Newcastle Gas Storage Facility Project. This report specifically addresses the site, including the proposed LNG tank (which will be up to 56m high with a diameter of up to 60m) and 40m high flare stack, due to their potential visual impact presented by their proposed heights. In addition, the potential impact of the planned access road, utility corridor, the Hexham receiving station and the connecting pipeline between the two sites is also addressed.

Field work was conducted in mid September 2010 and January 2011.

2.2 Terminology

The below meanings for the following terms shall apply to this report:

The *subject site* (referred to also as *the site*) is defined as the land area directly affected by the proposal within defined boundaries. For this study, the site refers to the PPA, the Hexham receiving station and the pipeline connecting the two sites.

The *study area* consists of the subject site plus the immediate surrounding land potentially affected by the proposal during its construction and operation phase and includes the immediate areas surrounding the site.

The *study locality* is the area of land within the regional visual catchments whereby the proposal can be readily recognised. Generally this is confined to a six-kilometre radius beyond which individual buildings are difficult to discern especially amongst other development where contrasts are low. Further, visual sensitivity generally declines significantly beyond this range due to the broad viewing range that can be had from vantage points. For this study the locality has been extended, due to the larger distance between the site and nearest viewpoint, land usage, site access and major road arrangement.

2.3 Objectives

The objectives of this report are as follows:

- To identify and describe the existing visual/landscape environment and to evaluate its current qualities.
- To graphically portray the proposal in contextual settings from selected viewpoints based on criteria established by TLA.
- To determine the likely impacts development will have on the visual/landscape quality of the area.
- To propose methods, where possible, to reduce the scenic impact of the proposed development or methods to increase the existing scenic quality.

2.4 Methodology

The PPA is located within the Port Stephens Shire Council Local Government Area (LGA), whilst the Hexham site is within the Newcastle LGA. As neither council have specific policies or guidelines regarding the requirements of a VIA, TLA have applied our own methodology, which has been developed over several years and uses relevant aspects of methods accepted in landscape assessment. This methodology has been extensively used for previous VIAs in these LGAs.

The assessment of visual impacts requires subjective judgement and cannot be totally objective, it is therefore necessary to limit the subjectivity of the work by adopting a comprehensive approach. The methodology applied to this study involved systematically evaluating the visual environment pertaining to the site and using value judgements based on community responses to scenery, as outlined in Appendix A (Visual Quality Reference Table). This identifies aspects that are more objective (such as the physical setting, character and visibility of a proposal), from more subjective aspects, such as the compatibility of the proposal with the setting.

Visual data collection involves systematically evaluating the visual environment from all relevant viewpoints through fieldwork to determine the actual potential for views to the site. Once a viewing point has been identified data is recorded both photographically and as detailed notes. The selection of viewpoints has generally been based on locations where potential for views of the proposed development would occur. Viewpoint selection criteria included consideration of where views can be obtained from publically frequented locations, such as major traffic corridors, urban residential areas, prominent look-outs or locations of high scenic value.

This assessment was undertaken in the following stages:

- A written description (with accompanying images) of the existing visual environment to provide an appreciation of the development's local context, including vegetation, topography and surrounding development.
- A description of the proposal in relation to its height, scale and materials.
- A desktop study including a digitally calculated viewshed analysis based on topographic features of the site locality and aerial photography.
- A viewpoint analysis to identify locations where scenic quality is likely to be affected by the proposed development and provide a visual indication of the development's likely impact on those views (where applicable).
- Fieldwork involving determining on site the location of the proposed storage tank and flare stack through the use of GPS software.
- Assessment of visual impacts from each viewpoint location with respect to assessment criteria ie. a value rating.

The purpose of the above methodology is to minimise subjectivity in the impact assessment and to provide sufficient data to allow for third party verification of results.

Temporary brightly coloured, large, helium-filled balloons to the maximum heights of the tank (56m above existing ground level and the flare stack 40m above existing ground level), with marker balloons set 5m higher were installed. The upper marker balloons provide a known visual scale with which to use for dimensional scaling of montages. One of the marker locations was located in dense bushland to ensure accuracy of the proposed structure location. These markers

were then used to identify (or attempted to view) the taller elements of the proposal from various locations within the subject locality and distant locations as determined by the desktop study and viewshed analysis fieldwork.

All viewing locations were assessed with the use of the handheld GPS units to provide accurate viewing direction to the site. The helium markers were often not visible and the data was recorded for verification of the accuracy of the viewing locations and viewing angle-distance to site calculations.

Fieldwork was delayed until conditions were suitable, ie. a fine day with almost nil wind, to ensure clear visibility and balloons maintained in a vertical position for accurate height representation.

The lower marker balloon indicates the proposed height of the structure. The upper balloon is set at a height 5.0m higher than the lower marker balloon for a visual scale reference.

Figure 2.1: Installation of temporary marker balloons on site.

3 VISUAL ASSESSMENT CRITERIA

3.1 Visual Quality

Visual quality of an area is essentially an assessment of how viewers may respond to designated scenery. Scenes of high visual quality are those that are valued by a community for the enjoyment and improved amenity that they can create. Conversely, scenes of low visual quality are of little scenic value to the community with a preference that they be changed and improved, often through the introduction of landscape treatments (eg screen planting).

As visual quality relates to aesthetics, its assessment is largely subjective. There is evidence to suggest that certain landscapes are continually preferred over others with preferences related to the presence or absence of certain elements.

The rating of visual quality of this study has been based on the following generally accepted conclusions arising from scientific research (DOP, 1988).

- Visual quality increases as relative relief and topographic ruggedness increases.
- Visual quality increases as vegetation pattern variations increase.
- Visual quality increases due to the presence of natural and/or agricultural landscapes.
- Visual quality increases owing to the presence of waterforms (without becoming common) and related to water quality and associated activity.
- Visual quality increases with increases in land use compatibility.

Appendix A contains a visual quality preference table that has a more detailed breakdown of the above elements and their impact on visual quality.

3.2 Visual Sensitivity

Another aspect affecting visual assessments is visual sensitivity. This is the estimate of the significance that a change will have on a landscape and to those viewing it. For example, a significant change that is not frequently seen may result in a low visual sensitivity although its impact on a landscape may be high. Its assessment is based on a number of variables such as the number of people affected, viewer location including distance from the source, the surrounding land use and degree of change. Variables may also include viewer position, such as *inferior*: viewer sightline to site is below the horizontal axis, *neutral*: viewer sightline is generally along the horizontal axis, *superior*: viewer sightline is above the horizontal axis ie: looking down towards the site. Generally the following principles apply:

- Visual sensitivity decreases as the viewer distance increases.
- Visual sensitivity decreases as the viewing time decreases.

- Visual sensitivity can also be related to viewer activity (e.g. a person viewing an affected site while engaged in recreational activities will be more strongly affected by change than someone passing a scene in a car travelling to a desired destination).

The following table is a guide to visual sensitivity based on the above criteria. It describes general ratings however, consideration also must be given to particular conditions that may modify the results for specific sites.

VISUAL SENSITIVITY TABLE			
	distance zones		
land use	**Foreground (0-1km)**	**Middleground (1-6km)**	**Background (>6km)**
Residential: Rural or Urban	High Sensitivity	High Sensitivity	Moderate Sensitivity
Tourist or Passive Recreation	High Sensitivity	High Sensitivity	Moderate Sensitivity
Major Travel Corridors	Moderate Sensitivity	Moderate Sensitivity	Low Sensitivity
Tourist Roads	High Sensitivity	Moderate Sensitivity	Low Sensitivity
Minor Roads	Moderate Sensitivity	Low Sensitivity	Low Sensitivity
Agricultural Areas	Moderate Sensitivity	Low Sensitivity	Low Sensitivity
Industrial Areas	Low Sensitivity	Low Sensitivity	Low Sensitivity

Source: EDAW, 2000
Table 1: Visual Sensitivity Table

3.3 Visual Effect

Visual effect is the interaction between a proposal and the existing visual environment. It is often expressed as the level of visual contrast of the proposal against its setting or background in which it is viewed. This is particularly important should any proposed development extend above the skyline unless, once again, there are particular circumstances that may influence viewer perception and/or visual impact.

Low visual effect occurs when a proposal blends in with its existing viewed landscape due to a high level of integration of one or several of the following: form, shape, pattern, line, texture or colour. It can also result from the use of effective screening often using a combination of landform and landscaping.

Moderate visual effect results where a proposal noticeably contrasts with its viewed landscape, however, there has been some degree of integration (e.g. good siting principles employed, retention of significant existing vegetation, provision of screen landscaping, careful colour selection and/or appropriately scaled development.)

High visual effect results when a proposal presents itself with high visual contrast to its viewed landscape with little or no integration and/or screening.

3.4 Visual Impact

The following table illustrates how visual effect and visual sensitivity levels combine to produce varying degrees of visual impact.

VISUAL IMPACTS TABLE				
		Visual Effect Levels		
Visual Sensitivity Levels		**High**	**Moderate**	**Low**
	High	High Impact	High Impact	Moderate Impact
	Moderate	High Impact	Moderate Impact	Low Impact
	Low	Moderate Impact	Low Impact	Low Impact

Source: EDAW, 2000

Table 2: Visual Impacts Table

It should be noted that a high visual impact does not necessarily equate with a reduction in scenic quality, and the degree of visual impact has to be understood and assessed in relation to both the existing scenic quality of an area and the design merits of the proposal itself. For example, a well-designed proposal with a high visual impact may help to improve the visual environment of an area with low scenic quality.

4 EXISTING VISUAL ENVIRONMENT

4.1 Site Location, Zoning & Ownership

The proposed gas plant is approximately 13km northwest of the Newcastle Central Business District, 8km south of Raymond Terrace and 4km east of the Hexham Industrial Area. It is located in the northeast corner of Lot 105 DP 1125747 (also known as 5 Old Punt Road, Tomago), within the Port Stephens Local Government Area (LGA) and will occupy approximately 28 hectares to the north of Tomago Aluminium Smelter. The footprint of the gas plant itself is approximately 13.3 ha. The land is currently owned by Tomago Aluminium Company (TAC) and as such, the project requires the subdivision of the gas plant site from Lot 105. The study area also includes the following:

- Proposed access to the gas plant will occur via an access road connecting to the south western corner of the site. The access road and utility corridor will join the gas plant to the TAC Northern Access Road between approximately 130m and 236m south of the intersection of the TAC Northern Access Road and Old Punt Road. The TAC Northern Access Road joins Old Punt Road approximately 200m from the intersection of Old Punt Road and the Pacific Highway. This road shall be approximately 30m wide.
- Pipeline corridor connecting the gas plant site with the Hexham receiving station.
- Hexham receiving station site. This site is located at Old Maitland Road, adjacent to the existing Jemena Gate Station Facility.

The PPA is zoned 4(a) (Industrial – General: Port Stephens Shire Council) and the Hexham receiving station site is zoned 4(b) Port and Industrial (Newcastle City Council).

Figure 4.1: Gas plant site location (refer overall site locality plan for further detail).

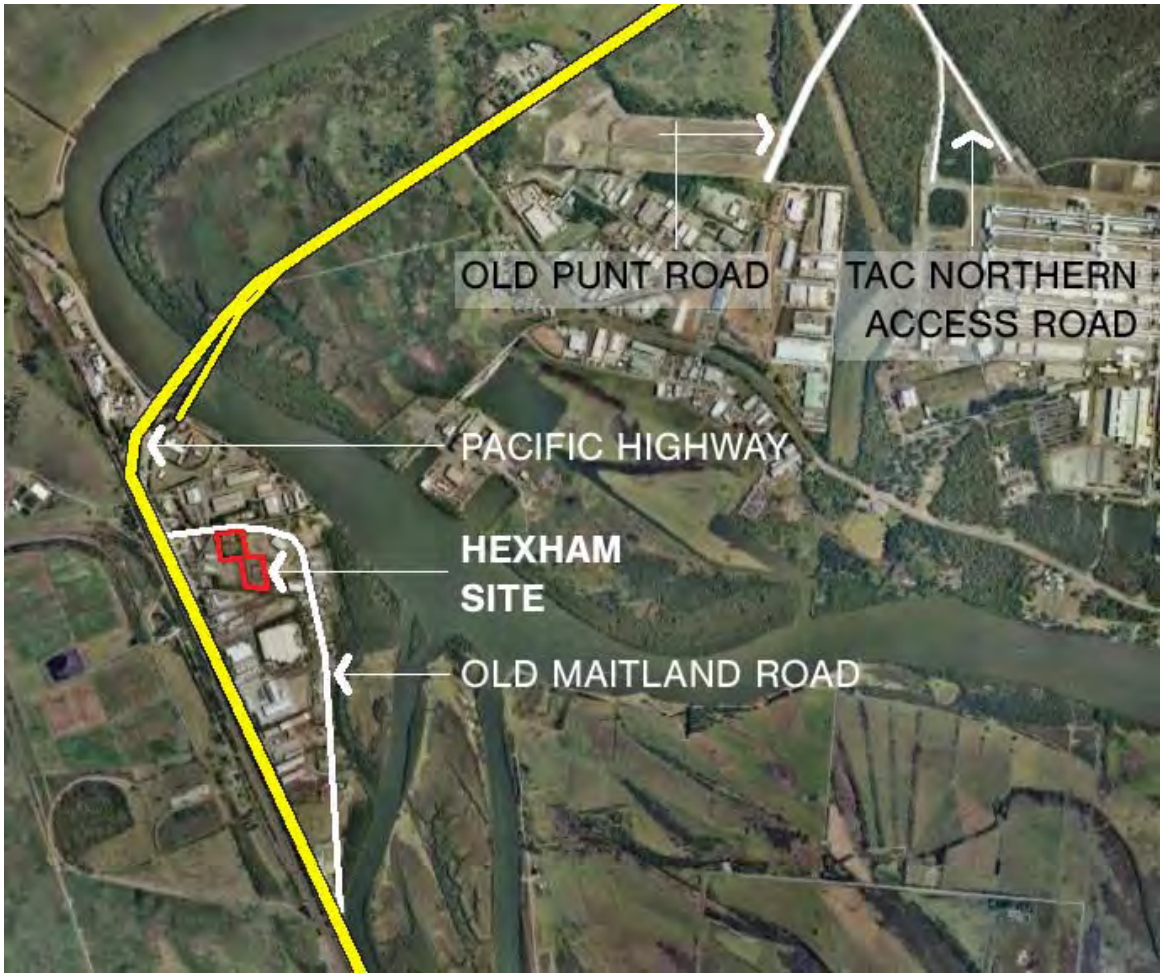


Figure 4.2: Hexham receiving station site location (refer overall site locality plan for further detail).

4.2 Local Area and Site Character

The gas plant site is located within the northern extents of the Tomago Industrial Area. With the exception of a network of unformed access tracks and an overhead powerline easement, the majority of the gas plant site consists of regrowth woodland and forest vegetation. It is bounded by similar vegetation types to the west, north and east, whilst significant industrial development occurs to the south. The site presently contains no buildings or structures.

A high voltage overhead powerline easement runs parallel with the site's northern boundary, offset from the boundary approximately 250m. This bisects the forest vegetation and adjoins the southern boundary of the Hunter Botanical Gardens.

The nearest trafficable roads are the Pacific Highway and Tomago Road, both approximately 2km from site. Medium to high density commercial development aligns both sides of the Pacific Highway at Heatherbrae and Motto Farm and further southward near Tomago, however native canopy vegetation adjoins the highway in the proximity to the site. High density industrial development also dominates the western section of Tomago Road, which becomes intermittent heading eastward. In contrast, there are open rural paddocks to the south of this road, which

increases the visual amenity within this area. Views to the site are obstructed by these commercial and industrial buildings, whilst pockets of native vegetation provide visual buffer.

4.3 Topography and Views

The site is relatively level and the surrounding topographic variation is low. No significant ridgelines or outcrops are present within the study area, therefore elevated viewing locations are minimal and distant. The aforementioned industrial development and surrounding vegetation obstructs immediate views into the site. Refer Section 5 Viewpoint Analysis for further detail on viewsheds.

5 THE PROPOSAL

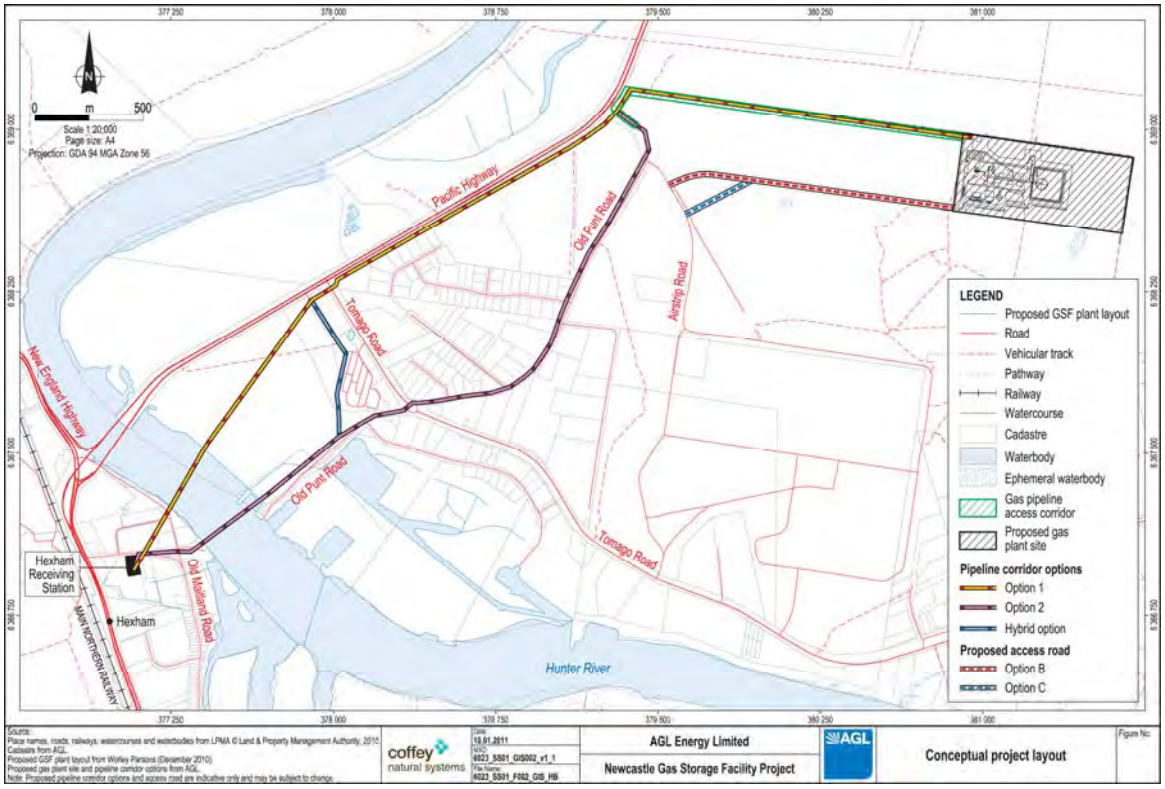
The proposal seeks to develop the Newcastle Gas Storage Facility Project to meet AGL's peak gas market requirements. It consists of the construction and operation of:

- Access road and utility corridor from Old Punt Road to the gas plant site.
- Gas plant site, including a LNG storage tank (up to 56m high and with a diameter of up to 60m) and a 40m high flare stack.
- Hexham receiving station, linking the Project to the existing NSW gas network.
- Natural gas pipeline connecting the gas plant and receiving station which includes the gas pipeline access corridor on the northern edge of the PPA.

The scope of this study aims to primarily address the potential visual impact of the proposed storage tank and flare stack, as shown in Figure 4.2. Consideration shall also be given to the potential impact of vegetation removal required for construction of the facility and proposed access road which will ultimately link the TAC Northern Access Road to the site. Figure 4.1 indicates the options for the proposed access road location. The proposed road and easement shall be 30m wide. Two options with a hybrid option for the proposed gas pipeline route are also indicated in Figure 4.1. Whilst the pipeline itself shall be underground, a 30m wide cleared easement is required along the section between the Pacific Highway and the PPA, therefore the visual impact of vegetation removal along this easement shall also be considered. The remaining area impacted upon by the pipeline installation shall be rehabilitated and returned to its current use. During construction of the pipeline a horizontal directional drilling rig shall be set back approximately 50m from the southern bank of the Hunter River at Hexham and approximately 150m from the northern river bank. The river bank and existing mangrove vegetation will therefore not be impacted upon by the pipeline.

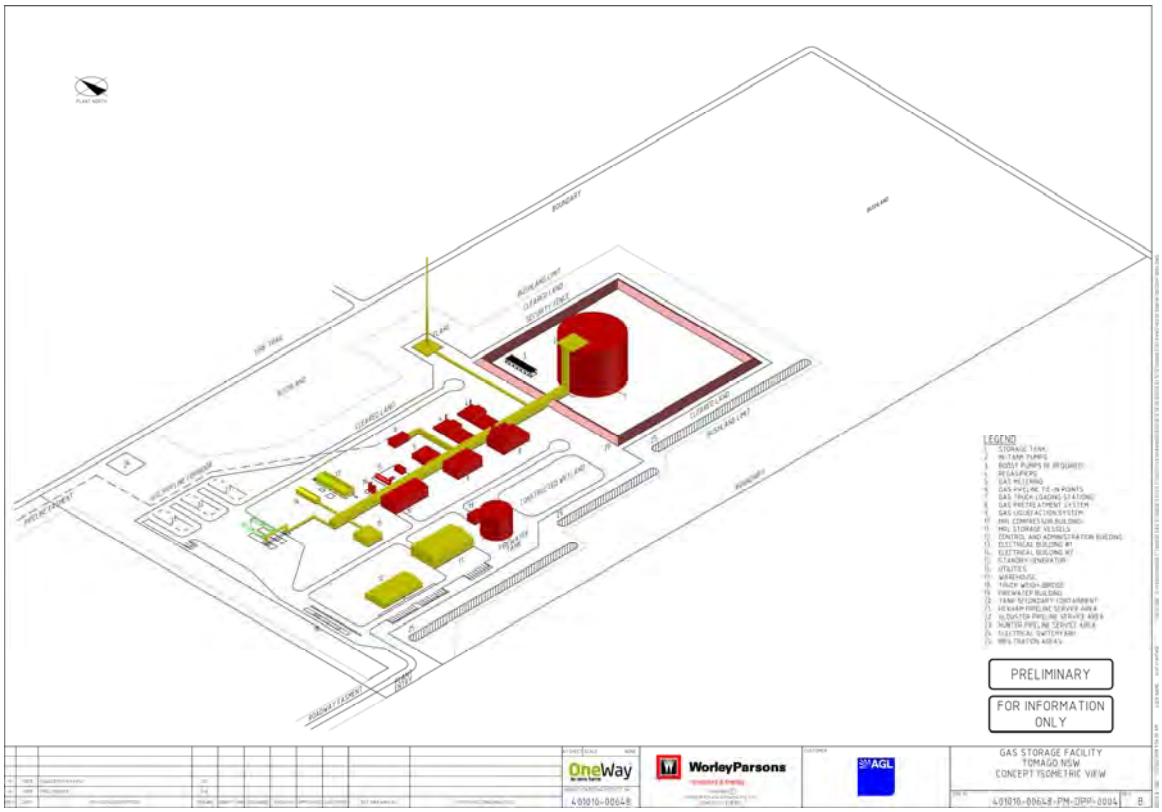
The flare on the gas plant site shall operate continuously and the flame will be 1m high, but will increase to 2-3m high during liquefication in the warmer months. It will also be higher during planned maintenance or if depressurisation is required during an emergency, during which it may reach 20-30m. Maintenance depressurisation may be done at either a slow rate (to keep the flame small), or at a fast rate, which creates a bigger flame for a shorter period. Smoke generation will be minimal due to the low molecular weight of natural gas.

The proposed receiving station shall be located on Old Maitland Road, Hexham and shall include pressure reduction valves, meters, a control room, a pig receiver and pipework. The existing double storey brick and weatherboard building (previously NSW Soccer Federation) shall be retained, although an addition to the rear of the building (approximately 9m by 12m) may be removed.



Source: Coffey Natural Systems

Figure 5.1: Conceptual Project Layout



Source: Coffey Natural Systems

Figure 5.2: Conceptual Gas Plant Layout

6 VIEWPOINT ANALYSIS

The scenic assessment considers the likely impact that the proposed development may have on the local environment. A combination of assessment criteria has been adopted.

1. Digital Viewshed Mapping
2. Fieldwork - Ground based visual analysis.

This work has been undertaken by selecting particular sites, referred to as viewpoints, conducting inspections and determining what part of the development will be visible from the viewpoints and the visual impact of that development proposal. The evaluation is based upon the criteria detailed in the appendices of this report.

6.1 Digital viewshed mapping.

A desktop study undertaken using Terranean Mapping Technologies software to calculate the potential viewshed applicable to the storage tank and flare stack, based upon topographic contour data of the surrounding environment. The digital study is useful in determining the 'potential' areas that views to the site may be obtained and to provide a base plan to identify the extent of areas to be covered in the fieldwork assessment, however the analysis does not take into account (and is not feasible to map) the variety and extent of varied vegetation and structures over a large radial distance around the site that would potentially screen views of the site structures.

Digital Viewshed Mapping was undertaken as follows:

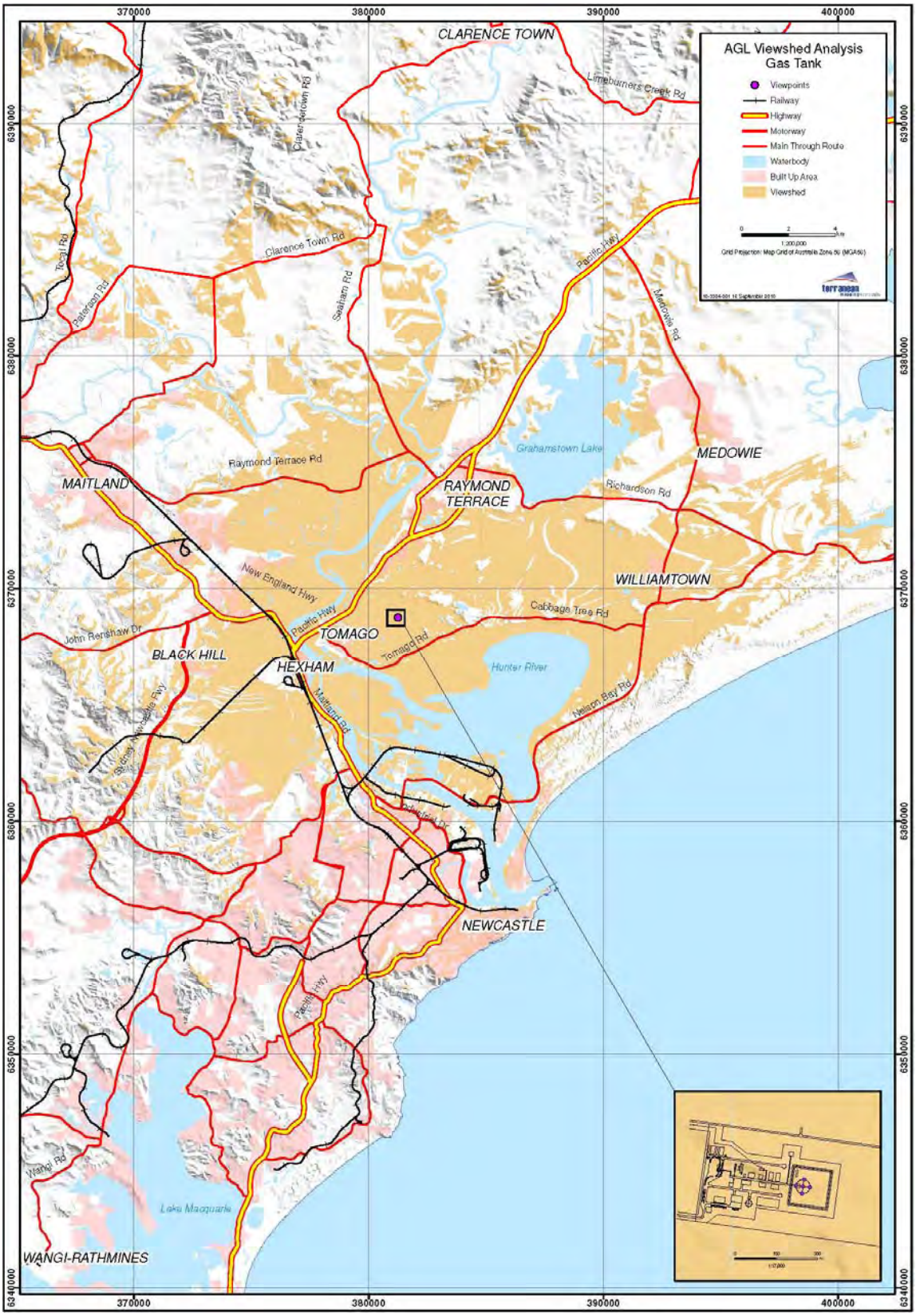
Digital Elevation Model (DEM) data (5m and 25m raster) provided to Terranean were imported into TNTMips specialized geospatial software. The 25m DEM was re-sampled to 5m cell spacing using bilinear interpolation and combined with the 5m DEM to create a single complete coverage over the project area. One reference point was created for the flare stack 40m above the ground at the centre of the proposed structure. As the tank structure is the largest piece of infrastructure to be constructed, five reference points were created for the tank, with four equally spaced around the edge of the proposed structure and one in the centre.

All tank reference points were set to 56m above the ground. TNTMips internal viewshed modelling was run for each viewpoint to form binary viewshed rasters showing which areas of the landscape the viewpoint is visible from. The output viewsheds for the tank were added together to form a single viewshed. Viewsheds were then vectorised and exported to ESRI shape file format.

As shown in Figures 5.1 and 5.2, the viewsheds and 'potential' views to the site for both structures was quite extensive, however following the field assessment it became apparent that the vegetation not only within the site but around the area has a major influence on the potential views. Therefore for efficacy the nominated viewpoints were selected on the basis of where the development would appear to be most prominent, either based on degree of exposure, major traffic routes or the number of people likely to be affected. Based on these criteria and due to the site location and vegetation, the majority of viewpoints were taken from distances greater than 1km beyond the site. This in itself reduces the immediate visual impact.

Source: Terranean Mapping Technologies

Figure 6.1: Viewshed Analysis – Flare Stack



Source: Terranean Mapping Technologies

Figure 6.2: Viewshed Analysis – LNG Tank

6.2 Fieldwork – Ground based visual assessment

Following a desktop analysis of aerial maps, vehicular routes, topography, residential areas and adjoining land uses, fieldwork analysis was undertaken to assess the actual visual impact that would occur from numerous locations and more publically accessible areas. Predominantly the viewpoints were selected as locations that are more commonly accessed by the general public or locations where a significant detrimental impact may occur, such as the bushwalking area to the east of the Hunter Botanic Gardens. The location of existing industrial areas, the TAC Aluminum Smelter or existing vegetation restricted views from adjacent residential areas to the gas plant facility. Therefore viewpoints from residential areas occurred at only 5 locations noted in Table 3 below.

Photographic images were taken using a digital camera with a focal length approximating a standard 50mm lens for a conventional 35mm camera and equivalent to the human eye, so that all images represent an accurate representation that is neither zoomed in or out. A number of photo panoramas have been included to put views to the site in context with the surrounding area. Additional night images were taken from selected locations where the flare tower was estimated to be visible at night. Refer Appendix B for landscape format viewpoint worksheets providing analysis data.

The following viewpoint locations were assessed:

VIEWPOINT NUMBER	LOCATION	DISTANCE FROM SITE	REASON FOR SELECTION
1	Corner of Pacific Highway and Motto Lane, Heatherbrae. View south eastward.	3km	Potentially high viewer access due to high volumes of traffic using Pacific Highway. Nearest main carriageway to site.
2	Pacific Highway, Motto Farm. View south eastward.	2.5km	As per Viewpoint 1.
3	Pacific Highway, Tomago. View eastward.	2km	As per Viewpoint 1.
4	Pacific Highway, Hexham. Approx 500m north of Hexham Bridge. View north eastward.	4.1km	Potentially high viewer access due to high volumes of traffic using Pacific Highway, plus unobstructed foreground views towards direction of site.
5	Pacific Highway, Hexham Bridge. View north eastward.	4.8km	Potentially high viewer access due to high volumes of traffic using Pacific Highway, plus elevated viewer location provides greater

			viewing potential.
6	Old Maitland Road, Hexham. View south westward.	10m from Hexham site	Proposed receiving station site. Consideration of visual impact required despite it's established industrial context. Close proximity viewpoint due to obstruction of views by existing side boundary fences.
7	Old Maitland Road, Hexham. View south eastward.	20m from Hexham site	As per viewpoint 6.
8	Pacific Highway, Hexham. View north eastward.	5.1km	Residential area. Potentially high viewer access due to high volumes of traffic using highway.
9	Pacific Highway, Sandgate. View north eastward.	5.3km	Potentially high viewer access due to high volumes of traffic using highway.
10	Ferry Road, Sandgate. View northward.	5.8km	Unobstructed views across water towards site provide potential clear visual access.
11	Pambalong Road, Steel River Industrial Area. View northward.	7.3km	Potential distant open views across grasslands in undeveloped industrial estate.
12	Stockton Bridge, Fern Bay. View north westward.	9.8km	Elevated position allows for greater viewshed unobstructed by vegetation or structures at ground level.
13	Nelson Bay Road, Fern Bay. View north westward.	9.4km	Opposite a residential area. Potentially open views across water. Nearest high volume vehicular access to east of waterbody.
14	Fullerton Cove Road, Fern Bay. View north westward.	9.4km	Rural residential area. Potentially open views across water. Nearest vehicular access to east of waterbody.

VIEWPOINT NUMBER	LOCATION	DISTANCE FROM SITE	REASON FOR SELECTION
15	Fullerton Cove Road, Fern Bay. View north westward.	8.15km	As per Viewpoint 14.
16	Tomago Road, Tomago. View north westward.	1.8km	Adjacent to a residential area. Nearest main road to east of site. Potentially high viewer access due to high volume of vehicular traffic.
17	Unnamed road, off Tomago Road, Tomago. View northward.	1.7km	Nearest vehicular access to east of site. Potential for clear visual access due to lack of vegetation and development in foreground.
18	Tomago Road, Tomago. View north westward.	1.9km	Nearest main road to south of site and on periphery of industrial development. Potentially high viewer access due to high volume of vehicular traffic.
19	Tomago Road, Tomago. View north eastward.	2.8km	Potentially high viewer access due to high volume of vehicular traffic.
20	Southern boundary, Hunter Botanical Gardens. View south eastward.	1.0km	Nearest public access to site, via botanical gardens.
21	South eastern boundary, Hunter Botanical Gardens. View south eastward.	0.75km	Nearest cleared public access on Crown Land, within electricity easement.

Table 3: Viewpoint Summary Table

7 IMPACT ASSESSMENT

A summary of the potential visual impact from the site's immediate vicinity, local and regional context is as follows:

Foreground - Immediate Vicinity (< 1km)

Both physical and visual access to the PPA is restricted due to its location within bushland, therefore only two viewpoints occur within the foreground zone. These adjoin the southern boundary of the Hunter Botanical Gardens, which is the nearest publically accessible location. The close proximity of mature canopy vegetation to the viewpoint locations and the setback of the site resulted in a complete obstruction of views to the marker balloons. This screening vegetation occurs on surrounding properties; therefore any clearing undertaken within the site for construction of the plant shall not reduce the screening potential of the existing vegetation.

The Tomago Aluminium Smelter is located south of the PPA and would have views to the proposed storage tank and flare stack. No viewpoints were taken from this location as access to this site is restricted and not available to the general public, however the potential viewers would likely only be employees or approved visitors. Consideration should also be given to it occurring within an industrial context, with a low visual sensitivity rating.

Both viewpoints for the Hexham receiving station site also occur within this category. Close proximity views for this site were assessed due to the unlikelihood that the proposed works shall be visible from beyond. The proposed location of the works to the rear of the site and the retention of the existing building in the foreground, allows for only offset views whilst approaching the site from both angles. This site is located on a secondary road within an established industrial area, therefore potential viewers would likely be industrial employees or customers, or occasional local traffic.

Middleground - Local Views (1km – 6km)

Of the ten viewpoints occurring within the middle-ground zone, the marker balloons were only visible from one location; a very low use road adjoining the Tomago Industrial Area (Viewpoint 17). Viewpoints were otherwise located along major or secondary roads, as these had the highest potential viewer numbers. Two viewpoints within this zone adjoin residential areas (Viewpoints 8 and 16). Existing mature vegetation or commercial and industrial development along the roadside interface obstructed all views to the site. As noted above, the screening provided by existing vegetation occurs on properties external to the site; therefore any site clearing is not likely to increase the visual impact of the proposal.

Viewpoint 17 indicates that the proposed storage tank and flare stack will be visible from this location, as there is no foreground canopy to filter or obstruct vertical views. As this is the only location from which the balloons were visible for the entire study, consideration should be given to the very low number of viewers and the industrial context within which they are situated, that is, not adjacent to a residential area. The nearest residential development occurs approximately 1km north eastward from this location and approximately 1km south eastward from the PPA. Significant mature canopy vegetation obstructs all views between the residences and the PPA, as indicated in Viewpoint 16. The intended tank and flare stack will also not be viewed in isolation, as industrial sheds and towers already breach the foreground horizon, whilst an existing tower is located at approximately the same scale as the proposed flare stack. The proposed white coloured storage tank will minimise contrast against the existing industrial sheds. An additional

night viewpoint was unsuccessfully attempted for this location, however access was restricted due to a locked gate. This further highlights the limited visual access to the site by the general public.

Whilst the marker balloons were not visible from the Hexham Bridge, the photomontage presented in Viewpoint 5 indicates that the gas storage tank is likely to be visible from this location. This viewpoint has a high viewer access, due to high traffic volume, however vehicle travelling speed allows for only sporadic glimpses of the proposed structure. Consideration should also be given to the context within which it shall be viewed: that is, it shall not be viewed in isolation, but rather as an incremental change to an existing industrial area. The proposed white tank colour shall also minimise contrast with the skyline haze, making it difficult to focus when viewed in transit. An additional night image was also attempted from this location, but was unable to be safely achieved without controlling traffic flow. As this is not a pedestrian bridge and a two second delay is required on the camera timer for a clear image, no photographic image was possible. Considering the night image and comments taken at viewpoint 4, it can only be assumed that the flare stack shall be marginally visible at night within the context of the existing industrial lighting.

The proposed access road from TAC Northern Access Road to the PPA extends from the foreground into this zone. This will require the clearing of an easement approximately 30m wide. As this is area is currently vegetated, a viewpoint taken from this position would not accurately indicate the potential view corridor created by removal of the vegetation. All options for the access road are curved towards the western entry point, therefore eliminating the “gun barrel” effect that may occur along a direct line access. Entrance to the actual site will be located approximately 1.2km eastward from TAC Northern Access Road, so distant views to the site entrance will likely occur directly along this easement only when the viewer is actually on the access road.

The proposed pipeline corridor easement extending from the north west corner of the PPA to the Pacific Highway shall be cleared of existing canopy vegetation and maintained as such, thus impacting upon the existing vegetated landscape and potentially providing direct views along its axis into the site. As previously discussed, the site setback from the highway shall result in only distant views along this axis and as the viewer progresses either north or southward of the corridor, the retained existing vegetation adjoining the easement will obstruct the view line. Similarly with the access road, the area adjacent to the easement within the site is designated for vegetation retention, thus providing a green background along this axis. Additionally, the proposed location of the tank and flare stack are offset from the easement, therefore all screening currently provided by existing vegetation will remain.

Background - Regional Views (>6km)

Generally the extents of a Visual Impact Assessment are limited to a range of approximately 6km, as it is commonly accepted that visual sensitivity is greatly reduced beyond this. However, due to limited physical and visual access to the PPA from closer positions, and to ensure a thorough assessment was undertaken, the scope of this study includes some viewpoints 6-10km from the site, of which 3 adjoin residential areas (Viewpoints 13, 14 and 15).

The marker balloons were not visible from any of these locations due to the long viewing distances, even with the use of binoculars. Views to the site were available from many of the distant locations due to a different landscape character consisting of more cleared areas and the lack of foreground screening that limited views from closer locations around the site.

Where distant views were obtained, the proposed storage tank and flare stack structures would impact visually on the skyline. However the impact of this is considered to be a small incremental

increase on the visual impact that the Tomago Aluminium Smelter already has and individual structures are not clearly identified or discernable with the naked eye from this distance. The potline stacks with Tomago Aluminium Smelter are recorded as 55.0m high, 1m lower than the maximum height of the proposed gas storage tank and provide the context in which the proposed storage tank and flare stack would be viewed.

The flare stack includes a gas flame operating at the top of the flare stack. We understand that the NGSF flare stack will operate a continuous flame as follows:

- The flare stack on the gas plant site shall operate continuously and will be 1m high, but will increase to 2-3m high during liquefaction in the warmer months.
- The flame will be higher during planned maintenance or if depressurisation is required during an emergency, during which it may reach 20-30m. Maintenance depressurisation may be done at either a slow rate (to keep the flame small), or at a fast rate, which creates a bigger flame for a shorter period. There shall be minimal smoke generation due to the low molecular weight of natural gas.

Given the limited viewing opportunities to sight the flare except from distant locations and the operating detail provided by AGL, it is unlikely to have a significant visual impact.

The gas pipeline connecting the PPA to the proposed receiving station at Hexham extends into this portion of the study area. The proposed pipeline shall be located underground and vegetation rehabilitated. Whilst it is acknowledged there shall be a visual impact during installation, it shall be minimal to nil following plant establishment at the completion of the project.

The proposed receiving station at Hexham has a relatively small roadside interface due to its shape and orientation, therefore visual access from Old Maitland Road will be limited. The proposed retention of the existing double storey brick and weatherboard building towards the road shall provide some screening of views deeper into the site.

Proposed structures within the site shall consist mainly of pipes and horizontal tanks which shall not exceed the height of the existing building. Whilst it is acknowledged that some of the infrastructure may be visible from Old Maitland Road, the impact may be minimised with the inclusion of screen planting to side boundaries. This is subject to the final site layout, the location of underground service lines and any requirements for visual access for security purposes. Consideration should also be made of the industrial context within which this component of the project shall be viewed, therefore it is not adjacent or within sight to any residences. The nearest residences are located approximately 300m south eastward of this site with all views obstructed by existing industrial development.

Comments

What became apparent was how isolated the PPA location is, and how limited opportunities are to view the site set within the surrounding vegetated landscape. The surrounding landscape area includes Fullerton Cove, two kilometres to the east including the Kooragang Nature Reserve extending to the south on Kooragang Island. One kilometre to the north is the Hunter Botanic Gardens and vegetation over the Tomago Anna Bay sand beds. Three kilometres to the west is the Hexham Wetland Nature reserve.

Whilst the surrounding topography is generally flat and the digital viewshed analysis undertaken shows that there is an extensive area in which to obtain views to the PPA, the surrounding landscape vegetation limits the actual extent of the sites visual exposure in the following ways:

Firstly, views of proposed structures on the PPA would almost always be distant viewing locations due to the isolated location of the site. The distance significantly decreases the visual impact of the proposed structures.

Secondly the vegetation around the site and immediately adjoining the public roads has a close proximity blocking effect on the viewer. The closer that a structure or vegetation is located to the viewer the greater the blocking effect is to distant elements. An example of this is the results that were obtained from along the Pacific Highway between the Hexham Bridge and Raymond Terrace. Whilst the site is approximately 1.5-2.0km away from the highway, the analysis found that no sightings of the marker balloons could be obtained along that entire stretch of highway due to the close proximity foreground vegetation This is indicated on aerial images that show the extent and proximity of existing native vegetation adjoining the eastern side of Pacific Highway between the entry to the Tomago Aluminium Smelter and Motto Farm to the north.

The locations where views to the proposed storage tank and flare stack may be obtained are either within the adjoining industrial sites to the south [principally the Tomago Aluminium Smelter site] or from distant locations in more cleared areas that allow panoramic views across to the site. Where distant views are possible, the structures are seen as a distant skyline silhouette and always seen within the context of visual impacts of the existing Tomago Aluminium Smelter structures. The structures will not be viewed against a completely vegetated background, therefore the proposed white coloured storage tank will minimise contrast with the skyline haze. The report provides a montage of these impacts for assessment.

Thirdly, viewing locations that do allow these distant skyline views of the proposed structures are often intermittent views from motorists perspectives. An example of this is the view obtained from vehicles travelling north crossing the new Hexham Bridge. This is an elevated position that allows views to the north [see viewpoint panorama image] however visual access is only for approximately 5-10 seconds.

8 CONCLUSIONS

The proposal seeks to develop a gas storage facility within approximately a 28 hectare parcel of land currently owned by Tomago Aluminium Company.

The gas plant site is extensively vegetated vacant industrial land and currently undeveloped with the exception of unformed access tracks and fire trails. The vegetation consists of mature regrowth woodland and forest vegetation.

The proposal would require the removal of approximately half of the site vegetation and construct the gas processing facility to meet AGL's peak gas market requirements. Clearing of a 30m wide pipeline easement extending from the north western corner of the PPA to the Pacific Highway is also required however the remainder of the pipeline route to the Hexham receiving station shall be rehabilitated to its current level. Proposed access to the gas plant site shall be via a 30m wide lead in road, connecting to the TAC Northern Access Road. The receiving station shall consist of above ground pipes and horizontal tanks, with a maximum height not exceeding the existing on site building.

This study sought to achieve an accurate analysis of the likely visual impact of the proposed gas storage tank and flare stack. The use of the helium balloons provides an accurate visual marker for the visual assessment. A total of twenty one viewpoints were taken from a range of less than one kilometre to almost 10km from the site, including 5 locations adjacent to residential areas. One hundred and fifty kilometres was covered by the assessment team in a vehicle following principal traffic routes and where necessary less publically accessed areas.

Following the field assessment, it was found that the storage tank and flare stack are only visible from distant viewing locations with the exception of one location within a two kilometre radius of the site. The close proximity viewing location has a very low viewer number and is located within an industrial area, not adjacent to residences.

The close proximity of existing development and mature vegetation to many of the viewpoints obstructs views to the site when observed up to 3km away. Foreground and middle ground screening also obstructs most views within the 3 – 6km range from site. Where glimpses are available through occasional breaks in vegetation and buildings, the proposed development will not be viewed in isolation, but within the industrial context of its surroundings. Viewpoints taken from beyond 6km provided greater visual access, owing to a lack of foreground screening; however the visual impact is reduced because of loss of detail affected at this scale.

The removal of vegetation necessary for construction of the gas plant and access road is not likely to impact upon the screening currently available to the site, as this is dependent upon vegetation external to the site. The curved alignment of the access road will eliminate the potential for direct sightlines along its axis into the site. Actual views into the site shall be limited and distant due to its setback from the highway.

The retention of the existing building on the receiving station site at Hexham shall obstruct views into the rear of the site where some installation of the new infrastructure is proposed. Additional screening may be provided to the side boundaries to filter oblique views from Old Maitland Road.

This VIA has found that the proposed development will have low impact on the scenic quality of the surrounding areas considering the context of the sites locality and visual buffers provided by existing vegetation. From the few locations where the proposed tank is likely to be viewed, the

white colour shall provide minimal contrast with the skyline, resulting in a reduced potential visual impact.

Considering the low visual impacts of the project, no recommendations regarding the minimisation of visual impact are provided, with the exception of the following:

- Additional screen planting to the front and site boundaries of the Hexham receiving station site. This will be subject to the final site layout, the location of underground service lines and the possible requirement for visual access for security surveillance.

9 REFERENCES

9.1 Publications and Reports

Clouston & Brouwer, C. “Lake Macquarie Recreation and Open Space Plan: Scenic Quality Plan (draft)”, prepared for Lake Macquarie City Council, August 1997.

Department of Planning (DOP). “Rural Land Evaluation, Government Printer (Dept. of Planning), August 1988.

EDAW (Australia). “Section 12, Visual Assessment”, The Mount Arthur North Coal Project Pty Ltd Environmental Impact Statement, URS Australia Pty Ltd, prepared for Coal Operations Australia Limited, 2000.

Williamson, D. “Scenic Perceptions of Australian Landscapes”, Landscape Australia, Vol. 2, pp 94-100, 1978.

9.2 Maps

Google maps

9.3 References

Port Stephens Council Local Environment Plan 2000, Port Stephens Council, December 2000

APPENDICES

Appendix A - Visual Quality Reference Table

	LOW	**MEDIUM**	**HIGH**
RELIEF / LANDFORM Diversity & Contrast	Flat terrain dominant. Ridgelines not often seen.	Undulating terrain dominant. Little contrast or ruggedness. Ridgelines prominent in only half or less of landscape unit.	High hills in forground and middleground. Presence of cliffs, rocks and other geological features. High relief (eg: steep slopes rising from water or plain). Ridgelines prominent in most of landscape unit.
VEGETATION Diversity & Contrast	One or two vegetation types present in forground. Uniformity along skyline.	Patterning in only one or two areas. 3 or 4 vegetation types in forground. Few emergent or feature trees.	High degree of patterning in vegetation. 4 or more distinct vegetation types. Emergent trees prominent and distinctive to region. Stands of specimen or accent vegetation (eg: palms, pines, etc).
NATURALNESS	Dominance of development within many parts of a landscape unit.	Some evidence of development, but not dominant. Traditional built character. Development in background and / or partially concealed.	Absence of development or minimal disturbance within landscape unit. Presence of parkland or other open space including beach, lakeside, etc.

	LOW	MEDIUM	HIGH
WATER Presence, Extent & Character	Little or no view of water. Water in background without prominence. Presence of polluted water or stagnant water.	Moderate extent of water. Presence of calm water. No islands, channels meandering water. Intermittent streams, lakes, rivers, etc.	Dominance of water in forground and middleground. Presence of flowing water, turbulence and permanent water. Intricate shapes and river edges.
DEVELOPMENT Form & Identity	Presence of commercial and industrial structures. Presence of large scale development (eg: mining, infrastructure, etc). Newer residential development prominent.	Presence of established residential development. Small scale industrial etc in middleground. Presence of sports and recreation facilities.	Presence of rural structures (eg: farm buildings, fences, etc). Heritage buildings and other structures apparent. Isolated domestic scale structures.
CULTURAL	No evidence present. Area free of cultural landmarks. Presence of new development.	Presence of established, well landscaped development, esp in middleground and background.	Presence of established, maintained landscapes (eg: farmlands, forests, gardens, etc), old towns and buildings etc.

Source: After Clouston & Brouwer, 1995 and Williamson, 1978.

Table 4: Visual Quality Reference Table

Site Location

Newcastle Gas Storage Facility

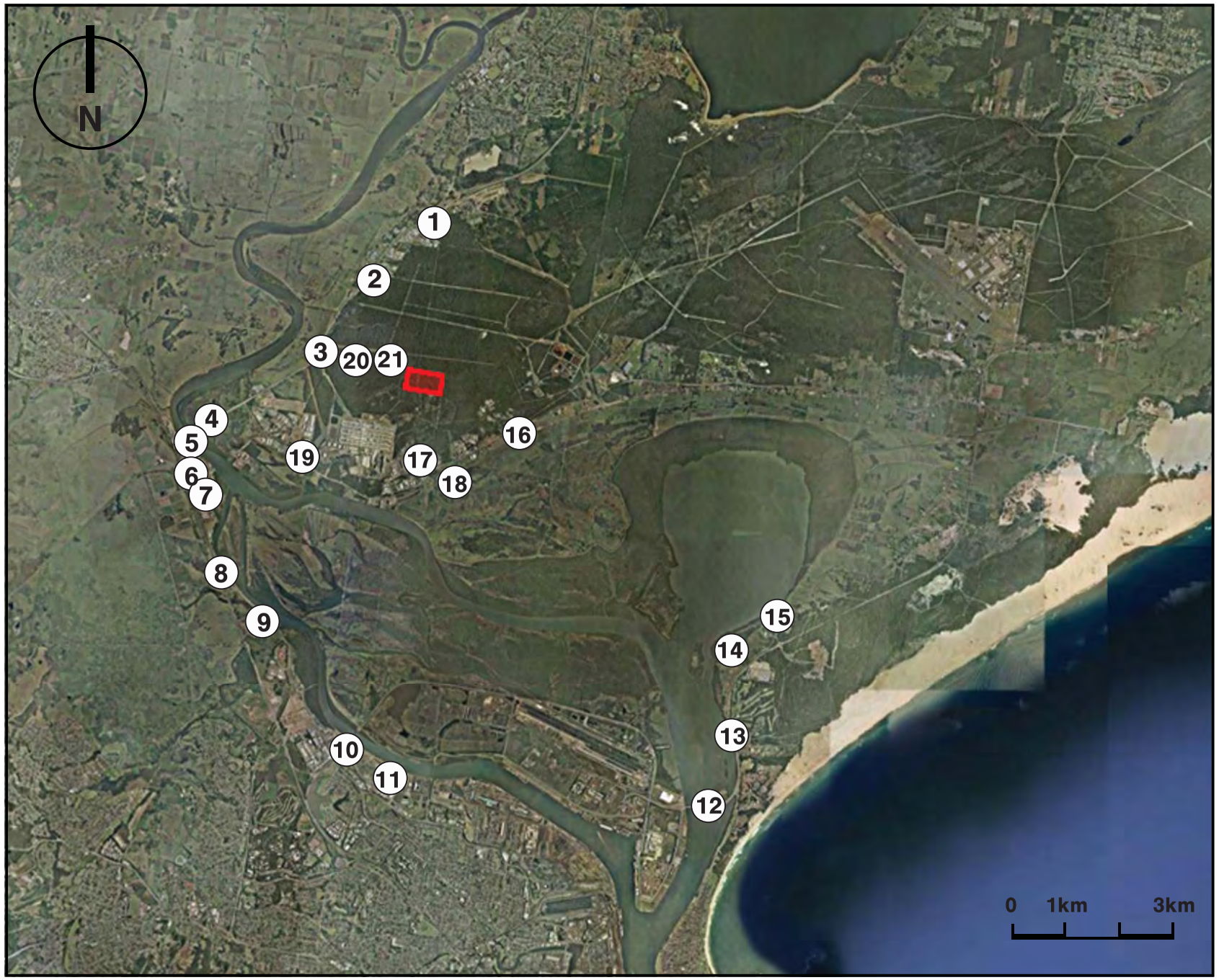
- A Pacific Highway
- B Old Punt Road
- C Tourle Street
- D Fullerton Road
- E Nelson Bay Road
- F Medowie Road
- G Cabbage Tree Road
- H Tomago Road

- I Raymond Terrace
- J Heatherbrae
- K Motto Farm
- L Hunter Botanical Gardens
- M Tomago Aluminium Smelter
- N Hexham
- O Sandgate
- P Mayfield West
- Q Mayfield North
- R Kooragang
- S Fern Bay
- T Fullerton Cove
- U Williamtown

terras

Viewpoint Location

Newcastle Gas Storage Facility



1. Cnr Pacific Highway & Motto Lane, Heatherbrae
2. Pacific Highway, Motto Farm
3. Pacific Highway, Tomago
4. Pacific Highway, Hexham
5. Hexham Bridge - Pacific Highway, Hexham
6. Old Maitland Road, Hexham
7. Old Maitland Road, Hexham
8. Pacific Highway, Hexham
9. Pacific Highway, Sandgate
10. Ferry Road, Sandgate
11. Pambalong Road, Steel River Industrial Area
12. Stockton Bridge, Fern Bay
13. Nelson Bay Road, Fern Bay
14. Fullerton Cove Road, Fern Bay
15. Fullerton Cove Road, Fern Bay
16. Tomago Road, Tomago
17. un-named road, off Tomago Rd,Tomago
18. Tomago Road, Tomago
19. Tomago Road, Tomago
20. Southern Boundary, Hunter Botanic Gardens
21. South-eastern Boundary, Hunter Botanic Gardens

terras

Viewpoint 1

Newcastle Gas Storage Facility

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Corner Pacific Highway and Motto Lane - Heatherbrae.

DISTANCE FROM SITE:

3km

COMMENTS:

Attempted viewpoint. Site and marker balloons not visible from this location.
Potentially high viewing access from high volume of traffic using Pacific Highway, however site setback, existing development and existing mature canopy vegetation obstructs all views to site.
Line of vegetation canopy broken by signage and development to foreground.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☑ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

terras

Viewpoint 2

Newcastle Gas Storage Facility

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Pacific Highway - Motto Farm

DISTANCE FROM SITE:

2.5km

COMMENTS:

Attempted viewpoint. Site and marker ballons not visible from this location.
Similarly to Viewpoint 1, potentially high viewing access from high volume of traffic using Pacific Highway, however site setback and existing mature canopy vegetation obstructs all views to site.
Foreground canopy vegetation continuous and unbroken from this location.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☑ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

terras

Viewpoint 3

Newcastle Gas Storage Facility

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Pacific Highway - Tomago

DISTANCE FROM SITE:

2km

COMMENTS:

Attempted viewpoint. Site and marker ballons not visible from this location.
Similarly to previous viewpoints, potentially high viewing access from high volume of traffic using Pacific Highway, however site setback and close proximity of existing mature canopy vegetation obstructs all views to site.
Foreground canopy vegetation continuous and unbroken from this location.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☑ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

terras

Viewpoint 4

Newcastle Gas Storage Facility

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Pacific Highway - Hexham, approximately 500m north of Hexham Bridge.

DISTANCE FROM SITE:

4.1km

COMMENTS:

Attempted viewpoint. Site and marker ballons not visible from this location.
Potentially high viewing access from high volume of traffic using Pacific Highway, however distance from site limits viewer access. Visual access further obstructed by existing mature canopy vegetation.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☑ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

terras

Viewpoint 4

Newcastle Gas Storage Facility

night image

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Pacific Highway - Hexham, approximately 500m north of Hexham Bridge.

DISTANCE FROM SITE:

4.1km

COMMENTS:

Attempted viewpoint. 60 degree viewing cone towards direction of site. Site and marker balloons not visible from this location during the day. The relatively small flame (1m high) above the flare stack will not be visible from this distance at night.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☑ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

terras

Viewpoint 5

Newcastle Gas Storage Facility

montage

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Pacific Highway - Hexham Bridge (Northbound)

DISTANCE FROM SITE:

4.8km

COMMENTS:

Site and marker balloons not visible from this location but tank would be visible [indicative montage shown].
Vehicular viewer access only as no pedestrian access available at this location. Difficult to determine exact location of site, due to vehicle movement, however this indicates that any potential visual access to site will be fleeting. Existing industry visual impact to skyline.
One of two “superior” viewer elevations, from northbound bridge. Note: southbound bridge at lower elevation than northbound bridge (visible in foreground of image). Potentially high viewing access from high volume of traffic using Pacific Highway, however distance from site limits viewer access. Visual access impacted by existing mature canopy vegetation. Night shot attempted from this location, but impossible to safely achieve without stopping traffic.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☑ Middleground	☐ Background
Viewer Position:	☐ Inferior	☐ Neutral	☑ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

terras

Viewpoint 6

Newcastle Gas Storage Facility
Hexham Receiving Station

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Old Maitland Road, Hexham

DISTANCE FROM SITE:

10m

COMMENTS:

Site located on a secondary road within a long established industrial area. Observers likely to be employees / customers of businesses and some local residential traffic. Proposed site layout unconfirmed, however existing building to be retained and new works to be located to rear of site. Proposed structures shall not exceed existing building height, therefore front views into site obstructed by building. Existing colorbond fence also obstructs views when observed further eastward of site, allowing for only partial sightlines at oblique angles to rear of site. Landscape screening may assist in further filtering views, subject to final site layout, service line locations and security factors, however consideration also should be given to the site's industrial context.

EVALUATION CRITERIA:

Location of Site:	☑ Foreground	☐ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

terras

Viewpoint 7

Newcastle Gas Storage Facility
Hexham Receiving Station

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Old Maitland Road, Hexham

DISTANCE FROM SITE:

20m

COMMENTS:

Site located on a secondary road within a long established industrial area, as per Viewpoint 6. Proposed site layout unconfirmed, however existing building to be retained and new works to be located to rear of site. Proposed structures shall not exceed existing building height, therefore front views into site obstructed by building. Existing colorbond fence to side boundary and front of adjoining property also obstructs views when observed further westward of site, allowing for only partial sightlines at oblique angles to rear of site. Existing Casuarinas provide some filtering of views at the upper level, however lower level landscape screening may assist in further filtering views.

EVALUATION CRITERIA:

Location of Site:	☑ Foreground	☐ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

terras

Viewpoint 8

Newcastle Gas Storage Facility

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Pacific Highway - Hexham

DISTANCE FROM SITE:

5.1km

COMMENTS:

Attempted viewpoint. Site and marker ballons not visible from this location.
This viewpoint is within a residential area on a very high usage road (highway).
The close proximity of the existing foreground mangrove vegetation completely obstructs views to site.
Occasional glimpses available through breaks in vegetation, however clear views not achieved due to vehicle travelling speed. Not a highly used pedestrian area, which may otherwise provide more prolonged viewing periods further along the highway.
Viewer distance from the site also limits visual access.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☑ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

terras

Viewpoint 9

Newcastle Gas Storage Facility

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Pacific Highway - Sandgate

DISTANCE FROM SITE:

5.3km

COMMENTS:

Attempted viewpoint. Site and marker ballons not visible from this location.
Very high usage road (highway).
The close proximity of the existing foreground roadside vegetation filters views to site.
Occasional glimpses available through breaks in foreground vegetation, however mangrove vegetation across the channel provides a secondary visual buffer.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☑ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

terras

Viewpoint 10

Newcastle Gas Storage Facility

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Ferry Road, Sandgate

DISTANCE FROM SITE:

6.8km

COMMENTS:

Attempted viewpoint. Site and marker ballons not visible from this location.
Very minor road for local traffic only. Road provides no vehicular thoroughfare, however access to water for boat launching available.
Unobstructed views available across water towards site, however shoreline vegetation and viewer distance negates any potential visual impact.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☐ Middleground	☑ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

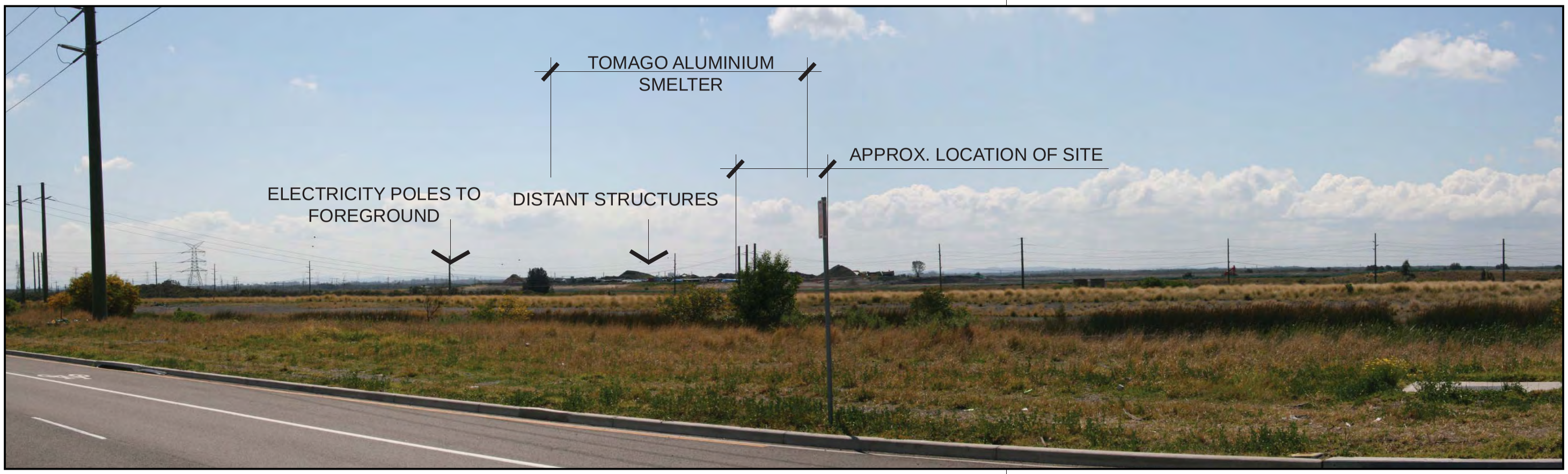
terras

Viewpoint 11

Newcastle Gas Storage Facility

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL



VIEWPOINT LOCATION:

Pambalong Road, Steel River Industrial Area

DISTANCE FROM SITE:

7.3km

COMMENTS:

Attempted viewpoint from existing industrial area. Site and marker ballons not visible from this location.
Very minor road used only by local traffic within an existing industrial area.
Unobstructed views available across open paddocks (undeveloped industrial zone) towards site.
Existing industrial development in background breaches horizon and provides the context in which the proposed storage tank and flare stack would be viewed, had they been visible.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☑ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

terras

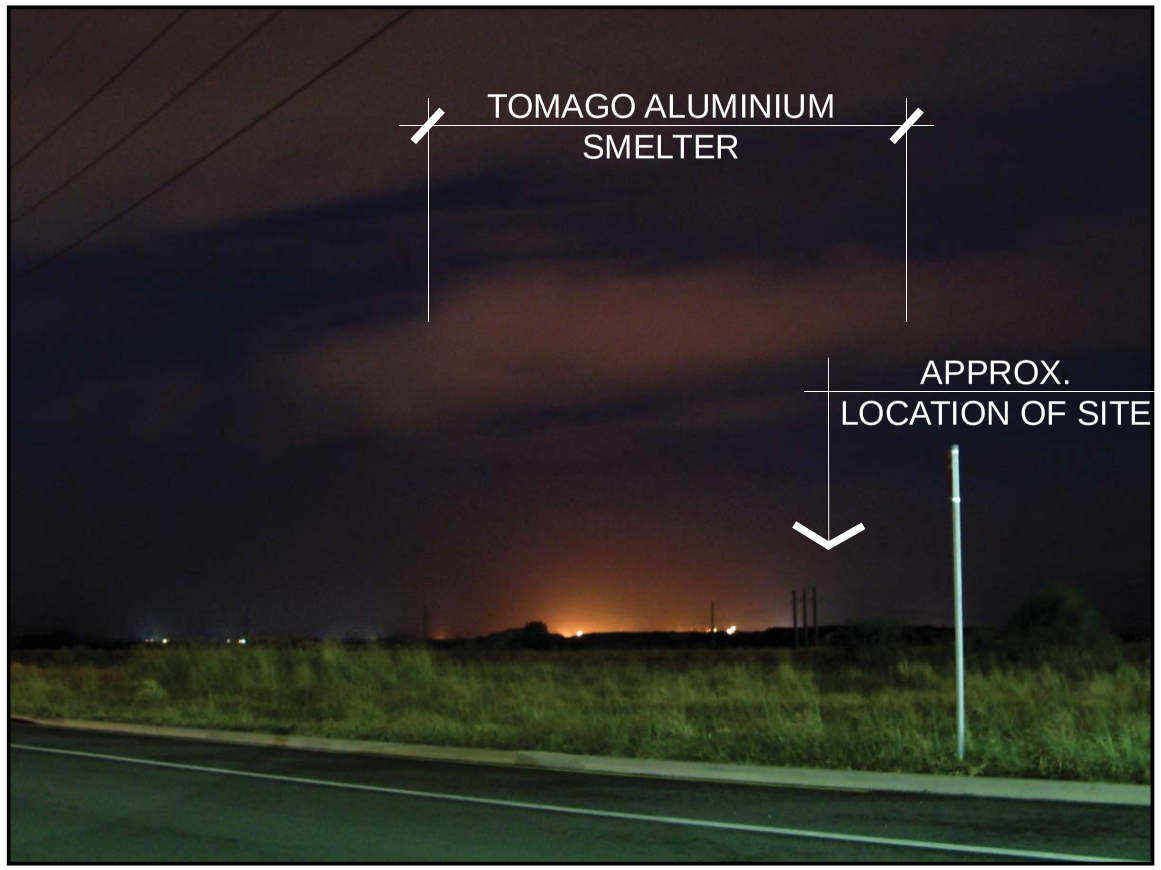
Viewpoint 11

Newcastle Gas Storage Facility

night image

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL



VIEWPOINT LOCATION:

Pambalong Road, Steel River Industrial Area

DISTANCE FROM SITE:

7.3km

COMMENTS:

Night shot from existing industrial area. Site and marker ballons not visible from this location, during daylight hours.
Very minor road used only by local traffic within an existing industrial area, generally during business hours.
Unobstructed views available across open paddocks (undeveloped industrial zone) towards site.
The existing stacks visible as concentrated glows are at an approximate height of 55m. The proposed flare will not exceed 40m in height, therefore will be approximately two thirds the height of those visible. Glow of existing industrial development in background predominant in skyline and provides the context in which the flare stack would be viewed, if visible.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☑ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

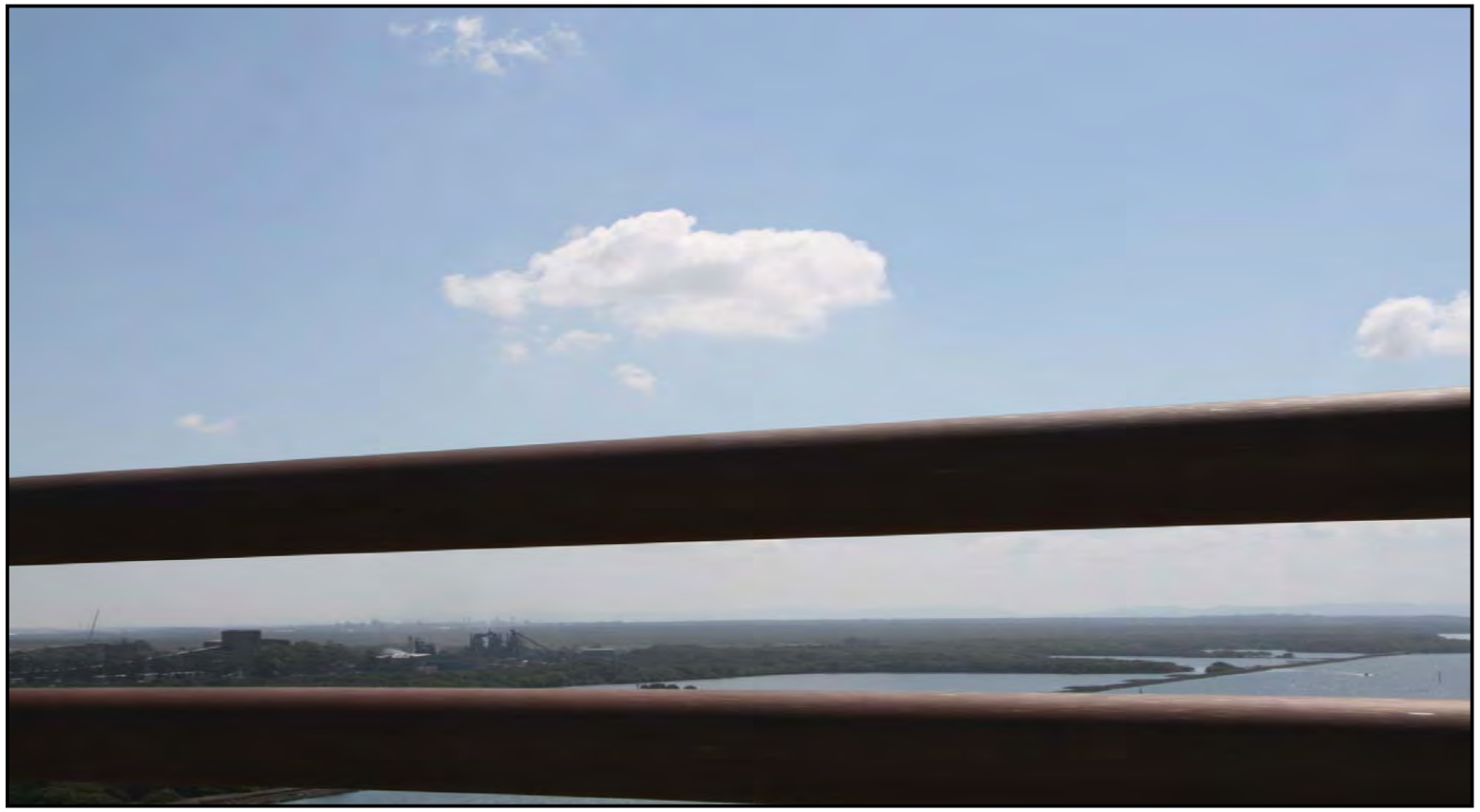
terras

Viewpoint 12

Newcastle Gas Storage Facility

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL



VIEWPOINT LOCATION:

Stockton Bridge, Fern Bay

DISTANCE FROM SITE:

9.8km

COMMENTS:

Attempted viewpoint. Site and marker ballons not visible from this location.
Frequently used road connecting north-eastern localities to Newcastle CBD.
This is one of two “superior” viewer positions available in this study, due to the level topography surrounding the site.
Elevated position allows for unobstructed views across water and existing industry towards site.
Viewer distance negates any potential visual impact from this location.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☐ Middleground	☑ Background
Viewer Position:	☐ Inferior	☐ Neutral	☑ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

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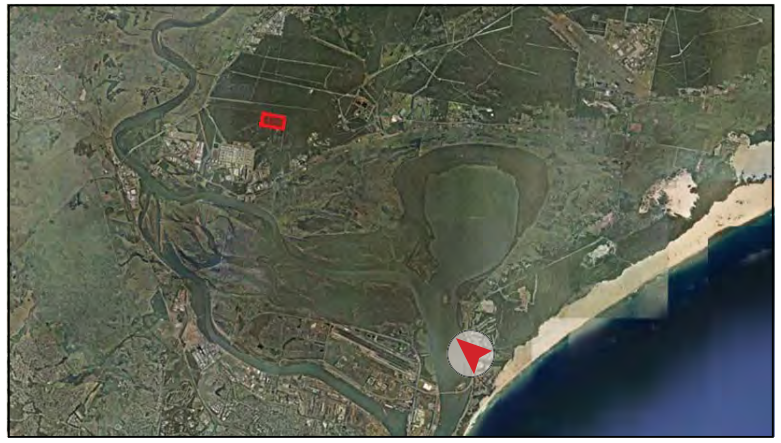
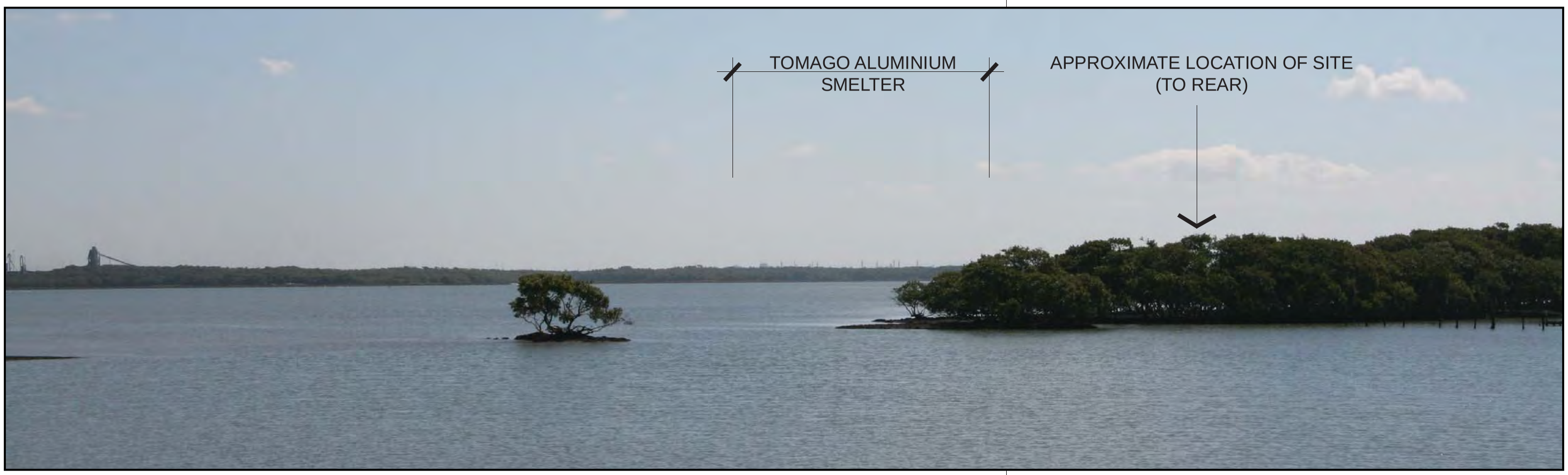
Viewpoint 13

Newcastle Gas Storage Facility



VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL



VIEWPOINT LOCATION:

Nelson Bay Road, Fern Bay

DISTANCE FROM SITE:

9.4km

COMMENTS:

Attempted viewpoint. Site and marker ballons not visible from this location.
Foreshore opposite a residential development, separated by a frequently used road connecting north-eastern localities to Newcastle CBD. Open panoramic views across water provides immediate foreground. Distance of shoreline vegetation reduces its screening benefit as existing industrial towers still visible beyond canopy. However, the proposed storage tank and flare stack will not be visible from this location due to distance from site.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☐ Middleground	☑ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

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Viewpoint 14

Newcastle Gas Storage Facility

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Fullerton Cove Road, Fern Bay

DISTANCE FROM SITE:

9.4km

COMMENTS:

Attempted viewpoint. Site and marker ballons not visible from this location.
Rural residential location on a minor road, used by local traffic or tourists only.
Open panoramic views across paddocks provide immediate foreground. Shoreline vegetation to middleground screens water and existing industry to background. Occasional glimpses of background available through breaks in vegetation, however vehicle travelling speed reduces visual impact. Static views available from occasional rural residences, which impacts upon a low number of viewers.
The proposed storage tank and flare stack will not be visible from this location due to distance from site.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☐ Middleground	☑ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

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Viewpoint 15

Newcastle Gas Storage Facility

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Fullerton Cove Road, Fern Bay

DISTANCE FROM SITE:

8.15km

COMMENTS:

Attempted viewpoint. Site and marker ballons not visible from this location.
Rural residential location on a minor road, used by local traffic or tourists only.
This viewpoint has the same properties as Viewpoint 11, however the increased distance further reduces the visual impact of existing industry to the distant background. The proposed tank and flare stack will not be visible from this location.

EVALUATION CRITERIA:

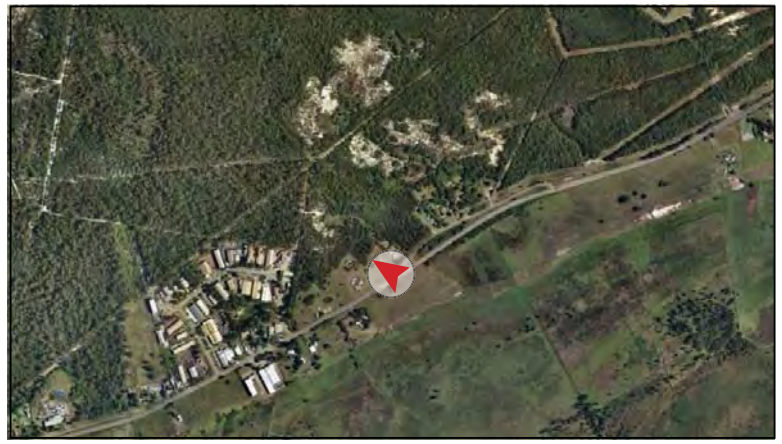
Location of Site:	☐ Foreground	☐ Middleground	☑ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

terras

Viewpoint 16

Newcastle Gas Storage Facility

VIEWPOINT LOCALITY



VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Tomago Road, Tomago

DISTANCE FROM SITE:

1.8km

COMMENTS:

Attempted viewpoint. Site and marker ballons not visible from this location.
This viewpoint adjoins a residential area along Tomago Road (visible to left of image). Potentially high viewing access from high volume of traffic using Tomago Road, however site setback and existing mature canopy vegetation obstructs all views to site.
Foreground canopy vegetation continuous and unbroken from this location.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☑ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

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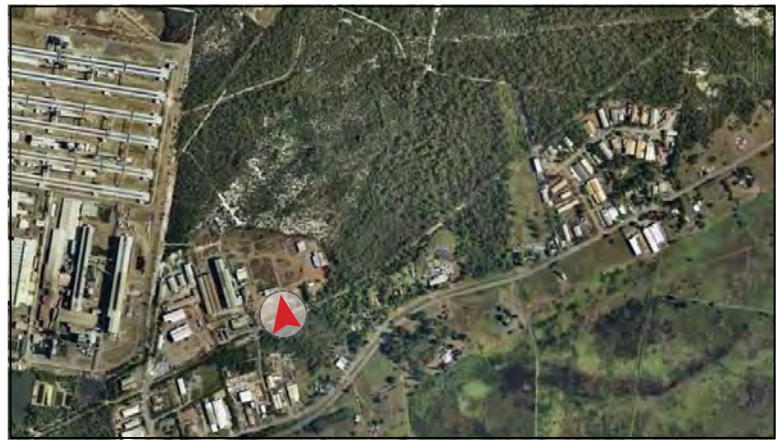
Viewpoint 17

Newcastle Gas Storage Facility

VIEWPOINT LOCALITY



VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Unnamed Road off Tomago Road, Tomago

DISTANCE FROM SITE:

1.7km

COMMENTS:

This is the only location where the marker balloons were visible (enhanced for clarity in image).
Minor backroad / laneway within an existing industrial area, infrequently or rarely used.
Panoramic views across open paddocks include industrial sized sheds and existing industrial towers to foreground and middleground.
The viewer distance from the background canopy vegetation reduces it's screening potential from this location as the proposed storage tank and flare stack would be visible beyond the canopy height. Consideration should be given to the industrial context and the low number of viewers impacted upon from this location.
Roadside vegetation and existing industrial development along Tomago Road completely screens background views.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☑ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

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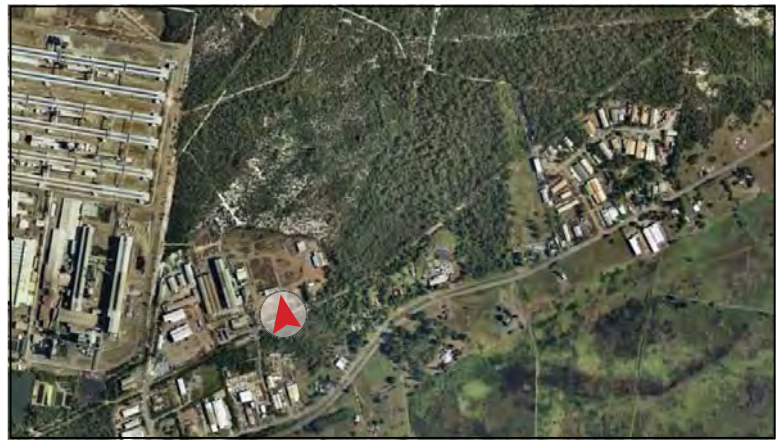
Viewpoint 17

Newcastle Gas Storage Facility

montage

VIEWPOINT LOCALITY



VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Unnamed Road off Tomago Road, Tomago

DISTANCE FROM SITE:

1.7km

COMMENTS:

This montage indicates the likely appearance of the storage tank and flare tower.
From this location, the proposed structures breach the existing tree canopy line. Additional screen planting on site will not minimise the visual impact.
Night view attempted from this location, however a locked gate prevented access. General public would therefore not have visual access to the site from this location.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☑ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

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Viewpoint 18

Newcastle Gas Storage Facility

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Tomago Road, Tomago

DISTANCE FROM SITE:

1.9km

COMMENTS:

Attempted viewpoint. Site and marker ballons not visible from this location.
Potentially high viewing access from high volume of traffic using Tomago Road, however site setback and close proximity of existing mature canopy vegetation obstructs all views to site.
Industrial development currently under construction potentially provides additional visual obstruction. Site will function as an electricity substation upon completion of construction works.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☑ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

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Viewpoint 19

Newcastle Gas Storage Facility

VIEWPOINT LOCALITY

VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Tomago Road, Tomago

DISTANCE FROM SITE:

2.8km

COMMENTS:

Attempted viewpoint. Site and marker ballons not visible from this location.
Potentially high viewing access from high volume of traffic using Tomago Road, however the site setback and close proximity of existing industrial development obstructs all views to site.

EVALUATION CRITERIA:

Location of Site:	☐ Foreground	☑ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

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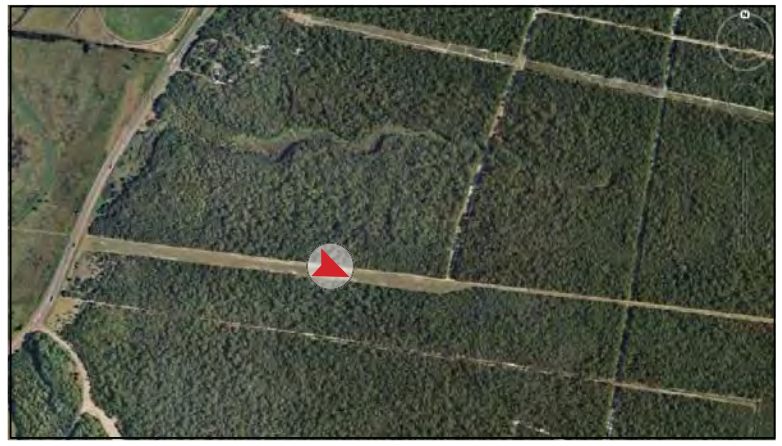
Viewpoint 20

Newcastle Gas Storage Facility

VIEWPOINT LOCALITY



VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Hunter Region Botanic Gardens, southern boundary

DISTANCE FROM SITE:

1.0km

COMMENTS:

Attempted viewpoint. Site and marker ballons not visible from this location.
Mainly pedestrian access only from occasional visitors to the Botanic Gardens who may stray beyond the limits of the designated walking tracks. Upper canopy cover within the walking tracks obstructs overhead views.
Occasional vehicular access adjoining Botanic Gardens boundary accessed only for overhead powerline maintenance or firefighting purposes.
Existing canopy vegetation provides sufficient screening to obstruct views to the proposed storage tank and flare stack.

EVALUATION CRITERIA:

Location of Site:	☑ Foreground	☐ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

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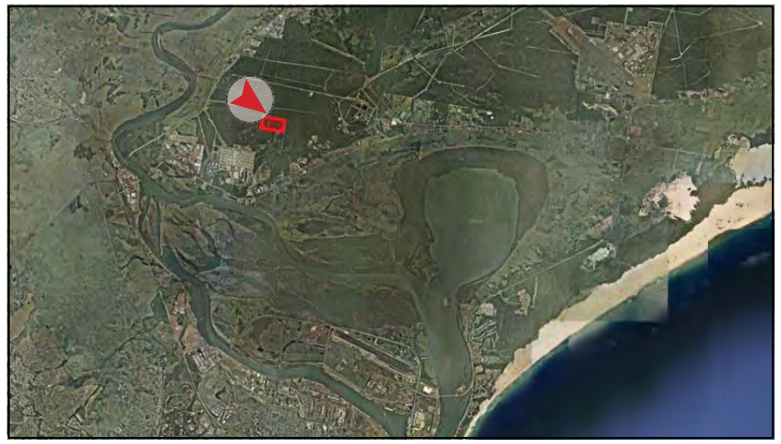
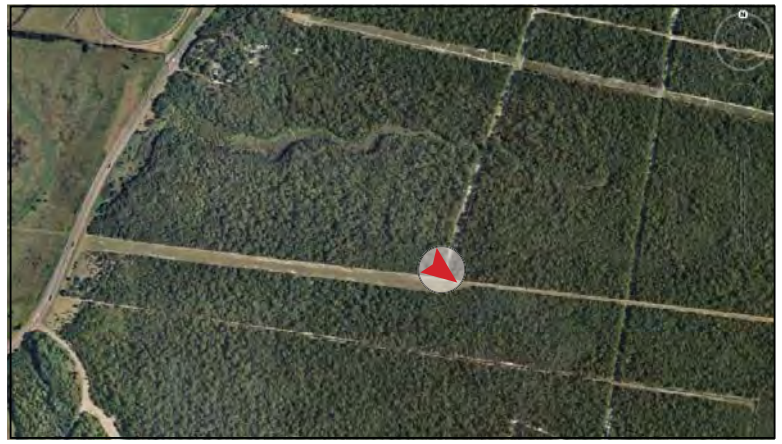
Viewpoint 21

Newcastle Gas Storage Facility



VIEWPOINT LOCALITY



VIEWPOINT LOCALITY DETAIL

VIEWPOINT LOCATION:

Hunter Region Botanic Gardens, south eastern boundary.

DISTANCE FROM SITE:

0.75km

COMMENTS:

Attempted viewpoint. Site and marker ballons not visible from this location.
This is the closest publicly accessible location to the site. Only accessed for overhead powerline maintenance or firefighting purposes.
The proposed storage tank and flare stack will not be visible from this location due to the close proximity of mature canopy vegetation.

EVALUATION CRITERIA:

Location of Site:	☑ Foreground	☐ Middleground	☐ Background
Viewer Position:	☐ Inferior	☑ Neutral	☐ Superior
Viewer Access:	☑ Low	☐ Medium	☐ High
Visual Sensitivity:	☑ Low	☐ Medium	☐ High
Visual Effect:	☑ Low	☐ Medium	☐ High
Visual Impact:	☑ Low	☐ Moderate	☐ High

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