APPENDIX 3

VISUAL IMPACT ASSESSMENT

Coffs Harbour City Council

Coffs Infrastructure Alliance

Coffs Harbour Water Treatment Plant Visual Impact Assessment

Feburary 2007

Contents

Table Index

Figure Index

1. Introduction

1.1 Brief Description of the Proposal

In the next two decades, based on predicted growth rates, it is anticipated that there will be a shortfall of water supply to Coffs Harbour. Several factors such as drought and the increasing need for environmental flows currently place additional pressure on supplies. To address this shortfall, Coffs Harbour City Council proposes to develop a water treatment plant (WTP) on Upper Orara Road, Karangi. It is expected that the WTP will provide additional potable water supplies for future development and growth of the Coffs Harbour Local Government Area (LGA) as well as reduce existing pressure on the Orara River.

The proposed development constitutes a “Major Project” under Part 3A of the *Environment Planning and Assessment Act 1979* (Act), requiring an Environmental Assessment of the WTP to be undertaken. Council has engaged GHD Pty Ltd to prepare this assessment.

1.2 Visual Assessment

As part of this Environmental Assessment a visual impact assessment is required. A visual impact assessment investigates the potential visual impacts of the proposed WTP on the surrounding environment. This assessment reviews the existing visual character of the site and its surrounds, the expected impacts of the WTP on the existing visual character of the proposed WTP on nearby existing residences and publicly accessible locations such as Upper Orara Road. More specifically, the visual assessment will consider the following:

- Existing views to the proposed sites;
- The visual character of the surrounding landscape;
- The sensitivity of the landscape to alteration by the proposal;
- The visual character and extent of the proposed WTP; and
- Viewer sensitivity to alteration of the environment by the proposal.

In addition to assessing potential views from affected properties to the proposed WTP, this report will also make recommendations to mitigate any potential visual impacts.

2. Methodology

2.1 Methodology

2.1.1 Understanding the Proposal

The visual assessment will initially involve the review of relevant documentation for the proposed WTP. Documentation to be reviewed will include things such as site plans, floor plans and elevations, the location of associated roads, parking areas and other built elements. This review will include associated infrastructure including entry roads, internal roads, and other built elements.

2.1.2 Site Analysis

This stage will involve a detailed investigation of the proposed site and its surrounds. This investigation will identify the existing landscape character of the site and surrounds. It will identify any properties or public locations likely to have views affected by the proposed WTP. These locations will be illustrated on a map including the project site and site surrounds.

2.1.3 Potential Views to the Site

Photographs of the properties identified in the previous stage as having views potentially affected by the proposed WTP will be utilised to illustrate the potential impacts. To provide an indication of how the WTP would affect existing views an outline of the proposed building mass will be added to the photographs to provide an impression of how the WTP would be incorporated into the view.

2.1.4 Visual Analysis

The photographs will be used to determine the visual impacts of the WTP on affected public locations and properties. To measure the potential impact on each view to the WTP site, standard desirable outcomes will be used. The following desirable outcomes will be used to provide a standard against which to measure the potential impact for each possible view to the WTP. These desirable outcomes represent a best-case scenario, where there is minimal visual impact. The desirable outcomes are as follows:

1. The construction phase of the WTP would not cause any long-term visual impacts i.e. visual impacts that would continue to exist after the WTP and associated infrastructure has been installed.
2. The WTP and associated infrastructure would not be viewed with the sky as a backdrop.
3. The WTP and associated infrastructure would not interrupt the view from any public location or nearby property to any landscape feature.
4. The WTP and associated infrastructure would not detract from the visual amenity of an important visual or cultural element or landscape.
5. When viewed from a nearby property or a public location the WTP and associated infrastructure would be of a scale appropriate to the setting.
6. The WTP and associated infrastructure would be of materials and forms that are sympathetic to the surrounds.

Each of the views to the proposed WTP has been assessed against these ‘desirable outcomes’ an overall assessment of the potential visual impact will be made. The potential visual impact will be based on a rating of low, medium or high.

2.1.5 Recommendations

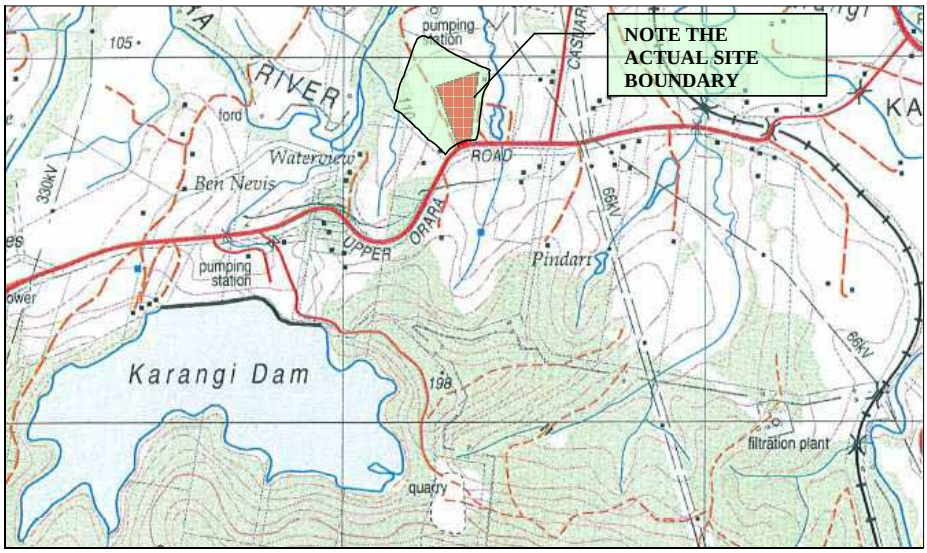
The potential visual impacts for each of the views assessed will be collated and recommendations will then be made to mitigate identified impacts on affected properties and public locations.

3. The Project Site

3.1 Site Location

The project site is located on Upper Orara Road 11km to the west of Coffs Harbour on the NSW Mid North Coast, 130 m RL and approximately 600 metres north east of the Karangi Dam. The site is described as Lot 2 DP 1083920 and occupies 3.5 hectares.

Figure 1 Location of project site.



3.2 Site Description

The site description relates to aspects of the site that are likely to be relevant to the visual assessment for the WTP. Site characteristics that are not relevant to this study have been omitted as they will form part of other reports.

The site has been largely cleared due to the previous rural land uses such as small scale grazing and rural residential uses. The site is predominantly grassed with two separated areas of vegetation of approximately 0.7 hectares. One area is adjacent to the Orara River on the western boundary of the site and contains riparian vegetation and Camphor Laurel (*Cinnamomum camphora*). The second located on the southern side of the entrance to the site contains Tall Open Blue Gum – Tallowwood forest with Camphor Laurel (*Cinnamomum camphora*). Both patches of vegetation have been formally mapped by Council as "Tertiary Koala Habitat", under Council's *Koala Habitat Plan of Management* (Coffs Harbour City Council Koala Plan of Management, Lunney *et al*. 1999). A Blue Gum 'Parrot' Tree is a significant vegetation feature on top of the ridge of the project site.

The current activities on the site include a contemporary residential building and a heritage building. The heritage building is referred as the "Dairy Bails" building and is the subject of a Statement of Heritage

Significance prepared in October 2006. Additional structures associated with the farm residence included stockyards, a shed, water tanks, a septic tank and fences.

The project site is undulating with the southern section situated on a ridge. The ridge slopes gently to the north and west towards drainage gullies located beyond the site boundaries. The northern part of the site slopes towards the Orara River, which is beyond the site's northern boundary. The highest point on the site is on the southern boundary at 119m Australian Height Datum (AHD). The northern part contains the lowest point on the northeastern boundary at 108m AHD.

The site is accessed from Upper Orara Road, approximately 2 kms west of Coramba Road. This represents the only public access into the WTP.

Figure 2 Site and surrounds

Figure 3 Looking north from ridge towards Orara River

Figure 4 Looking south towards southern extent of the site

3.3 Site Surrounds

The topography of the surrounding area is undulating. From the western boundary, at the sites lowest point the topography rises to the southwest to approximately 110m AHD. This ridge then slopes towards the north and again rises to approximately 120m AHD. Two residential dwellings are located on both ridges west of the site. North of the project site, the land slopes towards the Orara River. Orara River is the most significant waterway in Karangi. Water is pumped from the Orara River to Karangi Dam. The Orara River catchment is within the Orara West State Forest and covers roughly 131 km^2. The river drains west and then head south to meet up with Fridays Creek and Walgarah Creek. Beyond the Orara River the topography rises to the northwest to the highest peak of the surrounding area at approximately 260m AHD. The Orara West State Forest is located beyond this ridge. The visual quality of the bushland to the north and west is considered high due to the distinctive natural character. The topography of the site surrounds will play an important role in determining which properties and public locations have a view to the proposed WTP.

Upper Orara Road is located south of the site. The road runs east – west and connects to Coramba Road. Coramba Road is the main access into Orara Valley. The intersection of Upper Orara Road and Coramba Road features a general store and petrol station. Along Upper Orara Road, approximately 600 metres south west of the project site is Karangi Dam and 1 km south west of the project site is the Orara River Pump Station. Adjacent to the project site is the Transgrid Electrical Substation along Casuarina Lane. The sub station has recently been expanded and is located on a ridge to the north east of the project site. The sub station is a major structure on the surrounding landscape and acts as a visual barrier to the residences beyond.

Residential premises are located approximately 100 metres south west of the site, 200m south west of the site, 400 metres south-south east of the site, and 200 metres south of the site. Other dwellings are located northwest and west of the site at distances greater than 500 metres. All the surrounding residences are low-density detached dwellings. Residences are primarily associated with agricultural activity.

4. Water Treatment Plant

4.1 Siting

The WTP is located at 140 Upper Orara Road (Lot 2 DP 1083920), Karangi. The proposed site for the WTP will occupy both the southern side and northeastern side of the site. The area that the WTP would be sited on is a relatively cleared area. Figure 5 indicates the location of the proposed WTP on the site. This figure is an extract from the Coffs Harbour City Local Environmental Plan 2000.

Figure 5 Proposed siting areas for the WTP structures (siting area of structures is indicative only and not to scale or design)

Agriculture Zone

Environmental Protection Habitat and Catchment

Proposed WTP siting

Koala Habitat/ Vegetation Mapping

1. Area where the control building, dissolved air flotation and filtration (DAFF) and chemical plant will be located

The design of the WTP includes five main areas. These include a control building located on the southern entrance to the site; a DAFF and chemical plant located adjacent to the control building; a sludge dewatering building, a treated water pump station and treated water storage tanks all located on the north eastern boundary of the site. The highest building will be the DAFF, which will include a lime silo at approximately 15 metres high, and the DAFF building at the highest point will be approximately 12 metres high. A proposed road will be positioned from the southern entrance (from the control building and DAFF and chemical plant) and towards the proposed facilities on the northeastern side of the site.

Access to the WTP site for construction and future treatment chemical deliveries will be from Upper Orara Road. Coffs Harbour City Council is proposing to modify the road alignment at the entrance point to facilitate safe entry and exit for chemical delivery trucks and other required site traffic.

4.2 Facilities

A shortfall in the provision of water in Coffs Harbour is predicted to occur over the next two decades based on growth trends. The WTP is proposed to treat all potable water supplies flowing to Coffs Harbour consumers from the existing Karangi Dam. Inflows to the Karangi Dam are currently from both the Orara and Nymboida River catchments, however in future these inflows will be augmented with supplies from the proposed Shannon Creek Dam. The WTP is proposed to have a present day design output capacity of 42 megalitres per day of filtered (potable) drinking water.

The construction activities proposed would be as follows:

- Abandonment of the existing lime dosing facilities on the Karangi Dam site and construction of new lime dosing facilities at the proposed new WTP (i.e., the Upper Orara Road) site;
- Relocation of carbon dioxide dosing facilities from the Karangi Dam site to the proposed WTP site;
- Modifications to the Karangi Dam outlet pumping station to enable pumping of raw water at a controlled rate to the WTP inlet (some 600 metres north-east from the Karangi Dam site);
- Cutting in to the existing Karangi Dam to Red Hill tank main and construction of supply and return pipe branches to the proposed WTP site;
- Construction of a dissolved air flotation and filtration ('DAFF') treatment plant within the proposed above-ground concrete water retaining structures at the WTP site;
- Provision of chemical storage and dosing facilities (at the WTP site) for:
  - lime and carbon dioxide (as mentioned above) for corrosion control and pH correction;
  - potassium permanganate dosing for oxidation of manganese;
  - powdered activated carbon (PAC) for control of (intermittent) taste and odour events;
  - aluminium sulphate (alum) dosing for coagulation;
  - polymer dosing as a coagulation aid;
  - polymer dosing as a flocculant aid;
  - sodium hydroxide (caustic soda) dosing for post filtration pH correction;
  - chlorine gas dosing to provide a post filtration disinfectant residual (chlorine dosing plant would be located within a separate building on the site);
  - fluoride dosing;
  - dosing of polymer for washwater thickening; and

  - dosing of polymer for sludge dewatering.
- Provision of ultra-violet disinfection of the filtered water;
- Provision of mechanical plant for backwashing of filters;
- Construction of washwater recycle, sludge thickening and sludge dewatering facilities. Supernatant would routinely be returned to Karangi Dam via the existing “regional” pipeline, or otherwise returned to the plant inlet if the regional pipeline is unavailable;
- Construction of above ground tanks for:
  - treated water storage (4 megalitres); and
  - washwater holding tank.
- Construction of an earthen emergency storage containment lagoon to provide for the (unlikely) event of a plant overflow or sludge dewatering system failure;
- Construction of a combined control building, testing laboratory and meeting room on the WTP site;
- Construction of a treated water pump station to transfer treated water to the existing Red Hill tanks for distribution into the Coffs Harbour water supply system;
- Construction of a 150 mm diameter treated water pipeline to the township of Coramba, some 4 km north west of the site. Pumps for this supply will be incorporated within the treated water pump station on the WTP site;
- Installation of a kiosk-style power supply transformer on the WTP site to power the various plant, including the provision of a backup diesel generator; and
- Construction of a paved access road around the WTP site.

5. Construction Phase & Earthworks

5.1 Construction Works

Preliminary advice of the construction phase for the proposed Water Treatment Plant would likely to involve the following activities. The quality and conditions is currently unknown and is subject to further detailed design.

- Earthworks (cut and fill);
- Detailed excavation;
- construction of structures;
- Mechanical installations starting with pipework;
- Installation of fill to the site and new roads.

Machinery used on site during the construction phase of the proposed WTP would likely to include:

- Tower crane at approximately 35 m high with 70 m boom to construct DAFF and tanks;
- Excavators and scrappers for the earthworks;
- Rollers;
- Smaller cranes;
- Road trucks and
- Backhoes.

5.2 Visual Impact of the Construction Phase

For the properties with direct views to the project site, the machinery and operations associated with the construction works will be visible for the duration of the construction period. Views to the construction works are likely to take in machinery movement and operations, earthworks, mechanical installation, building works, road works and construction of the associated infrastructure. In many instances, views will be screened by on and off site vegetation and the Transgrid Electrical Substation.

The works will involve the fill to be stockpiled on the project site. The fill is unlikely to be high enough to cause any visual impact.

Following the completion of the construction phase of the project, it would be likely affected properties would see exposed cut and fill batters. Eventually these areas will be revegetated or will regenerate naturally. There should be no long-term visual impacts with the construction phase of the WTP.

6. Views from Public Locations

6.1 Public Locations

The nearest public locations to the project site include Upper Orara Road, Casuarina Lane and Orara River. These locations are indicated in the following illustrations.

Figure 6 Public locations and potential views

6.2 Views to Site

6.2.1 Upper Orara Road

Assessment of views

Upper Orara Road is located south of the project site. It provides the main access into the WTP. Currently there is a small amount of vegetation and a wooden fence between Upper Orara Road and the proposed WTP. Upper Orara Road is at a lower elevation than the project site. The control building, DAFF and Chemical Plant will occupy significant views from Upper Orara Road as an essential public identity. However, due to the lower elevation of the road and the lower siting of the treated water storage, sludge dewatering building and treated water pump station no views will be possible to these buildings.

Figure 7 View from Upper Orara Road looking north

Figure 8 View from Upper Orara Road with impression of proposed WTP

The views from Upper Orara Road have been assessed against the desirable outcomes with the following findings.

Desirable Outcome 1

The construction phase of the WTP would not cause any long-term visual impacts i.e. visual impacts that would continue to exist after the WTP and associated infrastructure has been installed.

The view from Upper Orara Road would be likely to take in a large proportion of the construction works. The road is close to the project site and road users would be particularly prone to viewing the construction works associated with the construction of the control building, DAFF and Chemical Plant. Views would take in machinery movement, work crews, earth works for the DAFF and building works. These views would be likely to be cluttered, busy and untidy.

Following the completion of construction works such construction activities as exposed earthworks; unsealed roads or exposed sub grades will not be visible. Any potential visual impacts from the construction phase will be appropriately landscaped. Hence, there would be no long-term visual impacts associated with the construction phase of the WTP as viewed from Upper Orara Road

Desirable Outcome 2

The WTP and associated infrastructure would not be viewed with the sky as a backdrop.

The proposed WTP control building, DAFF and Chemical Plant would not be viewed with the sky as a backdrop. It would be viewed against the backdrop of the vegetation and a rural landscape within the northern extent of the site.

Desirable Outcome 3

The WTP and associated infrastructure would not interrupt the view from any public location or nearby property to any landscape feature.

Currently, the view from this location takes in the landscape features of the vegetated ridgelines and hills. The proposed control building, DAFF and Chemical Plant would partially conceal the vegetation north of the site due to the lower elevation of the road. The control building has been designed to not only function as the point of contact for the public but also as an aesthetically pleasing structure, which is sensitive to the rural context. Therefore, while the control building, DAFF and Chemical Plant will partially interrupt the views to the vegetated hills in the distance it will mainly function as an identifiable public building that integrates into the rural environment.

Desirable Outcome 4

The WTP and associated infrastructure would not detract from the visual amenity of an important visual or cultural element or landscape.

The surrounding landscape to this site has a high visual amenity. Views take in the undulating landscape and large areas of vegetation. The WTP will be an additional and obvious built element within the project site. However, the design of the structures will be in a pleasing aesthetic and sculptural composition as well as suited to the existing rural context. At the same time the WTP will be visually and functionally separate to the electrical substation. Therefore, whilst the building would be an obvious built element, it is unlikely to detract from the visual amenity of the existing rural context.

Desirable Outcome 5

When viewed from a nearby property or a public location the WTP and associated infrastructure would be of a scale appropriate to the setting.

The existing site is open and only a limited number of small built elements are visible. The Transgrid electrical substation provides a large-scale built element, which provides an appropriate setting for the WTP. However, the substation is only partially visible from the viewing location and the surrounding visual landscape is mostly natural. The proposed WTP particularly the control building, DAFF and Chemical Plant would appear very large in scale in comparison to the relatively natural view.

Desirable Outcome 6

The WTP and associated infrastructure would be of materials and forms that are sympathetic to the surrounds.

The proposed buildings will only partially vacate the foreground of the new view and would be viewed with a natural backdrop of vegetation and distant hills. The material and forms of the WTP and associated infrastructure would be likely to complement the nearby vegetation and the distant hills. The proposed facilities will be aesthetically pleasing as well as sensitive to the rural context. These buildings are generally to be designed to “fit” into the rural environment. The external material utilised for the

structures will enable longevity with minimal maintenance and to control degradation of the building external appearance over time. The external colours and finishes will help mitigate the buildings visibility and therefore any external colours and finishes will complement the background.

Summary of Findings

Construction works would likely to be highly visible from Upper Orara Road. The proposed WTP would not be viewed with the sky as a backdrop. The WTP and associated infrastructure would be viewed from this viewing location with vegetation and distant vegetated hills as a backdrop. While, the control building, DAFF and Chemical Plant will partially interrupt the views to the vegetated hills in the distance it will mainly function as an identifiable public building that integrates into the rural environment.

The view to the WTP will be an additional and obvious built element within the project site. However, the design of the structures will be in pleasing aesthetic and sculptural composition as well as suited to the existing rural context. At the same time the WTP will be visually and functionally separate to the electrical substation. Therefore, whilst the building would be an obvious built element, it is unlikely to detract from the visual amenity of the existing rural context. The proposed WTP would appear against a natural backdrop and the material and forms of the WTP would complement the rural landscape.

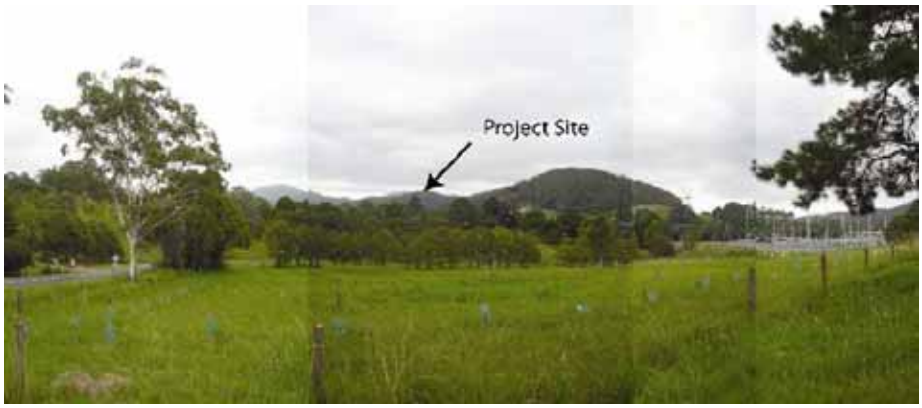
Recommendations

1. Install screen planting immediately on the south boundary of the project site. The vegetation will be located between the boundary and the proposed control building, DAFF and Chemical Plant. Screen planting should include trees, shrubs and ground covers to create a dense visual barrier. Foliage should be compact and dense to maximise the efficiency of the planting to create a visual screen. Locate screen planting for the entire length of the southern boundary (not including the entrance).
2. Select a muted colour for the southern buildings that would minimise the potential for the bulk of the WTP to complement with the rural context.

6.2.2 Casuarina Lane

Casuarina Lane is located approximately 800 metres east of the project site. Casuarina Lane is located on a ridge and provides access to residential properties beyond the Orara River. Currently there is a corridor of remnant vegetation between Casuarina Lane and the project site. There is a small break in the vegetation however, as the majority of the structures are south of the site, they would be concealed by vegetation. It would be unlikely to view the proposed WTP form Casuarina Lane. As no views are possible from this location, the views have not been assessed against the desirable outcomes.

Figure 9 View from Casuarina Lane looking west towards project site



6.2.3 Orara River

The Orara River bounds the project site to the north. The river is sited at a significantly lower level than the WTP. Currently there is dense vegetation on the banks of the river. Water is not visible from the project site. It is therefore unlikely that the WTP would be viewed from Orara River. However, in some instances there may be some filtered views through the dense vegetation. As no views are possible from this location the views have not been assessed against the desirable outcomes.

7. Views from Residences

7.1 Determining Affected Properties

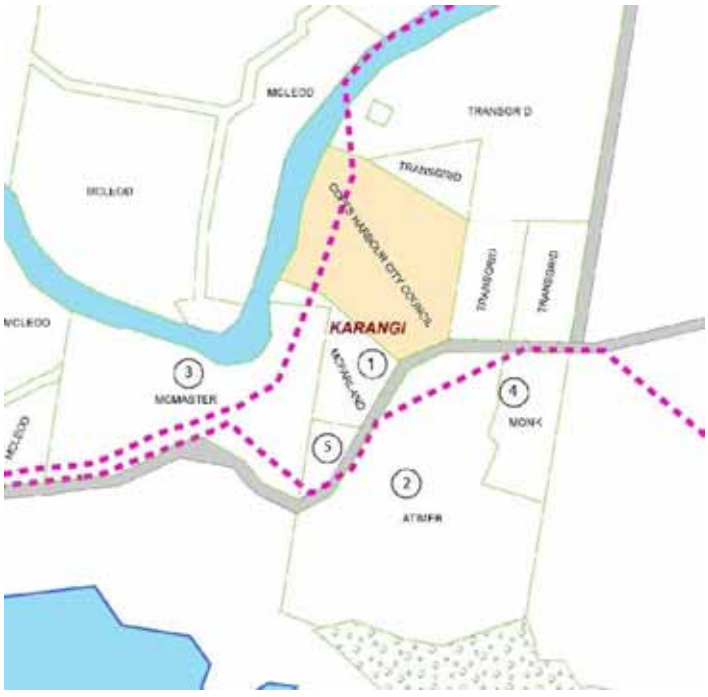
An initial review of a topographical map provided an indication as to which residences may have their views affected by the proposed WTP. The undulating surrounds to the site, particularly to the west and east, either restrict views to the project site or promote views to the site. Following the identification of potentially affected properties, a site visit then narrowed the list to five properties. Council provided contact details for these properties. These property owners were then contacted via phone. The properties were visited with one of the following outcomes:

- It was evident there were no existing views to the project site and the nearby property would not be visually affected by the proposed WTP;
- The property did have either partial or full views to the project site and their views to the project site and their views may be affected by the proposed WTP.

For some unaffected properties further analysis has been recommended as the views have been screened by deciduous trees and would need further analysis in winter. However, at present photographs indicate that these properties have no current views to the project site.

The following map locates the properties that were the subject of further investigation.

Figure 10 Potentially affected residential properties



The following table provides a summary of the investigation into the 5 potentially affected properties and indicates those properties where further analysis was relevant.

Table 1 Potentially affected properties

Map Location	Address	Property Owner	Action
1	146 Upper Orara Road, Karangi	Mr EG & Mrs JA McFarland	Site visited. Property adjacent to site. Project site partially visible from property. Refer photos.
2	147 Upper Orara Road, Karangi	Mr PG & Mrs KJ Latimer	Site visited. Property directly opposite project site. Not possible to see project site from property. Possible views during winter due to deciduous trees.
3	186 Upper Orara Road, Karangi	Mr AR & Mrs RJ Mc Master	Site visited. Property on adjacent ridge west of site. Project site partially visible from property. Refer photos.
4	121 Upper Orara Road, Karangi	Mr NB & Mrs JA Monk	Site visited. Not possible to see project site from property. Possible views during winter due to deciduous trees.
5	156 Upper Orara Road, Karangi	Miss M Stansfield & Ms VR Bell	Site visited. Not possible to see project site from property.

7.2 Assessment of views

7.2.1 Private Property 1

This property is located at 146 Upper Orara Road, Karangi. The property has an undulating topography with its highest point at approximately 100 metres AHD. The property adjoins the project site to the west. The residential dwelling is located approximately 100 metres from the project site in the southeast corner on a ridgeline. The property is accessed via Upper Orara Road. The residence is sited below Upper Orara Road. The view to the project site from the residence is screened by remnant vegetation. It is unlikely that from the residence the WTP will be visible due the vegetation screening that. However, from the north eastern property boundary the entire WTP will be visible. The lime silo, which is located on the DAFF and chemical plant building, will be the tallest structure on the visible buildings. However this will

be located on the eastern side of the building and due to the topography of the project site it is unlikely to be viewed from this location.

The view from this property has been assessed against the desirable outcomes with the following findings.

Figure 11 Private Property 1 looking from residence to project site

Figure 12 Private Property 1 on boundary looking east towards project site.

Figure 13 Private Property 1 looking east with impression of WTP

Desirable Outcome 1

The construction phase of the WTP would not cause any long term visual impacts i.e. visual impacts that would continue to exist after the WTP and associated infrastructure has been installed.

The view from this property would be likely to take in a large proportion of the construction works. The property is close to the project site and would be particularly prone to viewing the construction works associated with the construction of the control building, DAFF and chemical plant. However, as the sludge dewatering building, treated water pump station and associated tanks will be on the other side of the ridge, these will not be seen from this property. Views would take in machinery movement, work crews, earth works for the DAFF and building works. These views are likely to be cluttered, busy and untidy.

Following the completion of construction works such construction activities as exposed earthworks; unsealed roads or exposed sub grades will not be visible. Any potential visual impacts from the construction phase will be appropriately landscaped. Hence, there would be no long-term visual impacts associated with the construction phase of the WTP as viewed from Upper Orara Road.

Desirable Outcome 2

The WTP and associated infrastructure would not be viewed with the sky as a backdrop.

The proposed WTP control building, DAFF and Chemical Plant would be partially viewed with the sky as a backdrop. The property boundary is located significantly below the proposed WTP.

Desirable Outcome 3

The WTP and associated infrastructure would not interrupt the view from any public location or nearby property to any landscape feature.

The views from this location take in the sky as well as existing vegetation and building on the project site. The proposed WTP would partially conceal the sky due to the lower elevation of the property. However, the WTP will not interrupt the view to the vegetated hills north of the property in the distance.

Desirable Outcome 4

The WTP and associated infrastructure would not detract from the visual amenity of an important visual or cultural element or landscape.

The surrounding landscape to this site has a high visual amenity. Views take in the undulating landscape and large areas of vegetation. The WTP will be an additional and obvious built element within the project site. However, the design of the structures will be in a pleasing aesthetic and sculptural composition as well as suited to the existing rural context. At the same time the WTP will be visually and functionally separate to the electrical substation. Therefore, whilst the building would be an obvious built element, it would unlikely detract from the visual amenity of the existing rural context.

Desirable Outcome 5

When viewed from a nearby property or a public location the WTP and associated infrastructure would be of a scale appropriate to the setting.

The existing site is open and only a limited number of small built elements are visible. The Transgrid electrical substation provides a large-scale built element, which provides an appropriate setting for the WTP. However, the substation is only partially visible from the viewing location and the surrounding

visual landscape is mostly natural. The proposed WTP particularly the control building, DAFF and Chemical Plant would appear very large in scale in comparison to the relatively natural view.

Desirable Outcome 6

The WTP and associated infrastructure would be of materials and forms that are sympathetic to the surrounds.

The proposed buildings will only partially vacate the foreground of the new view and would be viewed with a backdrop of the sky. The material and forms of the WTP and associated infrastructure are likely to complement the nearby vegetation and the distant hills as well as the sky. The proposed facilities will be aesthetically pleasing as well as sensitive to the rural context. These buildings are generally to be designed to "fit" into the rural environment. The external material utilised for the structures will enable longevity with minimal maintenance and to control degradation of the building's external appearance over time. The external colours and finishes will help mitigate the building's visibility and therefore any external colours and finishes will complement the background.

Summary of Findings

The view to the project site from the residence is screened by remnant vegetation. It is unlikely that that the WTP will be visible from the residence due the vegetation screening.

From the eastern boundary, construction works are likely to be visible from Private Property 1. The WTP and associated infrastructure would be viewed from this viewing location with the sky as a backdrop. The vegetation south of the property would partially conceal the proposed WTP. However, the WTP will not interrupt the view to the vegetated hills north of the property in the distance and would not affect the significant views to these hills.

The view of the WTP will be an additional and obvious built element within the project site. However, the design of the structures will be in pleasing aesthetic and sculptural composition as well as suited to the existing rural context. At the same time the WTP will be visually and functionally separate to the electrical substation. Therefore, whilst the building would be an obvious built element, it is unlikely to detract from the visual amenity of the existing rural context. The proposed WTP would appear against a natural backdrop and the material and forms of the WTP are likely to complement the rural landscape.

Recommendations

1. Install screen planting immediately on the west boundary of the project site. The vegetation will be located between the property boundary and the proposed control building, DAFF and Chemical Plant. Screen planting should include trees, shrubs and ground covers to create a dense visual barrier. Foliage should be compact and dense to maximise the efficiency of the planting to create a visual screen. Locate screen planting for the entire length of the southern boundary (not including the entrance).
2. Maintain the existing vegetation between this property and the project site.
3. Select a muted colour for the southern buildings that would minimise the potential for the bulk of the WTP to complement with the rural context.
4. Keep spaces simple and uncluttered to minimise the potential for the WTP to look untidy.

7.2.2 Private Property 2

This property is located at 147 Upper Orara Road, Karangi. The property sits at approximately 120 metres AHD and is approximately 200 metres south east of the site. The property is accessed via Upper Orara Road. The residence is elevated above Upper Orara Road and over looks this road.

The view to the project site is screened by existing vegetation. However, the vegetation screening the project site is deciduous and the project site will be visible during winter. However, mitigation measures are recommended to screen the WTP during these months.

During the site visit the visual assessment concluded that the actual WTP and associated infrastructure would not be viewed from this site and therefore would not be viewed against the sky from this location. The WTP would be out of site (not including the winter period) and therefore would not interrupt the view to any landscape feature. There will be no long term visual impacts associated with the construction phase of the WTP.

As no views were identified during the site visit from this location the views have not been assessed against the desirable outcomes.

Figure 14 Private Property 2 looking north towards project site.

Recommendations

1. Maintain the existing vegetation between this property and the project site to provide ongoing screening to the WTP.
2. Install native vegetation between this property and the project site to provide ongoing screening to the WTP.
3. Install screen planting immediately on the south boundary of the project site. The vegetation will be located between the boundary and the proposed control building, DAFF and Chemical Plant. Screen planting should include trees, shrubs and ground covers to create a dense visual barrier. Foliage

should be compact and dense to maximise the efficiency of the planting to create a visual screen. Locate screen planting for the entire length of the southern boundary (not including the entrance)

4. Keep spaces simple and uncluttered to minimise the potential for the WTP to look untidy.

7.2.3 Private Property 3

This property is located at 186 Upper Orara Road, Karangi. The property has an undulating topography and at its highest point sits at approximately 110 metres AHD. The property is located on the ridge west of the project site. The residence is located approximately 300 metres from the project site in the northern boundary on a ridge. The property is accessed via Upper Orara Road. The residence is elevated above Upper Orara Road. The property is generally on the same level as the project site. The southern area of the project site is partially screened by remanent vegetation from the viewing location. However, views are possible to the northern extent of the project site and hence the majority of the DAFF and chemical plant building. The lime silo, which is located on the DAFF and chemical plant building, will be the tallest structure on the visible buildings. However this will be located on the eastern side of the building and due to the topography of the project site it is unlikely to be viewed from this location. However, as the sludge dewatering building, treated water pump station and associated tanks will be on the other side of the ridge, these structures will not be visiblel from this property.

The view from this property has been assessed against the desirable outcomes with the following findings.

Figure 15 Private Property 3 looking east towards project site.

Figure 16 Private Property 3 looking east towards project site with impression of WTP

Desirable Outcome 1

The construction phase of the WTP would not cause any long term visual impacts i.e. visual impacts that would continue to exist after the WTP and associated infrastructure has been installed.

The view from this property would take in a large proportion of the construction works. The property is close to the project site and would be particularly prone to seeing the construction works associated with the construction of the DAFF and chemical plant. However, as the sludge dewatering building, treated water pump station and associated tanks will be on the other side of the ridge will not be visible from this property. Views would take in machinery movement, work crews, earth works for the DAFF and building works. These views would be likely to be cluttered, busy and untidy.

Following the completion of construction works such construction activities as exposed earthworks; unsealed roads or exposed sub grades will not be visible. Any potential visual impacts from the construction phase will be appropriately landscaped. Hence, there would be no long-term visual impacts associated with the construction phase of the WTP as viewed from Upper Orara Road.

Desirable Outcome 2

The WTP and associated infrastructure would not be viewed with the sky as a backdrop.

The proposed WTP control building, DAFF and Chemical Plant would not be viewed with the sky as a backdrop. It would be viewed against the backdrop of the vegetation and the Transgrid Electrical Substation within the eastern extent of the site.

Desirable Outcome 3

The WTP and associated infrastructure would not interrupt the view from any public location or nearby property to any landscape feature.

Currently broad views are available from this location. The view from this location takes in the landscape features of the vegetated ridgelines and hills. Vegetation currently on the project site will conceal proportions of the structures. The proposed WTP would partially conceal the vegetation and distant hills east of the project site.

Desirable Outcome 4

The WTP and associated infrastructure would not detract from the visual amenity of an important visual or cultural element or landscape.

The surrounding landscape to this site has a high visual amenity. Views take in the undulating landscape and large areas of vegetation. The WTP will be an additional and obvious built element within the project site. However, the design of the structures will be suited to the existing rural context. At the same time the WTP will be visually and functionally separate to the electrical substation. Therefore, whilst the building would be an obvious built element, it is unlikely to detract from the visual amenity of the existing rural context.

Desirable Outcome 5

When viewed from a nearby property or a public location the WTP and associated infrastructure would be of a scale appropriate to the setting.

The existing site is open and only a limited number of small built elements are visible. The Transgrid Electrical substation provides a large scale built element which provides an appropriate setting for the WTP. However, the substation is only partially visible from the viewing location and the surrounding visual landscape is mostly natural. The proposed WTP particularly the DAFF and Chemical Plant would appear large in scale in comparison to the relatively natural view.

Desirable Outcome 6

The WTP and associated infrastructure would be of materials and forms that are sympathetic to the surrounds.

The proposed buildings will only partially vacate the foreground of the new view and would be viewed with a natural backdrop of vegetation and distant hills. The material and forms of the WTP and associated infrastructure is likely to complement the nearby vegetation and the distant hills as well as the sky. The proposed facilities will be aesthetically pleasing as well as sensitive to the rural context. These buildings are generally to be designed to “fit” into the rural environment. The external material utilised for the structures will enable longevity with minimal maintenance and to control degradation of the building external appearance over time. The external colours and finishes will help mitigate the buildings visibility and therefore any external colours and finishes will complement the background.

Summary of Findings

Construction works are likely to be visible from Private Property 3. The WTP and associated infrastructure would be visible from this viewing location with vegetation and distant vegetated hills as a backdrop. The proposed WTP control building, DAFF and Chemical Plant would not be viewed with the sky as a backdrop. It would be viewed against the backdrop of the vegetation and the Transgrid Electrical Substation within the eastern extent of the site. The view from this location takes in the landscape features of the vegetated ridgelines and hills. Vegetation currently on the project site will conceal proportions of the structures. The proposed WTP would partially conceal the vegetation and distant hills east of the project site. The view of the WTP will be an additional and obvious built element within the project site. However, the design of the structures will be in pleasing aesthetic and sculptural composition as well as suited to the existing rural context. At the same time the WTP will be visually and functionally separate to the electrical substation. Therefore, whilst the building would be an obvious built element, it is unlikely to detract from the visual amenity of the existing rural context. The proposed WTP would appear against a natural backdrop and the material and forms of the WTP are likely to complement the rural character of the area.

Recommendations

1. Install screen planting immediately on the west boundary of the project site. The vegetation will be located between the property boundary and the proposed control building, DAFF and Chemical Plant. Screen planting should include trees, shrubs and ground covers to create a dense visual barrier. Foliage should be compact and dense to maximise the efficiency of the planting to create a visual screen. Locate screen planting for the entire length of the southern boundary (not including the entrance).
2. Maintain the existing vegetation between this property and the project site.
3. Consider liasing with the owners to install a planted buffer to the top of the ridge between the property and views to the WTP.
4. Select a muted colour for the southern buildings that would minimise the potential for the bulk of the WTP to complement the rural context.
5. Keep spaces simple and uncluttered to minimise the potential for the WTP to look untidy.

7.2.4 Private Property 4

This property is located at 121 Upper Orara Road, Karangi. The property sits at approximately 100 metres AHD and is approximately 400 metres south east of the site. The property is accessed via Upper Orara Road. The residence is elevated above Upper Orara Road and over looks this road.

The view to the project site is screened by existing vegetation. However, the vegetation screening the project site is deciduous and the project site will be visible during winter. However, mitigation measures are recommended to screen the WTP during these months.

During the site visit the visual assessment concluded that the actual WTP and associated infrastructure would not be viewed from this site and therefore would not be viewed against the sky from this location. The WTP would be out of site (not including the winter period) and therefore not interrupt the view to any landscape feature. There will be no long term visual impacts associated with the construction phase of the WTP.

As no views were identified during the site visit from this location the views have not been assessed against the desirable outcomes.

Figure 17 Private Property 4 looking north west towards project site.

Recommendations

1. Maintain the existing vegetation between this property and the project site to provide ongoing screening to the WTP.
2. Install native vegetation between this property and the project site to provide ongoing screening to the WTP.
3. Install screen planting immediately on the southern boundary of the project site. The vegetation will be located between the boundary and the proposed control building, DAFF and Chemical Plant. Screen planting should include trees, shrubs and ground covers to create a dense visual barrier. Foliage should be compact and dense to maximise the efficiency of the planting to create a visual screen. Locate screen planting for the entire length of the southern boundary (not including the entrance)
4. Select a muted colour for the southern buildings that would minimise the potential for the bulk of the WTP to complement the rural context.

7.2.5 Private Property 5

This property is located at 156 Upper Orara Road, Karangi. The property has an undulating topography with its highest point at approximately 100 metres AHD. The property is located adjacent to Private Property 1. The residence is located approximately 300 metres from the project site in the northern boundary on a ridge. The property is accessed via Upper Orara Road. The residence is sited below Upper Orara Road. The property is generally on the same level as the project site. Vegetation on this property and Private Property 1 screen the project site. The view to the project site is screened by existing vegetation.

During the site visit the visual assessment concluded that the actual WTP and associated infrastructure would not be viewed from this site and therefore would not be viewed against the sky from this location.

The WTP would be out of site and therefore would not interrupt the view to any landscape feature. There will be no long term visual impacts associated with the construction phase of the WTP.

As no views were identified during the site visit from this location the views have not been assessed against the desirable outcomes.

Figure 18 Private Property 5 looking north east towards project site.

Recommendations

1. Maintain the existing vegetation between this property and the project site to provide ongoing screening to the WTP.

8. Buffer Planting

8.1 Buffer Planting

The installation of buffer planting at certain locations has been recommended to screen the proposed WTP. The installation of buffer planting to the WTP would need to be the subject of more detailed design. The extent and nature of earthworks will have a bearing on the validity of installing buffer planting at certain locations for example; road locations. The location and content of buffer planting would be subject to NSW RFS bushfire regulations for the site. The following is intended as a guide only.

8.2 Proposed Species

The proposed species are to be included in the buffer planting areas but are subject to further detailed design.

- Tallowwood (*Eucalyptus microcorys)*;
- Flooded Gum (*Eucalyptus grandis*);
- Sydney Blue Gum (*Eucalyptus saligna*).

8.3 Proposed Density

It is recommended buffer planting areas are a minimum of 3 metres wide. Based on a buffer planting area of that width, the following planting densities are recommended to provide a dense visual screen.

- 1 tree @ every 6 metres
- 1 shrub per 2 m^2
- 2 ground covers per $1m^2$

Planting layout would need to be adjusted depending on the mature size of species included. The above density is intended as a general indication only.

9. Conclusion

9.1 Overview

The visual assessment report has considered the installation of a Water Treatment Plant on Upper Orara Road, Karangi. The following sites were considered in this report:

- Upper Orara Road, Karangi;
- Casuarina Lane, Karangi;
- 146 Upper Orara Road, Karangi;
- 147 Upper Orara Road, Karangi;
- 186 Upper Orara Road, Karangi;
- 121 Upper Orara Road, Karangi; and
- 156 Upper Orara Road, Karangi

9.2 Visual Assessment Summary

The following summary provides an overview of each of the affected locations and the visual impact in relation to the proposed WTP. The overall rating has been provided for each of the potentially affected properties. This rating has been achieved by reviewing the summary of findings for each of the properties and making an assessment as to how each property rated relative to the 'desirable outcomes'. The following table demonstrates a summary of the rating.

Table 2 Rating

Rating	' Desirable outcomes' conclusions
No impact	Achieved all desirable outcomes
Low visual impact	Fully achieved at least 5 of the desirable outcomes and impacts could be lessened through mitigation measures
Medium visual impact	Fully achieved at least 4 of the desirable outcomes and impacts could be lessened through mitigation measures
High visual impact	Achieved less than 3 of the desirable outcomes and it would be extremely difficult to lessen the visual impacts.

Table 3 Ratings for affect properties or public locations

Viewing Site	Summary of Findings	Potential Visual Impact
Upper Orara Road	◗ Some construction works will be visible from road ◗ No long term visual impacts ◗ WTP will not be viewed against the	Medium

Viewing Site	Summary of Findings	Potential Visual Impact
	sky ◗ WTP would only partially interrupt views to landscape features ◗ WTP would only interrupt views to distant hills ◗ WTP will be an obvious built element ◗ WTP would unlikely to detract from visual amenity of the existing rural context. ◗ Materials & colours would contrast with natural backdrop. ◗ Vegetation buffers will screen any view to the WTP	
Casuarina Lane	◗ Vegetation restricts views to project site from property. ◗ Not possible to view the project site.	No impact
Private Property 1	◗ Some construction works will be visible from property. ◗ No long term visual impacts ◗ WTP will be viewed against the sky ◗ On a portion of the WTP would be highly visible ◗ WTP would not interrupt views to distant hills. ◗ WTP will be an obvious built element ◗ WTP would unlikely to detract from visual amenity of the existing landscape ◗ Materials & colours would contrast with natural backdrop. ◗ Vegetation buffers will screen any view to the WTP.	Medium
Private Property 2	◗ Vegetation restricts views to project site from property during site visit ◗ Not possible to view the project site during site visit.	low

Viewing Site	Summary of Findings	Potential Visual Impact
	◗ Deciduous trees may increase visibility of WTP during winter. ◗ Vegetation buffers will screen any view to the WTP.	
Private Property 3	◗ Some construction works will be visible from property ◗ No long term visual impacts ◗ WTP would not be viewed against the sky. ◗ Only a portion of the WTP would be highly visible ◗ WTP would not interrupt views to distant hills. ◗ WTP will be an obvious built element ◗ WTP would unlikely to detract from visual amenity of the existing rural context. ◗ Materials & colours would contrast with natural backdrop. ◗ Vegetation buffers will screen any view to the WTP.	Medium
Private Property 4	◗ Vegetation restricts views to project site from property during site visit ◗ Not possible to view the project site during site visit. ◗ Deciduous trees may increase visibility of WTP during winter. ◗ Vegetation buffers will screen any view to the WTP.	Low
Private Property 5	◗ Vegetation restricts views to project site from property. ◗ Not possible to view the project site.	Low

9.3 Recommendations

The recommendations have been included to reduce visual impact for affected properties and location. These recommendations relate to installing screening plants, retaining vegetation and the colour and material of the building.

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