Coffs Infrastructure Alliance

Coffs Harbour City Council

Water Treatment Plant

Environmental Assessment

June 2007

Submission of Environmental Assessment

Prepared under the Environmental Planning and Assessment Act 1979, Section 75H

Environmental assessment prepared by:	
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Address	Lot 1 Howard Street (PO Box J61) Coffs Harbour NSW 2450
In respect of:	
Project to which Part 3A applies	
Applicant name	Coffs Harbour City Council
Applicant address	Locked Bag 155, Coffs Harbour 2450 NSW
Land to be developed	Lot 2 DP 1083920; 140 Upper Orara Road, Karangi NSW
Proposed development	Construction and operation of a Water Treatment Plant.
Environmental assessment	An environmental assessment is attached
Certificate	I certify that I have prepared the contents of this document and to the best of my knowledge: • It is in accordance with the requirements of Part 3A; • It contains all available information that is relevant to the environmental assessment of the development to which it relates; and • The information contained in the document is neither false nor misleading.
Signature	
Name	Stefan Everingham
Date	19 June 2007

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Executive Summary

1. Overview of the proposal

1.1 Introduction

This Environmental Assessment (EA) has considered the potential impacts of the proposal to develop a Water Treatment Plant (WTP) to serve the City of Coffs Harbour and other smaller townships near Coffs Harbour in NSW. The EA has been prepared by Coffs Infrastructure Alliance (CIA) on behalf of Coffs Harbour City Council (Council) to assist the Minister for Planning in assessing Council's application for approval for the proposal. The EA has been prepared in accordance with the provisions of Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act) and the requirements of the Director-General of the Department of Planning.

1.2 Why is the proposal needed?

This proposal of a new water treatment plant is needed because the existing drinking water supply to Coffs Harbour does not achieve the requirements of the *Australian Drinking Water Guidelines* (ADWG, 2004) in that:

- A formal water quality risk assessment identified a number of potential water quality hazards that are considered to pose a high risk to consumers; and
- The current treated water supply to Coffs Harbour does not always comply with the aesthetic ADWG requirements.

Further, these water quality risks are considered to be increased with respect to the following:

(i) As further development occurs within the Orara River catchment;

(ii) As increased use is made of the Nymboida River water resource, and

(iii) As the poorer quality water from the future Shannon Creek Dam becomes progressively relied on in the near future.

1.3 What would the proposal involve?

Water Treatment Plant

The proposal involves the construction of a filtered drinking water treatment plant (WTP) with a present day design output capacity of up to 42 megalitres per day. Provision would also be made in the design for a future expansion in the plant's capacity, via the future addition of additional process units, when and if required.

The proposed WTP structures would be contained within the site boundaries of the proposed site at 140 Upper Orara Road, on higher ground above any reasonably expected (i.e. probable maximum flood) Orara River flood levels. Some pipeline connections activities would, however, involve works outside of the site boundary (up to 90 metres from the south eastern boundary). The proposed WTP facility would treat all potable water supplies flowing to Coffs Harbour consumers from the existing Karangi Dam. The Karangi Dam is currently supplied with waters from both the Orara and Nymboida River catchments, however in future these inflows would also be augmented with supplies from the Shannon Creek Dam. This future Dam is currently being constructed about 9 kilometres west of Coutts Crossing, south-west of Grafton, NSW.

The following construction activities would be required to deliver the required water treatment, transfer and delivery facilities:

- Possible abandonment of the existing lime dosing facilities on the Karangi Dam site and construction of new lime dosing facilities at the proposed WTP site;
- Relocation of the existing 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 to the proposed WTP inlet;
- Cutting in to the existing Karangi Dam to Red Hill Balance Tanks 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 incorporating above-ground concrete water retaining structures at the WTP site;
- Provision of a range of chemical storage and dosing facilities (at the proposed WTP site) for treatment of the raw water;
- Provision of chlorination and ultra-violet disinfection facilities for the filtered water;
- Provision of fluoridation facilities for the filtered water;
- Construction of washwater recycle, sludge thickening and sludge dewatering facilities;
- Construction of above ground tanks for:
  - treated water storage (5.8 megalitres); and
  - washwater storage (1.5 megalitres).
- Construction of an earth walled 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;
- Construction of a treated water pump station to transfer treated water to the existing Red Hill balance tanks: and
- Allowance (i.e. space on the site) has been made for a possible future ozone and granular activated carbon (GAC) treatment process downstream of the DAFF process if water quality deteriorates further due to future development in the catchments.

Coffs Harbour City Council is also proposing to modify the road alignment at the entrance to the site in order to facilitate safe entry and exit from the Upper Orara Road site access point, during all construction activities and for chemical and other deliveries and for other operational site traffic.

Employment

It is anticipated that the project would generate employment opportunities for:

- 80 individuals during the construction stage; and
- 3 – 4 individuals for the ongoing operation of the WTP facility (over the operational life of the project).

1.4 Changes to the Proposal

The scope of the proposal has changed since the director Generals Requirements were issued. Council are undertaking further investigations with respect to the supply of treated water to Coramba. The assessment of the Coramba supply line has been removed from this document and works to supply Coramba with treated water would be the subject of a separate Environmental Impact Assessment once Council have finalised their investigations. Options being considered include a separate water treatment facility at Coramba, which would not require a water supply line from the proposed WTP.

1.5 What are the benefits of the proposal?

It is envisaged that the proposed WTP facility would provide the following benefits to the residents of Coffs Harbour LGA:

- Provides a state-of-the-art water treatment facility, that would ensure that residents of Coffs Harbour receive drinking water that meets the minimum requirements of the Australian Drinking Water Guidelines;
- Provides a water treatment facility that would be able to cater for any algal contamination outbreaks, that may occur in the future (at present there is no effective treatment alternative should such an outbreak occur);
- Provides a water treatment facility that would be able to cater for any poorer quality raw water supplies that may, at times, be the best quality that is able to be supplied from either the new Shannon Creek Dam or the Nymboida or Orara Rivers;
- Achieves NSW Health Department requirements; and
- Provides opportunities for local employment, particularly during the construction stage of the project.

2. Scope of the environmental assessment

The proposed facility is a project to which Part 3A of the EP&A Act applies. The Minister for Planning is the approval authority for the proposal and an Environmental Assessment (i.e., this document) is required to support Council's application for development consent. The Environmental Assessment provides:

- Information on the proposal, including its strategic context and justification and the alternatives considered;
- An assessment of the potential environmental impacts of the proposal; and
- Measures proposed to minimise and manage potential environmental impacts where necessary.

The environmental assessment focuses on the key assessment requirements specified by the Director General's Requirements. It is supported by a number of specialist technical studies, provided as appendices to the main document.

3. Key assessment requirements

3.1 Odour impact

An investigation has been conducted to determine an appropriate buffer distance from the identified potential odour causing elements of the proposed WTP facility (i.e., sludge storage facilities) to ensure that potential for odour nuisance impacts within the local area would be successfully avoided. Due to the absence of recognised guidelines to recommend appropriate buffer distances, the investigation used values from other existing WTP's to calculate an appropriate distance for the proposed WTP.

The investigation concluded that the buffer distances required to minimise off-site odour impacts from the proposed sludge dewatering activities would be readily achievable within the currently proposed site layout and design.

3.2 Flora and fauna

An ecological assessment was undertaken in August 2006, considering the potential direct and indirect impacts of the construction and operation of the proposed WTP on threatened species and endangered ecological communities (EEC) within the study area.

The Flora and Fauna Assessment found that no areas of remnant vegetation would be affected by the water treatment plant proposal, however a number of isolated trees would still require removal from the site, but these being not locally indigenous species. The only locally indigenous tree requiring removal is a Flooded Gum located adjacent to the existing residence on the site.

An Assessment of Significance assessment was conducted and found the following:

- The removal of an individual Koala food tree is not considered likely to place any extant local Koala population at risk of extinction, especially as replacement of potential habitat for the Koala (and various other threatened species) is proposed through planting of locally indigenous trees;
- Whilst the action proposed to remove a native tree specimen would otherwise constitute part of a "Key Threatening Process" (i.e., clearing of native vegetation),

the proposed mitigation planting would serve to replace the original native vegetation on the site; and

- No critical habitat, endangered population, Endangered Ecological Community or Critically Endangered Ecological Community is likely to be affected by the proposed development.

3.4 Bushfire risk assessment

A bushfire risk assessment was undertaken, based on the Bush Fire Prone Land mapping carried out by Coffs Harbour City Council, in liaison with the Rural Fire Service (RFS).

Council mapping indicates that the area of vegetation to the southeast of the proposed WTP is considered Category 1 Bushfire Prone Land and includes a buffer of approximately 100 metres in width. Most of the rest of the site is cleared with scattered trees. The current development footprint does not fall directly within the bushfire prone land or even the buffer zone.

As the area mapped as bushfire prone land already includes a 100 m wide buffer zone and the development footprint includes a roadway around the entire development area, the development itself would not fall within the area deemed to be bushfire prone land, or buffer land and it is considered that no other mitigation measures would therefore be required. No further consultation with the local officers of the RFS is considered necessary with respect to this issue.

3.5 Water quality issues

An evaluation of water quality issues for the Coffs Harbour water supply was completed by reviewing existing water quality data, making an assessment of the catchments' land-uses and the completion of a formal water quality risk assessment.

A catchment to tap water quality risk assessment was undertaken to determine the water quality risks for both the current drinking water supply to Coffs Harbour and also for this area's requirements into the near-future (with respect to the Shannon Creek Dam water supply shortly becoming available for use). The approach adopted was consistent with that recommended by the ADWG and the Cooperative Research Centre's (CRC) *A Guide to Hazard Identification and Risk Assessment for Drinking Water Supplies, 2004*.

The major potential risks to water quality that have been identified, both for the existing water supply system and for when Shannon Creek Dam comes into service were as follows:

- *Cryptosporidium* contamination from cattle, septic tanks and sewage treatment plant discharges;
- Other micro-organisms from either chlorination failures and/or high turbidity (i.e., > 1 nephelometric turbidity units **(**NTU)) at the point of disinfection;
- High turbidity events from various sources;

- Poor water quality due to the presence of dissolved manganese and/or iron (mainly aesthetic issues, only);
- Contamination due to "chlorinated organics" (the by-products of the disinfection of organic matter via the use of chlorine) from higher levels of organic matter being present, and/or with respect to a possible future reduction in minimum disinfection by-product levels; and
- Taste and odour issues stemming from either "blue green" algal blooms in the source water or from variable levels of chlorine "residual" in the treated water.

It should also be noted that the current water supply, at times experiences instances where the micro-organism indicator species, *E.coli* (*Escherichia coli*) may be detected in treated water supplies, as well as some periods of poor taste and various instances of "dirty water" complaints.

A risk assessment workshop with relevant stakeholders was undertaken on 19 and 20 June 2006 with the recommendations from the risk assessment being incorporated into the overall design for the proposed WTP.

3.6 Noise

A noise impact assessment was undertaken, providing details of existing noise levels at nearby receivers, calculating noise impact assessment criteria and predicting noise levels that would be expected to result from the construction and operation of the proposed WTP facility.

Results of the modelling suggest noise emanating from the operation of the WTP is unlikely to exceed project specific noise levels.

A worst case assessment of noise from the proposed construction activities indicates that construction noise would exceed the project specific noise criteria. The following was used in the model to provide a worst case construction noise level:

- Noise was modelled with all the machinery operating at full power at the same time. Individual items of machinery would likely to be only operating at full power in stages and high noise generating machinery would not be operating concurrently for extended periods.
- The machinery was assumed to be operating within those construction areas located closest to the sensitive receivers. Mobile machinery would likely move about, which would variously alter the directivity of the noise source with respect to the individual receivers. Additionally works would not be concentrated in the areas closest to the sensitive receivers for extended periods.
- The dominant high noise generating machinery are proposed to be used during the initial 8 week period for the earthworks and clearing phase and would not be used throughout the entire construction period.

The following measures are recommended to mitigate the impact of construction noise:

- During construction activities, Council should keep affected residents appropriately informed;

- All construction activities (including deliveries and haul trucks) would be limited to normal business days between 7 am and 6 pm and on Saturdays, between 8 am and 1 pm;
- All site workers would be sensitised to the potential for noise impacts on the local residents and encouraged to take all practical and reasonable measures to minimise noise during the course of their activities;
- All construction equipment would be maintained in good condition.
- All combustion engine plant will be checked to ensure they produce minimal noise and fitted with residential grade exhaust silencers;
- Whenever practical, machines would be operated at low speed or power and switched off when not being used; and
- Machines found to produce excessive noise should be removed from site or stood down until repairs or modifications can be made.

Based on the results of the operational noise assessment it is believed that the proposed WTP would meet project specific noise goals during general day and night time operations.

3.7 Hazards and risk

A Preliminary Hazard Analysis report (PHA) was prepared by the Coffs Infrastructure Alliance for the proposed Coffs Harbour WTP to determine the hazardous nature of the WTP, in accordance with NSW land use planning regulations.

A hazard identification workshop (HAZID) was conducted on the proposed WTP, qualitatively reviewing the hazards associated with all the dangerous goods on site. The HAZID was conducted by personnel with operational, design, environmental and risk assessment experience, with the aim of determining if a potential hazardous scenario could result in offsite impacts to public safety or the environment. It was determined that only an incident involving the release of a toxic cloud of chlorine could generate public safety hazards extending beyond the site boundary.

Chlorine release scenarios were subject to a full quantitative risk assessment and it was found that the risk posed by the WTP is considered acceptable under the NSW land use planning regulations. It is noted that the risk posed by chlorine is substantially reduced due to the control measures (chlorination building, automatic shut-off valves and extraction system) that are to be installed as part of the chlorination system. The PHA demonstrates that the storage and usage of dangerous goods can be safely and effectively managed at the Coffs Harbour WTP.

3.8 Soil and Water Quality

Surface Water

The proposed WTP construction works (including pipelines) would be located approximately 300 metres to the south of the Orara River with runoff from the construction areas likely to flow either northeast into the gully between the WTP site and

Casuarina Lane or northwest into the adjacent gully before flowing north into the Orara River.

Erosion and sedimentation control measures will be required for the WTP construction and the pipeline construction and connection activities. The operational drainage systems will also require consideration to the quality and volume of runoff being generated following rainfall.

All construction works (including the pipeline works that would extend up to 90 metres from the south east boundary of the WTP required to connect with the existing distribution pipeline) would be undertaken in accordance with an Erosion and Sedimentation Control Plan, prepared in accordance with *Managing Urban Stormwater* (NSW Department of Housing 2004). These measures are likely to involve the use of a sedimentation pond on the WTP site and stabilisation of excavations and stockpiles through sealing, replanting and seeding of vegetation as soon as possible.

Operational stormwater would be collected and discharged through flow spreading and velocity reducing devices such as grass swales to promote infiltration and minimise scouring.

Appropriate bunding for chemical storage as well as spill response kits would also be required to be maintained on site during construction and operation.

Contaminated Land Issues

A Preliminary Phase 1 Site Investigation has been conducted and found that the proposed WTP site has been used in the past for rural agricultural uses, with the primarily use during this time being dairy farming. In 1986 the site was subdivided and it has been assumed that at this stage the agricultural use changed to a rural residential use before being purchased by Council for the construction of the proposed WTP facility.

Indications are that certain site structures have been demolished and that the current residence has been transported onto the site. These activities are considered to have the potential for onsite asbestos impact and observations that were made during the site inspection indicated that cement fibre sheeting (potentially containing asbestos) is present on the site. No intrusive investigations (such as sampling) were undertaken to confirm any impacts, however, the potential for impact is considered to be fairly typical for agricultural land use and this is therefore not considered to be a constraint to the construction and operation of the proposed WTP facility.

It is recommended that appropriate remedial activities for all material potentially containing asbestos should be carried out, in accordance with the relevant requirements of the *Occupational Health and Safety Regulations 2001* and the *Code of Practice for the Safe Removal of Asbestos*.

To validate this remediation process, surface soil samples should also be collected from around the location of the former sheds and houses for further asbestos analysis and for additional hydrocarbon analysis (where appropriate).

3.9 Visual amenity

A Visual Impact Assessment report has been prepared by GHD in February 2007. The assessment investigates whether any potential visual impacts would be imposed on the surrounding environment from the development of the proposed WTP facility. The assessment reviews the existing visual character of the site and surrounding area, the expected impacts of the development on the existing, nearby residential development and other publicly accessible locations, such as Upper Orara Road. A set of recommendations have been made to reduce visual impact for affected properties and public locations. These recommendations relate to the installation of screening plants, retaining existing vegetation and recommended colours and material of the WTP buildings.

3.10 Aboriginal and European Cultural Heritage

Aboriginal and European historic cultural heritage assessments were undertaken.

Advice from aboriginal stakeholders and other individuals consulted during the course of the aboriginal assessment indicates that the proposed development would have no direct or indirect impacts on any known sites or places of cultural heritage significance.

Various stakeholder groups consider the study area to have the potential to contain undetected evidence of past Aboriginal occupation. This potential however could only be reliably assessed on the basis of further, subsurface archaeological investigation. The subsurface investigation has been undertaken and the results and recommendations are proposed to be incorporated into the environmental management plan, following appropriate consultation with stakeholders, interested parties and organisations.

A structure with potential European cultural significance was identified at the site, this being the original “Dairy Bails” building, representing an “illustration” of the historical dairy industry within the Orara Valley. However, it was found that the proposal is unlikely to impact on the Dairy Bails building as the development footprint will not impact the shed itself. Mitigation measures have been recommended to preserve the structure for future historical interest groups.

3.11 Traffic and access

A Traffic Impact Assessment report has been prepared to investigate the impacts that the construction and operation of the proposed WTP facility may potentially have on the local traffic network. Even though it is not required to carry out any major road works at the WTP’s proposed access point, the report identified that the current entrance to the proposed WTP site is situated near to the apex of a corner and therefore the following recommendations have been made:

- General visibility for traffic approaching the site would be improved by reshaping the embankment;
- The site’s entry gate should be relocated a further 20 metres west from its current position; and
- Traffic control to be used, as required, during construction.

3.12 Emergency Storage Lagoon

An emergency storage lagoon would be established, but would remain empty nearly all of the time so that the lagoon would be able to accept and store the effluent from any system or plant overflow events and to also prevent it from becoming a breeding ground for mosquitoes. The lagoon would be located within the fenced site area and would not be readily accessible by the general public or by feral, native or domestic animals, other than birds.

In the unlikely event that a plant overflow does occur, captured water would then be gradually fed back into the plant washwater system for further treatment and recycling. The lagoon would not contain any significant amount of water for any period exceeding about one week.

Contained waters would drain to a low point in the lagoon where a submersible pump would be installed within a concrete sump. A pipeline would return the water to the WTP's "centrate" tank. These waters, combined with any centrate waters would then be re-pumped to the washwater holding tank for processing together with other waters from the WTP's washwater treatment and disposal / recycling system.

An earthen cut-off drain would also be constructed on the high side of the lagoon to prevent any surface run-off waters from the site collecting in the lagoon.

A low-permeability lining for the lagoon would also be employed and the proposed lagoon would not have a significant impact on groundwater flows in the surrounding areas, nor any significant impact on the base flows to the Orara River.

3.13 Waste Water Management

The principal solid waste expected from the proposed WTP facility would be dewatered "alum" sludge, produced from the thickening and centrifugation of filter washwater and Dissolved Air Floatation Filtration (DAFF) "float" material. Due to the available site area constraints and the local climatic conditions, sludge drying beds (i.e., for the dewatering and drying of alum sludge) are not preferred for this proposal. It is proposed that any wastewater produced at the plant would not be discharged to any receiving waters and as such any option that did not involve the re-use or recycling of washwater / wastewater was not considered.

As mentioned above, emergency WTP overflows and any overflows arising from failures of the sludge dewatering system would be directed to the emergency storage lagoon and these waters would normally then be recycled through the washwater system, which would separate contained sludge material and direct this to the sludge thickener. Only the "supernatant" (i.e. the clearer water that lies on top of any settled material) rising to the top from the thickener would then be sent back to Karangi Dam for re-incorporation with the raw water supply and hence for subsequent recycling into the inlet supply.

On some, rare occasions this supernatant water may also be recycled directly back to the WTP inlet, at a controlled rate of less than 10% of the total inflow rate. Chemical

storage areas will be fully bunded to meet regulatory requirements. Liquid chemical unloading areas will have a spill apron and valved drainage sump.

Site stormwater run-off will be collected and directed off site to existing table drains and natural drainage paths.

4 Draft statement of commitments

The environmental assessment provides Council's commitments for environmental mitigation, management and monitoring. The draft statement of commitments includes recommended mitigation measures to reduce and avoid identified impacts, management measures (such as the preparation of construction and operation environmental management plans) to ensure a high level of environmental performance against identified criteria, and measures to monitor performance. The statement of commitments would be finalised following public exhibition.

5. Conclusion

This environmental assessment has considered the potential impacts of the proposal to develop a water treatment facility at Orara near Karangi in the City of Coffs Harbour. It recognised that the design of the proposed facility would incorporate a range of features and controls to minimise the potential for negative impacts on the environment.

In addition, the environmental assessment recommends measures to reduce the overall potential for impacts.

It is considered that the proposal would:

- Improve the quality of drinking water supplied to Coffs Harbour and surrounding areas over the next three decades;
- Allow for the future expansion of the Coffs Harbour region by providing the capacity to treat water to the appropriate drinking water standards;
- Utilise existing infrastructure for the treatment and distribution of water resources in a more effective manner than at present; and
- Reduce the risk to public health and acceptability by providing treated drinking water that:
  - Is safe to drink (does not contain pathogens or chemicals that could be harmful);
  - Is aesthetically acceptable to most customers (i.e. colourless and odourless);
  - Complies with Australian Drinking Water Guidelines (ADWG 2004); and
  - Complies with NSW Department of Health requirements.

LIST OF ABBREVIATIONS

ABS	Australian Bureau of Statistics	INP	Industrial Noise Policy
AHD	Australian Height Datum	LALC	Local Aboriginal Land Council
ADWG	Australian Drinking Water Guidelines	LEP	Local Environmental Plan
APZ	Asset Protection Zone	LGA	Local Government Area
CIA	Coffs Infrastructure Alliance	NHMRC	National Health and Medical Research Council
CRC	Cooperative Research Centre	NTU	Nephelometric Turbidity Unit
DAFF	Dissolved Air Filtration Floatation	PAC	Powdered Activated Carbon
dB	Decibel	PCU	Platinum Cobalt Units (used to report value for the colour of water)
DGR	Director General's Requirements	PHA	Preliminary Hazard Analysis
EA	Environmental Assessment	PER	Program Environmental Representative
EEC	Endangered Ecological Community	REP	Regional Environmental Plan
EMP	Environmental Management Plan	RFS	Rural Fire Service
GAC	Granular Activated Carbon	SEPP	State Environmental Planning Policy
HACCP	Hazard Analysis & Critical Control Point	THM	Trihalomethane
HAZOP	Hazard Operational Study	WTP	Water Treatment Plant
IMS	Integrated Management System		

CHANGES TO GOVERNMENT AGENCIES

The NSW government has changed various department names since the Director Generals Requirements were issued on 18th December 2006. A summary of the changes is provided below with the new department names being used, where possible, throughout the remainder of the document.

- Department of Natural Resources (DNR) abolished
- Department of Environment and Conservation (DEC) now known as the Department of Environment and Climate Change (DECC)
- DECC assumes responsibility from DNR for native vegetation, environmental water, coastal policy and soils policy.
- DECC assumes responsibility from the Department of Primary Industries (DPI) for fisheries management.
- Department of Energy, Utilities and sustainability (DEUS) has been abolished and replaced by the Department of Water and Energy (DWE).
- DWE assumes responsibility from DNR for water management (except environmental water).
- DPI assumes responsibility from DNR for soil conservation service (salinity and acid sulphate soils and forestry structural adjustment).

1. Introduction

1.1 Overview

Coffs Harbour City Council (Council) proposes to develop a Water Treatment Plant (WTP) facility at 140 Upper Orara Road, near Karangi in NSW (referred to as the "proposed WTP facility" for the purposes of this Environmental Assessment). The proposed facility would initially be developed in a single stage involving the construction of the WTP and associated infrastructure and its necessary connection to other existing water supply infrastructure in the local vicinity. Provision has also been made in the current design of the WTP for areas that would allow for the future expansion of the plant's capacity, if required, via the addition of further process units.

The proposed WTP facility would treat all reticulated water supplies flowing to Coffs Harbour consumers from the existing Karangi Dam. Inflows to the Karangi Dam currently come from both the Orara and Nymboida River catchments, however in the future the inflows to this Dam will be augmented with supplies from Shannon Creek Dam (currently being constructed 9km west of Coutts Crossing, south-west of Grafton, NSW). The quality of the raw water to be supplied from these combined sources, in the future, is expected to fall below an acceptable standard for consumption, from time to time. A catchment-to-tap water quality risk assessment was therefore undertaken in 2006 on both the current and future raw water sources. A preferred treatment process was selected to appropriately manage any potential water quality risks, as reflected in the design of the proposed WTP facility.

Council has entered into an "alliance" contract to form the Coffs Infrastructure Alliance (CIA). The CIA was formed to design, gain approval for and deliver the necessary infrastructure for the proposed WTP facility and various other treated water delivery infrastructure, including the preparation of the Environmental Assessment (EA) document for this WTP proposal. The CIA is also responsible for the design and delivery of other, unrelated major infrastructure items for Council that are not the subject of this EA document.

This EA document has been prepared by the CIA in accordance with Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to address the various requirements of the Director-General of the Department of Planning (the Director-General's Requirements), that were issued to Council on 18 December 2006 (a full copy of the Director-General's Requirements is presented in ***Appendix 1***).

1.1.1 Coramba Pipeline

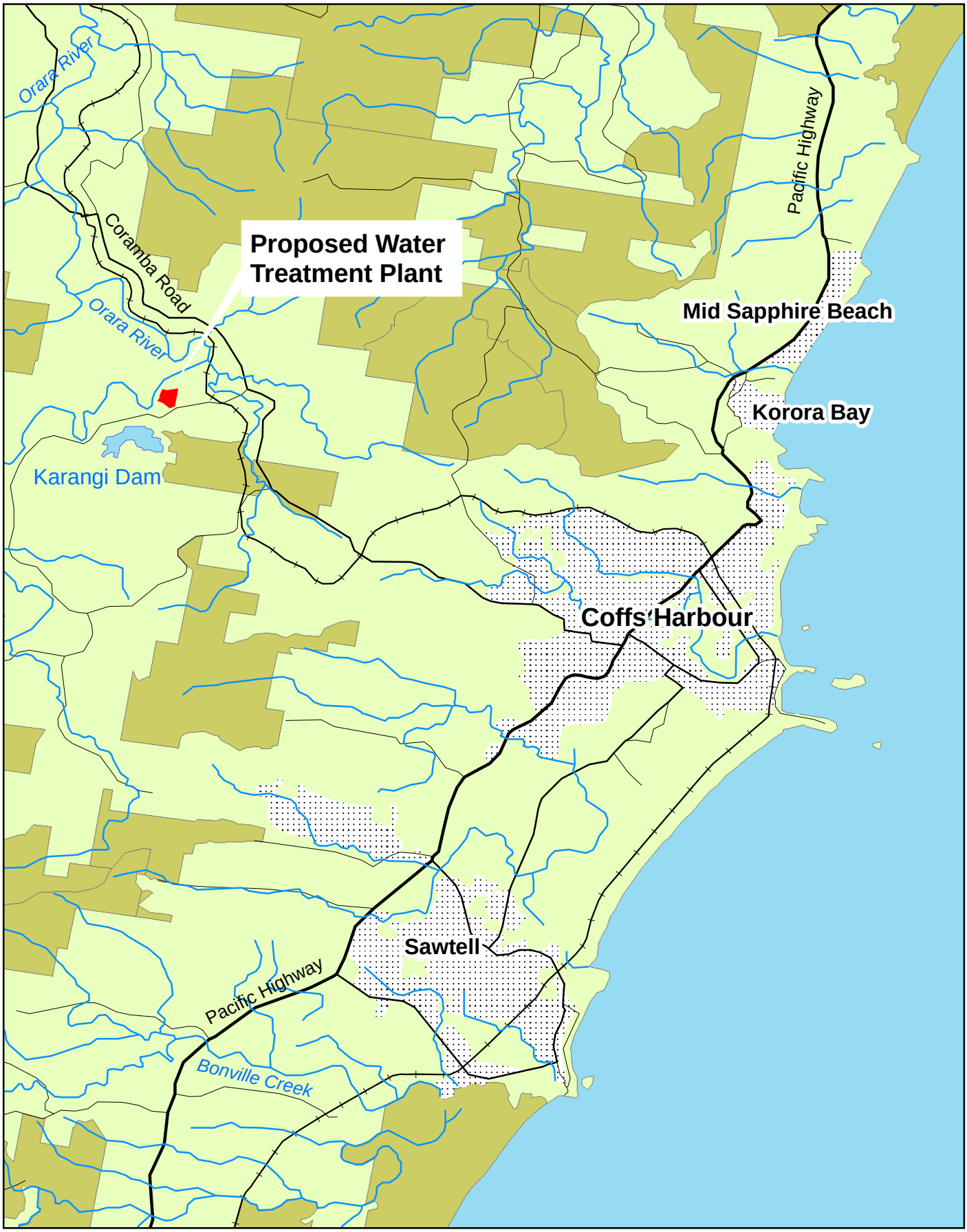
At the project inception it was envisaged that a pipeline would be constructed adjacent to the existing regional water supply line for the purpose of suppling Coramba with drinking water from the proposed WTP. As a result references to this pipeline are noted within the Director-General's Requirements and agency correspondence. These pipeline works have since been removed from the scope of the CIA and Council are undertaking further investigations with respect to the supply of treated water to Coramba. The Coramba supply line has been removed from this document and works to supply Coramba with treated water would be the subject of a separate Environmental Impact Assessment once Council have finalised their investigations.

Options being considered include a separate water treatment facility at Coramba, which would not require a water supply line from the proposed WTP.

1.2 Location of the Proposal

The Coffs Harbour local government area (LGA) is located on the mid-north coast of NSW, about 83 kilometres south of Grafton. The site for the proposed facility (referred to as "the site" for the purposes of this EA document) is located at Lot 2, DP 1083920, 140 Upper Orara Road, Karangi, approximately 700 to 800 metres north-east of the existing Karangi Dam site and about 12 kilometres inland from the Coffs Harbour Central Business District (CBD). The site is a single parcel of land, approximately 5 hectares in size and is currently owned by Council, having been recently acquired for the purpose of this proposal. The site was chosen and purchased by Council for a number of reasons judged to be potentially favourable to this proposal, not only because it is located in close proximity to Karangi Dam, but also because it has suitable topography with an elevation above sea level that allows the minimisation of energy requirements, efficient hydraulic performance, as well as the operational and treated water delivery characteristics required for the proposed WTP facility. As a result, the Upper Orara Road site was identified as one of only a few possible sites within the region that would be potentially suitable for the construction and operation of the proposed WTP facility.

The location proposed for the WTP facility is shown in ***Figures 1.1*** and ***1.2*** and the regional water distribution system for the greater Coffs Harbour area is shown in ***Figure 1.3***.



GRID N

LEGEND

- Principal Road
- Secondary Road
- Minor Road
- Railways
- Built-up area
- WTP site
- Reservoir
- Reserves

1:100,000

0 495 990 1,980 2,970 3,960

Metres

Geographic Coordinate System
Horizontal Datum: Geodetic Datum of Australia 1994

GHD CLIENTS | PEOPLE | PERFORMANCE

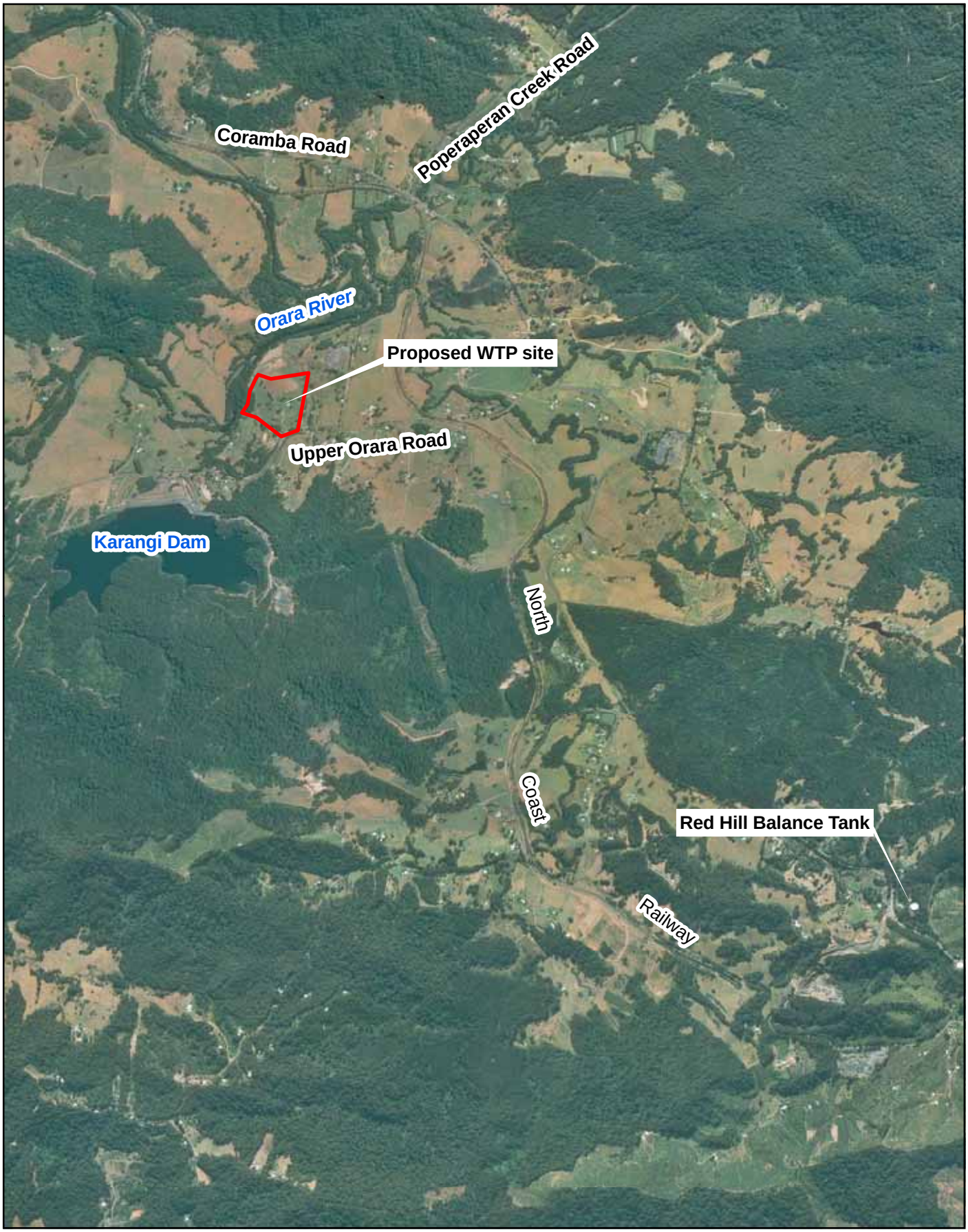
Coffs Harbour City Council
Water Treatment Plant
Regional Location

job no. 31-18991-11
rev no.

Figure 1.1

15 | May 2007

Gis File No: G\31\18991-11\GIS\MAPS\Figure1.1 2/115 West High Street Coffs Harbour NSW 2450 Australia T 61 2 6650 5600 F 61 2 6652 6021 E cfsmail@ghd.com.au W www.ghd.com.au



GRID N

LEGEND

Proposed WTP site

1:30,000

0 125 250 500 750 1,000

Metres

Geographic Coordinate System
Horizontal Datum: Geodetic Datum of Australia 1994

GHD CLIENTS | PEOPLE | PERFORMANCE

Coffs Harbour City Council
Water Treatment Plant

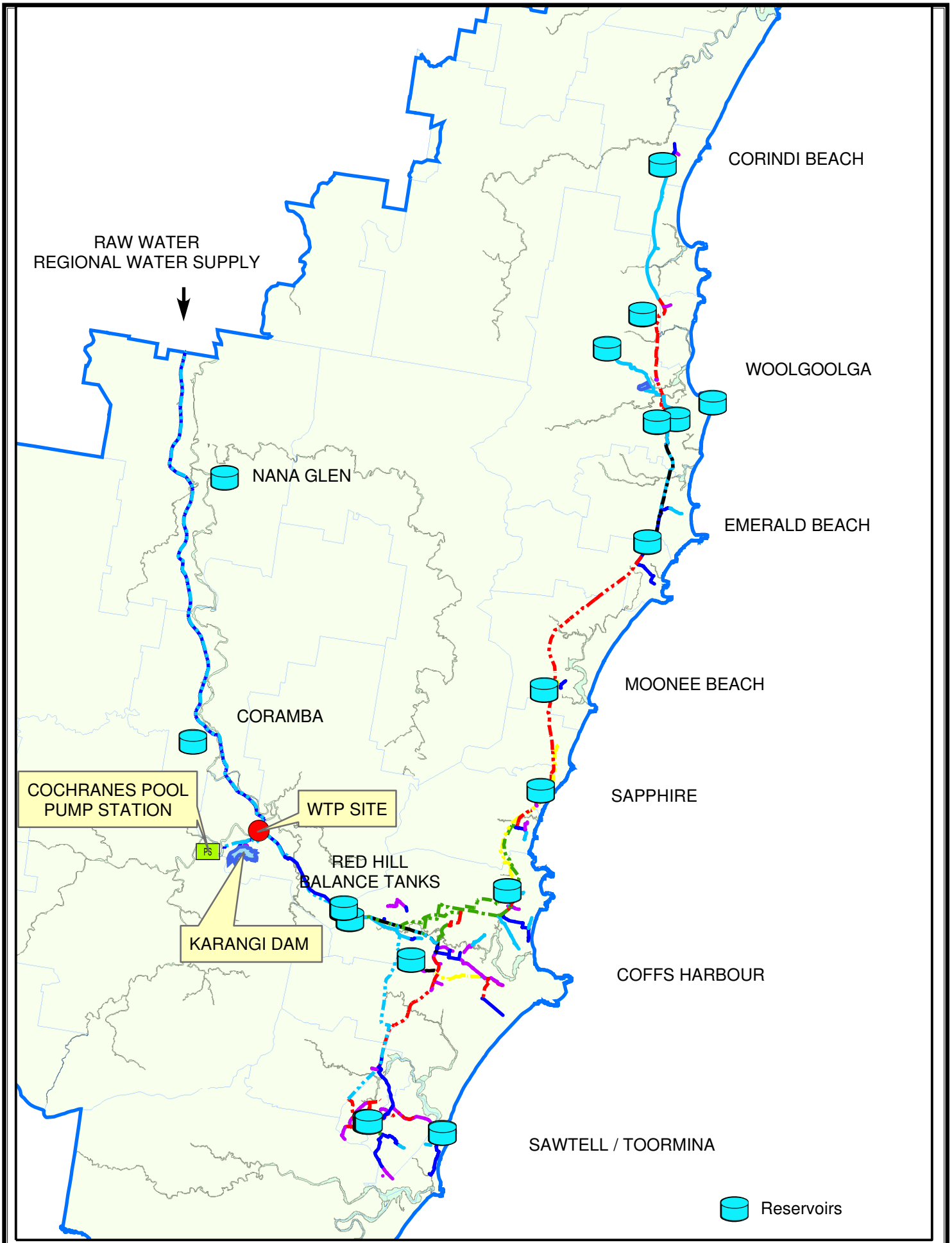
Site Location

job no. 31-18991-11
rev no.

Figure 1.2

15 | May 2007

Gis File No: G\31\18991-11\GIS\MAPS\Figure1.2 2/115 West High Street Coffs Harbour NSW 2450 Australia T 61 2 6650 5600 F 61 2 6652 6021 E cfsmail@ghd.com.au W www.ghd.com.au



Coffs Harbour Water

Date: 09/12/04 Drawn By: CSL

The locations shown on the plan are indicative only.

DISTRIBUTION SYSTEM

Figure 1.3

Legend

Air Valve	1000mm
Always Closed Shut Valve	100mm
Bend	150mm
Hydrant	200mm
Pressure Reducing Valve	225mm
Scour Valve	250mm
Stop End	300mm
Stop Valve	375mm
Tee	450mm
	500mm
	50mm
	525mm
	600mm
	750mm

1.3 Key Features of the Proposal

The process required to adequately treat the identified water quality risks (refer to ***Section 5.3***) was broadly defined within the Coffs Harbour WTP Options Review, GHD 2005. The process train of the proposed WTP has since been refined to cater for the risks identified in the Water Quality Risk Assessment. The proposed water treatment process is summarised within ***Figure 1.4***.

The key features of the proposed facility and construction activities provided below and the general site layout, including the location of pipelines is shown in ***Figure 1.5*** and the indicative location of ancillary construction facilities are shown in ***Figure 1.6***.

- The proposed WTP facility would be constructed on a parcel of Council owned land located at 140 Upper Orara Road, Karangi;
- The WTP is proposed to have a design output capacity of up to 42 megalitres (ML) per day of treated water;
- The actual output of the WTP would be dependant on the daily water demand (as is the existing system). It is not proposed to change the volume of water being extracted from the various water sources (refer to ***Section 5***).
- The plant has been designed to operate for 22 hour per day at 42 ML per day and would operate for shorter periods during lower flows. Presently, daily flows are approximately 15 ML per day.
- Provision would also be made for a future expansion in the plant's capacity, via the addition of additional process units, that would also be located within the grounds of the new WTP site;
- The existing lime dosing facilities at the Karangi Dam site are ultimately intended to be de-commissioned, however these may be retained in-situ and in operation at the Dam site until a later time when economic circumstances allow for the new lime dosing facilities to be constructed at the proposed WTP site;
- The existing carbon dioxide (CO_2) dosing facilities at the Karangi Dam site would be re-located to the new WTP site;
- The Karangi Dam outlet pumping station would be modified to enable pumping of raw water at a controlled rate to the proposed WTP inlet, about 700 to 800 metres north-east of the Karangi Dam site as well as maintaining the ability to pump straight to the Red Hill balance tanks in an emergency;
- The existing Karangi Dam to Red Hill balance tanks' trunk main would be cut into and appropriate supply / return pipe branches would be constructed from and to the proposed WTP site. These works would occur up to approximately 90 metres from the south eastern boundary (refer to ***Figure 1.5***);
- A process diagram of the proposed WTP has been summarised in ***Figure 1.4*** and shown in detail within in ***Appendix 2***.
- A dissolved air floatation filtration (DAFF) treatment plant would be constructed within the proposed above-ground concrete water retaining structures at the new WTP site;

- All the following chemical storage and dosing facilities would be provided at the new WTP site:
  - lime (when and if relocation of the lime plant is adopted) and carbon dioxide (as mentioned above) for corrosion control and for pH correction;
  - potassium permanganate dosing for oxidation of dissolved manganese;
  - powdered activated carbon (PAC) for control of any intermittent taste or odour problems;
  - aluminium sulphate (alum) dosing for coagulation and flocculation of colloidal material;
  - polymer dosing as a coagulation aid;
  - polymer dosing as a flocculant aid;
  - sodium hydroxide (caustic soda) dosing for post filtration pH correction;
  - The existing chlorine dosing system at the Red Hill Balance Tank may be relocated to the proposed WTP for chlorine gas dosing to provide a post filtration chlorine residual for disinfection purposes (and also for pre-chlorination) ;
  - fluoride dosing to meet the requirements of NSW Health;
  - polymer dosing for washwater thickening; and
  - polymer dosing for sludge dewatering.
- Ultra-violet disinfection would be provided for the filtered water;
- Pumps, pipework valves and washwater storage / water supply would be provided for backwashing of the WTP's filters;
- Washwater recycling, sludge thickening and sludge dewatering facilities would be constructed. Supernatant water separated from the wash water and sludge would be routinely returned to Karangi Dam via the existing 600 mm regional pipeline, or would otherwise be recycled back to the WTP inlet main, if the return pipeline to Karangi Dam is unavailable for operational reasons;
- Dewatered sludge would be temporally stored within enclosed bins within the sludge holding building (also enclosed) until it can be removed and taken off site for disposal at the Coffs Harbour resource recovery centre.
- Above-ground storage tanks would be constructed at the new WTP site for:
  - treated water storage (approximately 5.8 megalitres); and
  - washwater holding tank (approximately 1.5 megalitres).
- An earth walled emergency storage containment lagoon would be constructed at the new WTP site to provide for the (unlikely) event of either a plant overflow or sludge dewatering system failure;
- Construction of a combined control building, testing laboratory and meeting room at the new WTP site;
- Construction of a treated water pump station at the new WTP site to transfer treated water to the existing Red Hill Balance tanks for distribution into the existing Coffs Harbour water supply system;
- A kiosk-style power supply transformer would be installed at the new WTP site to provide electrical power to the various plant at the site;

- The locations of existing high voltage power lines would be diverted across the site;
- A backup diesel generator would be provided;
- A paved access road would be constructed around the new WTP site;
- The general building layout is proposed to be architecturally co-ordinated with consideration to the rural setting. The architectural detail includes options for rainwater tanks, however these details have not been finalised; and
- Extensive landscaping would also be undertaken around the new WTP site.
- Allowance (i.e. space on the site) has been made for possible future ozone and granular activated carbon (GAC) treatment process downstream of the DAFF process, if water quality deteriorates further due to future development in the catchments.

All the proposed structures, as specified above, are proposed to be built on the new WTP site and would be contained wholly within the site boundaries of 140 Upper Orara Road, As stated in the 'Karangi Dam Dambreak Study', (NSW DPW&S, May 1999), the Probable Maximum Flood level without dam break at the WTP site is RL 104.43, and RL 107.22 with dam break. The lowest section of the WTP is the floor of the emergency storage lagoon, which is above both PMF levels at RL 108 and therefore all structures would be above the probable maximum flood level.

Council is also proposing to modify the road alignment at the entrance to the site in order to facilitate safe entry and exit from the Upper Orara Road access point. Proposed adjustments to the road alignment would be completed prior to the commencement of construction activities and would also facilitate future, ongoing chemical and other deliveries to the WTP site, as well as all other construction and operational site traffic.

The treatment and transfer facilities that are proposed to be constructed are shown in ***Figure 1.5*** and in drawing no. WTP-DWG- C-200-01, presented in ***Appendix 2***.

A 3D view, plan and sections of the main DAFF treatment units and chemical storage areas are shown on drawings no. WTP-DWG-C-220-01 and WTP-DWG-C-220-02, presented in ***Appendix 2***. The general DAFF building would have a floor area of approximately 1,570 m^2 (including the 190 m^2 of the adjacent chemical storage areas) with a roof height sloping from approximately 12 to 6 metres above the ground surface level. The proposed future lime silo (attached to the eastern side of the DAFF building) would be the highest point of the proposed WTP, with a top level of 14.5 metres above the ground surface level. Photomontages presented within the visual impact assessment (***Section 7.5***) provide an indication on how the main structures will look in the current surrounds (without the proposed screening trees recommended in the visual impact assessment).

1.3.1 Ancillary Construction Facilities

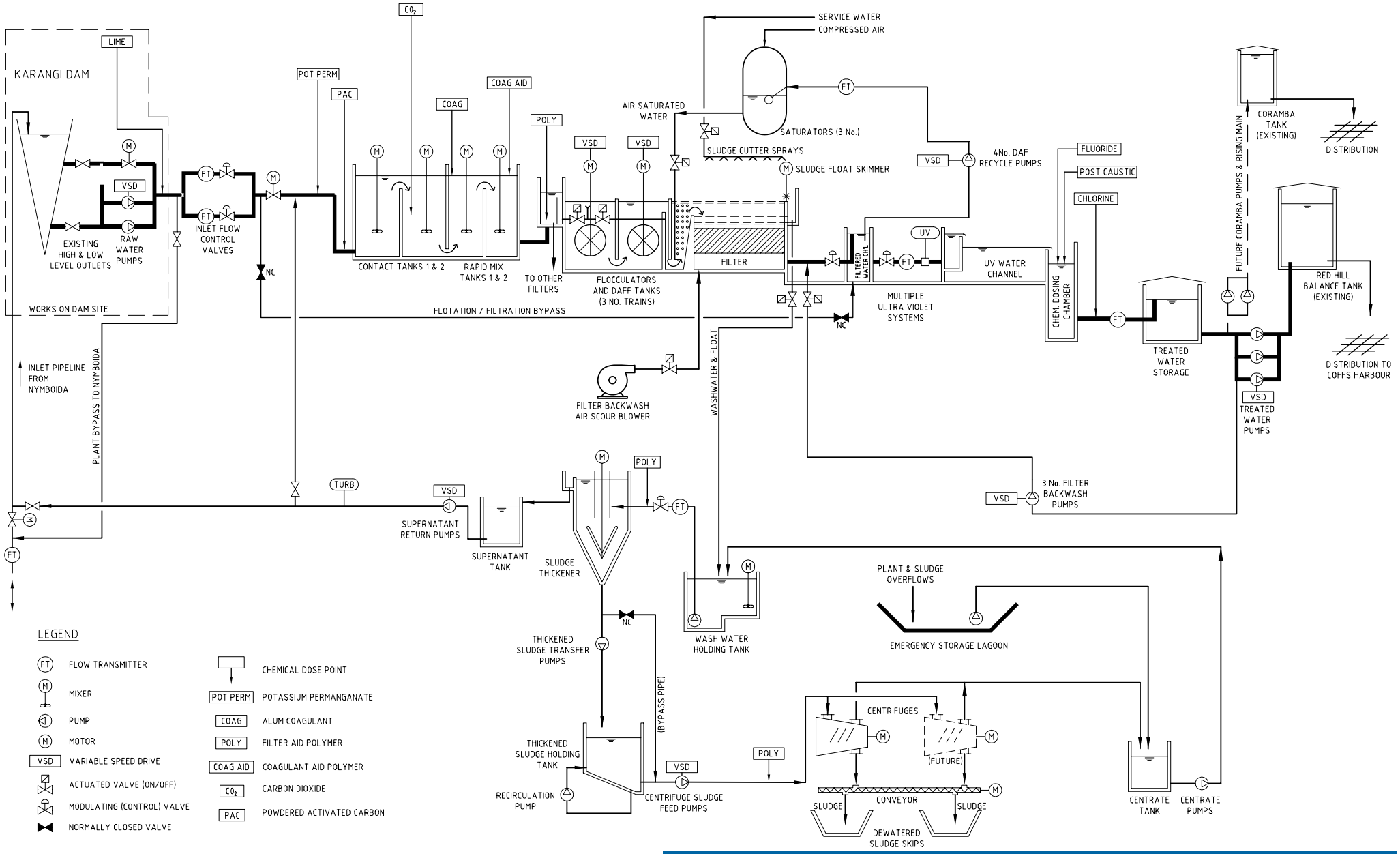
The indicative location of ancillary construction facilities are shown in Figure 1.6 and would likely involve the following:

- An initial 740 m2 and future 600 m2 car parking areas;
- A 220 m2 project site office
- A 40 m2 meeting room;
- Two 18 m2 toilet blocks; and

- 150m2 area for the workforce lunch room, change rooms and toilets.

The areas available to locate the above ancillary construction facilities are limited to the south western portion of the site due to the following site constraints:

- Limited areas of relatively level land that is above flood levels and not proposed to be part of the WTP (i.e. above 20 year average recurrence interval flood event);
- Access to communication and electrical services;
- Access to Upper Orara Road.
- Site safety and security issues, i.e. ideally any site visitors would be able to park and register their attendance at the site office before entering the construction area; and
- Location of pumpout sewage systems away from creeks, rivers and flood prone areas.



COFFS INFRASTRUCTURE ALLIANCE

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QLD 4000 Australia
GPO Box 668 Brisbane QLD 4001
T 61 7 3316 3000 **F** 61 2 9219 7772
E ciamail@cia.optusincite.com

GHD CLIENTS | PEOPLE | PERFORMANCE

COFFS HARBOUR CITY COUNCIL
WATER TREATMENT PLANT

job no. | 31-18991
rev no. | A

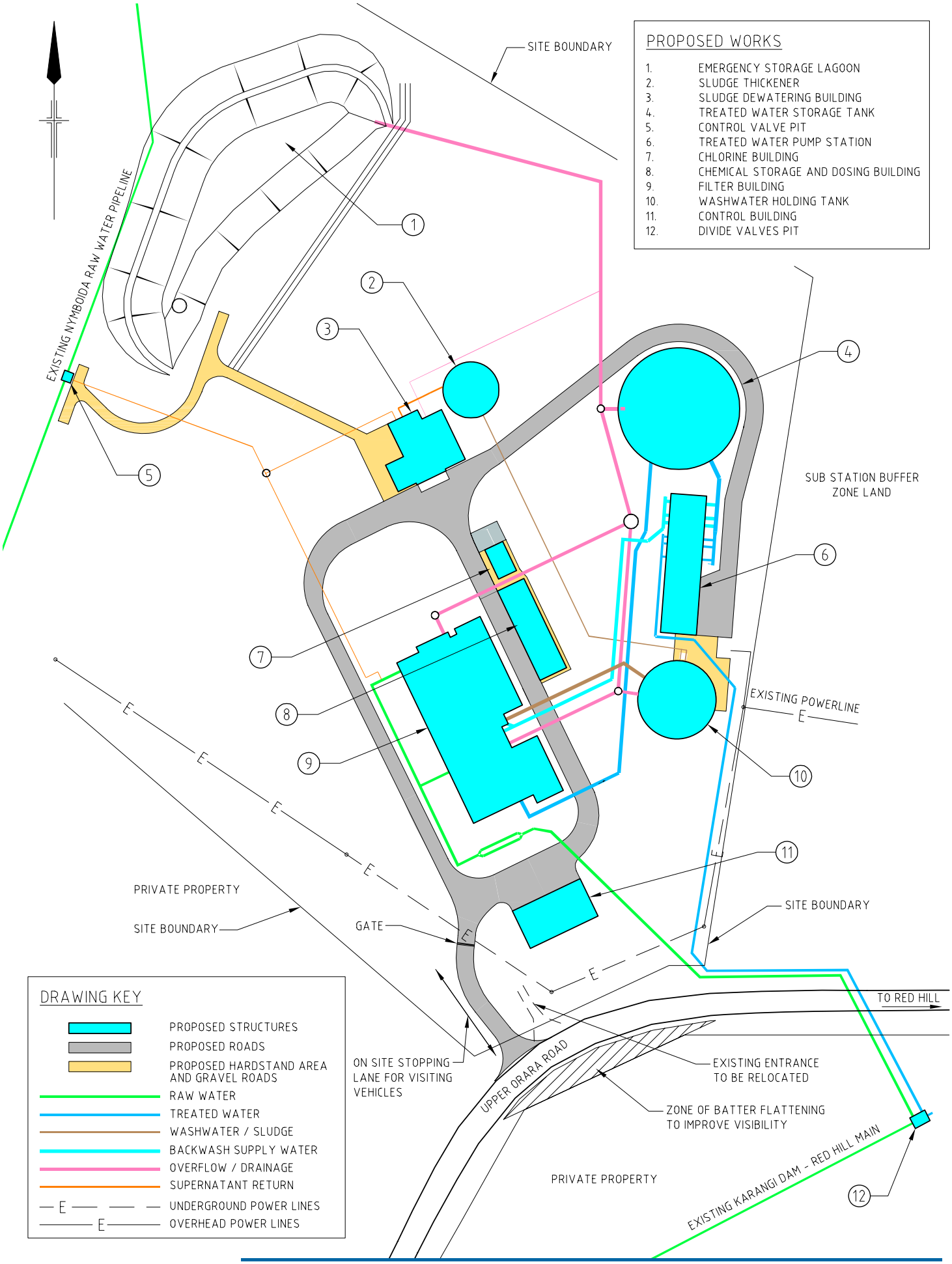
PROPOSED WATER TREATMENT PROCESS FLOW DIAGRAM

Figure 1.4

scale | NTS for A4 date | JUNE 2007

Level 8, 180 Lonsdale Street Melbourne VIC 3000 Australia **T** 61 3 8687 8000 **F** 61 3 8687 8111 **E** melmail@ghd.com.au **W** www.ghd.com.au

Plot Date: 12 June, 2007 - 1:49 PM Cad File No: FIGURE-EA-1.4.dwg



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COFFS HARBOUR CITY COUNCIL
WATER TREATMENT PLANT

OVERALL SITE LAYOUT

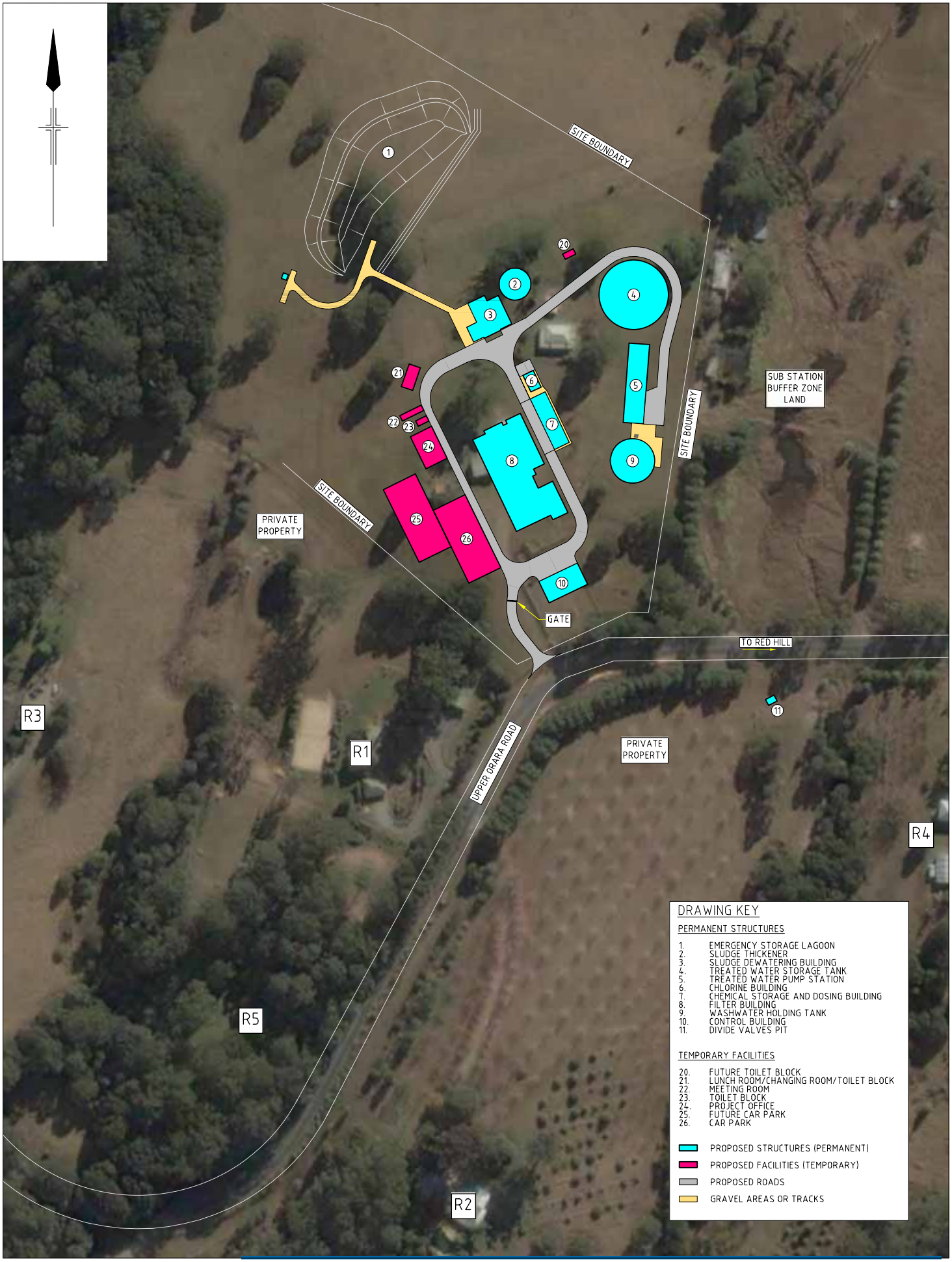
job no. 31-18991
rev no. A

scale | N.T.S. for A4 date | MAY 2007

Figure 1.5

Level 8, 180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com.au W www.ghd.com.au

Plot Date: 12 June, 2007 - 1:58 PM Cad File No: FIGURE-EA-1.5.dwg



COFFS INFRASTRUCTURE ALLIANCE

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QLD 4000 Australia
GPO Box 668 Brisbane QLD 4001
T 61 7 3316 3000 **F** 61 2 9219 7772
E ciamail@cia.optusincite.com

GHD CLIENTS | PEOPLE | PERFORMANCE

COFFS HARBOUR CITY COUNCIL WATER TREATMENT PLANT

INDICATIVE LOACTION OF ANCILLARY CONSTRUCTION FACILITIES

scale | 2500m for A4 date | JUNE 2007

job no. | 31-18991
rev no. | A

Figure 1.6

Level 8, 180 Lonsdale Street Melbourne VIC 3000 Australia **T** 61 3 8687 8000 **F** 61 3 8687 8111 **E** melmail@ghd.com.au **W** www.ghd.com.au

Plot Date: 12 June, 2007 - 1:59 PM Cad File No: FIGURE-EA-1.6.dwg

1.4 Who is the Proponent?

Coffs Harbour City Council is the local government authority responsible for the administration and management of various works and services for the City of Coffs Harbour LGA. Under the provisions of the NSW *Local Government Act, 1993*, part of Council's administration and management responsibilities include the provision of certain services and basic infrastructure, within the domain of its responsibilities under the Act. Council currently owns and operates the Karangi Dam and the existing chemical dosing and water pumping facilities at the Dam site and is now proposing to upgrade and improve its water supply operations in order to provide safe drinking water for the present and future residents of Coffs Harbour.

1.5 Purpose and Benefits of the Proposal

The future quality of the raw water is expected, on occasion, to fall below acceptable standards for consumption. Existing Water Treatment consists of water conditioning (alkalinity and pH correction) and disinfection with chlorine. Presently Council are able to meet acceptable standards due to the ability to achieve selective harvesting of high quality water from the Nymboida River, Orara River or Karangi Dam. Council additionally have a quarterly mains flushing program to maintain quality, however Council currently do not have the capability of treating substandard raw water. Upon the completion of the Shannon Creek Dam, river extraction licences will be tightened, decreasing the possibility of selective harvesting, and increasing the possibility of receiving substandard water.

The key objective of the proposal is to provide a secure, treated drinking water supply to the Coffs Harbour region that continually meets the *Australian Drinking Water Guidelines*. The objectives of the treatment processes are to provide a product that:

- Is safe to drink;
- Is aesthetically acceptable to most customers;
- Complies with the *Australian Drinking Water Guidelines*; and
- Complies with Department of Health Requirements.

The proposed WTP facility has therefore been designed to treat these raw waters to a standard that would be generally acceptable for all consumers of drinking water within the Coffs Harbour area.

Further details with respect to the strategic justification for the proposal are also provided in ***Section 5***.

1.6 Guide to the Approval Requirements and Environmental Assessment

1.6.1 Summary of approval requirements

The proposal is classified as a Major Project under *State Environmental Planning Policy (Major Projects) 2005* as it is a type of development listed in Schedule 1, Clause 25 of this Policy, namely development for the purpose of water treatment works for drinking water supply that has a capital investment value of more than $30 million, and has been declared to be a project

to which Part 3A of the Act applies. The applicability of the project to Part 3A has been confirmed by the Department of Planning's letter to Council dated 28 November, 2006 (copy presented in ***Appendix 1***).

Therefore, the Minister for Planning is the consent authority for the proposal and an Environmental Assessment document (this document) is required to support Council's application to the Minister for development consent, in accordance with the requirements of the EP&A Act.

Further information on the assessment requirements for the proposal is provided in ***Section 3***.

1.6.2 Purpose and Scope of the Environmental Assessment

This EA supports an application for the approval of the Minister for Planning for the proposed WTP facility, under the provisions of Part 3A of the EP&A Act. The Director-General of the Department of Planning issued its Environmental Assessment Requirements (the Director-General's Requirements) for this proposal on 18 December 2006 (a copy of the Director-General's Requirements is presented in ***Appendix 2***).

This EA document has been prepared in accordance with the EP&A Act, with appropriate consideration to the Director-General's Requirements and provides the following:

- Information on the proposal, including its strategic context, project justification and an assessment of the alternatives considered; and
- An assessment of the potential environmental impacts of the proposal, and how these impacts will be appropriately managed.

1.6.3 Contents of the Environmental Assessment

The EA document has been compiled as a single volume that comprises nine sections preceded by an Executive Summary.

A second volume contains the appendices consisting of supporting information and reports.

The contents of the EA are intended to satisfy the requirements of the Part 3A assessment process and no additional information should be required.

2. Location & Setting

2.1 Regional Setting

Coffs Harbour is located on the New South Wales coast, approximately 170km north of Port Macquarie and 83km south of Grafton. The proposed WTP site is located approximately 12 kilometres west from the Coffs Harbour CBD and urban areas, with the closest village to the site being Karangi, 1.25 kilometres to the east. The proposed WTP site is located about 250 metres to the south of the Orara River, which provides a significant natural water resource to the Coffs Harbour region. The proposed site is located about 700 to 800 metres north-west of the existing Karangi Dam Site.

The township of Karangi and the proposed WTP site lie within the traditional country of the Gumbaingirr-speaking people. These Aboriginal people traditionally inhabited a wide area of the region from the Clarence River to at least as far south as the Nambucca River, prior to subsequent European colonisation and the displacement of these Aboriginal people.

The Coffs Harbour LGA encompasses an area of approximately 1,160 square kilometres. The LGA is bounded by the Pacific Ocean to the east, Bellingen Shire LGA to the south and south west and Clarence Valley LGA to the north and north west. Local and regional topography includes mountainous terrain, coastal plains, bays, estuaries, rivers and lakes.

The Coffs Harbour township is the main commercial and administrative centre for the City of Coffs Harbour LGA. The LGA is administered by Coffs Harbour City Council.

The natural environment and semi-tropical climatic conditions are major attractions of the Coffs Harbour area. Within its boundaries are a number of beaches and rainforests. The various National Parks and State Forests are all popular natural tourist attractions.

Manufacturing, tourism, retail and agriculture represent the core income generating economic activities for the Coffs Harbour LGA. Major industries in and around the Coffs Harbour centre include banana growing, tourism, timber getting and various forms of primary production, including vegetable growing, dairy farming, etc. Major local employers in the Coffs Harbour area include the local tourist industry, various light industries, local agriculture, the Coffs Harbour Education Campus (a partnership between Southern Cross University and TAFE NSW (i.e. the NSW Department of Technical and Further Education), the Coffs Harbour Base Hospital, as well as the various functions associated with local government and with the offices of various state government agencies.

The population of the Coffs Harbour LGA is approximately 67,000 (ABS, 2001). Between 1996 and 2001, the annual population growth was an average of 2.98% or 1,740 persons per annum. In 2001, the population of the township of Coffs Harbour of 25,828 represented approximately 38.5% of the Coffs Harbour LGA's total population. The Department of Planning has also published projections that it expects the population of Coffs Harbour LGA to reach 91,800 by the year 2031.

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2.2 Existing Environment

2.2.1 Land Use Zones

Existing land use zones

The main land use zones in the region of the study area are shown in ***Figure 2.1***.

Site for the proposed facility

The proposed site (i.e., the land at 140 Upper Orara Road) was originally developed as part of an almost five hundred acre dairy farming property known as "Avondale". At the time of this environmental assessment the site contained a residential dwelling that was previously occupied by the former owners of the 140 Upper Orara Road site. Apart from the limited history of development for dairying and residential purposes, the site has remained otherwise undeveloped. The majority of the land on which the proposed WTP facility would be located is currently unused pastoral land.

Surrounding land uses

The main land uses within the study area (in the vicinity of the site for the proposed facility) is for reserves and rural land but a variety of other land uses are also located throughout the study area, including:

- Scattered rural dwellings;
- Public utilities and associated infrastructure;
- Tourism / tourist accommodation;
- Education; and
- Manufacturing.

Land uses in the vicinity of the of the site of the proposed facility

The site for the proposed facility is bounded by pastoral lands to the south and west, buffer land for the Transgrid substation to the east and the Orara River to the north. Access to the site is provided via by the Upper Orara Road that borders the south eastern end of the property.

The nearest publicly accessible locations to the proposed WTP site are parts of Upper Orara Road, Casuarina Lane and the Orara River. The nearest existing residential dwellings to the site are the following:

- Residential dwellings located along Upper Orara Road and Casuarina Lane (as discussed in the Visual Impact Assessment report, presented as ***Appendix 3***); and
- Some other rural residential dwellings, approximately 2 kilometres to the east.

Other land uses within the vicinity of the site include:

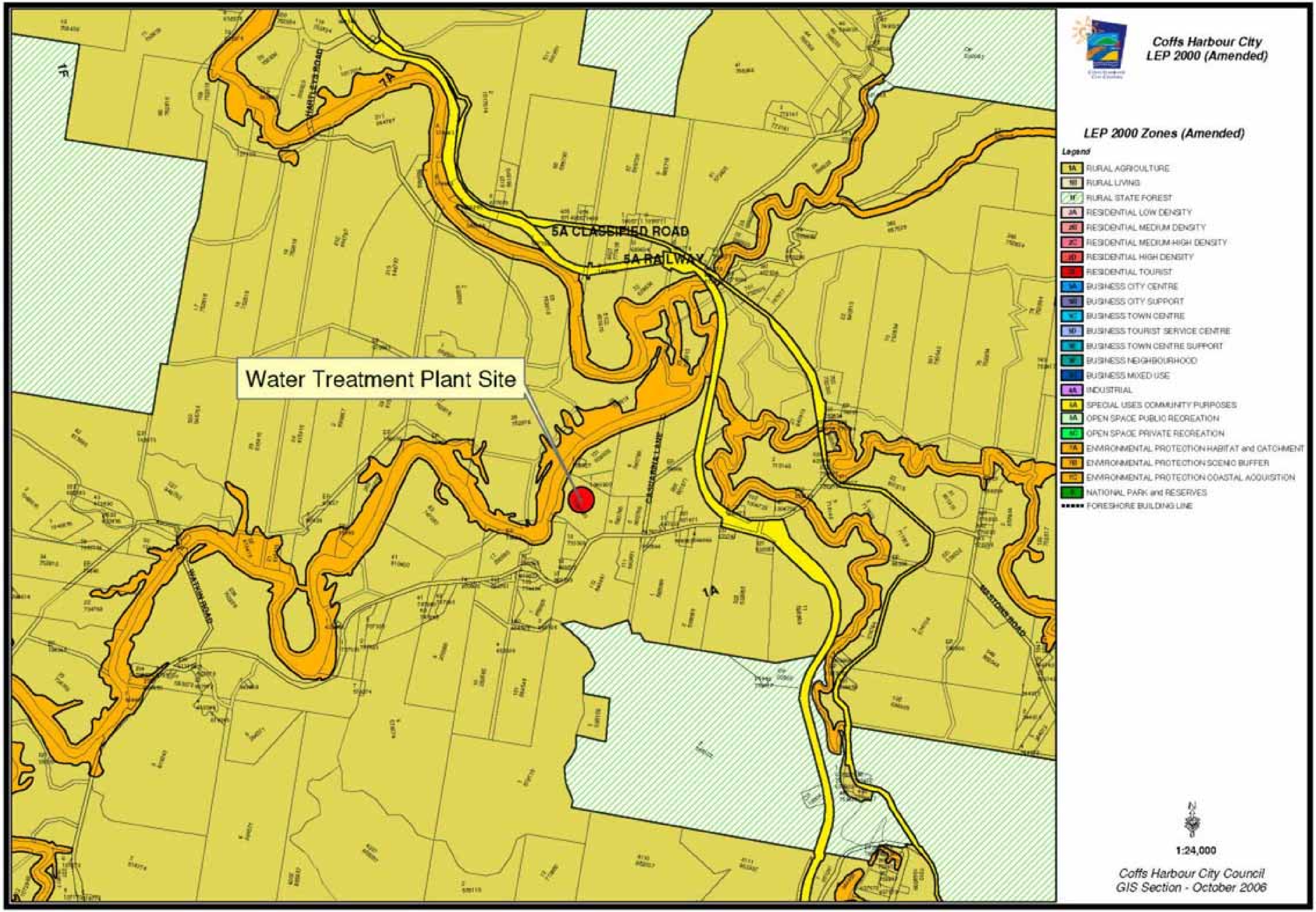
- Public utilities and associated infrastructure, including:
  - Karangi Dam, located approximately 700 to 800 metres to the south-west;
  - Orara River Pump Station, located approximately 1 km to the west (at Cochran's Pool); and
  - TransGrid's electricity substation, located directly adjacent to the site.

Natural features in the vicinity of the site include the Great Dividing Range to the west of the site and the Orara and Nymboida Rivers to the north of the site.

Land uses surrounding the proposed WTP

The main land uses in the vicinity of the WTP Site are as follows:

- Non intensive forms of agriculture and private farms / paddocks;
- Scattered rural dwellings and rural residential development and land uses;
- Rural holdings; and
- TransGrid's electricity substation.


Coffs Harbour City
LEP 2000 (Amended)
LEP 2000 Zones (Amended)
Legend
1A RURAL AGRICULTURE
1B RURAL LIVING
1F RURAL STATE FOREST
2A RESIDENTIAL LOW DENSITY
2B RESIDENTIAL MEDIUM DENSITY
2C RESIDENTIAL MEDIUM-HIGH DENSITY
2D RESIDENTIAL HIGH DENSITY
RESIDENTIAL TOURIST
BUSINESS CITY CENTRE
BUSINESS CITY SUPPORT
BUSINESS TOWN CENTRE
BUSINESS TOURIST SERVICE CENTRE
BUSINESS TOWN CENTRE SUPPORT
BUSINESS NEIGHBOURHOOD
BUSINESS MIXED USE
4A INDUSTRIAL
5A SPECIAL USES COMMUNITY PURPOSES
6A OPEN SPACE PUBLIC RECREATION
6C OPEN SPACE PRIVATE RECREATION
7A ENVIRONMENTAL PROTECTION HABITAT and CATCHMENT
7B ENVIRONMENTAL PROTECTION SCENIC BUFFER
7C ENVIRONMENTAL PROTECTION COASTAL ACQUISITION
NATIONAL PARK and RESERVES
FORESHORE BUILDING LINE
Water Treatment Plant Site
5A CLASSIFIED ROAD
5A RAILWAY
CASUARINA LANE
HARTLEYS ROAD
WATKIN ROAD
1A
1F
7A
N
1:24,000
Coffs Harbour City Council
GIS Section - October 2006

Future land use strategies

Council currently has in place its *Coffs Harbour Urban Development Strategy (UDS)*, dated August 1996, which was originally prepared for the entire LGA prior to the rezoning of land for urban purposes under the *Coffs Harbour LEP 2000*. The Department of Planning (DoP) has more recently urged Council to review and update the existing UDS. The *North Coast REP* also requires the preparation of an approved urban land release strategy prior to any significant rezoning for urban purposes within the North Coast region.

Council's draft Settlement Strategy, entitled "Our Living City" was therefore developed by Council and placed on public exhibition from 3 July to 13 October 2006. The draft Settlement Strategy outlines a vision for the future of Coffs Harbour, as well as a strategy to achieve this vision. The Strategy is intended to both appropriately update and to replace the existing UDS. At the time of writing this EA document, it was intended that Council would consider the adoption of the finalised draft Settlement Strategy document at its Ordinary Meeting of 5 July, 2007.

It is intended that the updated Strategy will assist Council to guide future urban and other development within the LGA. The draft Strategy therefore sets out a "big picture" approach to guide Council's land use decisions up to the year 2031, providing appropriate mechanisms to ensure that the growing City offers a range of quality styles of living, working and recreating, a balanced approach to land supply and demand issues. The draft Strategy also includes a series of policies aimed at tackling a range of future transport and urban growth issues.

Part 3 of the draft "Our Living City" document contains an overall strategy for future development areas and recommended priority releases, as well as detailed strategies for local areas, all based on sustainability principles and intending to concentrate future growth within the CBD and other key centres, but also offering a hierarchy for development in other areas of Coffs Harbour, including Woolgoolga, Moonee and Toormina, as well as other smaller settlements and hinterland villages. The background analysis that underlies the Strategy has revealed that Coffs Harbour is expected to experience a shortage of urban land in the period 2016 to 2021 and beyond. Part 3 of the draft Strategy also contains a demand and supply analysis based on future population projections and a land release program that provides short, medium and long term strategies to meet expected population growth to 2031.

With the future adoption of the finalised Strategy, Council envisages that all relevant future land releases and other developments across the LGA would be consistent with the plans laid out for the area within the adopted Strategy document. Future development around the proposed WTP facilities at Upper Orara Road would therefore necessarily be consistent with the intent of the land use plans contained within the finally adopted Strategy. It should be noted, however, that the draft Strategy document does not currently propose any alterations to any existing zonings or land uses within the area immediately surrounding the proposed WTP site. The Strategy does, however, allow for the future investigation of the provision of upgraded utility services and street scapes for all of the City's hinterland townships and villages, including the area around Karangi. It should also be noted that Council is currently considering, at an appropriate time in the future, updating of its adopted Rural Residential Strategy, last updated in 1999.

Further, it should be noted that the supply of treated drinking water proposed to become available from the WTP development and intended for the area's consumption, would both service and help to facilitate local development and growth.

2.2.2 Cultural Heritage

Indigenous (Aboriginal) Heritage

An Aboriginal Cultural Heritage Assessment Report was compiled by Jacqueline Collins, Consultant Archeologist, of Dunbogan, NSW in December 2006, following an earlier inconclusive surface inspection of the proposed WTP site that was undertaken on 6 September 2006, in conjunction with nominated representatives (i.e. elders) of the Coffs Harbour and District Local Aboriginal Land Council (LALC) and the Gumbula Julipi Elders Corporation. A copy of the Aboriginal Cultural Heritage Assessment Report is presented in ***Appendix 4*** and a summary of the report provided in ***Section 7.6***. Further archeological investigations have been carried out as recommended in the report.

Historic (Non-indigenous) Heritage

As mentioned previously, a historic shed with potential heritage significance (this being the old "Dairy Bails structure at Avondale") exists on the proposal site. A Statement of Heritage Significance was compiled by Jamison Architects Pty Ltd in October 2006 with respect to this structure. A copy of Jamison's Statement is presented in ***Appendix 5***. The Statement considers the historic, aesthetic and technical attributes of this historic structure in this particular setting, as well as the potential impacts associated with the construction of the proposed WTP facility that may be relevant to this historic structure and its associations with any local (or broader) heritage significance. No construction or other impacts are would occur from the proposed WTP facility on the Dairy Bails structure. ***Section 7.7*** provides information on the management of this structure in line with the recommendations made by Jamison Architects.

2.2.3 Traffic

A Traffic Impact Assessment report has been prepared to investigate the impacts that the construction and operation of the proposed WTP facility may potentially have on the local traffic network. A copy of the Traffic Impact Assessment report is presented in ***Appendix 6*** and a summary of the report provided in ***Section 7.10.***

2.2.4 Climate

The nearest Bureau of Meteorology monitoring station is located to the southeast of the site at the Coffs Harbour Airport. The Bureau indicates that the climate in this region of NSW is characterised by mild to subtropical conditions, with annual average daily air temperatures ranging from 14.0°C (minimum) to 23.3°C (maximum). Coffs Harbour has a mean maximum temperature of 26.9^{o}C in January and a mean minimum temperature of 7.5^{o}C in July.

Rainfall within the area is described by the Bureau as being "moderate to high", with the Coffs Harbour meteorology station receiving 1,668.5 millimetres of rainfall per annum, on average.

The relative humidity is described as being "medium to high", with the mean 9 am and 3 pm relative humidity levels being 68% and 63% respectively, with some variation occurring between seasons (ranging from 75 – 54%). This feature of the climate has meant sludge drying beds for the proposed WTP are not a workable solution and thus a sludge centrifuge concept was required to be developed.

2.2.5 Topography

The proposed WTP site is located on a spur that features a level to low-gradient crest, elevated at between 115 to 117 metres AHD, defined to the east (beyond the site boundary) by a highly modified seasonal gully that separates it from a more substantial spur on which the adjacent TransGrid electricity sub-station is located, on Casuarina Lane. Although surface contours are largely intact, the spur has been cleared of its original rainforest vegetation in the historical past, for grazing and possibly also for past cultivation purposes. The site is now dominated by grass cover.

Further historical site disturbance was due to the construction of a rural residential dwelling with associated garden beds and a large shed on the spur crest, as well as the "Dairy Bails" building, discussed in ***Sections 7.7***.

Further away from the site the topography is undulating. From the western boundary, at the site's lowest point, the topography rises towards the southwest. This ridge then slopes towards the north and again rises to approximately 120m AHD. North of the proposed site, the land slopes down towards Orara River, one of the most significant waterways around the Karangi district, being one of two sources of water supply to the Karangi Dam.

The Orara River catchment lies within the Orara West State Forest and encompasses about 131 square kilometres. The River drains in a general north westerly direction for approximately 100 km before meeting up with the Clarence River at a location approximately 20 km north west of Grafton. The highest peak within the area surrounding the proposal site is approximately 260m AHD. The Orara West State Forest is located beyond this ridge.

2.2.6 Geology and Soils

The local area forms part of the Megan Soil Landscape unit, characterised by strongly acid, stony and highly erodible red and brown earths and podzolic soils formed on the late Carboniferous metasediments of the Coffs Harbour association. This association includes greywacke, siliceous argillite and some quartz, chert and jasper. No rock outcrops occur within the proposal site.

The topsoil at the site appears to comprise a brown clay loam with ironstone pedes and fragmented quartz, as has also been separately identified on the adjacent easterly spur, in other studies.

There are no known occurrences of acid sulphate soils within the study area.

2.2.7 Hydrology

The proposed WTP site is located on a spur (as described in Section 2.2.5) and as such surface water runoff is mainly directed to the west and east into adjacent gullies that would then direct water into the Orara River. The Orara River is located within the study area, however no impacts to local hydrology are anticipated to arise from either the construction or operation of the proposed WTP facility.

3. Statutory Framework

3.1 Permissibility of the Proposal

3.1.1 Coffs Harbour Local Environmental Plan 2000

Coffs Harbour City Local Environmental Plan (LEP) 2000 applies to the site. The majority of the Upper Orara Road site is zoned 1A Rural Agricultural under the Coffs Harbour LEP, including the whole of the area proposed for the WTP facility. Under Clause 9 of the LEP, development for the purposes of a "utility installation" is permissible, with consent. The definitions contained in Part 6 of the LEP define the proposed WTP facility as a utility installation, with the definition of a utility installation being as follows:

…. a building, work or undertaking carried out under the authority of any Government authority (including Council), or in pursuance of any Commonwealth or State Act, for the purpose of:

a. railways or roads, or

b. railways, road, water or air transport, or wharf or river undertakings, or

c. the provision of sewerage or drainage services, or

d. the supply of water, hydraulic power, electricity or gas, or

e. telecommunications facilities.

The proposal would therefore be considered to be a utility installation under the provisions of the LEP, as it is proposed to be undertaken by Coffs Harbour City Council for the purpose of the supply of water. The proposal is therefore considered to be permissible, with development consent, under Clause 9 of the Coffs Harbour LEP, except that Schedule 1 of the LEP also lists various Activities not Requiring Consent and Not Prohibited by (the) Plan, including the "carrying out. (of) public utility undertakings, being water, sewerage … undertakings." This includes "(a) development of any description effected in pursuance of any statutory power to provide … a supply of water ... ". The development of the proposed WTP facility would therefore not require development consent to be issued under Part 4 of the EP&A Act. The project's environmental assessment process for the proposal would, however, still need to satisfy the provisions of Part 5 of the Act, except that, as demonstrated in ***Section 3.2***, below, according to *State Environmental Planning Policy (Major Projects) 2005*, the proposed facility is considered by the Minister for Planning to be a Major Project to which Part 3A of the EP&A Act applies.

It should also be noted that a significant portion of the land parcel at Lot 2 DP 1083920 is zoned 7A Environmental Protection (Habitat and Catchment) under Coffs Harbour LEP, this being the heavily wooded, undeveloped land that occupies the riparian zone along the banks of the Orara River, at the western side of the property. It should be noted, however, that this "7A" portion of the total land parcel is not required to site any part of the proposed WTP facility, nor for any other development proposed as part of this, nor any other currently envisaged future development proposal. The necessity for substantial vegetation clearance within this 7A zoned land, as well as other significant physical constraints at this part of the site mean that locating

any part of the proposed WTP facility within the 7A zoned land is regarded as being highly undesirable at this time and also at any other time within the foreseeable future.

3.2 Approval Authority

3.2.1 Part 3A of the Environmental Planning and Assessment Act 1979

Part 3A of the EP&A Act commenced on 1 August 2005. This new Part of the Act consolidates the assessment and approval regime for all major projects that require the approval of the Minister for Planning. Previously these would have been dealt with under either Part 4 or 5 of the Act. Part 3A applies to State government infrastructure projects, sites of state significance, critical infrastructure projects and other developments previously classified as being "State Significant", as well as some other individual locations, projects, plans or programs, as declared by the Minister. Part 3A now provides a separate, streamlined and integrated development assessment and approvals regime for certain major infrastructure and other projects that are of significance to the State of New South Wales.

According to *State Environmental Planning Policy (Major Projects) 2005*, the proposed facility is a project to which Part 3A of the EP&A Act applies (see ***Section 3.2.2***).

Clause 75B (1) (Part 3A) of the EP&A Act also states that:

This Part applies to the carrying out of development that is declared under this section to be a project to which this Part applies:

(a) by a State environmental planning policy, or

(b) by order of the Minister published in the Gazette.

Additionally, Clause 75B (3) states that:

If part of any development is a project to which this Part applies, the other parts of the development are (subject to subsection (4)) taken to be a project to which this Part applies.'

Clause 75D (1) and (2) states that the Minister is the approval authority for Part 3A projects and also that:

A person is not to carry out development that is a project to which this Part applies unless the Minister has approved of the carrying out of the project under this Part; and

The person is to comply with any conditions to which such an approval is subject.

3.2.2 State Environmental Planning Policy (Major Projects) 2005

State Environmental Planning Policy (Major Projects) 2005 (referred to here as the "Major Projects SEPP") was gazetted on 25 May 2005. The Major Projects SEPP clarifies what types of development would constitute a Major Project for the purposes of the Act.

Section 2 of the SEPP defines the SEPP's aims as follows:

(a) to identify development to which the development assessment and approval process under Part 3A of the Act applies,

(b) to identify any such development that is a critical infrastructure project for the purposes of Part 3A of the Act,

(c) to facilitate the development, redevelopment or protection of important urban, coastal and regional sites of economic, environmental or social significance to the State so as to facilitate the orderly use, development or conservation of those State significant sites for the benefit of the State,

(d) to facilitate service delivery outcomes for a range of public services and to provide for the development of major sites for a public purpose or redevelopment of major sites no longer appropriate or suitable for public purposes, and

(e) to rationalise and clarify the provisions making the Minister the approval authority for development and sites of State significance, and to keep those provisions under review so that the approval process is devolved to councils when State planning objectives have been achieved.

Clause 6(1) of the SEPP defines Part 3A projects as follows:

Development that, in the opinion of the Minister, is development of a kind:

(a) that is described in Schedule 1 or 2, or

(b) that is described in Schedule 3 as a project to which Part 3A of the Act applies, or

(c) to the extent that it is not otherwise described in Schedules 1–3, which is described in Schedule 5, is declared to be a project to which Part 3A of the Act applies.

Schedule 1 of the SEPP includes the following definition (under the definitions contained under Group 8 - Transport, energy and water infrastructure):

25 Water supply works

(1) Development for the purpose of water treatment works that has a capital investment value of more than $30 million for drinking water supply.

The proposed WTP facility is therefore considered to meet the definitions included within Schedule 1 of the SEPP because it is a Water Treatment Plant with a capital investment value of more than $30 million. The proposed WTP facility is therefore considered to be a Major Project to which Part 3A of the EP&A Act applies. This was also confirmed in writing by the Department of Planning's letter to Council of 28 November, 2006 (a copy of the Department's letter to Council is presented in ***Appendix 1***).

3.2.3 Summary

- The proposed facility is a project to which Part 3A of the EP&A Act applies;
- The environmental assessment and approval requirements specified by Part 3A of the Act applies to the proposed WTP facility as a whole; and
- The Minister for Planning is the approval authority for the proposed WTP facility. An application for approval must be made to the Department of Planning.

3.3 The Application Process

The application and assessment process for the proposal is summarised below.

Director-General's Requirements

Under clause 75F of the Act, the Director-General of the Department of Planning is required to prepare and issue the proponent with requirements for undertaking the environmental assessment. The Director-General's Requirements (DGRs) identify key issues to be addressed and the level of assessment required.

The DGRs were issued to Council on 18 December 2006. A full copy of the DGRs are presented in ***Appendix 1***. All the matters raised by the Director-General for consideration in this EA are outlined in Table 3.1, below, together with reference notes indicating the section of this EA document where each individual matter is addressed.

Table 3.1 Director-General's Requirements

Issue Category	Requirement	Comment	Document Reference
General Requirements	Executive summary	--	Executive summary
	Description of existing water treatment and the proposal	Note staging is currently not applicable to the project.	Sections 1.3 & 5.1
	Location of the proposal	--	Sections 1.2, 2.1& 2.2
	Applicable environmental planning provisions	--	Section 3
	Consideration of alternatives	--	Section 6
	Assessment of impacts with a focus on the key assessment requirements	--	Section 7
	Design and layout of the proposed WTP and associated onsite and transfer facilities	--	Section 1.3 & 5.4
	Proposed construction methods for water crossings	Not relevant to this proposal	Section 1.1.1
	Indication of any proposed dredging or reclamation	Not relevant to this proposal	Section 1.1.1
	Mitigation/management of environmental impacts	--	Section 8

Issue Category	Requirement	Comment	Document Reference
	Justification for undertaking the project	--	Section 5
	Draft statement of commitments	--	Section 8
	Certification by the author	--	Page 2
Key Assessment requirements	Need and Justification	Note: The need and justification is focused on the requirement to guarantee a quality of supply that meets the Australian Drinking Water Guidelines. The supply of water to Coffs Harbour had previously been secured following the approval of the Regional Water Supply.	Section 5
	Flora and fauna	Note: there would not be any impact to aquatic environments as the Coramba pipeline has been removed from the scope of this Environmental Assessment and the proposal does not alter the quantity of water to be supplied to Karangi Dam.	Section 7.2
	Water treatment	--	Section 5 & 8.4.2
	Water quality and water management	--	Sections 5 & 7.11
	Waste water management	--	Section 7.12
	Water crossings	Not relevant to this proposal	Section 1.1.1
	Noise impacts	--	Sections 7.4
	Air quality	--	Section 7.1
	Cultural heritage	--	Sections 7.6

Issue Category	Requirement	Comment	Document Reference
	Hazardous Materials	--	Section 7.8
	Fire Risk	--	Section 7.3
	Traffic and transport	--	Sections 7.10
	Waste generation	--	Chapter 7.12
	Contaminated land	--	Section 7.9.2
	Visual amenity	--	Section 7.5
Consultation requirements	Need to consult with relevant agencies	--	Section 4.2

Exhibition

If this EA document is considered to meet the Director-General's Requirements, the Department of Planning will place it on public exhibition for at least 30 days. During the exhibition period, submissions will be invited from relevant agencies and members of the public.

The Department will provide Council with either a copy of all the submissions or a summary of all the issues raised in each submission. Council will be asked to respond to all the issues and may then choose to modify the project and its draft Statement of Commitments in order to further minimise any potential impacts on the environment that may have been identified during this process.

If the overall proposal is modified in response to the issues raised, a Preferred Project Report would be prepared to describe the scope of the revised project. The Director-General would make this report publicly available.

Assessment and determination

Following the exhibition period, the Department will, on behalf of the Minister, review the environmental assessment, any preferred project report and all submissions received. Once the Department has completed its assessment, a draft assessment report will be prepared for the consideration of the Director-General. This report may include recommended Conditions of Approval for the project.

Any recommended Conditions will also refer to the Statement of Commitments and may modify these, and/or may impose some additional provisions.

The assessment report will then be submitted to the Minister for formal determination. The Minister may then approve the project with any appropriate Conditions imposed, or may also choose to refuse the project.

Immediately following the Minister's determination, copies of the determination and the Director-General's report will be published on the Department of Planning's web site.

3.4 Other Relevant Environmental Planning Instruments

3.4.1 Regional Environmental Plans

The *North Coast Regional Environmental Plan (REP)* applies to all lands within the local government area of Coffs Harbour. Amongst other things, the *North Coast REP* aims to "provide a basis for the co-ordination of activities related to growth in the region and encourage optimum economic and social benefit to the local community and visitors to the region" by specifying "objectives for the future planning and development of land within the region", "regional policies to guide the preparation of local environmental plans within the region" and "regional policies for the control of development in the region."

It is considered that the proposed WTP facility is not inconsistent with any of these aims of the *North Coast REP*, nor is it considered that the requirements of the REP would otherwise constrain the potential for development of a WTP at this location. The REP does, however, require that vegetation not be significantly impacted during such a development proposal. This issue of the potential for vegetation impacts is discussed in greater detail, below.

No other Regional Environmental Plans apply to the site.

3.4.2 State Environmental Planning Policies

A number of State Environmental Planning Policies (SEPPs) that may potentially apply to the development of the proposed WTP are identified on Council's Planning Certificate Issued under Section 149(2) of the EP&A Act, issued to Walsh & Associates on 28 April 2006 (refer to copy of Planning Certificate No. 1492075/06, presented in ***Appendix 9***). Those SEPPs that are considered to be the most potentially relevant to the proposed development are discussed further, below.

State Environmental Planning Policy No. 11 - Traffic Generating Developments

The objectives of *State Environmental Planning Policy (SEPP) 11* are to ensure that the Roads and Traffic Authority (RTA) is made aware of the implications of developments likely to generate significant traffic impacts and to provide the RTA with an opportunity to make representations with respect to any such developments.

Developments to which the Plan applies are listed in Schedules 1 and 2 of SEPP 11. The proposal does not meet any of the descriptions within these Schedules. The requirements of SEPP 11 therefore do not apply to the proposed WTP facility.

State Environmental Planning Policy No 33 - Hazardous and Offensive Development

State Environmental Planning Policy 33 - Hazardous and Offensive Development (SEPP 33) aims to identify proposed developments that may have potential for significant offsite impacts, in terms of risk and/or offence. SEPP 33 defines a "hazardous industry" as follows:

a development for the purposes of an industry which, when the development is in operation and when all measures proposed to reduce or minimise its impact on the locality have been employed would pose a significant risk in relation to the locality: (a) to human health, life or property; or (b) to the biophysical environment.

That is, if a development is considered to be likely to result in significant risks and/or to cause offence to offsite receptors (for example, as a result of storage of significant quantities of

dangerous goods, or potential noise or odour impacts) then the development would be considered to be a "hazardous" and/or an "offensive" development.

SEPP 33 requires that, in determining whether a development is considered to be hazardous, consideration must also be given to relevant industry and government publications and other accepted guidelines. The government published guidelines considered to be most relevant to the application of SEPP 33 are the Department of Planning's publication entitled *Applying SEPP 33 – Hazardous and Offensive Development Guidelines*, published on the Department's web site at the following address:

- http://www.planning.nsw.gov.au/plansforaction/sepp33.asp.

SEPP 33 requires that a preliminary hazard analysis (PHA) be prepared for potentially hazardous industries, including potentially hazardous storage establishments. If the PHA concludes that there is a risk that exceeds the relevant threshold criteria, the development would then be classed as a "hazardous industry" and would thus be prohibited under the current Rural 1A zoning for the Upper Orara Road site.

A PHA has therefore been prepared for this proposal by the Coffs Infrastructure Alliance in general accordance with both SEPP 33 and the Department of Planning's *Hazardous Industry Advisory Paper No.6 - Guidelines for Hazard Analysis*. A copy of the PHA is presented in ***Appendix 10***, with a summary provided in ***Section 7.8***.

"Offensive" developments are defined in SEPP 33 as being any developments that when in operation, and with all control measures in place, the development would still emit a polluting discharge. Wherever a development is identified as being "potentially offensive" then the minimum requirements for such developments is that they must meet the relevant requirements for pollution licensing by the DECC. If a proposed development cannot obtain the necessary pollution control licenses for any polluting discharge, the development would then be classified as an "offensive industry" and would similarly be prohibited under the current Rural 1A zoning that applies to the Upper Orara Road site.

The PHA has considered the various risks that may be associated with the development, in terms of accidental loss scenarios and the potential for hazardous incidents.

The PHA seeks to address the following:

- Identify all potential hazards associated with the proposal;
- Analyse the consequences for all potential hazards for both people and for the environment in general, as well as the probability of the hazards actually occurring;
- Estimate that the resultant risk to any surrounding land uses and to the environment; and
- Ensure that the safeguards proposed are adequate and thus demonstrate that the operation of the proposed development will not impose a level of risk that would not be acceptable within the surrounding environment.

In accordance with SEPP 33 and the Department's *Hazardous and Offensive Development Application Guidelines* the PHA conducts a screening of all potentially dangerous goods that may be relevant to this development proposal as well as a qualitative risk assessment that reviews the following:

- Input/output materials storage, processing and handling; and
- Primary items of the process.

The PHA concludes that the cumulative risk values were below the *Hazardous Industry Planning Advisory Paper* criteria for all adjacent land uses but also recommends that appropriate risk management and mitigation procedures should form part of the design of the proposal. This would ensure that the potential hazards and risks are maintained at an acceptable level.

Further information is available in ***Section 7.8***.

State Environmental Planning Policy No 44 – Koala Habitat Protection

SEPP 44 aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas. Coffs Harbour LGA is not listed on Schedule 1 of SEPP 44 and therefore the requirements of SEPP 44 do not apply to this proposal.

A portion of the site is identified on Council's "Koala Habitat" map (refer to ***Section 7.2.3***) as having potential for some species of "Koala food trees" to exist (i.e., several species of Eucalyptus trees that Koalas would commonly feed upon) however this portion of the site is located in an area where no development is proposed for the purposes of the WTP facility. A flora and fauna assessment for the whole site was conducted by Eco Logical Australia Pty Ltd (Eco Logical) in August 2006. A copy of Eco Logical's report is presented in ***Appendix 7*** and its results discussed in ***Section 7.2***. No potential impacts of the development have been identified with respect to any potential Koala food trees.

State Environmental Planning Policy No. 55 – Remediation of Land

The aims and objectives of SEPP 55 are to provide a statewide planning approach to contaminated land remediation. It also promotes the remediation of contaminated land to reduce the risk of harm. SEPP 55 restricts consent authorities from issuing consent for development on land that may be contaminated. Consent may be granted if the consent authority is satisfied that the land is suitable for development or would be suitable for development if appropriate remediation were undertaken.

Potential site contamination issues are considered in ***Section 7.9.2***.

3.5 Other Legislative Requirements

3.5.1 NSW Legislation

The *Protection of the Environment Operations* (POEO) *Act 1997,* came into effect on 1 July 1999, repealing the *Clean Air Act 1967*, the *Clean Waters Act 1970*, the *Pollution Control Act 1970*, the *Noise Control Act 1975*, and the *Environmental Offences and Penalties Act, 1989*. The POEO Act consolidated these Acts and also incorporates the major regulatory enforcement provisions of the former *Waste Minimisation and Management Act 1995*.

The proposed WTP facility is not an activity listed under Schedule 1 of the POEO Act. As such, an Environment Protection Licence is not required for the proposal. Nevertheless, the general requirements of the POEO Act that are relevant to the proposed WTP facility include:

- Any discharges to the environment (including any potential discharges to air, water or soil) would need to be the subject of an appropriate Environment Protection Licence, negotiated and agreed between the proponent (Coffs Harbour City Council) and the NSW Department of Environment and Climate Change;

- Any hazardous waste must be stored in an environmentally safe manner and may not come into contact with any incompatible waste;
- Waste must be transported only to a controlled waste facility, or to a waste facility that can lawfully receive waste;
- Transport vehicles must be kept in a clean condition and be constructed and maintained so as to prevent waste spillage;
- Transport vehicles must be covered when loaded so as to prevent spilling and loss of waste and to prevent emission of odours; and
- Waste transporters must have a licence to transport waste.

These requirements of the POEO Act have all been appropriately considered and incorporated into the draft Statement of Commitments, presented in ***Section 8.2*** of this document.

Threatened Species Conservation Act 1995

Any potential impacts of the proposed WTP facility on matters requiring consideration under the *Threatened Species Conservation (TSC) Act 1995* are appropriately considered in ***Section 7.2*** of this document. The flora and fauna assessment conducted by Eco Logical in August 2006 (copy presented in ***Appendix 7***) concluded that the proposal is unlikely to have a significant impact on any threatened species or endangered ecological communities (EEC).

National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* provides the basis for legal protection and management of Aboriginal sites in NSW. The implementation of the Aboriginal heritage provisions in the Act is the responsibility of the Department of Environment and Climate Change (DECC). Section 75U of the EP&A Act, 1979 removes the requirement to obtain permits or consent under Sections 87 and 90 (Part 6) of the *National Parks and Wildlife (NPW) Act 1974* for approved projects subject to Part 3A of the EP&A Act, 1979 (and the investigations required to gain approval). The reporting and consultation requirements stipulated in the NPW Act 1974 were followed by Jacqueline Collins to provide the Aboriginal Cultural Heritage Assessment Report presented in ***Appendix 4*****.**

Rivers and Foreshores Improvement Act 1948 and the Water Management Act 2000

Under Part 3A of the EP&A Act, approvals under Part 3A of the Rivers and Foreshores Improvement Act 1948 and Sections 89 and 91 of the Water Management Act 2000 are not required. Nevertheless, the works still need to comply with all relevant Government policy. The need to minimise the potential for erosion and sedimentation to impact on local waterways has been considered during development of the proposal. Potential impacts and mitigation measures are detailed in ***Section 8.2***.

3.5.2 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The primary objective of the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* is to "provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance."

Environmental approvals under the EPBC Act issued by the Commonwealth Department of Environment and Heritage would be required for any "action" that is likely to have a significant impact on:

- matters of national environmental significance (known as “NES matters”), or
- the environment on Commonwealth land (whether or not the action is occurring on Commonwealth land).

An “action” is considered to include any project, development, undertaking, activity or series of activities. NES matters include any matters with respect to any of the following:

- World Heritage Areas;
- National Heritage Places;
- Ramsar wetlands of international importance;
- Nationally listed threatened species and ecological communities;
- Listed migratory species;
- Nuclear actions;
- Commonwealth marine areas; and
- Commonwealth heritage places.

There is no Commonwealth land potentially affected by the development of the proposed WTP facility, nor any actions proposed that are likely to have a significant impact on any NES matters. Therefore, no approvals under the EPBC Act from the Commonwealth Department of Environment and Heritage would be required.

4. Community and Stakeholder Consultation

4.1 Community Consultation Activities

Council has conducted a range of liaison, consultation and communication activities with all residents adjacent to the proposed WTP site and with various other stakeholders, including TransGrid, within both the immediately affected and wider localities.

TransGrid have been formally notified by Council with respect to the proposed WTP facility and also regarding any issues to do with electrical "surge" protection, other electrical faults and other relevant matters potentially stemming from the presence, on the immediately adjacent property, of TransGrid's electrical distribution infrastructure. No objection to Council's proposal or any other significant comment has been received from TransGrid, to date.

There are five existing households that have been identified as being potentially affected stakeholders in this project, due to their close proximity to the proposed WTP site, being either adjacent to the site or potentially being able to view the proposed WTP facility. During this environmental assessment process, meetings and/or telephone discussions were undertaken with all the following (actual names and addresses have been withheld here, for privacy reasons):

- Household 1 – some visual impact;
- Household 2 – possible visual impact during winter due to deciduous trees;
- Household 3 – would view part of WTP until screening trees are able to grow;
- Household 4 – possible visual impact; and
- Household 5 – no visual impact.

Table 4.1 Details of communication with adjacent residents

Date	Communication
18/07/06	Letterbox circulation of appropriate information to all affected households in area of the potential site investigations (23 households).
18/07/06	Council's representative, Ms Angela O'Brien spoke with residents of **household 2** regarding the Water Treatment Plant and investigations at various possible sites.
3/08/06	Mail out to all households in area as to the preferred site for WTP (23 households)
08/08/06	Council's representative spoke with residents of **household 1** by telephone, as they had previously been away from home for a period of up to nine weeks.
11/08/06	Council's representative spoke with residents of **household 4**, discussed the proposed design of the WTP facility, noted the residents' concerns and communicated these to the project's design engineers.

11/08/06	Council's representative spoke with residents of **household 3**, discussed the proposed design, noted the residents' concerns and communicated these to the project's design engineers. A possible design overlay on an aerial-photo map and an information sheet were left with the residents, for their further perusal and information.
14/08/06	Mail communication forwarded from Council to residents of **household 1** (away from home, in Brisbane), including the latest proposed site layout plan. A follow-up telephone call was also made to the residents, by Council's representative.
15/08/06	Council's representative spoke with residents of **household 2**, discussed the proposed design, noted the residents' concerns and communicated these to the project's design engineers. Possible design overlay on an aerial-photo map and an information sheet were left with the residents.
17/08/06	Council's representative spoke with residents of **household 5**, discussed the proposed site layout and invited feedback.
04/09/06	Council's representatives Mr Simon Thorn, Mr Glenn O'Grady and Ms Angela O'Brien spoke with the residents of **household 1** again. Discussed residents' concerns and made a commitment to incorporate appropriate mitigating measures in the design and proposed operational regimes for the plant.
8/09/06	Council's representatives spoke with the residents of **household 2**. Discussed residents' concerns and made a commitment to incorporate appropriate mitigating measures in the design.
15/09/06	Council's representatives spoke with residents of **household 4**. Discussed residents' concerns and made a commitment to incorporate appropriate mitigating measures in the design.

4.1.1 Key Issues Raised

The following is a summary of the main issues raised by the above-mentioned residents:

- The neighbourhood has only just "survived" the redevelopment of TransGrid sub station – i.e. construction noise, etc. Council is now proposing to start a 12 to 15 month construction project that would generate noise and traffic over that period;
- Noise during construction is a significant concern;
- Concern over potential noise impacts from filter blowers would be mitigated by locating the blowers within an acoustically treated building;
- Concern over potential noise impacts from the centrifuges would be mitigated by a design change whereby the location of these centrifuges would now be adjacent to the TransGrid site and would therefore be over the crest of a hill and further away from the most potentially affected neighbours;
- Concern over potential loss of Gadagi Trees (eucalyptus torelliana) on the corner (opposite the WTP site), however there is a commitment from Council that these trees would be retained;
- Concern over ongoing maintenance and other access required within the route of the Karangi - Red Hill pipeline, through private property. This pipeline would be moved further east away to the edge of this property and thus no trees would be affected;

- Concern over the potential "industrial" appearance of the plant, however Council has made a commitment to working with architects to minimise the potential visual impact and to improve aesthetic characteristics. Council would also undertake extensive landscaping as soon as the environmental assessment has been approved;
- Concern over potential loss of property value; and
- Concern over ongoing access to the proposed WTP facility being via a potentially "dangerous" corner, however Council has made a commitment to improve vehicle sight lines and sight distances at this location by "shaving off" some of the existing embankment (i.e., by re-aligning the road geometry).

4.2 Statutory Consultation

The following agencies were requested by the Department of Planning and by the proponent to provide input into the Director-General's Requirements and for the purposes of further consultation during the environmental assessment process:

- Department of Environment and Climate Change (DECC, formerly known as Department of Environment and Conservation);
- NSW Department of Natural Resources (DNR, since been abolished with responsibilities spread over the DECC, DPI and DWE);
- NSW Department of Primary Industries (DPI, Fisheries, fisheries management has since been incorporated into the responsibilities of DECC);
- North Coast Area Health Service (NCAHS);
- Northern Rivers Catchment Management Authority; and
- Commonwealth Department of the Environment and Heritage.

The results of the responses received are summarised below in Table 4.2, together with a document cross reference to where each issue is addressed, or further discussed within this EA document. Copies of all correspondence received from these various agencies are presented in ***Appendix 11***.

Table 4.2 Issues raised by agencies

Agency Stakeholder	Key Issues raised	Document Reference
Department of Environment & Climate Change (Formerly DEC)	Requirements for information with respect to potential for impacts on the all following: ◗ Water quality and quantity; ◗ Air quality; ◗ Acid sulphate soils; ◗ Contaminated land; ◗ Noise; ◗ Waste; ◗ Threatened species; and	Section 5 Section 7.1 Section 7.9.2 Section 7.9.2 Section 7.4 Section 7.12 Section 7.2

Agency Stakeholder	Key Issues raised	Document Reference
	◗ Aboriginal heritage.	Section 7.6
	General requirement that the design and layout of the facility should seek to minimise potential environmental impacts and to achieve ambient goals.	Sections 7 & 8
	General requirement that appropriate measures should be implemented to avoid or mitigate environmental impacts or that compensatory measures should be incorporated to minimise any unavoidable impacts of the proposed construction works and operational activities on the site.	Sections 7 & 8
	General requirement that the proponent should refer to all the applicable assessment guidelines, as itemised in Attachment B to the DECC's letter (copy presented in ***Appendix 11***).	Sections 5 & 7
	The proponent should also consider all appropriate options for effluent disposal, including options for waste water to be recycled to the plant inlet, or directed to sewer if requiring further treatment before discharge. DECC strongly recommends that the WTP should also incorporate 100% reuse of water, but that any water that cannot be recycled via the head of the WTP used should be disposed of appropriately to sewer.	Section 7.12.2
	All discharges to any receiving waters should be the subject of an appropriate licence agreement with DECC.	Section 7.12
Department of Natural Resources (DNR)	If the use of the emergency storage lagoon has the potential to interact with groundwater or base flows to the Orara River then consideration should be given to ensuring that the lagoon is lined appropriately and is consistent with the relevant standards of the DECC in this regard. (Note environmental water management is currently the responsibility of DECC)	Section 7.11
Department of Primary Industries (Fisheries) (DPI)	DPI strongly recommends attaching the Coramba pipeline to any existing bridges or that under boring of watercourses should be undertaken (such as the Orara River) to mitigate the potential for impacts on the Eastern Freshwater Cod. (Note fisheries management is currently the responsibility of DECC)	Coramba pipeline component of the proposal has been removed. Refer to Section 1.1.1.
	General requirement that the proponent should refer to all the minimum information requirements for environmental assessment, as itemised in the attachment to the DPI's letter (presented in ***Appendix 11***).	
North Coast Area Health Service (NCAHS)	The proponent has been encouraged to consider all the following: ◗ All drinking water that would be produced should	

Agency Stakeholder	Key Issues raised	Document Reference
	comply with NHMRC's *Australian Drinking Water Guidelines, 2004*. The proponent is also encouraged to review the management of their water supplies in accordance with the *Framework for Management of Drinking Water Quality* contained within those *Guidelines*;	Section 5
	◗ Any nuisance affects to residents arising from dust from the proposed construction works;	Section 7.1.2
	◗ Appropriate protection of lagoons at the WTP to prevent access to both humans and animals;	Section 7.11
	◗ Appropriate design of any artificial waterways to minimise the potential for mosquito breeding;	Section 7.11
	◗ Capacity of the proposed WTP facility to supply drinking water in times of scarcity and meet increased demand for future population growth;	Section 5
	◗ Use of rainwater tanks for non-potable use (if reticulated water is to be provided).	Section 1.3
Northern Rivers Catchment Management Authority	No reply received.	NA
Commonwealth Department of the Environment and Heritage	The Department notes that potential for impacts on "Matters of National Environmental Significance" (NES matters) are not expected. The Department nevertheless highlights that the proponent is responsible for examining whether NES matters are relevant to the proposal and if so, for making a formal referral to the Department if any significant impacts are likely: ◗ The heritage values of any listed World Heritage properties or National Heritage Places; ◗ The ecological character of any wetlands listed under the EPBC Act as Ramsar Wetlands; ◗ Nationally threatened species and ecological communities listed under the EPBC Act; ◗ Migratory (i.e., bird) species listed under the EPBC Act; ◗ Nuclear actions; ◗ The Commonwealth Marine Environment; and ◗ The environment of any land owned by the Commonwealth Government.	Sections 7.2

5. Strategic Justification

5.1 Existing Water Treatment

The existing water supply system servicing Coffs Harbour currently uses selective extraction to minimise turbidity (less than 2 NTU, whenever possible) in water diverted from the Nymboida or Orara rivers. Also, aerating at Karangi Dam and selecting a near surface outlet is used to minimise manganese levels in the outgoing water. The existing system also includes other water quality management processes such as lime/carbon dioxide dosing (for pH adjustment and pipeline corrosion control at Karangi Dam) and chlorination for disinfection at the Red Hill Balance Tanks.

Aeration in Karangi Dam provides an initial treatment process to minimise undesirable levels of algae, manganese and iron in the water supply. However, the absence of an appropriate filtering process has resulted in Council being required to implement routine (approximately every three months) pipeline flushing works throughout the entire Coffs Harbour reticulation system.

5.2 Need for the Proposal – Water Quality

The current level of treatment (as described above) is regarded as being insufficient to guarantee a quality that meets the Australian Drinking Water Guidelines in terms of water quality risk management and for achieving all water quality guideline limits.

The two existing sources of supply (the Nymboida and Orara Rivers) and new source (Shannon Creek Dam) presently under construction together with their water quality risks are summarised in ***Table 5.1*** (water from all these sources of supply is / will be transferred to Coffs Harbour consumers via the existing Karangi Dam).

Table 5.1 Summary of High Water Quality Risks

Source	Normal Water Quality Risks	Drought Water Quality Risks
◗ Orara River at Cochran's Pool (current supply) ◗ Nymboida River weir (current supply). Both of the above are distributed via Karangi Dam.	*Cryptosporidium*, Turbidity, Algae taste & odour, Manganese, Iron, Micro-organisms (chlorinator failure), *THMs	(insufficient water, hence need for Shannon Creek Dam source)
Shannon Creek Dam (currently under construction)	Micro-organisms, Turbidity, Manganese, Iron, Taste & odour, *THMs	Normal risks as for current supplies plus more frequent and intense normal Shannon Creek Dam water quality risks

*** THM's = Trihalomethanes, a potentially harmful by-product of the chlorination of organic matter.**

Extraction of water from the Orara and Nymboida Rivers is currently limited due to licence requirements from the DWE that ensures environmental flows are preserved before extraction is permitted. The license requirement becomes more stringent (that is the environmental flows are to be increased) once the Shannon Creek Dam becomes fully operational. The options available to Council with respect to the selective extraction (noted above as being integral to the existing treatment process) are therefore limited as a result of these environmental flow requirements. As the Coffs Harbour area becomes increasingly reliant on waters supplied from the Shannon Creek Dam in drier years, the requirement for water treatment is expected to increase due to the expected poorer raw water quality from this source.

Raw Water Supply System

All water is currently, and would continue to be transferred through the Karangi Dam storage to the proposed WTP facility. By-passing of the Dam, to cater for any emergencies, would remain an operational option at all times, however under these circumstances an important water quality protection 'barrier', namely Karangi Dam, would be removed. This will further heighten water quality risks. The future raw water supply feeding Karangi Dam would be received from three sources (currently the first two, only):

- Orara River at Cochran's Pool (current supply)
- Nymboida River weir (current supply)
- Shannon Creek Dam (currently under construction)

The main system characteristics and water quality parameters are summarised in ***Figure 5.1***.

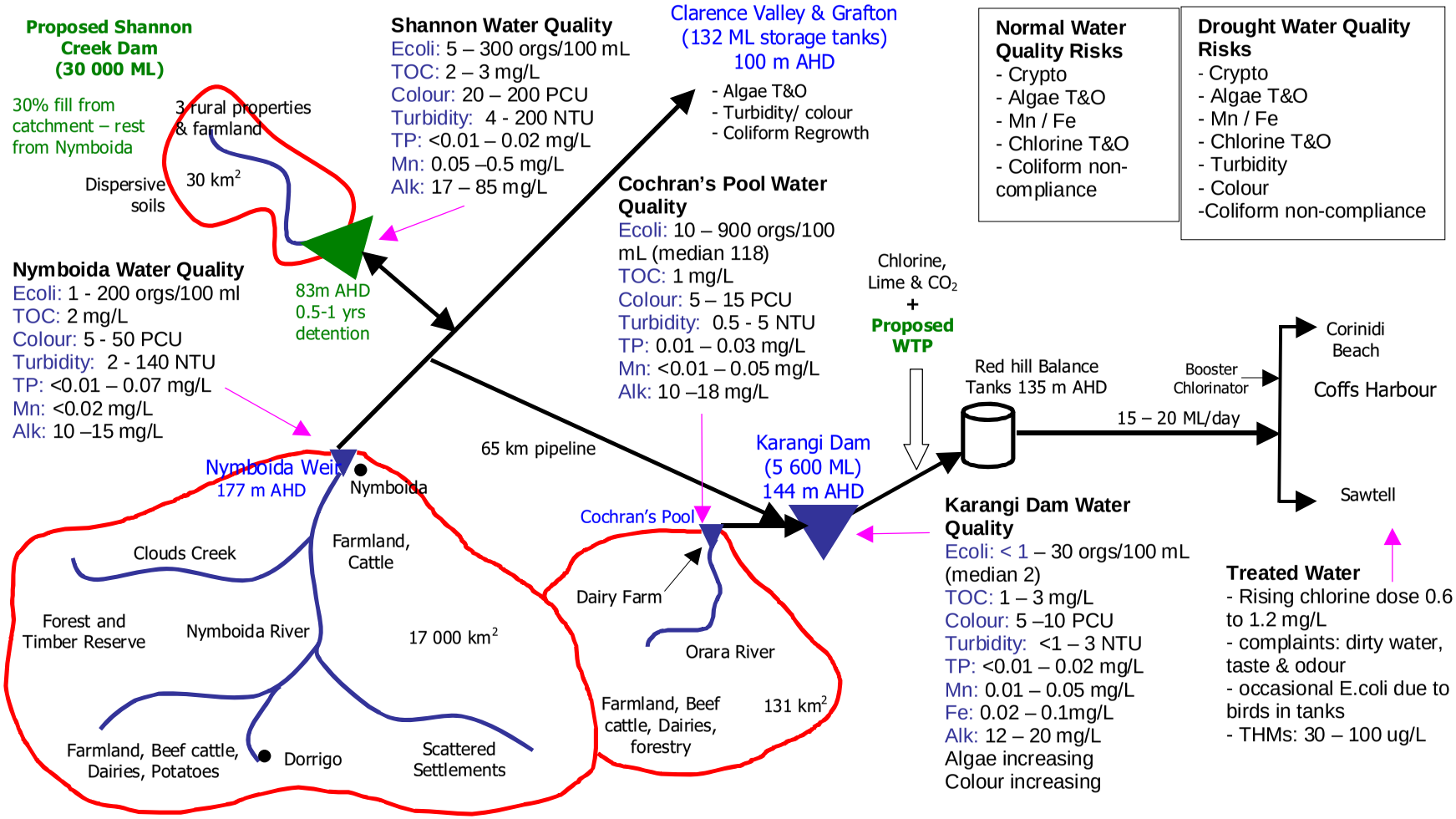


Figure 5.1 – System Schematic, Typical Water Quality and Risks

The Orara and Nymboida sources are soft (low alkalinity), with relatively low colour and turbidity, but can have spikes of higher colour/turbidity and micro-organisms in storm events.

The Shannon Creek Dam water is expected to be a higher alkalinity and generally be a more turbid, coloured and manganese rich water.

Karangi Dam sediments can generate iron/manganese and based on recent water quality data, algae levels appear to be increasing. The relatively high micro-organism levels in the source waters are reduced by storage and detention in Karangi Dam and then chlorination prior to entry into the closed distribution pipe network.

The typical water quality from the three sources is summarised in ***Table 5.2***.

Table 5.2 Summary of Raw Water Quality

Parameter	Orara River at Cochran's Pool	Nymboida River	Shannon Creek Dam
E. coli	10 – 900 orgs/100 mL (median 118)	1 – 200 orgs/100 mL	5 – 300 orgs/100 mL
Total Organic Carbon	1 mg/L	2 mg/L	2 – 3 mg/L
Colour	5 – 15 PCU	5 – 50 PCU	20 – 200 PCU
Turbidity	0.5 – 5 NTU	2 – 140 NTU	4 – 200 NTU
Total Phosphorous	0.01 – 0.03 mg/L	<0.01 – 0.07 mg/L	<0.01 – 0.02 mg/L
Manganese	<0.01 –0.05 mg/L	<0.02 mg/L	0.05 –0.5 mg/L
Alkalinity	10 –18 mg/L	10 –15 mg/L	17 – 85 mg/L

Selective extraction based on turbidity (less than 2 NTU, whenever possible) occurs at present for diversion of Nymboida or Orara River water into Karangi Dam. The selective extraction process is subject to the provision of environmental flows that are set to increase once the Shannon Creek Dam becomes operational and therefore reduces the water available to Council from these sources. This will tend to increase the need to extract water with a higher turbidity from the Nymboida and Orara Rivers. A near surface outlet is used at Karangi Dam to minimise iron and manganese levels in the water that is withdrawn. An aerator operating all year round (on night rate electrical power) in the dam also minimises iron and manganese, blue-green algae risks, and short-circuiting of Karangi Dam. In future, Shannon Creek Dam will also incorporate these controls.

In general, the Orara and Nymboida sources will be the dominate sources of supply in wet and average years. In drier years, the Shannon Creek Dam will be the main source of supply.

5.3 Water Quality Risk Assessment

Evaluation of water quality issues was completed by a review of existing water quality data, assessment of catchment land uses and completion of a formal water quality risk assessment for the Coffs Harbour water supply.

The water supply catchment and system were inspected on 30th and 31st May 2006, and a catchment to tap water quality risk assessment was undertaken on 19th and 20th June 2006 to determine the water quality risks for the current and near future (with Shannon Dam water supply in use) drinking water supply to Coffs Harbour.

The risk assessment process involved separate consideration of risks to water quality arising in each catchment, Karangi and Shannon Creek Dams, water treatment systems (i.e. the existing chlorination/lime/CO_2 dosing) and the treated water distribution system 'elements' of the existing Coffs Harbour water supply system. Each of these elements has features which act as a 'barrier' to the passage of contamination from an upstream source of hazard. For example, a 'barrier' at the Orara River diversion point is the 'selective' withdrawal, where water is normally only pumped into Karangi Dam if the turbidity is < 2 NTU. Water quality hazards identified for each source of hazard in each system element that were considered High or Very High risks were 'rolled through' the downstream 'barriers' of the Karangi Dam, and existing treatment systems to customer taps. The significance of each risk was re-evaluated after the effect of each 'barrier' was considered.

The approach adopted was consistent with the ADWG and the CRC *A Guide to Hazard Identification and Risk Assessment for Drinking Water Supplies*.

Background information and further details of the results of the risk assessment are contained in ***Appendix 12.***

The main water quality risks identified for the existing water supply and when Shannon Dam comes into service were:

- *Cryptosporidium* from cattle, septic tanks and sewage treatment plant discharges;
- Micro-organisms from chlorination failures and 'shielding' because turbidity events of >1 NTU occur;
- High turbidity events from various sources resulting in poor aesthetic water quality and 'dirty water' complaints;
- Poor aesthetic water quality due to presence of manganese and iron;
- Chlorinated organics from higher levels of organics and possible lower disinfection by-product requirements in the future; and
- Taste and odour from blue green algae blooms and variable chlorine residual.

It was also noted that the current water supply at times experiences detection of *E.coli* in treated water as well as periods of poor taste and 'dirty water' events.

During the risk assessment, water quality hazards such as pesticides and radiological contaminants were also considered. A year long study on pesticides completed a few years ago in conjunction with the NSW Department of Health provided results indicating no

detectable levels of pesticides. Pesticide sources could include leaching from farm rubbish tips, sheep/cattle dip sites, spills/leakage from farm sheds and local spraying along water courses in the Nymboida and Orara river catchments. Radiological hazards were considered to be an insignificant risk due to lack of man-made and natural catchment sources. Sabotage was considered to be the only possible source of radiological hazard and it was concluded that it would be both a very unlikely event and very difficult to get in significant quantities.

For pesticides it was concluded that contamination could occur but would be in small quantities. The dilution in Karangi Dam is substantial and short-circuiting is not a significant risk due to operation of the mixing system in the dam.

Consequently, the risks were reduced to low or medium levels in the raw water that would enter the proposed WTP. As a result, no additional treatment process step was proposed at this stage. However, allowance on the proposed WTP site was made for retrofitting of ozone/GAC after the DAFF process. That is, it was considered that this risk may increase in the future as more development occurs in the catchments.

5.4 Plant Process Selection

The overall objective for the WTP (to be located near Karangi Dam) is to provide treated water from supplies discussed in ***Section 5.2*** that:

- Provides drinking water to Coffs Harbour consumers that meets current Australian Drinking Water Guidelines (ADWG) and achieves adequate risk management requirements;
- Achieves Health Department requirements; and
- Provides a 'fit for purpose' water treatment facility designed to achieve 'best practice' treatment targets.

To control the identified water quality risks and provide water that meets the above objectives, the overall treatment process selected for the WTP was dissolved air flotation-filtration (DAFF) followed by ultra-violet (UV) disinfection and then chlorination. The specific unit processes that will be incorporated into the WTP are described in greater detail within ***Section 1.3*** and ***6.2***

The proposed treatment process is shown in ***Figure 1.4*** and ***Appendix 2*** within the process flow diagram – drawing no. WTP-DWG-P-200-01.

5.5 WTP Performance Targets

The performance targets for the water treatment from all the proposed water quality safeguards (including selective extraction, Karangi Dam and the WTP) are listed in the Table 5.3, below. The targets satisfy water quality risk and water quality guideline requirements in the ADWG (2004).

Table 5.3 Water Treatment Performance Targets

Hazard or Parameter to be Controlled	Performance Target
Cryptosporidium / Giardia	≥ 4 log removal (i.e. 99.99% removal) based on 2–2.5 from DAFF + 2 from UV
Virus	> 4 log removal (i.e. none detected)
Bacteria	E. coli not detected in plant outlet
Colour/ Organics	◗ < 5 PCU for 95% of time, < 10 PCU for 100% of time at filter outlets ◗ THM's < 100 µg/L over summer, maximum not to exceed 250 µg/L
Turbidity	< 0.3 NTU 95% of time at each filter outlet, < 1 NTU 100% of time in combined filtrate
Chlorine	Typically set point ± 0.3 mg/L 95% of time to minimise taste & odour and for process control
Iron	< 0.1 mg/L 100% of time
Manganese	<0.02 mg/L for 90% of time, < 0.03 for 100% of time
Aluminium	< 0.1 for 90% of time, < 0.2 for 100% of time
Algae Taste & Odour	Not objectionable (treat via PAC dosing)
Algal Toxins	Below recommended ADWG levels.
Pesticides	Below recommended ADWG levels.
Variable pH/ colour/ Alkalinity/ Turbidity control	◗ Selective pumping at Orara and Nymboida River diversion points and blending in the Karangi Dam, say < 10 NTU ◗ Reservoir aeration to avoid short-circuiting across Karangi Dam ◗ Pre-pH / alkalinity control (e.g. lime/CO_2) at the WTP
Final treated water stabilisation	◗ Typically in range for calcium of 40–60 mg/L as $CaCO_3$ ◗ Set Point pH ± 0.3 ◗ Alkalinity > 50 mg/L
pH of treated water	Typically in range 7.5–8.0
Fluoride	Continuous monitoring, to meet Department of Health requirements (1 +/- 0.05 mg/L)
TDS	< 500 mg [ADWG 2004 (aesthetic)]
Pesticides	as per ADWG guidelines
Chloroacetic acid	<0.15 mg/L [ADWG 2004 (health)]
Dichloroacetic acid	<0.1 mg/L [ADWG 2004 (health)]

Hazard or Parameter to be Controlled	Performance Target
Trichloroacetic acid	<0.1 mg/L [ADWG 2004 (health)]

5.6 Water Quality Control Plan

The proposed WTP is designed to achieve the treatment targets outlined in the previous section. A Control Plan based on a Hazard Analysis & Critical Control Point (HACCP) analysis is being developed for the critical control points identified during the risk assessment and during a further HACCP plan workshop (held with Coffs Harbour City Council and the water treatment plant design team). This plan identifies the following critical control points:

- selective pumping at Cochran's pool (Orara river off-take) and Nymboida River
- aeration at dams and potassium permanganate dosing at the WTP
- coagulation
- filtration
- UV disinfection
- fluoridation
- corrosion control
- burst main repair

A schematic showing locations of these Critical Control Points and summary of the Control Plan for the filtration process is contained in ***Appendix 15***.

In addition to this Control Plan, Council will continue to monitor both untreated and treated water in accordance with current requirements for water quality. A more detailed discussion on water quality monitoring including the specific analyses and location of testing is included in Section 8.4.2.

6. Alternatives to the Proposal

6.1 "Do Nothing" Option

The "do nothing" option for the WTP facility (i.e. the option to not construct a water treatment facility on any site) was discounted following the completion of the water quality risk assessment process, as outlined in ***Section 5.2***. A number of water quality hazards considered as high and very high risks were identified to do with the continued use of water supplies from both the existing raw water supply infrastructure as well as with the incorporation of supplies from the future Shannon Creek Dam. These risks would be applicable for any alternative water supply within the Coffs Harbour Region.

In summary, if a WTP is not constructed, Council would not be able to do any of the following:

- Provide drinking water to Coffs Harbour consumers that meets current Australian Drinking Water Guidelines at all times;
- Achieve adequate risk management requirements for the high and very high water quality risks identified in the water quality risk assessment; or
- Achieve NSW Health Department requirements at all times.

It was therefore considered important to use appropriate treatment processes to mitigate these risks and to provide drinking water that is compliant with the above requirements.

6.2 Alternative WTP Processes

The options for the required water treatment process was considered in the context of the identified water quality risks (refer to the Coffs Harbour WTP Options Review and Risk Assessment contained in ***Appendix 12***,). Table 6.1 summarises the range of treatment process trains that were considered for the proposed WTP.

Table 6.1: Alternative WTP Process Trains

Process	Comment
Chlorination / Final Disinfection	All options considered included final chlorination or equivalent disinfection. Required as a barrier for bacteria and virus and provides some residual disinfection in the event of recontamination, whilst also restricting the growth of micro-organisms which can cause water quality issues such as taste and odour.

Process	Comment
Powdered Activated Carbon (PAC) / Dissolved Air Floatation Filtration (DAFF)	Removes particles through floatation as fine air bubbles pass upwards carrying solids to the surface. The water is then passed through multimedia filters. Conventional technology for algal cell removal. Reduces turbidity and colour. Removes organics, oxidised manganese and iron. PAC dosing prior to DAFF allows for the removal of algal tastes and odours, along with some THM precursors through the attraction of organic molecules to the carbon. Process backwash requires treatment and sludge disposal.
PAC / Microfiltration (MF)	Option involves PAC prior to MF. PAC system similar to above, however some concern with the possible impact of the PAC on the membranes as this combination is not a common practice. MF removes particles of greater size than the pore size (typically around 0.2µm). Reduces turbidity and colour. Removes algae, *Giardia and Cryptosporidium*. MF option assumes coagulation can be used with MF to deal with colour and oxidised manganese and iron. Backwash water contains chemicals that require treatment and sludge that must be disposed of as well as cleaning wastes. MF option has significantly greater associated costs than the DAFF option.
PAC / DAFF / UV	UV adds cyst inactivation capability (*Giardia and Cryptosporidium*) to the PAC / DAFF combination mentioned above (algae, algal tastes and odours, turbidity, colour, manganese and iron).
DAFF / Ozone / Granular Activated Carbon (GAC)	Involves dosing ozone to the filtrate (post DAFF) and then filtering the resultant stream through GAC beds. The ozone is a powerful oxidant and disinfectant that breaks down algal toxins and natural organics into more biodegradable forms. GAC is used in beds like conventional filters with the water passing slowly through the beds and molecules are absorbed onto the GAC particles. Ozone / GAC is an effective treatment combination for taste and odour, algal toxins and cysts and are commonly used in combination with DAFF or MF to provide comprehensive water treatment. Ozone / GAC plants are widely used for supplies with chronic algal problems. Ozone / GAC option increases costs significantly.

Process	Comment
MF / Ozone / GAC	Combination adds the capabilities of ozone / GAC as set out above to MF. Offers very reliable risk reduction. Very complex and expensive process option.

Following the water quality risk assessment, suitable process options were identified for control of the water quality hazards. The preferred process selected was a dissolved air flotation-filtration (DAFF) plant followed by ultra violet (UV) and then chlorine disinfection. Also, powdered activated carbon dosing (PAC) at the plant inlet for control of algae related water quality hazards was selected in conjunction with the DAFF process.

The other main process option considered was micro-filtration (without pre-clarification). This option was estimated to be approximately 40% more costly than the DAFF option to construct, with ongoing operation and maintenance costs estimated to be 50% more per year than the DAFF option. The main reasons for this higher capital cost were due to PAC dosing at the plant inlet and the presence of manganese in the raw water. These factors meant that a larger membrane area would be required and more frequent changes of the membranes would be expected due to fouling and more frequent clean-in-place cycles. This process option was rejected early on in the project on the basis of its higher capital and operating costs.

Sub-options considered for control of algae related water quality hazards consisted of:

- PAC dosing at the plant inlet (the preferred option)
- Separate granular activated carbon (GAC) filters after the DAFF process
- Separate GAC filters with ozonation
- Advanced oxidation (i.e. hydrogen peroxide dosing with much higher UV dose rates)

The latter three options would have added capital costs in the range of $1 million to $7 million and commensurate higher operating costs for no proven additional benefit over the preferred option. That is, blue-green algae levels are relatively low, hence toxins were not considered to be a significant risk to justify these options. On this basis, these options were rejected in favour of the PAC dosing option. However, it should be noted that the plant will be designed to allow space on the site for future retrofitting of any of these more advanced processes if possible future water quality standards require a higher level of treatment.

6.3 Alternative WTP sites considered

Eight potential sites were considered and are referred to below as the “Karangi Dam site” and sites “A1, A2, A3, B, C1, C2 and C3”. The relative locations of all these sites are shown on ***Figure 6.1***. The key selection criteria used to identify potentially useful sites for consideration for the proposed WTP facility were as follows:

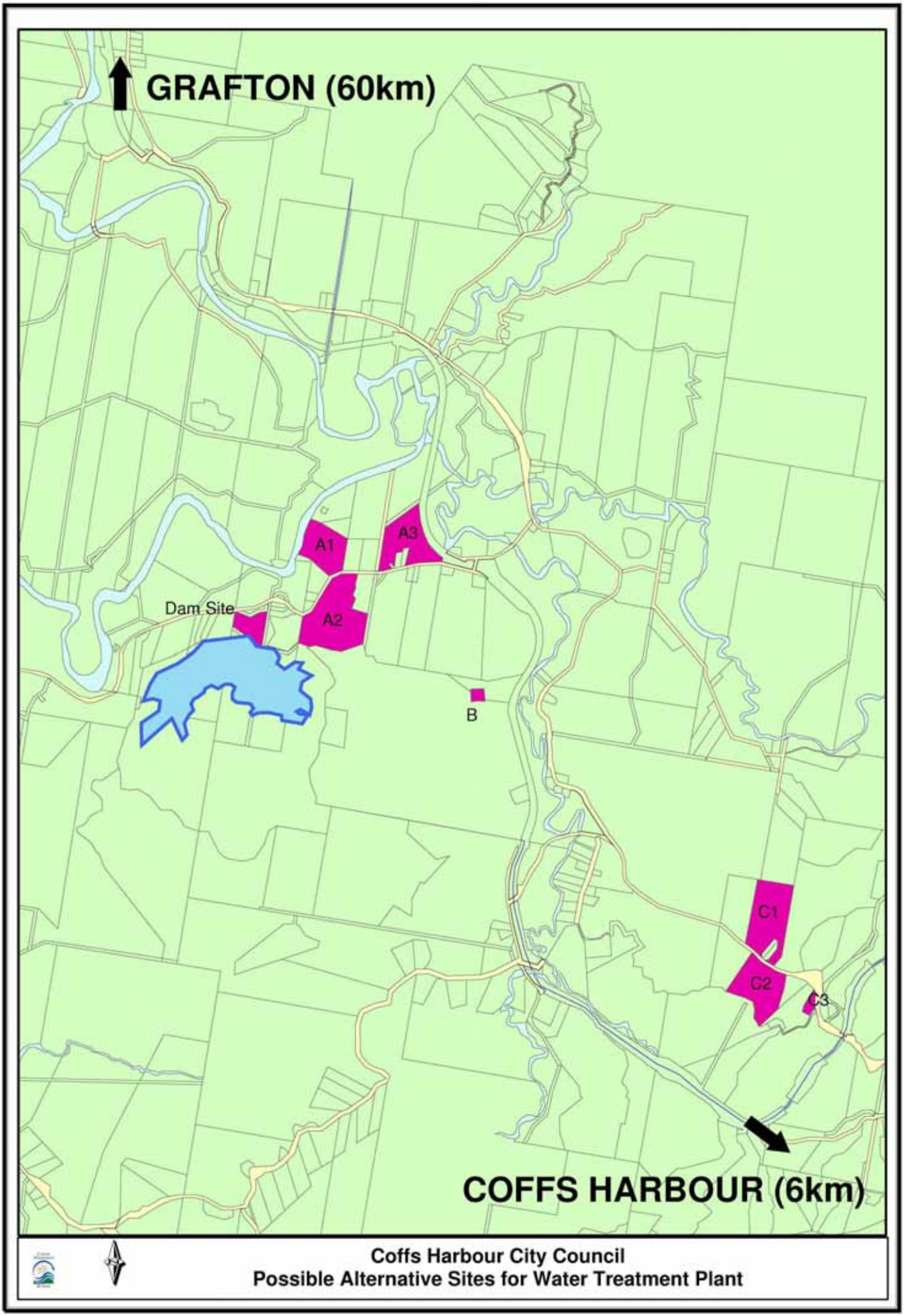
- Proximity to existing relevant and important infrastructure;
- Proximity to the water supply;
- Topographic characteristics of the site; and

- Environmental constraints.

Other characteristics considered to be desirable included:

- Availability of existing easements/corridors for water distribution;
- Distance from built up areas;
- Ease of access to the site (for chemical deliveries and other operational purposes);
- Existing land use zoning permits the use for a water treatment facility;
- Development would not require significant amounts of large scale clearing (for on site uses or transmission); and
- Whether the overall size of the site would permit the proposed WTP facility to be adequately buffered from sensitive surrounding land uses.

A summary of the findings of the site options analysis, with comments on all the sites considered is provided in ***Table 6.1***, below.



Coffs Harbour City Council
Possible Alternative Sites for Water Treatment Plant

Table 6.1 Summary of alternative sites considered

Site	Comments
Karangi Dam	Optimal proximity to water supply and thus would financially be the most favourable site. Council owned and operated land. Special Uses zoning. Significant impacts to adjacent neighbours with respect to the potential for significant visual impacts and noise Impacts within the “natural amphitheatre” topography of the area in which the site and these existing residences are all located. Site topography limits the scale of the WTP infrastructure required within the site. Additionally the spatial limitations would require the potential separation of process areas and limit expansion options. Public access to Karangi Dam would be prevented. Subject to further detailed assessment to determine suitability. Site not chosen due to limitations for future expansion and potential impacts to adjacent neighbours.
B	Site B is located at the site of an old filtration plant. This site was determined to be inappropriate due to the available area (approximately one hectare) being considerably short of that required.
A1	Site A1 is located to the east of the Karangi Dam site Land use zoning: 1A Rural Agricultural. Regional water supply pipeline runs along the northern portion of the site. Current pipe line connecting Karangi Dam to the Red Hill Balance Tanks is located within 100 metres of the north eastern side of the site. An area of land at the rear (to the north-west) of the proposed WTP site is zoned 7A Environmental Protection and an area of tertiary koala habitat within the south western portion of the site. Both sections of land would not be required to be cleared or otherwise developed or significantly impacted by the WTP proposal. The Orara River is located to the northwest of the site. This site contains Category 1 bushfire vegetation to the south and west of the proposed WTP site, identified on Council’s Bushfire Prone Lands map. The favourable features resulted in the A1 site being short listed for a further detailed assessment on the sites suitability. Detailed assessment determined site A1 as being the most appropriate due to proximity to Karangi Dam and existing pipelines, topography, minimal impacts on neighbours and minimal clearing.

Site	Comments
A2	Site A2 is located to the east of the Karangi Dam site. Land use zoning: 1A Rural Agricultural zone. The pipe line connecting Karangi Dam to the Red Hill Balance Tanks runs through the site. Koala Habitat: A parcel of tertiary habitat is located east of the site. A parcel of secondary habitat is also located to the east, south and west of the site. The southern boundary abuts land zoned 1F Rural State Forest. Contains Category 1 bushfire vegetation to the east, south and west of the site, as identified on Council's bushfire prone map. Site A2 was considered to be unsuitable due to its large size, the undulating characteristics of the landscape at its southern end and the extent of existing vegetation that would be required to be cleared.
A3	This region has good access to the 330 kilovolt transmission infrastructure. This site was purchased in 2005 to be developed as an alternative gas turbine facility site pending gas price negotiations. Land use zoning: 1A Rural Agricultural zone Any connection to the regional water supply pipeline would require an easement across neighbouring land. Koala Habitat: No habitat is located within the boundary of the site; however, small parcels of tertiary habitat abut the south-eastern and western boundaries of the site. Significant proportion of the site A3 is flood prone, which limits the WTP to the south western portion of the site directly adjacent to two houses. Site A3 was considered to be undesirable due to the proportion of flood prone land, location of adjacent residences and distances to supply pipelines (requiring easements and so on).
C1	This site is situated in close proximity to Red Hill Balance Tanks. Zone: 1A Rural Agricultural zone Koala Habitat: This site contains a significant amount of secondary habitat – this corresponds with an area of land zoned 7A Environmental Protection Habitat & Catchment Zone. Contains a significant area of Category 1 bushfire vegetation, as identified on Council's bushfire prone map. The geographical isolation from the Karangi Dam site, the significance of the on site vegetation and the implications associated with obtaining appropriate pipeline easements, means this site is inappropriate for construction of the WTP facility.

Site	Comments
C2	This site is situated in close proximity to Red Hill Balance Tanks. Zone: 1 A Rural Agricultural zone. Koala Habitat: There is a parcel of land extending across the south-western boundary identified as secondary koala habitat – this corresponds with an area of land zoned 7A Environmental Protection Habitat & Catchment Zone. Contains Category 1 bushfire vegetation extending along the south-western boundary of the site, as identified on Council's bushfire prone map. The geographical isolation from the Karangi Dam site, the significance of the on site vegetation and the associated implications associated with obtaining appropriate pipeline easements, means this site is inappropriate for construction of the WTP facility.
C3	This site is situated in close proximity to Red Hill Balance Tanks. Koala Habitat: A small parcel of land located to the west of the site is identified as primary habitat – this corresponds with an area of land zoned as 7A Environmental Protection Habitat & Catchment Zone. Contains Category 1 bushfire vegetation, as identified in Council's bushfire prone map (appears to affect the part of the site intended to be used for the WTP). The geographical isolation from the Karangi Dam site, the significance of the on site vegetation, the small size of the site and the associated implications associated with obtaining appropriate pipeline easements, means this site is inappropriate for construction of the WTP facility.

The selection criteria was used to assess each site and resulted in the Karangi Dam site and site A1 being short listed as the preferred locations. A further detailed assessment was then undertaken to select the most appropriate site from those short listed with consideration to the social, environmental and financial aspects of each location. Site A1 was assessed to be the most preferable site as summarised in ***Table 6.1***.

7. Key Assessment Requirements

7.1 Air Quality

7.1.1 Odour Impact Assessment

The operation of the WTP under normal conditions would not result in any off-site odour impact as there is no significant odour source within the plant. However, the dewatered sludge from the proposed treatment process has the potential to become odourous when "algal events" (occurrences of high algal content) occur in the WTP's raw water supplies. Once 'dewatered' the sludge is proposed to be collected and placed within storage bins for transfer to the Coffs Harbour resource recovery centre and would not be stored on site for significant time periods. When the storage bins are kept on site (waiting for removal) the sludge would be contained within the bin (bin with attached lid) with the bin additionally enclosed within the dewatering building (dewatering building is proposed to include roof and doors to further minimise the potential for odour releases).

There were no published buffer distance guidelines for NSW (potable) WTPs, except for the default value of 400 m used for waste water treatment plants (WWTPs). WWTPs are significantly more odourous than WTPs and the same buffer guideline should not necessarily be applied. The Victorian EPA have published a list of recommended buffer distances (EPAV, 1990) for a range of categories (such as WWTPs), however WTPs are again not listed.

In the absence of recommended buffer distances GHD have calculated an appropriate buffer distance from the sludge dewatering facilities with reference to other WTPs that are currently operating.

The calculated buffer distance has then been used to determine the potential for odour nuisance impacts within the local area. The odour assessment report is presented in ***Appendix 13***.

The WTP facility is proposed to be sited on a spur on the southern side of the Orara River, and as the axis of this section of the Orara River valley is directed to the east-north-east then this and other surrounding terrain would serve to form a regional cool air drainage flow down the river valley, directing air flows in a north-easterly direction at the WTP site. The action of this regional air drainage flow would be further assisted and supplemented by local slope flows to the north. The direction of cool air drainage and slope flows defines the likely directions for poor dispersion of odour and other potential air quality impacts. In these directions any buffer distance required to mitigate otherwise significant odour impacts would need to be increased in the order of about 50%.

The calculations indicate that, in order to ensure no significant off-site odour impacts under adverse climatic conditions, the sludge dewatering building should be located at least 50 metres from the nearest property boundaries shared with any other residence.

The report concludes that buffer distances are readily achievable, with the location of the nearest house being 200 metres to the south west and 90 metres to the nearest property boundary (Transgrid and Transgrid buffer land). The buffer distances required to minimise off-site odour impacts from the proposed sludge dewatering activities would therefore be readily achievable within the currently proposed site layout and design.

7.1.2 Dust Impact Assessment

During the construction phase there is the potential for local air quality impacts as a result of dust generation. The degree of dust generation would be minimised through the implementation of dust suppression techniques that would include the following:

- Prompt revegetation / sealing of exposed areas.
- Watering unsealed and exposed surfaces (including access tracks) during windy and dry weather.
- Not allowing mud to be tracked onto roads with road sweepers used if necessary.

Proposed monitoring of dust deposition during construction is provided in ***Section 8.4.1***.

Mitigation measures to control dust during operation is not considered to be necessary.

7.2 Flora and Fauna

An ecological assessment of the proposal was undertaken by Eco Logical Australia Pty Ltd (Eco Logical) in August 2006. The assessment considers the potential direct and indirect impacts of the construction and operation of the proposal on threatened species and endangered ecological communities (EEC) within the study area and recommends measures to mitigate identified impacts. This section provides a summary of the results of this assessment. Eco Logical's complete Flora and Fauna Assessment report is presented in ***Appendix 7.***

7.2.1 The Study Area

The study area encompasses an area within an approximate 10 km radius of the subject site at 140 Upper Orara Road and covers a complex of landforms centred around the headwaters of the Orara River. The valley floor areas are largely cleared and are subject to a variety of rural land uses such as grazing, horticulture, rural residential (including "hobby farms"), turf farms and orchards. The steeper valleys, foothills and surrounding low ranges are almost entirely publicly owned or managed, with the majority of these lands being dedicated State Forest, National Park or Nature Reserve.

The subject site has, to date, been utilised as a small-scale grazing property and is largely devoid of vegetation. Two separate patches (totalling approximately 0.7 hectares) are mapped by Council (Fisher, et al. 1996) as follows:

- Riparian Vegetation and Camphor Laurel (*Cinnamomum camphora*) adjacent to the Orara River on the western boundary; and
- Tall Open Blue Gum – Tallowwood forest with Camphor Laurel on the southern side of the entrance to the site.

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).

7.2.2 Methodology

Threatened flora and fauna species, populations and EECs that are known to occur within the study area were investigated by searching the following:

- DECC's Wildlife Atlas records (for a study area bounded by 30.00 to 30.50 decimal degrees South & 152.75 to 153.25 decimal degrees East);
- DEH's database for threatened species (for a study area based on a 10km radius around a point at 30.26 decimal degrees South and 153.03 decimal degrees East); and
- NES Matters as listed under the Commonwealth EPBC Act.

Investigations were then focused on the identification of those threatened species considered likely to occur on, or utilise the subject site, based upon information obtained during the subsequent site inspection. Relevant planning instruments and other guidance documents were also identified and any requirements for biodiversity management investigated and taken into account.

A site inspection was undertaken on 14th August 2006, involving a detailed traverse of the property to identify the likelihood of threatened flora species and the potential for threatened fauna habitat. Remnant vegetation on the site was assessed and compared with Council's vegetation mapping. All isolated trees on the site were identified and assessed for habitat value, including an assessment in accordance with Council's Koala Habitat Plan of Management (Lunney *et al,* 1999).

A floristic species list was compiled during the site traverse and is included within the Flora and Fauna Assessment, presented in ***Appendix 7***.

7.2.3 Existing Environment

Flora

84 plant species were recorded during the site traverse (full species list is presented in ***Appendix 7).*** Of these, 35 species are exotics (i.e., 42% of the total), although it should be noted that it is highly likely that not all plant species present on the site would have been able to be successfully recorded, due to the time of year the site inspection was undertaken and the fact that some areas of site had been recently slashed, leading to the possibility that a number of species (particularly annual grasses and herbs) may have been overlooked or would perhaps have been present only as seed or underground parts at that time.

The cleared areas on the site were found to consist of highly modified pasture land supporting a predominance of introduced grasses and herbs. About 25 individual, scattered Camphor Laurel trees were noted, as well as all the following Australian native trees:

- A single, mature, non hollow-bearing Flooded Gum (*Eucalyptus grandis*):
- A large, hollow-bearing Sydney Blue Gum (*Eucalyptus saligna*);
- Several large Hoop Pine (*Araucaria cunninghamii*);
- A single Black Bean (*Castanospermum australe*); and
- A single Macadamia (*Macadamia tetraphylla*).

The locations of all the above trees are marked on the aerial photograph (refer to ***Figure 7.1***). It should be noted that the Hoop Pines, the Black Bean and the Macadamia are all more likely to be planted specimens than part of any remnant forest still present on the site. The natural distribution of Hoop Pine and Black Bean does include the Upper Orara valley, however it is unlikely that these trees would represent remnants of the original vegetation at this site. The Macadamia is listed as a vulnerable species under the TSC Act, however its natural distribution is north of the study area.

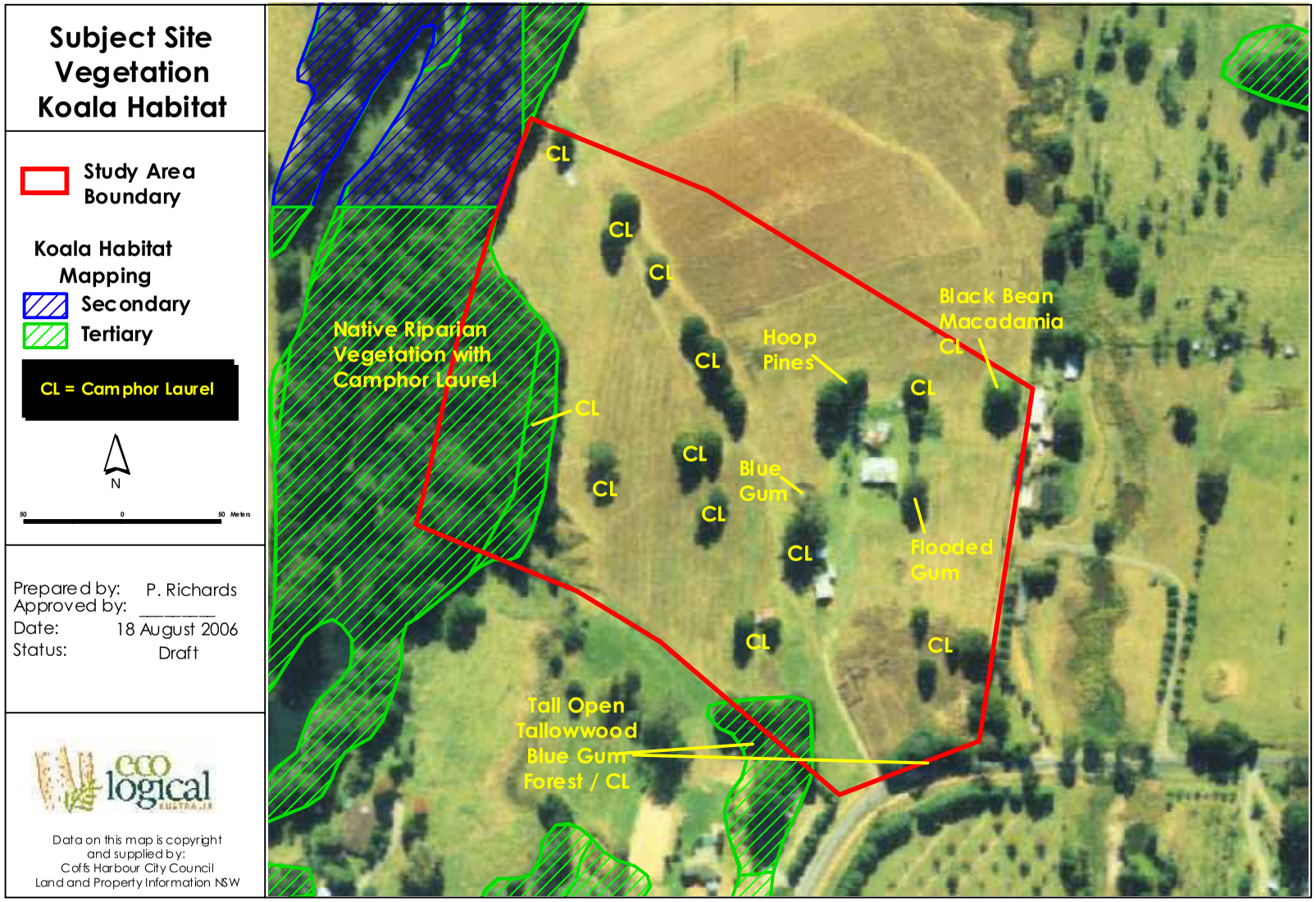


Figure 7.1: Subject Site showing vegetation and koala habitat.

The remnant vegetation communities present on the site were noted to be correctly represented on Council's vegetation and Koala Habitat mapping, the extent of which is also shown on ***Figure 7.1***. The remnant patch of Tallowwood – Blue Gum forest that lies just south of the entrance to the site were noted to have been heavily infested with Camphor Laurel. Also, most of the native trees identified within this forested patch are actually located on the adjoining property to the south. The most notable exception to this was a large, single specimen of Hard Quandong (*Elaeocarpus obovatus*), a species that is included in the original moist forest species typical of this area.

The riparian vegetation was found to comprise mainly scattered individuals of Flooded Gum, over disturbed warm temperate rainforest that is dominated by the exotic species, Camphor Laurel.

The site contains potential habitat for 10 threatened plant species, although a thorough inspection of the site failed to locate any threatened flora species.

Fauna

The site contains potential habitat for 36 threatened fauna species, as listed in the Flora and Fauna Assessment, presented in ***Appendix 7***.

All parts of the site provide some form of potential habitat for various threatened fauna species. The remnant vegetation provides potential foraging and shelter habitat for the majority of threatened species that are considered likely to occur within the broader study area. In the absence of suitable fleshy-fruited native tree species, even the exotic tree species, Camphor Laurel, will potentially provide valuable foraging resources for frugivorous species such as all the following vulnerable species of fruit dove:

- Wompoo Fruit Dove (*Ptilnopus magnificus*);
- Rose-crowned Fruit Dove (*Ptilnopus regina*);and
- Superb Fruit Dove (*Ptilnopus superbus*).

A number of other species are also able to utilise the various isolated trees as well as the grassy paddock areas. The individual Sydney Blue Gum on the site contains a large number of hollows of various sizes that would provide potential breeding habitat for various hollow-dependant threatened fauna, such as the following:

- Glossy Black-Cockatoo (*Calyptorhynchus lathami*);
- Large-footed Myotis (*Myotis adversus* - an insectivorous bat);
- Eastern Freetail Bat (*Mormopterus norfolkensis*); and
- Hoary Wattled Bat (*Chalinolobus nigrogriseus*).

The Sydney Blue Gum is also (anecdotally) known to provide breeding habitat for other, non-threatened, species including the following:

- Wood Duck (*Chenonetta jubata* - also known as the Maned Duck);
- Rainbow Lorikeet (*Trichoglossus haematodus*); and
- Crimson Rosella (*Platycercus elegans*).

The grassy paddock areas of the site (particularly on the river flats in the western part) may also provide a seasonal forage resource for the following endangered and vulnerable frog species:

- Giant Barred Frog (*Mixophyes iteratus*);
- Stuttering Frog (*Mixophyes balbus*); and
- Green-thighed Frog (*Litoria brevipalmata*).

In wet weather during late spring and summer, all these species are known to move well away from streams to forage for prey in open areas of grassland and to also move about in search of mates (DEC 2006). The grassy flats were also identified as potentially providing periodic foraging habitat for all the following vulnerable species:

- Square-tailed Kite (*Lophoictinia isura*);
- Masked Owl (*Tyto noaehollandiae*); and
- Stephens Banded Snake (Hoplocephalus stephensii).

The remnant vegetation on the site is also mapped as Tertiary Koala habitat on Council's Koala Habitat Plan of Management (Lunney *et al.*, 1999). Koalas (*Phascolarctos cinereus*) are an internationally known "iconic" and vulnerable species that may potentially utilise some of the isolated trees on the site, in particular the individual specimens of Flooded Gum and Sydney Blue Gum.

7.2.4 Impact Assessment

The Flora and Fauna Assessment has found that no areas of remnant vegetation would be affected by the water treatment plant proposal, however a number of isolated trees would still require removal from the site, these being mainly the exotic species, Camphor Laurel, but also the Australian native but not locally indigenous, Black Bean and Macadamia, that have apparently been planted on the site at some time in the past. The only locally indigenous tree requiring removal is the mature Flooded Gum that is located adjacent to the existing residence on the site. The large, hollow-bearing Sydney Blue Gum should be retained and protected, as the observed hollows represent potential breeding habitat for various threatened arboreal species. The grassy flats adjacent to the Orara River would remain largely unaffected by the proposal, as would the entire area of riparian forest immediately adjacent to the River.

Therefore, the only significant impact proposed to trees that are currently on the site would be the removal of the mature Flooded Gum. The only threatened fauna species considered to be affected by this removal would be the Koala. Therefore, an Assessment of Significance, addressing the requirements of Section 5A of the EP&A Act would be required. An appropriate assessment has been conducted by Eco Logical and found the following:

- No threatened species' habitat is proposed for removal, apart from one mature Flooded Gum (*Eucalyptus grandis*). The removal of an individual Koala food tree is not considered likely to place any extant local Koala population at risk of extinction, however replacement of potential habitat for the Koala (and various other threatened species) is proposed through planting of locally indigenous trees that would create a link with remnant native vegetation on the site. This proposed action is consistent with the *draft Koala Recovery Plan*, (published by DEC, 2003) in that the potential impact upon the Koala population would therefore be negated;
- Whilst the action proposed to remove a native tree specimen would otherwise constitute part of a "Key Threatening Process" (i.e., clearing of native vegetation), the proposed mitigative planting would serve to replace the original native vegetation on the site; and

- No critical habitat, endangered population, Endangered Ecological Community or Critically Endangered Ecological Community is likely to be affected by the proposed development.

The full text of the Assessment of Significance is provided as an Appendix to the Flora and Fauna Assessment, presented in ***Appendix 7***.

It is also necessary to consider whether the proposed WTP facility is likely to impact on any threatened aquatic species, fish or macroinvertebrates or their habitat. The proposed development would be located approximately 250 metres from the Orara River, however it is not expected to impact on this watercourse in any way. Therefore, the construction and operation of the proposed WTP is unlikely to result in any significant impacts on threatened aquatic species, fish or macroinvertebrates or their habitat.

The proposal does not involve any changes to the existing water extraction processes to supply Karangi Dam. The potential impacts on the aquatic environment from the water extraction, including potential impacts on threatened aquatic species as a result of water extraction to supply Karangi Dam have been previously assessed within the Regional Water Supply Project EIS prepared by ERM in 1999.

7.2.5 Recommended Mitigation Measures

The footprint of the proposed WTP and associated infrastructure has been chosen to minimise and avoid both the direct and indirect impacts on flora and fauna at this locality, especially in relation to identified threatened species and to the requirements of Council's adopted flora and fauna conservation strategies (including Council's Koala Habitat Plan of Management (Lunney *et al*., 1999)). Consequently, it is considered that significant impacts on the biodiversity of the area are unlikely. Nevertheless, a number of mitigation and management measures are proposed to prevent direct or indirect impacts of this proposal on flora or fauna, or their habitat, within the study area. The proposed mitigation and safeguard measures include:

- The large, hollow-bearing Sydney Blue Gum on the site would be retained and appropriately protected;
- Planting along the south-western boundary of the site would be conducted with local Koala food tree species (including Tallowwood, Flooded Gum and/or Sydney Blue Gum) in order to create a vegetated link between the riparian vegetation on the Orara River and the remnant Tallowwood – Blue Gum open forest at the southern corner of the site. Seed would be sourced from appropriate local trees and planting would be undertaken according to advice from appropriate personnel with specific knowledge of local Koala populations and relevant ecological requirements, for example from Council's Koala Management Advisory Committee;
- An observer with appropriate local ecological experience would be present on-site during any required tree removal or other significant disturbances to extant vegetation, in order to ensure that the welfare of any wildlife potentially using these resources is appropriately managed at all times; and
- During the construction period, construction personnel and all other on-site staff and visitors would be appropriately made aware of the possible presence of wildlife on the site and would be advised to exercise caution when departing or traversing the site.

7.3 Bushfire Risk Assessment

This bushfire risk assessment has been based on the Bush Fire Prone Land mapping carried out by Coffs Harbour City Council, in liaison with the Rural Fire Service (RFS).

Existing Fire Risk

Council mapping indicates that the area of vegetation to the southeast of the proposed WTP is considered Category 1 Bushfire Prone Land (see ***Figure 7.2***), and includes a buffer width of approximately 100 metres.

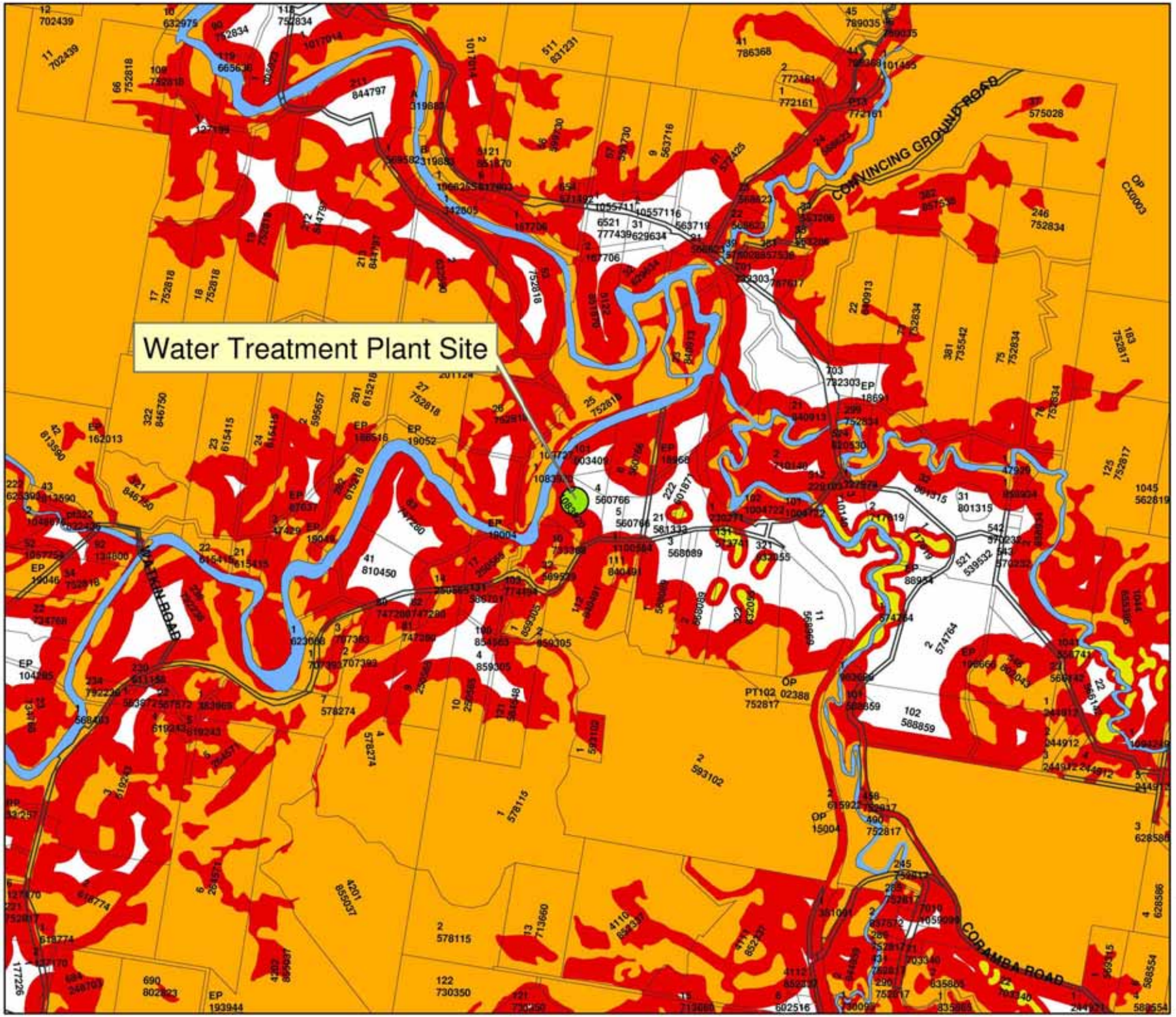
Most of the rest of the site is cleared with scattered trees. The current development footprint does not fall directly within the bushfire prone land or even the buffer zone.

Recommended Fire Management Measures

The need for an Asset Protection Zone (APZ) around the nearest elements of the proposed WTP facility to the stand of vegetation classified as Bushfire Prone Land has already been the subject of informal consultation with local officers of the RFS. Council has been verbally advised by the RFS that there would be no requirements for the establishment of an APZ for a WTP development, due to its nature and intended use as a non-habitable structure. The WTP design would, nevertheless, incorporate the use of a sealed perimeter road that would thus provide the fire protection benefits of a formally defined APZ, regardless of any formal requirements in this regard.

As the area mapped as bushfire prone land already includes a 100 m wide buffer zone and the development footprint includes a roadway around the entire development area, the development itself would not fall within the area deemed to be bushfire prone land, or buffer land and it is considered that no other mitigation measures would therefore be required.

Also, no further consultation with the local officers of the RFS is considered necessary with respect to this issue.



COFFS HARBOUR CITY COUNCIL

Bush Fire Prone Lands
Coffs Harbour LGA

Bush Fire Prone Land
- Vegetation Category 1
- Vegetation Category 2
- Vegetation Buffers - 100m & 30m
- WTP_Site

This map compiled by
Coffs Harbour City Council
GIS Section
February 2007

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7.4 Noise Impacts

A noise impact assessment for the proposal was undertaken by GHD. This assessment provides details of existing noise levels at nearby receivers, calculates the noise impact assessment criteria for the construction and operation of the WTP based on existing noise levels and relevant DECC guidelines, predicts the noise levels that are expected to result from the construction and operation of the site and provides an assessment of these levels against relevant criteria. A summary of the key noise findings is provided in this section and the full report is included in ***Appendix 8***

7.4.1 Existing Noise Levels

Noise sensitive receptors are generally defined as residential areas, hospitals, schools, caravan parks and other similar uses where people are present for an extended period. Identified potentially sensitive locations within the vicinity of the proposed WTP are limited to sporadic rural lots, primarily located to the south and west of the site. The nearest sensitive residential receiver ("R1") is located approximately 100 m southwest from the proposed site.

In order to establish background noise levels, unattended noise monitoring was undertaken at two representative locations within the vicinity of the proposed WTP. Unattended monitoring was undertaken using two EL 315 noise loggers, set to measure 15-minute data from 19 October to 26 October, 2006.

Noise logger 1 was located to the east of the site (approximately halfway from Upper Orara Road to Orara River). Noise logger 2 was located near the south western corner of the site (refer to full report in ***Appendix 8*** for further details on logger location) Tables 7.1 and 7.2 present the results of the noise monitoring activities that were undertaken.

Table 7.1Noise monitoring results – Background L_{A90} Noise Levels at Logger 1 (dB(A))

Date	Day (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night (10 pm to 7 am)
20/10/06	33.8	24.9	23.7
21/10/06	23.2	23.2	23.2
22/10/06	23.2	24.1	25.1
23/10/06	25.5	36.8	29.9
24/10/06	32.3	38.3	31.6
25/10/06	34.3	39.6	29.6
26/10/06	29.1	24.0	27.7
27/10/06	-	-	27.7
Rating Level Background	29.1	24.9	27.7

Table 7.2Noise monitoring results – Background L_{A90} Noise Levels at Logger 2 (dB(A))

Date	Day (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night (10 pm to 7 am)
20/10/06	34.4	37.3	
21/10/06	32.6	36.0	34.7
22/10/06	32.2	30.6	32.4
23/10/06	33.0	31.4	29.2
24/10/06	33.3	33.4	28.7
25/10/06	35.2	34.6	31.7
26/10/06	32.8	34.2	31.3
27/10/06	-	-	30.3
Rating Level Background	33.0	34.2	31.3

Long-term noise monitoring and attended observations indicated an ambient noise environment that is primarily described by natural resources such as wildlife with intermittent contributions from man made sources such as traffic and vehicles associated with the adjacent sub-station, cattle transport and logging.

Construction Noise Criteria

Criteria for the construction phase applied to the assessment were sourced from Section 171 of the Environmental Noise Control Manual. The criteria were established using the measured background noise levels and applying a conversion factor based on the expected construction period. Construction noise criteria based on background noise levels are shown in Table 7.3, below.

Table 7.3: Construction Noise Criteria

Construction Period	Level restrictions	Logger 1 L_{A10} (dB(A))	Logger 2 L_{A10}(dB(A))
Less than 4 weeks	Background + 20 dB(A)	50*	53
Less than 26 weeks	Background + 10 dB(A)	40*	43
More than 26 weeks	Background + 5 dB(A)	35*	38

* Note – The INP states that where the rating background level is found to be less than 30 dB(A), then it is set at a minimum of 30 dB(A), therefore the background levels have been adjusted to 30 dB(A) before applying the conversion factor.

Since the construction period is expected to continue for longer than 26 weeks, 35 dB(A) will be adopted as the project specific noise goal.

Operational Noise Criteria

The NSW Industrial Noise Policy (INP) provides guidance on the assessment of operational noise impacts. The guidelines include both intrusive and amenity criteria that are designed to protect receivers from noise significantly louder than the background level and limit the total noise from all sources near a receiver. Intrusive noise limits set by the INP control the relative audibility of operational noise compared to the background level. Amenity criteria limit the total level of extraneous noise with consideration to the landuse of the receiver. The lower of the intrusive or amenity criteria is then set as the project specific noise level.

7.4.2 Impact Assessment

Construction Noise Assessment

A detailed list of construction equipment, an indicative timeline of events and the expected maximum noise levels produced by each item (sourced from AS 2436 – 1981 *Guide to Noise Control on Construction Maintenance and Demolition Sites* and from GHD's internal database) were used to estimate construction noise levels. Modelled sound power levels for construction equipment are shown in ***Table 7.4***.

Table 7.4 Construction Equipment Sound Power Levels (L_w), dB(A)

Item	(L_w), dB(A)	Relative Height (m)
Bobcat	112	1.5
Bulldozer	117	1.5
Chainsaw	102	1

Item	(L_w), dB(A)	Relative Height (m)
Compactor	114	1
Concrete mixer	117	2
Concrete pump	114	2
Concrete Vibrator	108	2
Crane, Derrick	118	2
Crane, Mobile	110	2
Excavator	114	2
Grader (G12)	114	2
Large truck	103	3
Mulcher	98	3
Roller	106	2
Scraper	112	2

Acoustic modelling was undertaken using Computer Aided Noise Abatement (CadnaA) to predict the effects of the construction noise generated by the proposed WTP. CadnaA is a computer program for the calculation, assessment and prognosis of noise exposure.

An indicative construction program is shown in ***Table 7.5*** It was assumed that the majority of significant construction works (with respect to noise impact) would take place during the initial clearing and earthworks phases. During this period all items were modelled to operate at full power when in use whilst also running simultaneously at locations on the site closest to the sensitive receivers, to ascertain a worst case scenario.

Table 7.5 - Construction Program

Description	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20
Mobilise																				
Earthworks																				
Control Building																				
DAFF Building																				
Chemical Storage Building																				
Switchroom 2																				
Treated Water Storage																				
Washwater Tank																				
Treated Water Pump Station																				
Switchroom 1																				
Sludge Building																				
Sludge Thickener																				
Switchroom 3																				
Inground Services																				
Raw Water Pump Station																				
Chlorine Building																				
Commissioning																				

Table 7.6 provides a summary of noise levels for the modelled configuration and ***Figure 7.3*** provides further detail through the plotting of construction noise contours.

Table 7.6 Modelled Construction Noise Results

Receiver Location[1]	Sound Power Level dB(A)
R1	55
R2	48
R3	49
R4	50
R5	50

1 – refer to figure 7.3 for further details on the receiver location.

The modelled configuration of all machines operating at their maximum power would result in the potential for the adopted noise criteria of 35 dB(A) to be exceeded at the nearest receivers. The construction noise impacts are considered to be a conservative representation due to the following:

- It would be highly unlikely that all the machinery would be operating at full power at the same time.
- Individual items of machinery would only be operating at full power for brief stages with machinery producing lower sound levels while carrying out activities not requiring full power.
- Mobile machinery would likely move about, which would variously alter the directivity of the noise source with respect to the individual receivers. Additionally works would not be concentrated in the areas closest to the sensitive receivers for extended periods.
- The dominant sources of noise were the grader and scraper, which are proposed to be used during the initial 8 week period for the earthworks and clearing phase and thus not used throughout the entire construction period.

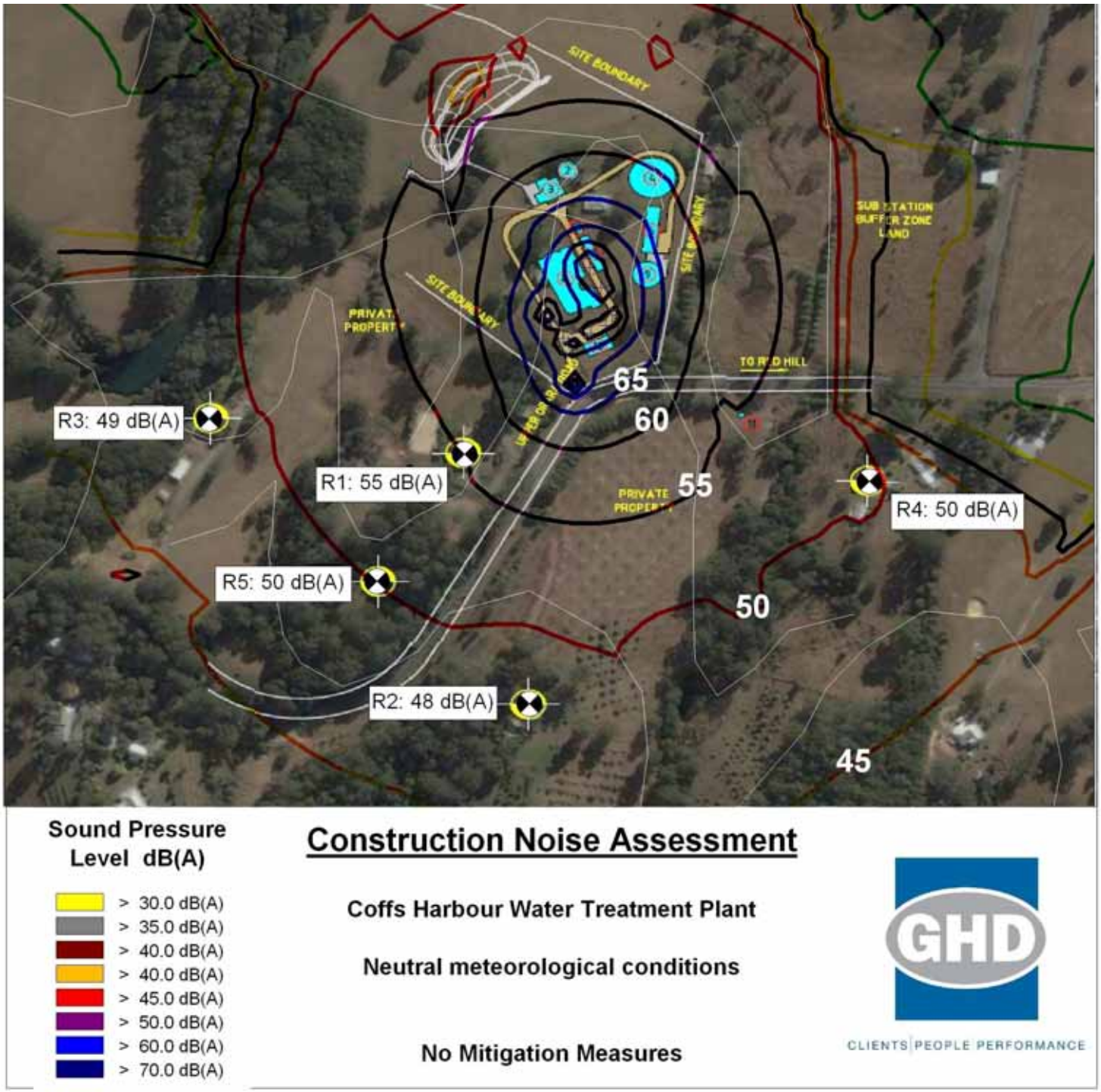


Figure 7.3: Construction Noise Assessment

Operation Noise Modelling

The operational acoustic modelling was undertaken using CadnaA as per the construction noise model to predict the effects of the industrial noise generated by the proposed WTP. The model assumed that all noise sources are to operate continuously at any one time. CadnaA considers topography, weather conditions, reflection, ground absorption, site sources and the location of the receiver areas to predict received noise levels from the proposed WTP. Modelling was undertaken based on a number of scenarios with differing meteorological and operational conditions.

Results of the noise modelling indicate that the operational noise is unlikely to exceed project specific noise levels during the day, evening or night time periods. The operational noise modelling reflects the latest design option of no structure enclosing parts of the plant (rapid mix and flocculation tanks). This scenario was modelled with wind towards the southwest in the direction of the residential receiver considered closest to the proposed WTP. Results of the noise modelling without a structure over the rapid mix and flocculator tanks indicated that the operational noise is unlikely to exceed project specific noise levels during day, evening and night time periods.

7.4.3 Noise Mitigation Options

Results of the modelling suggest noise emanating from the operation of the WTP is unlikely to exceed project specific noise levels. However, noise from construction activities is likely to be audible to nearby residents, and as such the following measures are recommended:

- During construction activities, it is recommended that Council should advise residential receivers located within close proximity to the site of the anticipated construction program and keep residences informed throughout the construction period;
- All construction activities (including deliveries and haul trucks) would be limited to normal business days between 7 am and 6 pm and on Saturdays, between 8 am and 1 pm;
- All site workers would be sensitised to the potential for noise impacts on the local residents and encouraged to take all practical and reasonable measures to minimise noise during the course of their activities;
- All construction equipment would be maintained in good condition.
- All combustion engine plant will be checked to ensure they produce minimal noise and fitted with residential grade exhaust silencers;
- Whenever practical, machines would be operated at low speed or power and switched off when not being used; and
- Machines found to produce excessive noise should be removed from site or stood down until repairs or modifications can be made.

Based on the results of the operational noise assessment it is believed that the proposed WTP would meet project specific noise goals during general day and night time operations.

7.4.4 Summary

Given the relatively quiet noise climate in the subject area and the proposed duration of construction activities, construction noise has the potential to exceed the relevant criterion at the nearest residences. Although this is not uncommon for construction sites, the depth of the issue is alleviated

by the fact that the construction activities are temporary in nature. However, the constructor is responsible to take all reasonable and practicable steps to ensure the noise impact on local residents is minimised at all times. To that effect construction mitigation measures are outlined in ***Section 7.4.3***.

7.5 Visual Amenity

A Visual Impact Assessment report was prepared by GHD in February 2007 with a copy of GHD's Visual Impact Assessment report presented in ***Appendix 3***. The Assessment investigated whether any potential visual impacts would be imposed on the surrounding environment from the development of the proposed WTP facility. The Assessment reviewed the existing visual character of the site and surrounding area, the expected impacts of the development on the existing, nearby residential development and other publicly accessible locations, such as Upper Orara Road. Specifically, the Visual Impact Assessment report considered all the following:

- Existing views to the proposed site;
- The visual character of the surrounding landscape;
- The sensitivity of the landscape to alteration by the proposed WTP facility;
- The visual character and extent of the proposed WTP; and
- "Viewer-sensitivity" to alteration, by the proposal, of the existing visual environment.

The report also made appropriate recommendations to mitigate the identified potential impacts. The following sites (i.e., viewpoints) were considered in GHD's Visual Impact Assessment with the location of the residences shown in ***Figure 7.4***:

- The view from the roadway at Upper Orara Road, Karangi;
- The view from the roadway at Casuarina Lane, Karangi;
- The view from the residence at 146 Upper Orara Road, Karangi (refer to Property 1, ***Figure 7.4***);
- The view from the residence at 147 Upper Orara Road, Karangi (refer to Property 2, ***Figure 7.4***);
- The view from the residence at 186 Upper Orara Road, Karangi (refer to Property 3, ***Figure 7.4)***;
- The view from the residence at 121 Upper Orara Road, Karangi (refer to Property 4, ***Figure 7.4***); and
- The view from the residence at 156 Upper Orara Road, Karangi (refer to Property 5, ***Figure 7.4***).

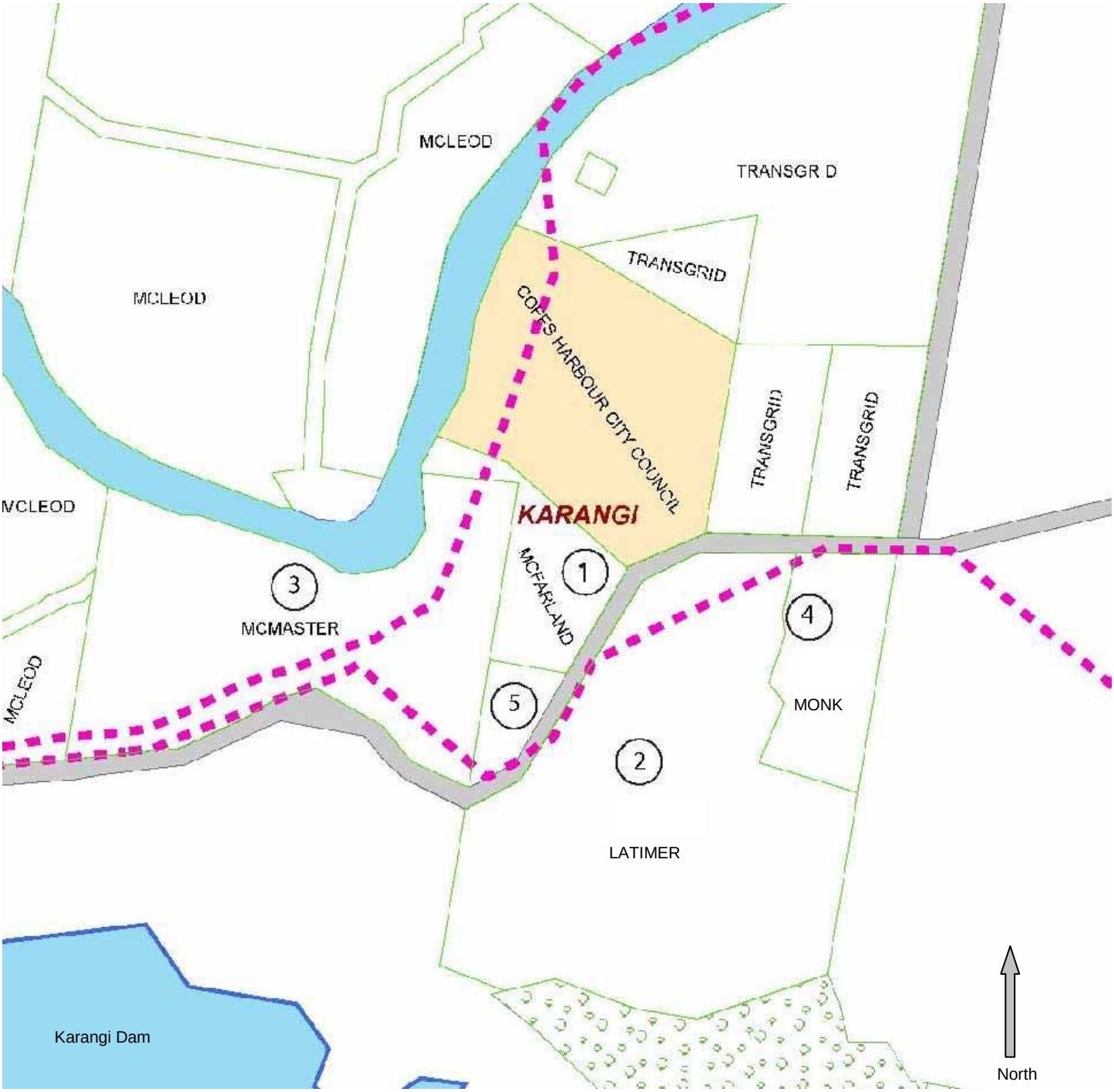
From each of the above sites, views to the proposed WTP were assessed against a suggested set of "desirable outcomes" that were adopted in order to provide standard criteria against which the potential impact to each viewpoint may be measured. The adopted desirable outcomes are as follows:

- That the construction phase of the WTP should not cause any long-term visual impacts i.e. visual impacts that would continue to exist after the construction of the WTP and associated infrastructure;
- That the WTP and associated infrastructure would not be able to be viewed with the sky as a backdrop;
- That the WTP and associated infrastructure would not interrupt the view from any public location

or nearby property towards any landscape feature;

- That the WTP and associated infrastructure should not detract from the visual amenity of an important visual or cultural element, or landscape;
- When viewed from a nearby property, or a public location, the WTP and associated infrastructure should be of a scale that is appropriate to the setting; and
- That the WTP and its associated infrastructure should be constructed of materials and comprise only built forms that are sympathetic to the proposed development's surrounds (from a visual point of view).

An overall assessment of the potential visual impact was made against each of the above criteria and the potential visual impact of the proposed WTP development was then given an overall rating of either "low", "medium" or "high" impact, with respect to each affected location, as shown in Table 7.5.



Indicates WTP site.

Indicates Property Boundary

Indicates Pipelines (Raw Water Pipeline to the north of WTP site, Karangi Dam to Red Hill balance tank trunk main to the south of the WTP site).

Figure 7.4: Locality of Adjacent Residences

Table 7.5 Visual Ratings Adopted for the Assessment

Rating	Conclusions with respect to "Desirable outcomes"
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.

The results of the Visual Impact Assessment study are summarised in Table 7.6.

Table 7.6 Summary of findings for affected properties and public locations

Viewing Site	Summary of Findings	Potential Impact
Upper Orara Road	◗ Some construction works would be visible from the road but no long term visual impacts are expected; ◗ WTP would not be viewed against the sky and would interrupt views to distant hills but only partially interrupt views to other landscape features; ◗ WTP would be an obvious built element but would unlikely detract significantly from the visual amenity of the existing rural context; ◗ Materials & colours of the WTP would contrast with the natural backdrop; and ◗ Vegetation buffers should be used to screen any view to the WTP.	Medium Impact (refer to ***Figure 7.5***)
Casuarina Lane	◗ Vegetation restricts views to project site from property and therefore it is not possible to view the project site.	No impact
146 Upper Orara Rd, Karangi	◗ Some construction works would be visible from the road but no long term visual impacts are expected; ◗ WTP would be able to be viewed against the sky, a portion of the WTP would be highly visible but would not interrupt views to distant hills; ◗ WTP would be an obvious built element but would unlikely detract significantly from the visual amenity of the existing rural context; ◗ Materials & colours of the WTP would contrast with the natural backdrop; and ◗ Vegetation buffers should be used to screen any view to the WTP.	Medium Impact (refer to ***Figure 7.6***)

Viewing Site	Summary of Findings	Potential Impact
147 Upper Orara Rd, Karangi	◗ Vegetation restricts views to project site from the property and therefore it is not possible to view the project site; ◗ Deciduous trees may increase the visibility of the WTP during winter; and ◗ Vegetation buffers should be used to screen any view to the WTP.	Low Impact
186 Upper Orara Rd, Karangi	◗ Some construction works would be visible from the road but no long term visual impacts are expected; ◗ WTP would not be viewed against the sky, a portion of the WTP would be highly visible but would not interrupt views to distant hills; ◗ WTP would be an obvious built element but would unlikely detract significantly from the visual amenity of the existing rural context; ◗ Materials & colours of the WTP would contrast with the natural backdrop; and ◗ Vegetation buffers should be used to screen any view to the WTP.	Medium Impact (refer to ***Figure 7.7***)
121 Upper Orara Rd, Karangi	◗ Vegetation restricts views to project site from the property and therefore it is not possible to view the project site; ◗ Deciduous trees may increase the visibility of the WTP during winter; and ◗ Vegetation buffers should be used to screen any view to the WTP.	Low Impact
156 Upper Orara Rd, Karangi	◗ Vegetation restricts views to project site from the property and therefore it is not possible to view the project site	No impact

Figure 7.5: View of WTP – Upper Orara Road

Figure 7.6: View of WTP – 146 Upper Orara Road

Figure 7.7: View of WTP – 186 Upper Orara Road

7.5.1 Recommendations

The following recommendations have been made to reduce visual impact for affected properties and public locations. These recommendations relate to installing screening plants, retaining existing vegetation and recommended colours and material of the WTP buildings:

- Install screen planting immediately on the southern and western boundaries of the proposed WTP site. This vegetation should be planted in a manner consistent with the buffer planting recommendations made in Section 8 of the Visual Impact Assessment report presented in ***Appendix 3***. Screen plantings are to be located between the southern and western boundaries and the proposed control building, DAFF building and the Chemical Plant;
- Screen plantings should be established along the entire length of the southern and western boundaries (but not including at the site entrance, along the southern boundary). Screen planting should include trees, shrubs and ground cover to create a dense visual barrier and foliage should be compact and dense to maximise the efficiency of the planting and to create the best possible visual screen;
- A muted colour would be selected for the southern WTP buildings in order to minimise the potential for the bulk of the WTP to visually "compete" with the rural context of the surrounding area. Note the specific colour has not yet been determined, the photomontages (shown in ***Figures 7.5 – 7.7***) show a main structure colour scheme that expresses the different materials;
- All existing vegetation would be maintained (on the boundaries) between affected properties and the proposed WTP site;
- Internal WTP spaces should be kept "simple" and uncluttered to minimise the potential for the site to look untidy;
- Council would liaise with the property owners at 186 Upper Orara Road, Karangi, with a view to installing a planted buffer at the top of the ridge between this property and its views towards the proposed WTP site;
- Install native vegetation between properties at 121 and 147 Upper Orara Road, Karangi and the proposed WTP site to provide ongoing visual screen of the WTP from these properties.

7.6 Aboriginal Heritage

An Aboriginal Cultural Heritage Assessment Report was compiled by Jacqueline Collins, Consultant Archeologist, of Dunbogan, NSW in December 2006, following a surface inspection of the proposed WTP site that was undertaken on 6 September 2006, in conjunction with nominated representatives (i.e. elders) of the Coffs Harbour and District Local Aboriginal Land Council (LALC) and the Gumbula Julipi Elders Corporation. A copy of the Aboriginal Cultural Heritage Assessment Report is presented in ***Appendix 4*****.**

The proposed WTP facility would directly impact less than 2.5 hectares of land at the Upper Orara Road site, however the construction activities required for the range of buildings, tanks, pumps, lagoon and connecting roadways and the fact that some of these facilities need to be constructed on a level platform mean that significant excavation would need to be undertaken, particularly within the eastern portion of the property. Owing to the extent of these excavations and other earthworks it is anticipated that the development required for the proposed WTP facility may result in the destruction

of any Aboriginal sites that might occur within the required footprint. The September 2006 site inspection was judged to be inconclusive as it was not possible to fully appraise the extent of the area to be impacted only on a "visual" basis, mainly due to the masking effects of both the pasture vegetation and the yet-to-be excavated topsoil layer in place during the site inspection. The subsurface testing of the site has been undertaken by Jacqueline Collins under the supervision of the LALC and Gumbula Julipi Elders.

Section 75U of the EP&A Act, 1979 removes the requirement for approved projects subject to Part 3A of the EP&A Act, 1979 to obtain permits or consent under Sections 87 and 90 (Part 6) of the *National Parks and Wildlife (NPW) Act 1974*. The term 'approved project' also applies to the investigations required for the purpose of complying with the EA requirements in connection with an application for approval to carry out the project. Typically an application under Section 87 is required for developments and activities not subject to Part 3A of the EP&A Act 1979 prior to any excavation or disturbance of land for the purpose of discovering an Aboriginal object.

To ensure that all the appropriate information has been gathered and adequate consultation with interested parties (such as the LALC) has been undertaken the investigations and reporting process has been undertaken to date in accordance with the application requirements under Section 87 (Part 6) of the *NPW Act 1974*. The requirements for a Section 87 application are outlined in the DECC's *Interim Aboriginal Community Consultation Requirements* document.

A substantial part of the process of applying for approval under Part 6 of the Act is to first invite the participation of all interested groups or individuals who may wish to be further involved in the assessment process. Appropriate written notification describing the proposed WTP facility and the archaeologist's intention to prepare a cultural heritage assessment report was therefore mailed to the following organisations:

- Coffs Harbour and District LALC;
- Gumbula Julipi Elders Corporation;
- Registrar of Aboriginal Owners, NSW Department of Aboriginal Affairs;
- NSW Native Title Services;
- Coffs Harbour City Council; and
- The DECC.

A newspaper notice was also placed in the *Coffs Harbour Advocate* on 7 October 2006, inviting any interested parties to contact Council to formally register their interest in contributing to the assessment process. Responses were received from the Coffs Harbour and District LALC and the Gumbula Julipi Elders Corporation, as well as from the DECC. The DECC requested that a further opportunity to register interest should also be extended to the following additional groups:

- Garby Elders Corporation;
- Yarrawarra Aboriginal Corporation; and
- Mudjay Elders.

Verbal advice was subsequently received from the Chairperson of the Garby Elders Corporation and from the Manager of the Jalumbo Cultural Heritage Unit of the Yarrawarra Aboriginal Corporation. Both Corporations advised that the Karangi area is not within their group's area of interest and that the Gumbula Julipi Elders would be the most appropriate group for the archaeologist to consult

further with. A further letter to a spokesperson for the Mudjay Elders was also forwarded at that time, also inviting their involvement, but to date no response has been received to this letter.

As a result, the Coffs Harbour and District LALC and Gumbula Julipi Elders were formally endorsed as the registered stakeholders in relation to the archaeologist's assessment. Each of these registered stakeholders was then formally invited to comment upon and to assist in any refinement required of the proposed assessment methodology. No responses were subsequently received, however the final draft of the archaeologist's report was later forwarded to each stakeholder for further comment.

As mentioned previously, Karangi lies within the traditional country of Gumbaingirr-speaking people, traditionally inhabiting an area from the Clarence River to at least as far south as the Nambucca River. The Gumbaingirr traditionally comprised a number of distinct but interrelated groupings of people, each associated with a defined geographical area and each sharing a range of economic and trading resources and also participating in a range of shared ceremonies and ceremonial occasions.

Despite a subsequent decline in population numbers and the significant changes brought about by European settlement, many local Gumbaingirr were still able to maintain traditional knowledge of, and relevant associations with the regional landscape within their traditional areas. In addition to important ceremonial and meeting places, information relating to such things as travelling routes, resource use and close relationships to land has been able to be handed down through surviving generations.

In an effort to assess any traditional and contemporary Aboriginal cultural heritage values that may be associated with the Upper Orara Road site, the above mentioned consultation needed to be undertaken with the elders and with other relevant knowledge-holders identified by the archaeologist. This consultation revealed that Mount Coramba, situated about 4.5 kilometres north-east of the proposed WTP site, is regarded as the most culturally-significant site within the surrounding hinterland area. The only other place of ceremonial, mythological or other significance identified during this process is a site associated with the pools at Bangalor Falls on the Urumbilum River (a tributary of the Orara River), situated more than 10 kilometres south-west of the study area.

Cochranes Pool, approximately 2 kilometres upstream of the study area, in the Orara River, was also identified as possibly having some traditional significance, however the actual degree and nature of this Pool's significance is apparently no longer able to be determined.

The archaeologist reports that the Upper Orara-Karangi area is valued as a "marchland" area, containing a network of traditional walking trails that followed the main ridges between the Bellinger and Clarence Rivers, however no known transit routes are located in or near the study area.

A number of campsites that were being used at the time of first European contact are known to have been generally located close to waterways in the Upper Orara-Karangi locality, including one campsite on the site of the Karangi Public School, about 1.25 kilometres north-east of the proposed WTP site. No other mapped or otherwise significant historic sites have been identified as occurring within or anywhere close to the study area.

Analysis of previous data collected in the area will usually provide an insight into the types, frequency and environmental context of sites that have been previously recorded. A number of archaeological surveys / investigations have been conducted within the local and broader area in response to other development proposals. The archaeologist's report (presented in ***Appendix 4***)

includes a summary of the findings of these previous reports. For example, the results of archaeological test excavations conducted in 2005 on locations proposed for electricity transmission line towers, immediately to the east of the present study area, are of particular relevance to this assessment. The artefacts recovered at this location comprise seven unmodified flakes, one flake fragment and a multi-platform core.

As further detailed in Table 1 of the archaeologist's report, 19 Aboriginal sites have been previously registered on the *DEC's Aboriginal Heritage Information Management System* (AHIMS) within a five kilometre radius of the study area, including 10 artefact scatters, five isolated finds, three scarred trees and a natural mythological site. All of the registered artefact sites are associated with ridge and spur landforms, occurring on crests, knolls, upper slopes and mid-slopes. None of these registered sites are located within the study area itself (i.e., within any of the subject land parcel at Upper Orara Road), however, as also detailed in the archaeologist's report, nine stone artefacts were recovered during a subsurface investigation of the registered site known as "Site #22-1-208", on an immediately adjacent spur above the Orara River.

Searches of the Australian Heritage Database maintained by the Commonwealth Department of Environment and Heritage, the NSW State Heritage Register and Schedule 2 (Heritage Items) of the North Coast Regional Environmental Plan and Schedule 5 of the Coffs Harbour LEP have revealed no listed Aboriginal sites or places in or close to the study area.

As mentioned above, a full field inspection of the study area was conducted on 6 September 2006, however no archaeological materials were detected, as already noted above, as surface visibility is significantly obscured at this site. Therefore, based on current knowledge of the archaeological sensitivity of similar topographical areas (especially level spur crests), the previous recovery of artefacts on the spur adjacent to the site and the number of artefact occurrences previously recorded within the local area, the archaeologist has concluded that the proposed WTP site at 140 Upper Orara Road has the potential to contain subsurface evidence (especially stone artefacts) of previous Aboriginal occupation of possible cultural, educational and scientific value.

Both registered stakeholder groups acknowledge that the development of the proposed WTP facility is critical to the maintenance of the local water supply and neither have any principal objections to the proposal proceeding, providing that such subsurface investigation is first appropriately conducted in order that the potential impacts of the proposed development may be more comprehensively understood and assessed, prior to proceeding further.

7.6.1 Subsurface Archaeological Investigation

Although the final report for the subsurface investigation was not finalised, Jacqueline Collins was able to provide a summary that has been reviewed and verbally agreed to by the LALC and Gumbula Julipi Elders. A copy of the summary has been included with the Aboriginal Cultural Heritage Assessment Report in ***Appendix 4***.

The subsurface archaeological investigation, undertaken on the 21st, 22nd and 23rd of May 2007, involved the excavation of 44 two square metre test pits, systematically spaced at 15 metres intervals across the crest and upper slopes of the spur to be impacted by the development.

Forty stone artefacts were recovered from 23 of the 44 test pits, giving an average of 0.45 artefacts per square metre over the investigation area. The recovered artefacts included:

- Unmodified flakes and flake fragments (77.5%);
- Cores (15.5%); and
- Flaked pieces (5%).

Due to the low artefact density and restricted range of artefact types, it has been concluded that the investigation site was used on a short term itinerant basis. Although the LALC and Gumbula Julipi Elders consider all sites within their territory to have at least some cultural value the aboriginal stakeholders have assessed the investigation site to have a low level of cultural significance with the results indicating that the site is not culturally stratified. It is reasonable to assume that the site was used by at least some of the people who occupied nearby registered sites, such as Mount Browne.

7.6.2 Recommended Measures

- The archaeologist report for the subsurface investigation is to be finalised and any additional recommendations incorporated into the environmental management plan as required.
- The LALC and Gumbula Julipi Elders are to be given the opportunity to re-deposit any of the recovered artefacts at a location agreed to with Council (preferably the 140 Upper Orara Road Site) following the completion of all development related disturbance works.
- In the unlikely event that any material of potentially high cultural significance is uncovered during any stage of the development all disturbance works must cease in the vicinity of the find. The DECC, LALC and Gumbula Julipi Elders would then be required to be immediately contacted for management advice.
- Council would continue to closely liaise with the LALC and Gumbula Julipi Elders in relation to cultural matters and be kept informed of the timetable for works associated with the planning and construction of the WTP.

7.7 Historic (European) Heritage

A Statement of Heritage Significance was compiled by Jamison Architects Pty Ltd (Jamison) in October 2006 for the old Dairy Bails structure at “Avondale”, i.e. the site now known as 140 Upper Orara Road, Karangi. The Statement considers the historic, aesthetic and technical attributes of this historic structure and the potential impacts of the proposed construction of the WTP development that may be relevant to this structure and its associations with any local or broader heritage significance. This section provides a summary of the contents and recommendations of Jamison’s Statement. A copy of the Statement is presented in ***Appendix 5.***

The study area

The study area considered by Jamison was generally limited to the Orara Valley, although as the Orara valley is part of the adjacent Clarence Valley watershed, some background research was also done on the early dairy industry in the Clarence Valley, centered on the city of Grafton.

Understanding the Place

After the cedar cutters and the early gold strikes, the first land grants in the Orara Valley were in the 1880’s. Patrick O’Neil took up a grant on what is now known as ‘Avondale’ in 1889 and settled with

his family.

The local dairy industry began utilizing technological advances from the 1890's with the introduction of centrifugal separators. Creameries were then established at strategic locations so that farmers could bring their milk for separation. By 1910 these creameries were replaced by butter factories, with concrete floors being required following the introduction of the new Dairy Act that came into force in 1919.

There are a number of pre 1919 dairy bails in the Orara Valley including the slab only and separate separator room of Jack O'Neil (at the old Upper Orara Road) and the partly collapsed Fred Walter's cow bails (in Walters Road). Photos of these sites are available in the full report contained in ***Appendix 5***.

The 'Avondale' dairy bails were probally built in the early 1930's with milking continuing from this dairy bail until the 1960's. The insufficient alluvial soils, distance to markets, the advent of margarine and the loss of Britain as a market led to the continued struggle of the dairy industry to survive in the Orara Valley and by 1970, eighty three dairy sheds had closed.

Methodology

Readily available information was gathered by Jamison on the technological aspects of the dairy industry and the relevant state legislation that affected the locality in the early twentieth century.

Local research also included discussions with Mrs. Betty Hudson, the grand-daughter of the holder of the original "Avondale" land grant (1889) and with Mr. Doug Hoschke, a lifetime resident of the Orara Valley. Some site inspections were also conducted with Mrs. Hudson and Mr. Hoschke. As mentioned above, some background research was also done on the early dairy industry in the Clarence Valley and the NSW Heritage Advisors Network was also contacted for sources of information and general information on the history of the north coast dairy industry.

Existing environment

The original building consisted of a roofed six-cow walk-through milking bail and at one step higher a machine room, separator room and a clean-up or store room. The floors are concrete; the walls are timber framed with vertical sawn hardwood planks and a galvanized iron roof. The cow bail has lost its roof and walls and a later room is built over part of the surviving slab. The slab floor falls to a dish drain which drains through a concrete end plinth. There is a rebate in the slab which accommodated the head of the bail walk-through timber framing.

The appearance of the original Dairy Bails building with its many layered partly painted old steeply pitched galvanized roof, with its crude but picturesque timber cladding, and its lower roofed clean-up shed and the intact cow bails concrete slab and plinth, are evocative of a once common sight in the Orara Valley and the north coast generally. It retains the ability to illustrate the story of the dairy industry in the Orara Valley.

7.7.1 Impact Assessment

The proposal is unlikely to impact on the Dairy Bails building. The development footprint will not impact the shed with the proposed water treatment plant sited north of the shed and a road between the shed and the plant.

7.7.2 Recommended Mitigation Measures

Whilst there are numerous intact timber Dairy Bails in the Orara Valley, and over 100 in the adjacent Clarence Valley, they are in private ownership, and nearly all have minor uses as storage sheds and will disappear over time. There is an opportunity to retain the dairy bail structure under Council possession and link it with the proposed water works for tourist use and interpretation. The following recommendations are made to protect and restore the structure so that it can be used for historical purposes and / or visited by legitimate interest groups:

- Whilst the galvanised roof sheets and timber vertical wall cladding are up to eighty years old they are in reasonable condition and should be generally left as is, conserved, and only be replaced, piece by piece, as individual portions fail;
- The timber frame and cladding built over the concrete plinths has been kept away from ground moisture and is in better condition than that around the clean-up area where there is no plinth. The grass and ground line around the clean-up area should be cleared away from the base of the timber;
- The building's roof should have second-hand sheets to replace any defective sheets to make the roof waterproof;
- A maintenance strategy is recommended which would incorporate regular inspection, say at least once a year, and frequent but probably small maintenance work that would retain the existing ambience of the place;
- Internal additions subsequent to the building use as a dairy should be removed, but the existing dairy era fabric be retained as is, and covered under the maintenance schedule; and
- If capital becomes available the dairy bail building could be reconstructed and remnants of, if not a full, working milking machine reconstructed. There may be opportunity to relocate an existing cream shed from a Valley property.

7.8 Hazards and Risk

7.8.1 Hazard Analysis

A Preliminary Hazard Analysis report (PHA) was prepared by the Coffs Infrastructure Alliance for the proposed Coffs Harbour WTP to determine the hazardous nature of the WTP with regards to NSW land use planning regulations. The hazard analysis was prepared in compliance with the Department of Planning (formerly the Department of Urban Affairs and Planning) Applying SEPP 33 and Multi-Level Risk Assessment. (Refer to ***Appendix 10***)

7.8.2 Hazard Identification (refer section 5 of PHA)

A preliminary risk screening was conducted to determine whether the WTP is potentially hazardous under the SEPP33 guidelines. The preliminary risk screening documents the nature and quantity of all dangerous and hazardous substances utilised, stored and produced at the WTP and compares them to the SEPP33 threshold screening values. It was found that the screening thresholds of chlorine, powdered activated carbon and the combined storage of dangerous goods Class 8 were breached, therefore a more detailed risk assessment was conducted.

A hazard identification workshop (HAZID) was conducted on the proposed WTP, qualitatively reviewing the hazards associated with all the dangerous goods on site. The HAZID was conducted by personnel with operational, design, environmental and risk assessment experience with the aim of determining if a potential hazardous scenario could result in offsite impacts to public safety or the environment. It was determined that only an incident involving the release of chlorine resulting in a toxic cloud could generate public safety hazards extending beyond the site boundary.

7.8.3 Consequence Analysis (refer section 6 of PHA)

A comprehensive list of chlorine release scenarios was developed with release, dispersion and subsequent toxic effect calculations modelled using SAFETI (Software for the Assessment of Fire Explosion and Toxic Impact). Consequence footprints were calculated and it was determined that toxic releases of chlorine could in fact have a fatal impact to persons beyond the site boundary, therefore the chlorine release scenarios were carried forward for further analysis.

7.8.4 Risk Assessment (refer section 8 of PHA)

To determine the risk posed through chlorine release scenarios the likelihood of their occurrence was estimated. This was accomplished through analysing the frequency of each release event using historical failure data and published failure rates (see ***Appendix 10,*** PHA Section 7). Once the frequency of failure events was determined this was combined with the consequence data and background information in the SAFETI risk modelling tool.

As specified by the Department of Planning (DoP) land use planning regulations three measures of risk were used to determine whether the risk posed by the WTP was acceptable under NSW regulations. The measures of risk used to assess the WTP were individual fatality risk, societal risk and individual injury and irritation risk (See ***Appendix 10***, PHA Section 4.2.2.5). It was proved that the Coffs Harbour WTP meets the DoP specified criteria for all three measures of risk and is therefore acceptable under the NSW land use planning regulations.

7.8.5 Conclusions (refer section 9 of PHA)

Although there were a number of other hazardous substances stored and utilised on site it was determined that release scenarios involving chlorine was the only hazardous event with the potential to impact public safety and the environment offsite. Chlorine release scenarios were subject to a full quantitative risk assessment and it was found that the risk posed by the WTP is considered acceptable under the NSW land use planning regulations. It is noted that the risk posed by chlorine is substantially reduced due to the control measures (chlorination building, automatic shut-off valves and extraction system) that are to be installed as part of the chlorination system. The PHA demonstrates that the storage and usage of dangerous goods can be safely and effectively managed at the Coffs Harbour WTP.

7.9 Soil and Water Quality

7.9.1 Surface Water

The Coffs Harbour region is located in a high rainfall area and is subject to higher than average surface water runoff. The Orara River is the closest sensitive waterway and the area of the proposed WTP construction works (including pipelines) would be located approximately 300 metres to the south of the river. Runoff from the construction areas is likely to flow either northeast into the gully between the WTP site and Casuarina Lane or northwest into the adjacent gully before flowing north into the Orara River. The main implication of the above for the construction and operation of the WTP is the increased potential for erosion and sedimentation impacts from both the potential for increased runoff and the sites proximity to a sensitive aquatic environment.

Erosion and sedimentation control measures will be required for the WTP construction and the pipeline construction and connection activities (refer to ***Figure 1.5*** and ***Drawing WTP-C-200-01-A*** for details on the location of the pipeline connections). The final operational drainage systems will also require consideration to the quality and volume of runoff being generated following rainfall.

All construction works would be undertaken in accordance with an Erosion and Sedimentation Control Plan prepared in accordance with *Managing Urban Stormwater* (NSW Department of Housing 2004). These measures are likely to involve the use of a sedimentation pond on the WTP site and stabilisation of excavations and stockpiles through sealing, replanting and seeding of vegetation as soon as possible.

The construction of the proposed WTP would involve the installation of the following pipelines:

- 240 metre raw water connection from the existing Red Hill Main to the contact tanks located at the north western corner of the DAFF building (includes an approximate 90 metres of pipework outside the site boundary).
- 220 metre treated water connection from the treated water pump station to the existing Red Hill Main for distribution (includes an approximate 90 metres of pipework outside the site boundary).
- Various other pipelines within the site boundaries, to be used for the transfer of water to the various treatment areas, emergency storage lagoon and washwater return (refer to ***Drawing WTP-C-200-01-A Appendix 2*** for further details on the locations of pipelines).

Both of the connections to the Red Hill Main would involve approximately 90 metres of pipework outside of the property boundary to the point indicated in ***Figure 1.5*** (located to the southeast of the

WTP site). Appropriate erosion and sediment controls would be required for all pipeline works including early stabilisation of disturbed areas.

Operational stormwater would be collected and discharged through flow spreading and velocity reducing devices such as grass swales to promote infiltration and minimise scouring.

All chemicals would be required to be stored within appropriate bunds, as required by the relevant Australian Standard. Spill response kits would also be required to be maintained on site during construction and operation.

7.9.2 Contaminated Land Issues

A Preliminary Phase 1 Site Investigation has been conducted by CIA and is presented in ***Appendix 14***. The Site Investigation had the following objectives:

- To review available site history information;
- To undertake an inspection of the site;
- To assess the need for further investigations; and
- To produce a Preliminary Phase 1 Site Investigation report in general accordance with the principles published in the National Environmental Protection (Assessment of Site Contamination) Measure (NEPM) published by the National Environmental Protection Council in 1999 and any relevant DECC guidelines.

As part of this Site Investigation, the following investigative activities were conducted:

- Review of available site history information including available historical land titles, development applications and aerial photographs;
- An inspection of the site was undertaken;
- Appropriate collation of data was conducted; and
- Appropriate recommendations on the management of potential contamination were provided.

The report finds that the proposed WTP site has been used from 1889 to 1986 for rural agricultural uses, with the primary use during this time being for the dairy industry. As there is no evidence to suggest otherwise, the land use during this time period "triggers" the potential for the site to be possibly contaminated with various chemicals, including pesticides and hydrocarbons. In 1986 the site was subdivided and it has been assumed that at this stage the agricultural use changed to a more "rural residential" use that has then continued from 1986 up until 2006, when the site was purchased by Council for the construction of the proposed WTP facility.

Indications are that certain site structures have been demolished and that the current residence has been transported onto the site. These activities are considered to have the potential for onsite asbestos impact and observations that were made during the site inspection indicated that cement fibre sheeting (potentially containing asbestos) is present on the site.

Acid Sulphate Soil Mapping for the area indicates that the site does not contain acid sulphate material (refer to ***Appendix 14***).

Although no intrusive investigations or sampling were undertaken to confirm any impacts, the potential for impact is considered to be of low risk and fairly typical for agricultural land use and this is therefore not considered to be a constraint to the construction and operation of the proposed WTP

facility.

It is recommended, however that appropriate remedial (i.e., removal and appropriate disposal) activities for all material potentially containing asbestos should be carried out, in accordance with the relevant requirements of the *Occupational Health and Safety Regulations 2001* and the *Code of Practice for the Safe Removal of Asbestos*.

To validate this remediation process, surface soil samples should be collected from around the location of the former sheds and houses for further asbestos analysis and for additional hydrocarbon analysis (where appropriate). The remedial action and subsequent validation would additionally assist in further assessing the risk from the historical agricultural landuse.

7.10 Traffic and Access

A Traffic Impact Assessment report has been prepared to investigate the impacts that the construction and operation of the proposed WTP facility may potentially have on the local traffic network. A copy of the Traffic Impact Assessment report is presented in ***Appendix 6.***

The scope of the Assessment is as follows:

- To identify existing transport routes to and from the proposed WTP site;
- To provide details on any upgrading required, or other construction activities proposed to improve the current access to the proposed WTP site;
- To assess the potential traffic impact of the construction of the proposed WTP facility, in terms of the capacity and safety of the required construction traffic routes and also the potential for damage to infrastructure, with respect to the use of these routes for construction vehicles and other construction period traffic;
- To assess the potential traffic impact of future (i.e. “operational”) traffic movements following completion of the proposed WTP works, including both commissioning and initial operation phases of the project, as well as during full operation of the proposed plant (such as for chemical deliveries and sludge bin removal), over the long term.

Construction and Operational Access Route

The report finds that the road transport routes that the majority of construction traffic and other operational vehicle movements are most likely to be as follows:

- Most WTP generated traffic is expected to originate from and ultimately return to the Pacific Highway;
- Traffic originating on Pacific Highway would then flow onto Coramba Road; and
- Traffic would flow from Coramba Road and access the proposed WTP site from Upper Orara Road, and return via the same route.

This route is illustrated in ***Figure 7.8***.

The report identified that the area surrounding the proposed WTP site, as mentioned previously in this EA document, consists primarily of rural and rural residential properties with some industrial and/or “special use” land, such as TransGrid’s electricity substation, the Karangi Dam and its existing water treatment infrastructure (chemical dosing plant, etc). The existing condition of the proposed

transport route to the new WTP site is shown in ***Figure 7.8*** and described as follows:

- Coramba Road is the main arterial road linking Coffs Harbour to the regional townships of Karangi, Coramba, Nana Glen and Glenreagh;
- Between Coffs Harbour and Karangi, Coramba Road services local residences, property owners, Red Hill Quarry (i.e. the T.G. Jung Quarries), other Council-owned water reticulation infrastructure (such as the Red Hill Balance Tanks) and various small businesses (primarily newsagent and short order takeaway type businesses);
- Upper Orara Road currently experiences an Average Daily Traffic Volume of 690 vehicles per day (vpd);
- The current entrance to the proposed WTP site is situated very near to the apex of a corner, with this entrance being a typical farm gate, set back approximately 10 metres from the edge of the road;
- The project will improve visibility for traffic approaching the site access by reshaping the embankment on the southern side of Upper Orara Road adjacent to the site access point.
- The average daily traffic volume is judged to be “low” and there is an existing speed limit on this stretch of road of 80 kilometres per hour.

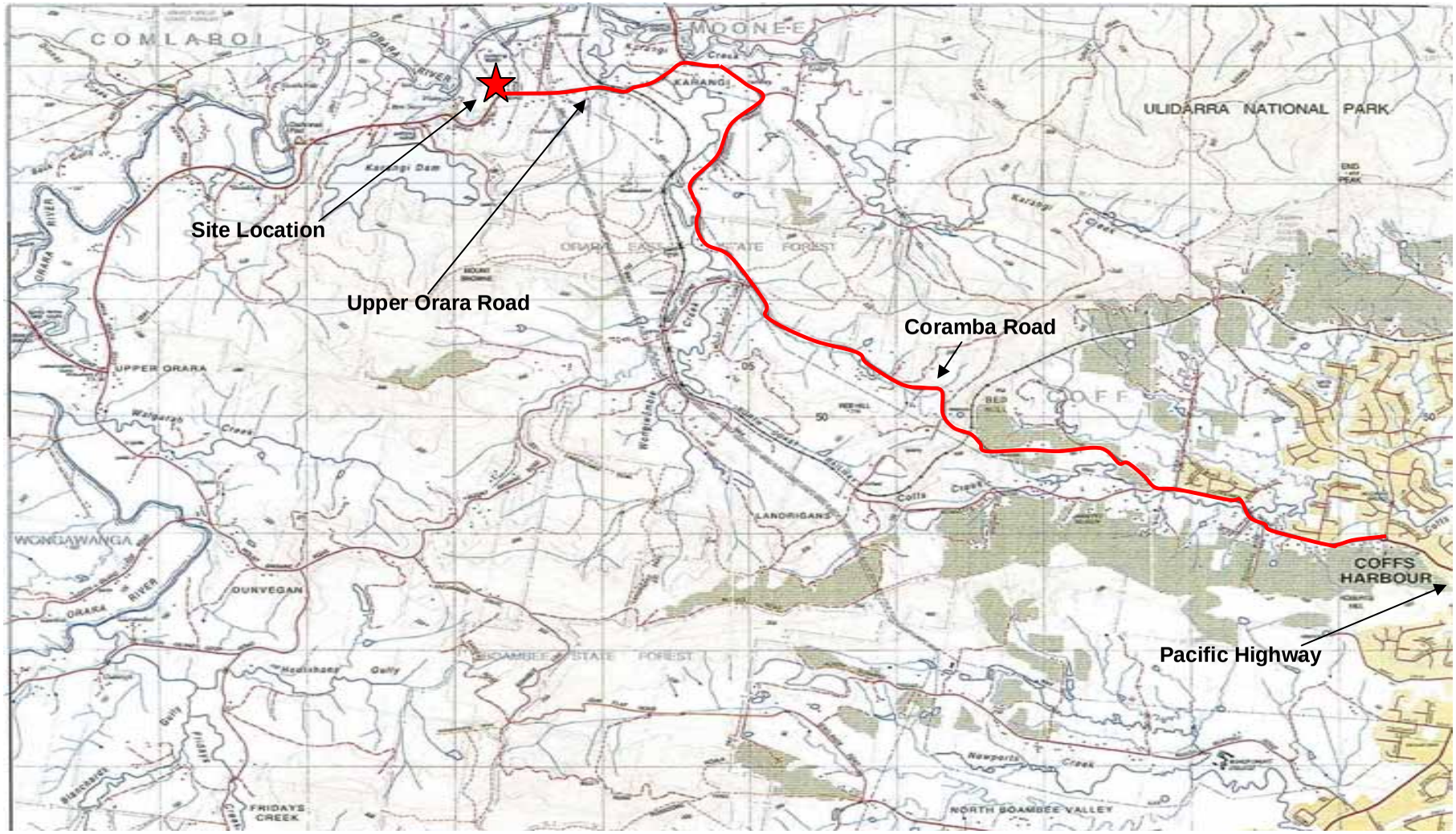


Figure 7.8: Traffic and Transport Route

7.10.1 Impact Assessment - Construction Traffic

Construction activities at the site would be preceded by some minor works required either on the embankments of Upper Orara Road adjacent to the proposed WTP site, (to improve the line of sight for traffic on this road) or the use of traffic calming devices to slow traffic to a manageable speed. Either option would improve the safety for local road users and for all traffic entering and exiting the site. The minor works associated with either or both options would have only a minimal or "short term" impact on local traffic movements, whilst providing a long term safety improvement within the surrounding local area.

The remainder of potential traffic impacts within the surrounding local area would all relate to the proposed construction activities at the WTP site and would most likely stem from the following traffic movements:

- Traffic from construction crews; and
- Delivery of materials and equipment.

The total construction period is estimated to be about 18 months and construction crews are expected to be maintained at approximately 60 employees, and peaking at approximately 100 employees (required on site during some short periods for specific aspects of the proposed construction program).

Truck traffic is expected to include deliveries of materials, mechanical equipment, plant and water carts. Incoming truck movements could peak as high as 30 trucks per day with an average of approximately 10 trucks arriving at the site over the construction period (i.e. an average of 20 truck movements per day in and out of the site). The highest frequency of truck movements is expected during concrete pours.

Options for accessing the proposed WTP site would be limited. The primary route available for construction traffic would be via the Pacific Highway to Coramba Road and then proceeding on to Upper Orara Road to the entrance to the site.

7.10.2 Impact Assessment - Operational Traffic

Operational traffic would primarily be accessing the site during normal daytime working hours. Normal operational traffic movements would include the following:

- Daily movements for operational staff (3 vehicles per day); and
- Truck movements for the delivery of chemicals required for the treatment process when operating at maximum capacity are outlined in Table 7.7, below (Table 1 from the Traffic Impact Assessment report, presented in ***Appendix 6*** – Also note that operational traffic movements during the "early" years of the WTP's operation would be most likely to be about half of the maximum expected frequencies stated below).

Table 7.7: Operational Deliveries and Truck Movements

Chemical	Frequency of Delivery (deliveries per year)
Sodium Hydroxide	24
Potassium Permanganate	4
Lime	12
Carbon Dioxide	24
Aluminium Sulphate	2
Fluorosilicic Acid	4
Chlorine	6
Total deliveries per year	**76**

7.10.3 Recommended Mitigation Measures

The following mitigation measures would be implemented to minimise traffic impacts during construction:

- The front entrance gate to the WTP would be re-located further uphill and a further 20 metres into the property from its current position to allow an "off road" waiting bay whenever access and egress may be blocked. These works would remove the need to unnecessarily take up road space whilst the access / egress is cleared;
- Advance advisory signs would be installed on the approaches to the site's access point, to warn other road users of the potential for vehicular movements ahead at the proposed WTP site;
- During the construction period, traffic using Upper Orara Road in the vicinity of the WTP would be under "Traffic Control' conditions that include the following:
  - Appropriate signage would provide advance warning of possible approaching traffic hazards;
  - Qualified Traffic Controllers would direct traffic wherever necessary; and
  - Reduced speed limits would be applied adjacent to the work site as appropriate.

7.11 Emergency Storage Lagoon

The emergency storage lagoon would remain empty nearly all of the time so that the lagoon would be ready to accept and store the effluent from any system or plant overflow events. It is envisaged that maintaining the lagoon in an empty state would prevent it from becoming a breeding ground for mosquitoes, but in the unlikely event that a plant overflow does occur and the lagoon becomes partially filled as a result, the captured water would then be gradually fed back into the plant washwater system for further treatment and recycling. The lagoon would not contain any significant amount of water for any period exceeding about 1 week.

Contained waters would drain to a low point in the lagoon where a submersible pump would be installed within a concrete sump. A pipeline would return the water to the WTP's "centrate" tank. These waters, combined with any centrate waters would then be re-pumped to the washwater holding tank for processing together with other waters from the WTP's washwater treatment and disposal / recycling system.

An earthen cut-off drain would also be constructed on the high side of the lagoon to prevent any surface run-off waters from the site collecting in the lagoon.

The lagoon would be located within the fenced site area and would not be readily accessible by the general public or by feral, native or domestic animals, other than birds.

Soils with the required permeability are available on site and would be used for construction of the lagoon to ensure no leakage occurs.

7.11.1 Impact Assessment (Potential Impacts to Groundwater)

GHD has conducted a geotechnical investigation of the proposed WTP site and has identified that ground conditions within the vicinity of the site proposed for the emergency storage lagoon generally comprise residual silty clays to about 1.6 metres depth, overlying weathered siltstones and mudstones. Groundwater has not been encountered at this location during any site investigations conducted. On the basis of information gained from the analysis of other boreholes drilled nearby it is reasonably anticipated that the long-term groundwater level would most likely be several metres below the proposed base level of the storage lagoon, proposed to be located at RL 108 metres.

The lagoon would be located some 100 metres from the southern / eastern bank of the Orara River. The base of the lagoon would be approximately 8 metres above the non-flood river levels at RL 100 metres and approximately 5.5 metres above the probable maximum flood level (refer to ***Section 1.3***).

Whilst detailed design of the lagoon had not yet been carried out at the time of compilation of this Environmental Assessment, it is nevertheless expected that a low-permeability lining would be required to minimise storage loss. It is anticipated that this lining would be constructed from clayey materials won either from the lagoon excavation, or from elsewhere on the site. Permeability results of materials tested from across the site in GHD's geotechnical investigation ranged between 2×10^{-9} m/s and 4×10^{-10} m/s. All Emerson Class tests undertaken returned values of 6, indicating the presence of materials suitable for the construction of water-retaining embankments.

As discussed above, the lagoon would not contain any significant quantity of water for any period exceeding about 1 week. The lagoon would only contain raw water or plant washwater overflows

that would not be contaminated with sewage. In the worst case, the washwater may contain high particulate levels. All potential stormwater run-off from areas outside of the lagoon would be diverted around the lagoon.

It is therefore anticipated that, following the incorporation of the low-permeability lining, any moisture losses from the lagoon would be minimal in comparison to the total capacity of the lagoon. The rate of loss would also be very minimal (and effectively negligible) in comparison to the flow of waters in the Orara River.

Accordingly, due to the employment of a low-permeability lining, the proposed emergency storage lagoon would be expected to not have a significant impact on groundwater flows in the surrounding areas and would also not have a significant impact on the base flows to the Orara River.

7.12 Waste Management

7.12.1 Liquid Waste

The proposed liquid waste streams from the WTP are listed in Table 7.8. The proposed method of collection and treatment of these waste streams is also described.

Table 7.8 Liquid waste streams

Proposed Waste Stream	Treatment / Disposal Route
DAF float	Collect and transfer into washwater holding tank for subsequent thickening and then dewatering in centrifuges. Reclaimed liquid (centrate) from the centrifuge returned to the head of the washwater system. Reclaimed washwater (supernatant) from the thickening tank returned to the head of the plant or to Karangi Dam. Sludge cake from the centrifuges collected in bins for off-site disposal at Councils resource recovery facility.
Filter washwater	Collect and transfer into washwater holding tank for subsequent thickening then dewatering in centrifuges. Reclaimed washwater returned to head of plant or to Karangi Dam. Sludge cake collected in bins for off-site disposal.
Analyser sample water	Recycled into main process or to washwater system.
Wash down water	Collected in floor drains and transferred into the WTP's washwater recycling system.
Tank drainage water	Directed to emergency storage lagoon for recovery/recycling at a later time.

Proposed Waste Stream	Treatment / Disposal Route
Laboratory basin waste water	Drained to an underground tank storage, with pump out type disposal.
Toilet, shower and hand basin waste water	Drained to an underground tank storage with pump out type disposal.

The principal solid waste from the proposed WTP facility would be dewatered alum sludge. This is produced from the thickening and centrifugation of filter washwater and DAF "float" material.

Due to the available site area constraints and to the local climatic conditions, sludge drying beds (i.e., for the dewatering and drying of alum sludge) are not preferred for this proposal.

Other options that did not involve re-use or recycling of washwater / wastewater were not considered.

7.12.2 Zero Discharge to Receiving Waters

It is not proposed that any wastewater would be discharged to any receiving waters.

Emergency WTP overflows and any overflows arising from failures of the sludge dewatering system would be directed to the emergency storage lagoon. Such overflows are expected to be only a rare event, perhaps occurring once every 5 to 10 years for short periods of several hours only, or less. These overflow waters would then be recycled through the washwater system which would separate contained sludge material and direct this to the sludge thickener. Only the "supernatant" (i.e. the clearer water that lies on top of any settled material) rising to the top from the thickener would then be sent back to Karangi Dam for re-incorporation with the raw water supply. On some, rare occasions, however, and only due to intermittent operational constraints, this supernatant water may also be recycled directly back to the WTP inlet, at a controlled rate of less than 10% of the total inflow rate. If any concern about the quality of the overflow is apparent at that time then these waters would not be recycled but would be pumped into appropriate tanker trucks and delivered to an alternative, safe, offsite disposal location.

Chemical storage areas will be fully bunded to meet regulatory requirements. Liquid chemical unloading areas will have a spill apron and valved drainage sump.

Site stormwater run-off will be collected and directed off site to existing table drains and natural drainage paths. The final stormwater design will require consideration to minimising the velocity of runoff whilst encouraging infiltration to prevent / minimise scouring and adverse downstream water quality impacts.

7.12.3 Solid Waste

Solids filtered out from the DAFF and filter backwash process would be transferred into the wash water tank, fed into the clarifier and then into the sludge handling building for dewatering via the centrifuge. The dewatered sludge would then be taken off site for disposal at the Coffs Harbour resource recovery centre.

7.12.4 Construction Waste

Materials to be used during construction would include material such as the following:

- Concrete;
- Reinforcing steel;
- Formwork;
- General building materials;
- General rubbish; and
- Oils and hydraulic fluids.

Waste from the above materials would be managed as required by the environmental management plan (EMP), with the EMP to include the following mitigation methods;

- Waste disposal and recycling bins to be present on site for staff to use and prevent littering;
- Waste to be reused and recycled wherever possible; and
- Materials unable to be reused or recycled would be disposed at an appropriate landfill.

8. Draft Statement of Commitments

Section 75F(6) of the EP&A Act allows that "the Director-General may require the proponent to include in an environmental assessment a statement of the commitments the proponent is prepared to make for environmental management and mitigation measures on the site." In accordance with this Section of the Act, the Director-General's Requirement issued to Council on 18 December 2006 included a General Requirement that the EA must include a "draft Statement of Commitments for environmental mitigation, management and monitoring for the project."

This section therefore provides Council's commitments for environmental mitigation, management and monitoring for the construction and operation of the proposed WTP facility.

8.1 Overall Commitments to Minimise Harm to the Environment

Coffs Harbour City Council confirms its commitment to ensuring that all practicable measures to prevent or minimise any impacts to the environment that may arise from the construction, commissioning and operation and, where relevant, the decommissioning of the proposed WTP facility.

8.2 Mitigation Measures

Coffs Harbour City Council confirms its commitment to implement the measures outlined in Table 8.1, below, to minimise the potential for environmental impacts.

Table 8.1 Mitigation Measures

Environmental Issue	Commitment		Timing
	Outcome	**Measures**	
1. Flora & Fauna	1.1 Protection of native flora.	Proposed amelioration and safeguard measures include: 1.1.1 The large, hollow-bearing Sydney Blue Gum on the site would be retained and appropriately protected pending an arborist's advice on safety concerns; 1.1.2 The Gadagi Trees on the corner of the site would be retained.	Construction and operation
	1.2 Amelioration for the removal of a flooded gum (recognised koala food tree).	1.2.1 Planting along the south-western boundary of the site would be conducted with local Koala food tree species (including Tallowwood, Flooded Gum and/or Sydney Blue Gum). Seed would be sourced from appropriate local trees and planting would be undertaken according to advice from appropriate personnel with specific knowledge of local Koala populations and relevant ecological requirements, for example from Council's Koala Management Advisory Committee;	Construction
	1.3 Protection of native fauna.	1.3.1 An observer with appropriate local ecological experience would be present on-site during any required tree removal or other significant disturbances to extant vegetation; and 1.3.2 During the construction period, construction personnel and all other on-site staff and visitors would be appropriately made aware of the possible presence of wildlife on the site and would be advised to exercise caution when departing or traversing the site. 1.3.3 Inclusion of flora and fauna amelioration and safeguard measures within the environmental management plans for construction and operation.	Construction and operation

Environmental Issue	Commitment		Timing
	Outcome	**Measures**	
2. Noise impacts	2.1 Minimising Construction Noise Impacts	2.1.1 During construction activities, residential receivers located within close proximity to the site would be advised of the anticipated construction program and residences kept informed throughout the construction period; 2.1.2 All site workers would be made aware of the potential noise impacts for local residents and encouraged to minimise noise during the course of their activities; 2.1.3 Construction activities that cause excessive noise would be limited to normal business days between 7 am and 6 pm and Saturdays between 8 am and 1 pm; 2.1.4 All construction equipment would be maintained in good condition and all machines found to produce excessive noise would be removed from the site or stood down until repairs can be made; 2.1.5 All combustion engine plant are to be fitted with residential grade exhaust silencers; 2.1.6 Noise management strategy to be included within the environmental management plan.	Construction
	2.2 Avoiding Operational Noise Impacts	2.2.1 All noise sources are to be located within buildings and acoustically treated rooms to provide the noise attenuation modelled as part of the noise impact assessment.	
3. Air Quality	3.1 Avoiding off site odour impacts.	3.1.1 Sludge dewatering facilities to be located within an enclosed building. 3.1.2 Dewatered sludge is to be placed into a storage bin for off site disposal at Councils resource recovery centre and would not be stored onsite for significant time periods. 3.1.3 Maintain buffer distances required to minimise off-site odour impacts from the proposed sludge dewatering activities. These distances are currently readily achievable within the currently proposed site layout and design.	Operation

Environmental Issue	Commitment		Timing
	Outcome	**Measures**	
	3.2 Minimise dust emissions	3.2.1 Activities undertaken in a manner that minimises dust emissions such as wind blown and traffic generated dust. 3.2.2 Measures to minimise dust to be specified in the environmental management plan	Construction
4. Indigenous Heritage	4.1 Avoid indigenous heritage impacts.	4.1.1 The archaeologist report for the subsurface investigation is to be finalised and any additional recommendations incorporated into the environmental management plan as required. 4.1.2 The LALC and Gumbula Julipi Elders are to be given the opportunity to re-deposit any of the recovered artefacts following the completion of all development related disturbance works. 4.1.3 In the unlikely event that any material of potentially high cultural significance is uncovered during any stage of the development all disturbance works must cease in the vicinity of the find. The DECC, LALC and Gumbula Julipi Elders would then be required to be immediately contacted for management advice. 4.1.4 Council would continue to closely liaise with the LALC and Gumbula Julipi Elders in relation to cultural matters and be kept informed of the timetable for works associated with the planning and construction of the WTP.	Prior to the commencement of construction

Environmental Issue	Commitment		Timing
	Outcome	**Measures**	
5. European Heritage	5.1 Retain dairy bail	5.1.1 Conserve galvanised roof sheets and timber vertical wall cladding 5.1.2 Maintain grass and ground line around the 'clean-up' area to prevent moisture further deteriorating timber frame and cladding. 5.1.3 Replace roof with second hand sheets as required to keep roof water proof. 5.1.4 Implement a maintenance strategy. 5.1.5 Internal 'non original' additions should be removed, whilst maintaining the existing dairy era fabric. 5.1.6 Significance of dairy bails and conservation requirements to be included within environmental management plan.	Construction and operation
6. Hazardous Materials	6.1 Reduce the risk to safety, environment and property	6.1.1 All relevant Australian Standards would be followed for the construction of storage vessels and barriers thereby reducing potential for unplanned releases; 6.1.2 Implementation of the Barriers outlined in the PHA (Table A3 - Hazard Identification); 6.1.3 Implementation of the design initiatives and adherence to Australian Standards; and 6.1.4 Implement safety conscious operating procedures for the storage of dangerous goods.	Construction and operation

Environmental Issue	Commitment		Timing
	Outcome	**Measures**	
7. Traffic & Transport	7.1 Minimise traffic hazards.	7.1.1 The front entrance gate to the WTP would be re-located from its current position, further uphill and 20 metres inside the site's front property boundary; 7.1.2 Improve visibility for traffic approaching the site access by reshaping the embankment on the southern side of Upper Orara Road adjacent to the site access point. 7.1.3 Advance advisory signs would be installed on the approaches to the site's access point; 7.1.4 During the construction period, traffic using Upper Orara Road in the vicinity of the WTP would be under "Traffic Control' conditions that includes: – Appropriate signage being provided; – Qualified Traffic Controllers being allocated, wherever necessary; and – Reduced speed limits being applied adjacent to the work site when necessary.	Construction
8. Soils	8.1 Minimise environmental and OH&S risks associated with potentially contaminated material.	8.1.1 Appropriate removal and disposal of any excavated material that potentially contain asbestos would be carried out, in accordance with the relevant requirements of the *Occupational Health and Safety Regulations 2001* and the *Code of Practice for the Safe Removal of Asbestos*. 8.1.2 Surface soil samples should be collected from around the location of the former sheds and houses for further asbestos analysis and for additional hydrocarbon and pesticide analysis as appropriate.	Construction

Environmental Issue	Commitment		Timing
	Outcome	**Measures**	
9. Water	9.1 Management of storm water runoff.	9.1.1 All activities (including pipelines) to be undertaken in a manner that minimises erosion and sedimentation. 9.1.2 Environmental management plan to include erosion and sedimentation control plan prepared in accordance with the NSW Department of Housing's '*Managing Urban Stormwater*' 2004. 9.1.3 Velocity reduction techniques applied to final operational stormwater outlets to prevent scouring and maximise infiltration.	Construction Incorporated into design and implemented and prior to operation
	9.2 Management of operational waste water and surface water run off	9.2.1 Zero discharge of operational waste water. 9.2.2 All chemical storage to be stored as required for hazardous materials (i.e. bunded areas). 9.2.3 Capacity of emergency storage lagoon to be maintained. 9.2.4 Storm water to be directed around emergency storage lagoon and towards natural drainage paths. 9.2.5 Laboratory, toilet, shower and basin waste water to be directed to an underground wastewater collection tank for pump out and appropriate disposal. 9.2.6 Requirements to be included within operational environmental management plan.	Operation

Environmental Issue	Commitment		Timing
	Outcome	**Measures**	
10. Visual Amenity	10.1 Minimise the visual impact of the proposal on the surrounding landscape.	10.1.1 Install screen planting immediately on the southern and western boundaries of the proposed WTP site, consistent with the buffer planting recommendations made in Section 8 of the Visual Impact Assessment report; 10.1.2 Screen plantings would be located between the southern and western boundaries and the proposed control building, DAFF building and the Chemical Plant; 10.1.3 Screen plantings would be established along the entire length of the southern and western boundaries (but not including at the site entrance, along the southern boundary); 10.1.4 Screen planting would include trees, shrubs and ground cover to create a dense visual barrier and foliage should be kept compact and dense; 10.1.5 A muted colour would be selected for the southern WTP buildings; 10.1.6 All existing vegetation would be maintained (on the boundaries) between affected properties and the proposed WTP site; 10.1.7 Internal WTP spaces would be kept “simple” and uncluttered; 10.1.8 Council would liaise with the property owners at 186 Upper Orara Road, Karangi, with a view to installing a planted buffer at the top of the ridge between this property and its views towards the proposed WTP site; and 10.1.9 Native vegetation would be installed between properties at 121 and 147 Upper Orara Road, Karangi and the proposed WTP site to provide ongoing visual screen of the WTP from these properties	Construction
11. Construction Waste	11.1 Minimise the volume of material sent to landfill	11.1.1 Uncontaminated fill is to be reused onsite 11.1.2 Reuse and recycling principals to be adopted for construction materials 11.1.3 Waste management strategy to be incorporated into the environmental management plan.	Construction

8.3 Environmental Management

8.3.1 Environmental Representative

Prior to the commencement of construction of the development, CIA (on behalf of Council) would appoint a qualified and experienced environmental management representative that would be known as the Program Environmental Representative (PER). The PER's role would be performed on a part-time basis, however the PER would be available to fulfil the role's requirements on an "on-call" basis at other times. The PER would be the key point of contact with respect to all on-site environmental issues during the construction, commissioning and initial operation of the development. The duties of the PER would include responsibility for all of the following:

- To be the main point of contact in relation to the overall environmental performance of the proposal;
- The production and appropriate implementation of all management plans and monitoring programs that may be required under any conditions of approval for the development proposal;
- The appropriate consideration and provision of advice on any matters specified within the conditions of approval;
- The appropriate implementation of any of the requirements of any other conditions imposed on the approval under any other licences or approvals related to the environmental performance and impacts of the proposed WTP facility; and
- For ensuring that community enquiries during the construction, commissioning and at least the initial operational phases of the project are handled appropriately (Note, however, that the initial receipt of and ultimate response to most instances of community contact and/or the handling of any other relevant enquiries would be via Council's Community Consultation Officer).

8.3.2 Construction Environmental Management Plan

An environmental management plan (EMP) for the construction phase of the project would be prepared and appropriately implemented. The EMP would outline environmental management practices and procedures to be followed during site preparation, construction and commissioning of the proposed WTP facility.

The EMP would cover the environmental protection practices, resources and sequence of activities required to comply with relevant environmental legislation, conditions of any applicable licence, approval and permit. The EMP would include:

- A description of all activities to be undertaken on the site during site preparation, construction and commissioning of the proposed WTP facility;
- Consideration of the statutory approvals and any other obligations that are required to be fulfilled during site preparation, construction and commissioning activities, including all approvals, consultation and agreements required from other authorities and any relevant stakeholders, as well as guiding legislation and officially recognised policies;

- Details of how the environmental performance of the site preparation and construction activities are proposed to be monitored, as well as what actions would be undertaken to address any identified adverse environmental impacts. In particular, the following environmental performance issues would need to be addressed:
  - Measures to monitor and manage dust emissions;
  - Measures to monitor and minimise soil erosion and the discharge of sediment and other pollutants to lands and/ or waters during construction; and
  - Measures to monitor and manage any contaminated soils/ materials encountered during construction and demolition;
  - Measures to monitor and manage any groundwater encountered during construction and demolition;
  - Measures to monitor and control noise emissions during construction and commissioning
  - Measures to monitor and control air emissions during construction and commissioning;
  - Measures to manage traffic during construction; and
  - Measures to manage bushfire risk.
- A description of the roles and responsibilities for all relevant employees involved in the construction of the development;
- The management plans and mitigation requirements listed in Table 8.1 relevant to construction and commissioning; and
- A set of appropriate complaints handling procedures that maybe used during construction, if required.

8.3.3 Operational Environmental Management Plan

Council would update its existing Raw Water Dosing Plant operating procedures to incorporate the operation of the proposed WTP facility into an Operational Management Plan (OMP). The OMP for the new WTP facility would include:

- Updated environmental, objectives and performance targets for the operation of the WTP;
- Identification of all statutory and other obligations, including consents, licences, approvals and voluntary agreements;
- Identification of the roles and responsibilities of all personnel and contractors to be employed on the WTP site, as well as all other relevant sites;
- Appropriate management policies, procedures and processes to monitor, review and assess the progressive implementation of environmental management practices and the overall environmental performance of the proposed WTP facility against the facility's adopted objectives and targets;
- Management plans and mitigation requirements as listed in Table 8.1 that are relevant to the operation of the proposed WTP facility;
- Incorporation of appropriate environmental protection measures and instructions in all relevant Standard Operating Procedures and Emergency Response Procedures;

- Environmental monitoring practices described in ***Section 8.4***; and
- Any specific procedures in relation to any of the following, as defined within this EA document or within the conditions of approval for the proposal:
  - Air quality management (including odour);
  - Emergency planning;
  - Safety management;
  - Soil and water management;
  - Landscape management; and
  - Noise management.

8.4 Monitoring

8.4.1 Air Quality

The following monitoring strategies are proposed to monitor air quality impacts during construction:

- Monitor the weather forecast and advice the project staff if extended periods of high wind are expected so that sufficient water carts can be made available for dust control if required; and
- Establish four depositional dust gauges on the boundary of the site to monitor dust fall out from construction activities. Depositional Dust Gauges to be located, installed and sampled in accordance with AS3580.10.1 (1991) and AS2922 (1987) with the monitoring results to be compared to DECC criterion of 4 g/m^2/month.

8.4.2 Water Quality

Construction

The following monitoring strategies are proposed to monitor water quality impacts during construction

- The effectiveness of the sediment and erosion control system including pollution control and around stockpiles will be monitored, reviewed and updated via weekly and routine inspections by the PER and Foreman as well as following significant rainfall events (greater than 15 mm);
- Runoff from site would be visually checked for evidence of litter and oil and grease; and
- The date, time, weather conditions, previous 48 hours rainfall and conditions of the run off (turbidity dissolved oxygen, electrical conductivity and pH) is to be noted on a monthly basis and following rain events greater than 40 mm in 48 hours.

Operation

Once the WTP is completed, operational tests will be performed on a wide range of parameters necessary to ensure that the final treated water meets the Department of Health requirements, the relevant Australian Drinking Water Guidelines and the performance targets outlined in ***Table 5.3***.

Water quality testing is carried out at present at 35 different sites throughout the water supply system to comply with Department of Health "Drinking Water Monitoring Program", 2005. The approximate locations where the water distribution system is currently being sampled and would continue to

be sampled is shown in ***Figure 8.1*** with further detail on the analysis undertaken at each location provided in ***Table 8.2***.

Table 8.2: Analytical Testing – Water Distribution Monitoring

Component	Location	Analysis	Frequency
Reticulation System	Redhill Reservoir, Nana Glen Grafton Street, Coramba Martin St, Ulmarra Offtake, Arrawarra, Safety Beach, Woolgoolga, Sandy Beach, Emerald, Coffs North York Street, Coffs South Jetty Oval, Corindi Pump Station 1	Free chlorine, Faecal Coliforms, Total Coliforms, e. coli, temperature	Alternate weeks (Week A)
Reticulation System	Redhill Reservoir, Moonee, Sapphire, Korora, Marcia Street, Council Chambers, Sawtell Boronia Park, Toormina Seabreeze Place, Toormina Hamilton Drive, Corindi Pump Station 2	Free chlorine, Faecal Coliforms, Total Coliforms, e. coli, temperature	Alternate weeks (Week B)
Reticulation System	Nana Glen	Aluminium	Weekly
Raw Water	Karangi Dam, Cochranes Pool, Regional Supply, Coramba, Nana Glen	pH, turbidity, apparent colour, true colour, TOC, faecal coliforms, total coliforms (all sites except Coramba and Nana Glen which just have Faecal Coliforms and Total Coliforms).	monthly
Sawtell Tap	Sawtell	pH, alkalinity, turbidity, colour (chloride once per month).	weekly
Woolgoolga Tap	Woolgoolga	pH, alkalinity, turbidity, colour	weekly
Balance Tank	Redhill	pH, alkalinity, turbidity, colour, calcium hardness, alkalinity, manganese, iron.	weekly
Storage	Karangi Dam	algae identification weekly at different depths	Weekly
Storage	Karangi Dam	• 1m (*tests:* iron, manganese, pH, conductivity, calcium hardness, alkalinity, total nitrogen, and total phosphorus). • 3m (*tests:* iron, manganese) • 6m (*tests:* iron, manganese) • 9m (*tests:* iron, manganese) • Cochranes pool (*tests:* iron, manganese)	monthly
Storage	Redhill	iron, manganese, pH, conductivity, calcium hardness, alkalinity.	Monthly
Storage - Lime Dosing	Karangi Dam	pH, conductivity, calcium hardness, alkalinity.	Monthly

Component	Location	Analysis	Frequency
Storage	Nana Glen reservoirs 1 and 2	pH, conductivity, turbidity, alkalinity, calcium hardness, colour, total iron, ferrous iron, manganese, aluminium.	monthly
Intake	Nana Glen River Water Site 1 (pump intake) and Site 2 (Rail Bridge) –	pH, conductivity, turbidity, alkalinity, calcium hardness, colour, total iron, ferrous iron, manganese, nitrate nitrogen, total phosphorus.	monthly

Analytical testing is carried out by Coffs Harbour City Council Laboratory (NATA Accreditation number 12359 - chemical and 14565 microbiological) and National Measurement Institute (NATA accreditation number 198) for the TOC analysis of raw water samples. All future analysis would be undertaken at these laboratories or other qualified and NATA registered laboratories as appropriate.

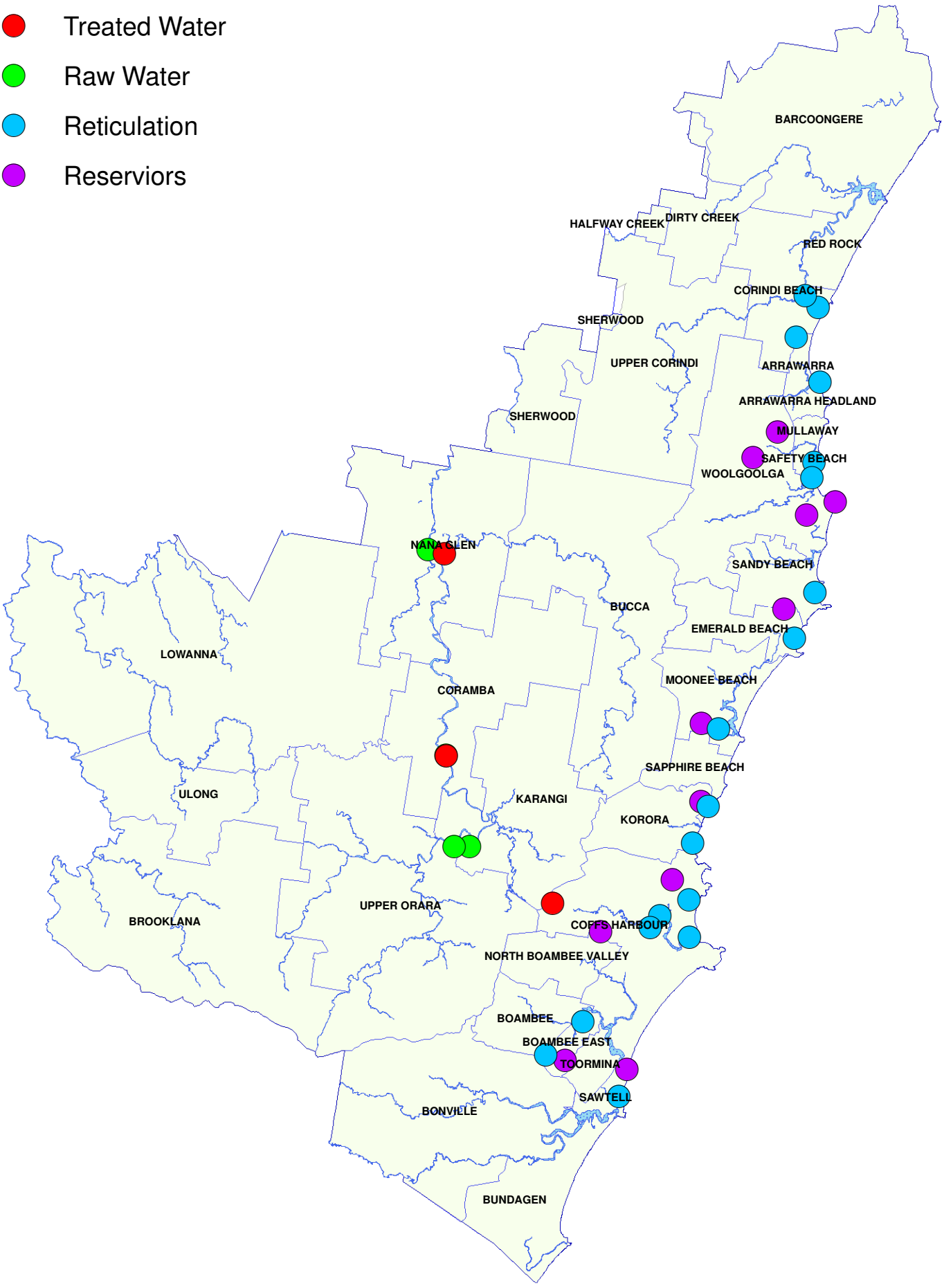
On-line testing is carried out for chlorine (disinfection) residuals and pH. This will continue once the WTP is built and additionally at the WTP continuous monitoring of turbidity and fluoride levels will occur. The proposed monitoring throughout the treatment process (i.e. within the WTP process as opposed to the distribution system) is detailed in ***Section 5.6*** and ***Appendix 15***.

At present fluoride is not dosed into Council's water supply. It is proposed to dose fluoride as part of the new plant and monitoring in accordance with the "Code of Practice for Fluoridation of Public Water Supplies 2002" will be performed.

At present radiological and pesticide monitoring is being performed on raw water sources. Tests of radiological and pesticide parameters will be carried out on a regular basis after commissioning of the WTP.

Legend

- Treated Water
- Raw Water
- Reticulation
- Reserviors



Coffs Harbour Water Figure 8.1 Water Quality Testing

8.4.3 Noise

Noise monitoring to be undertaken during the construction period would include:

- Daily pre start checking of machinery to check adequacy of the operating efficiency and acoustical controls. Machinery brought on site that has the potential to generate significant noise would have the noise levels checked for compliance with the recommended levels within AS 2436 – 1981, *Guide to Noise Control on Construction, Maintenance and Demolition Sites*.
- Attended monitoring at residences following receiving of valid noise related complaint.

8.4.4 Auditing

Auditing during the construction period is proposed to be undertaken with an initial audit of the system occurring within 12 weeks from commencement of significant construction followed by 6 monthly audits. Audits shall be carried out by staff members who have suitable external auditing qualifications and/or experience. The nominated Lead Auditor must be independent of the area being audited.

During operations, work is proposed to be in accordance with the Operational Management Plan that will be completed during the commissioning stage of the plant delivery. This plan will be regularly (6 monthly) audited and revised as part of Council's IMS procedures

9. Project Justification and Conclusion

9.1 Sustainability

Clause 6 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* outlines the requirements of an environmental assessment, including:

"The reasons justifying the carrying out of the development or activity in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development".

The Regulation lists the principles of Ecologically Sustainable Development as:

a) the **precautionary principle**, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;

b) **intergenerational equity**, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations;

c) **conservation of biological diversity and ecological integrity**, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration; and

d) **improved valuation, pricing and incentive mechanisms**, namely, that environmental factors should be included in the valuation of assets and services.

The following provides an assessment of the proposal against the above criteria, and takes into account the findings of this environmental assessment.

9.1.1 Precautionary Principle

The assessment of the potential impacts of the proposal is considered to be consistent with the precautionary principle. It is considered that the assessments presented throughout this environmental assessment are consistent with rigorous scientific and professional methodologies and have been undertaken in collaboration with key stakeholders. These investigations have identified a number of potential impacts of the proposal on the local or regional environment. Where impacts have been identified, a number of management measures have been nominated to reduce, or remove, the impacts. These include:

- Odours;
- Noise;
- Water cycle management;
- Flora and fauna;
- Bushfire hazard;
- Cultural heritage; and

- Potential risks and hazards associated with the proposal.

It is considered that these management measures, outlined in Section 8, would satisfactorily protect the environment during both the construction and operational phases. Further, any contractor awarded site works would be required to prepare an environmental management plan detailing measures to be put in place to manage environmental and other issues identified. It is recommended that environmental performance in relation to the plans be regularly assessed through external environmental audits. The audits would also assist in assessing the adequacy of safeguards implemented to minimise environmental impacts associated with the construction on the site and the operation of the facility. The proposed facility would use modern technology with known consequences and effects. The technology to be employed in the facility is used throughout the world for water treatment, thereby reducing the potential for unknown impacts.

9.1.2 Intergenerational Equity

The proposal has identified no long term impacts associated with the operation or construction of the proposed facility that would lead to the degradation of the environment. This, in concert with the proposed management and mitigation measures, would ensure that the potential for any long-term impacts are significantly decreased. Similarly, the site selection, on a generally previously cleared site, protects of the status quo and reduces the need to change the natural form of the site.

9.1.3 Conservation of Biological Diversity and Ecological Integrity

The site has previously been significantly modified. This facilitates a less intrusive site development and ensures that there is minimal impact on the local biological diversity and ecological integrity.

Studies conducted in conjunction with this environmental assessment have identified that there would be no significant impacts on threatened or endangered species as a result of the proposal. Mitigation measures, where identified to be beneficial to the environment and flora and fauna species, are recommended during both the construction and operational phase of the proposal to ensure adequate protection and conservation.

9.1.4 Improved Valuation and Pricing of Environmental Resources

This environmental assessment has identified the environmental and other consequences of the proposal and identified mitigation measures where appropriate to manage adverse impacts.

Construction of the proposal would be required to be in accordance with relevant legislation and any Environmental Management Plan for the proposal that may be prepared prior to construction.

Requirements imposed in terms of implementation of proposed management measures represent a cost to the proponent and any contractors. The implementation of these measures would also increase the capital and operating costs of the proposal, signifying that environmental costs have been appropriately valued as part of the impact assessment process. Detailed design of the proposal would ensure that a minimal environmental footprint would be created by the proposal, ensuring that it is developed with an environmental objective and imperative in mind.

9.2 Consequences of Not Proceeding

If a WTP is not constructed, then Council would:

- Not be able to provide drinking water to Coffs Harbour consumers that meets current Australian Drinking Water Guidelines all of the time;
- Not achieve adequate risk management requirements for the high and very high water quality risks identified in the water quality risk assessment; and
- Not achieve NSW Health Department requirements all of the time.

9.3 Conclusion

This environmental assessment has considered the potential impacts of the proposal to develop a water treatment facility at 140 Upper Orara Road near Karangi in the City of Coffs Harbour. It recognised that the design of the proposed facility would incorporate a range of features and controls to minimise the potential for negative impacts on the environment. In addition, the environmental assessment recommends measures to reduce the overall potential for impacts.

In conclusion, it is considered that the proposed construction and operation of the WTP facility would:

- Improve the quality of drinking water supplied to Coffs Harbour and surrounding areas over the next three decades;
- Allow for the future expansion of the Coffs Harbour region by providing the capacity to treat water to the appropriate drinking water standards;
- Utilise existing infrastructure for the treatment and distribution of water resources in a more effective manner than at present; and
- Reduce the risk to public health and safety by providing treated drinking water that:
  - Is safe to drink;
  - Is aesthetically acceptable to most customers;
  - Complies with Australian Drinking Water Guidelines (ADWG 2004); and
  - Complies with the Department of Health requirements.

10. Reference List

Australian Bureau of Statistics (ABS), 2001. *Australian Bureau of Statistics Census Data*. Australian Bureau of Statistics website,http://www.abs.gov.au/websitedbs/d3310114.nsf/home/Census%20data

Australian Standard 2436 – 1981, *Guide to Noise Control on Construction, Maintenance and Demolition Sites.*

Coffs Harbour City Council. *Our Living City, A Settlement Strategy for Coffs City to 2031*

Cooperative Research Centre, 2004. *A Guide to Hazard Identification and Risk Assessment for Drinking Water Supplies.*

Department of Health, 2005. *Drinking Water Monitoring Program*.

ERM Mitchell McCotter, January, 1999. *Environmental Impacts Statement Regional Water Supply Project*. Prepared for the Lower Clarence County Council.

EPAV, July 1990. *Recommended Buffer Distances for Industrial Residual Air Emissions*. Pubn # AQ 2/86.

GHD Pty Ltd, April 2005. *Coffs Harbour WTP Options Review*.

National Health & Medical Research Council, 2004. *Australian Drinking Water Guidelines.*

NSW Department of Health, 2002. *Code of Practice for the Fluoridation of Public Water Supplies*.