PREFERRED PROJECT AND RESPONSE TO SUBMISSIONS REPORT

Newcastle Gas Storage Facility Project

Major Project Application Number 10-0133

September 2011

CR 6023_10_v3

Coffey Environments Australia Pty Ltd ABN 65140765902
Level 1, 3 Rider Boulevard Rhodes NSW 2138 Australia
T (+61) (2) 9736 2400 F (+61) (2) 8765 0762
coffey.com

3. OVERVIEW OF STAKEHOLDER CONSULTATION

AGL has consulted extensively with government, non-government organisations and community groups and individuals prior to, during and post public exhibition of the EA.

The section below outlines the consultation that AGL has conducted in relation to the Project.

3.1 Consultation Prior to EA Exhibition

AGL had undertaken extensive stakeholder consultation during the preparation of and prior to the public exhibition of the EA. The consultation undertaken prior to the public exhibition of the EA is detailed in section 5 of the EA Main Report.

3.2 Consultation During EA Exhibition

In addition to the consultation outlined in the EA, AGL undertook three community information sessions during the EA public exhibition period. On Monday 27 June 2011, one session was held at the Tomago Bowling and Sporting Club and a second session was held at the Hexham Soccer Club. On Saturday 23 July 2011, a further community information session was held at the Tomago Bowling and Sporting Club.

The purpose of these sessions was to provide information about the Project to enable residents and other stakeholders to discuss the proposal in an informal atmosphere with the project team. Information boards were presented at sessions to explain the Project, outline the planning process and describe how the project team will address feedback.

Key representatives from the project team, including AGL, attended these sessions to help explain various aspects of the proposal when required.

3.3 Consultation Post EA Exhibition

Since the public exhibition of the EA, AGL has continued to engage with, and carried out further consultation with, the following organisations:

- NOW.
- OEH.
- PSC.
- Newcastle City Council (NSS).
- Hunter Central Rivers Catchment Management Authority (CMA).
- Roads and Traffic Authority (RTA).
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC).
- HWC.

The purpose of these discussions was to confirm proposed design changes to the Project and the statement of commitments including stormwater management, offset arrangements, vegetation removal, modification to footprint, pipeline option 2 as the preferred pipeline corridor, power supply connections and wastewater management.

Further consultation with non-government organisations, community groups and individuals has also been carried out since the public exhibition of the EA, to provide Project updates and to discuss potential partnership arrangements. Groups that were consulted include but are not limited to:

- Koala Steering Committee.
- Hunter Botanic Gardens.
- Native Animal Wildlife Trust.
- Tomago Caravan Park.

3.4 Further Stakeholder Engagement

Consultation will continue throughout the pre construction and construction phases of the project, until Project operation.

AGL is proposing to continue to work closely with the community and is committed to develop a stakeholder engagement management plan (SEMP). The SEMP will outline how regular communication will occur. It will cover day to day communication and engagement activities including the provision of sufficient notice prior to construction commencing at a new location, enquiry and complaint management and protocols for access and works.

Prior to construction commencing, AGL proposes to establish a community liaison group (CLG) to on a regular basis. It is envisaged that the,, members assist AGL in resolving matters of environmental and social concern relating to the NGSF and provide a conduit for the dissemination of information to, and input from community members and other key stakeholders in relation to the NGSF.

4. CONSIDERATION OF SUBMISSIONS

4.1 Overview

The EA was on public exhibition from 24 June 2011 to 29 July 2011. An additional week was added to the normal statutory 30-day exhibition period to allow for the NSW school holiday period.

Submissions received during the exhibition period were directed to the DP&I via email, their website or post. All submissions were numbered as received and provided to AGL for consideration.

The DP&I received 29 submissions during the exhibition period. A significant proportion of responses were from government agencies, however, a number of submissions were also received from community groups, individuals and non-government organisations.

4.2 Submissions Received

Twenty nine (29) submissions were received by DP&I. These submissions were from the following stakeholders:

- Government agencies (12 submissions):
  - Department of Defence.
  - Civil Aviation and Safety Authority.
  - Fire and Rescue NSW.
  - WorkCover (NSW).
  - NCC.
  - OEH.
  - CMA.
  - PSC.
  - RTA.
  - DP&I (Major Hazards Unit).
  - NOW.
  - HWC.

In addition, the DP&I also provided AGL with comments in relation to the EA.

- Community interest groups (6 submissions):
  - Gimbay Gatigaan Aboriginal Corporation.
  - Hunter Koala Preservation Society Inc.
  - Ironstone Community Action Group Inc.
  - River SOS.
  - Australian Water Campaigners.
  - Rising Tide (Newcastle).
- Private individuals (11 submissions including 4 anonymous).

Copies of all the submissions can be found on the DP&I website.

4.3 Key Issues Raised in Submissions

All the submissions received were reviewed by AGL and the issues raised in the submissions have been addressed and tabulated (see Table 4.1 and 4.2). The submissions have been split

between those raised by government agencies and those raised by community groups and individuals.

The key issues raised in the submissions by government agencies, community groups and individuals pertain to:

- Coal seam gas exploration.
- Groundwater management and concerns about contamination to Tomago Sandbeds aquifer.
- Ecological impacts from clearing of native vegetation, in particular, impact on koala habitat and Earp's gum.
- Lack of detail in the biodiversity offsets package provided within the EA.
- Hazard and human health impacts from the storage of high volume of LNG at the facility.
- Potential air emissions from the Project.
- Noise emissions from the project.

A short summary of AGL's response to each of these key issues is contained below.

Section 4.4 of this Report contains two tables, which provide detailed responses to the issues raised in each of the submissions.

4.3.1 Coal Seam Gas Exploration

The Project is does not involve any coal seam gas exploration or production. The Project is required to secure the energy requirements of NSW. The Project will store natural gas from the existing pipeline network as described in section 3 of the EA Main Report.

4.3.2 Groundwater Management

The potential impacts of the Project on groundwater and, in particular, the Tomago Sandbeds aquifer, have been assessed as summarised in section 7.4 of the EA Main Report.

The natural gas held in the above ground gas storage facility will not impact the Tomago Sandbeds aquifer. Any loss of gas from the storage facility will disperse into the atmosphere as a gas opposed to seeping into the water table as a liquid.

The Project has been designed so as to minimise the risk of any impact on groundwater and the Tomago Sandbeds aquifer. Specific protection measures include:

- Primary containment of all gas, coolants and chemicals in secure above ground piping and drum storage locations.
- Bunding of the main processing area.
- Collection, retention and treatment of all stormwater that runs off the main processing area.
- Pumping and piping of treated stormwater to Old Punt Rd (outside of the groundwater catchment).

In response to the issues raised in submissions and ongoing consultation, AGL has made a number of additional commitments to address groundwater issues. These are detailed in section 7.3.

4.3.3 Ecological Impacts

The ecological impacts of the Project have been assessed and the results of this assessment are summarised in section 7.5 of the EA Main Report.

A detailed biodiversity offset strategy is being prepared which will ensure a net gain in protected koala habitat within the Port Stephens LGA. Please refer to the further information on the proposed biodiversity offsets contained in section 3.3 of this Report.

As a result of the feedback provided in the submissions and the further consultation carried out since the EA was exhibited, a number of additional measures are now proposed to further reduce ecological impacts. These include:

- Selection of pipeline route option 2 which avoids the SEPP 14 Coastal Wetlands. This alleviates concerns about the impacts of the Project on wetland species.
- The location of the internal access road into the gas plant site has been redesigned to project a minimum of 52 Earp's gum trees.
- The relocation of the facility to further reduce impacts.
- In addition, perimeter fencing around the gas plant site will be designed in accordance with the requirements of PSC's Comprehensive Koala Management Plan 2002. Fences around the access roads and pipeline corridor will be typical three strand stock fencing. Fencing around the facility will be vermin proof security fencing to prevent fauna entering the site.

4.3.4 Biodiversity Offsets Package

AGL is continuing to consult with the OEH, DP&I and the DSEWPaC to confirm the final biodiversity offsets package which will be secured for the Project prior to the commencement of construction.

It is currently proposed that the Biodiversity Offset Package will comprise of:

- Offsets which will be assessed in accordance with the Biobanking assessment methodology to ensure reasonably 'like for like' principles and vegetation types to those impacted by the Project.
- Offset for the loss of up to 15 (subject to survey) *Eucalyptus parramattensis* (Earp's gum) from the gas plant site.

The provision of the offsets will result in an enduring net gain in biodiversity which will exceed the impacts of the Project on flora and fauna. A number of potential offsets sites have been identified and AGL is continuing to assess these and consult with landowners and the OEH, DP&I and DSEWPaC. The preferred offsets will be secured in perpetuity with appropriate management regimes and financial security via one or more of the following mechanisms:

- Conservation agreement under the *National Parks and Wildlife Act 1974* (NSW) (NPW Act).
- Dedication of land under the NPW Act.
- Planning agreement under the EP&A Act.
- A trust agreement under the *Nature Conservation Trust Act 2001* (NSW).
- A biobanking agreement under the Threatened Species Conservation Act 1995 (NSW).

A number of specific measures to protect Earp's gum are also proposed.

AGL consultants have also undertaken seed collection from Earp's gum located within the site in August 2011 as part of the proposed biodiversity offset strategy. This seed has been provided to

the Hunter Botanic Gardens who have agreed to propagate the seed and plant the seedlings on their property.

- In addition a habitat management sub plan will be prepared which will detail the management and ongoing protection of the remaining Earp's gum within the site.

4.3.5 Hazard and Risk

The potential hazards and risks arising from the Project have been assessed and the results of this assessment are summarised in section 8 of the EA Main Report.

A fire safety study will be prepared and submitted to FRNSW for review and comment. The fire safety study will be compiled in accordance with NSW Department of Planning and Infrastructure guidance note HIPAP 2, *Fire Safety Study Guidelines.*

AGL is committed to complying with the regulations applicable to major hazard facilities and will continue to consult with WorkCover in order to obtain details of its requirements for inclusion in the site risk assessment and safety report.

The European LNG Code, EN 1473:2007 recommends a radiant heat less than 15 kW/m^2, which requires an APZ of 43 m. The Department of Planning recommends a radiant heat less than 23 kW/m^2, which requires an APZ of 31 m. The current site layout has an APZ of 46 m (minimum), including the slashing zones, and therefore satisfies both requirements.

4.3.6 Air Emissions

Section 7.13 of the EA Main Report summaries the potential air quality impacts of the Project.

AGL is continuing to liaise with OEH in relation to the conditions which will be imposed on any environmental protection licence issued for the Project.

Chemicals and analytes, including glycol, used across the Project for dehydration, rehydration and refrigeration will be monitored and modelled. The results of this modelling will be provided to OEH.

PAE Holmes have prepared an additional report addressing the issues associated with air quality for the project. Appendix 1 for the supplementary PAE Holmes report.

In addition, since the preparation of the EA, the preferred contractor has provided revised emissions data for the plant design. This includes emissions data for the flare and the fired heaters.

4.4 AGL Responses to Submissions

This section of the Report contains two tables (Tables 4.1 and 4.2) which provide detailed responses from AGL to the issues raised in the submissions, from government agencies, community groups and individuals.

4.5 Submissions by Government Agencies Response Table

A summary of the issues raised in the government agencies' submissions and AGL's response to each of the issues raised is presented in Table 4.1 below. As the submissions are often paraphrased, the reader is advised to refer to the relevant submission itself, which can be found on DP&I's website.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses

Submission Number	Category	Issue	AGL Response
Submission 3: Fire and Rescue NSW (FRNSW)			
3.1	Building regulations	FRNSW requested that all new buildings comply with current BCA and relevant Australian Standards.	Noted. All new buildings will be designed and built according to all relevant BCA and Australian Standards.
3.2	Access and safety	FRNSW stated an emergency plan might need to be prepared to ensure Project is in compliance with clause 174ZC of the *Occupational Health and Safety Regulations 2001* (NSW).	Noted. An emergency plan will be prepared and comply with clause 174ZC of the *Occupational Health and Safety Regulations 2001* (NSW). The emergency response plan will be compiled in accordance with DP&I guidance note HIPAP 1, *Emergency Planning.*
3.3	Hazard and risk	FRNSW requested that a fire safety study be prepared in accordance with Hazardous Industry Planning Advisory Paper (HIPAP) No. 2 and submitted to FRNSW for review.	Noted. A fire safety study will be prepared and submitted to FRNSW for review and comment. The fire safety study will be compiled in accordance with NSW Department of Planning and Infrastructure guidance note HIPAP 2, *Fire safety study guidelines.*
3.4	Access and safety	FRNSW requested that an assessment of emergency traffic arrangements be undertaken to ensure they meet the requirements in FRNSW Guidelines for Emergency Vehicle Access, Policy No. 4.	Noted. The proposed emergency traffic arrangements will be reviewed and assessed to ensure compliance with the stated Emergency Vehicle Access Policy No.4.
Submission 4: Commonwealth Department of Defence (DoD)			
4.1	Air plume rise	DoD requested Civil Aviation Safety Authority (CASA) be consulted about the impact on civil aircraft operations from the proposed air plume rise.	Noted. CASA has reviewed the proposal and has stated there will be no issue with the air plume rise on civil aircraft operations (see Submission 10).
4.2	Height of structures	DoD requested that AGL provides ‘as constructed’ drawings and details of the proposed heights of the Project’s’ storage tank and flare stack to the RAAF Aeronautical Information Service (RAAF AIS).	Noted. AGL will provide ‘as constructed’ drawings and details to the RAAF as requested.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 9: WorkCover (WC)			
9.1	Hazard and risk	WC requested AGL consult WC with regard to complying with regulations applicable to major hazard facilities and obtaining requirements to prepare the site risk assessment and safety report.	Noted. AGL is committed to complying with the regulations applicable to major hazard facilities and will continue to consult with WorkCover in order to obtain details of its requirements for inclusion in the site risk assessment and safety report.
9.2	Hazard and risk	WC requested the safety report be submitted to WC no later than six months prior to commissioning, or any other date agreed by WC.	Noted. AGL will prepare and submit the safety report to WorkCover six months prior to commissioning.
Submission 10: Civil Aviation Safety Authority			
10.1		No issues relevant for Williamtown Airport.	No action required.
Submission 17: City of Newcastle (NCC)			
17.1	Noise	Noise control requirements will need to be determined during the detailed design phase to satisfy the Project noise goals and to comply with any pending approval conditions. Recommended a noise management plan to be prepared to document measures to manage construction and operational noise impacts.	Noted. Noise control requirements will be set out in the detailed noise management plan which will be prepared during detailed design to ensure the Project satisfies Project noise goals and development approval conditions.
17.2	Contamination	Further soil and groundwater sampling may be required depending on redevelopment requirements. Compliance is required with SEPP 55 Remediation of Land where a remedial action plan prepared for assessment by the consent authority may be required.	Clause 7 of SEPP 55 Remediation of Land does not apply to the determination of applications for project approval under Part 3A (*Australians for Sustainable Development Inc v Minister for Planning* [2011] NSWLEC 33 (10 March 2011) at paragraph 215). A preliminary contamination assessment has been carried out in relation to the Hexham receiving station site (see EA Volume 2). The results of this confirmed that the risk of widespread contamination within the fill on the Hexham site is low.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 17: (cont'd) City of Newcastle (NCC)			
17.2 (cont'd)	Contamination (cont'd)		Therefore, it is considered that the construction of the Hexham receiving station could be carried out using a construction environmental management plan that, would provide guidance on: • The management and disposal of fill in accordance with the NSW DECCW (2009) Waste Classification Guidelines. • The management of unexpected finds. • The management of ASS. AGL has been advised that the site is therefore considered suitable for ongoing industrial use, provided the following recommendations are carried out: • An ASS assessment is conducted to check the natural buffering capacity of the soil and satisfy the requirements under clause 25 of the Newcastle Local Environmental Plan 2003 (Newcastle LEP 2003). • A hazardous material survey is carried out prior to demolition of the existing building. • A groundwater assessment based on site redevelopment details is carried out. • A construction environmental management plan (CEMP) is prepared that includes procedures for the management and disposal of fill material, procedures for unexpected finds and an ASS management plan, if require. See Appendix 2 for a letter confirming the low risk of contamination at Hexham receiving station site.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 17: (cont'd) City of Newcastle (NCC)			
17.3	Acid sulfate soils (ASS)	The proposed ASS management plan will need to be considered by NCC to ensure it complies with the ASS Manual.	Noted. AGL will prepare and submit a draft ASS management plan to NCC for their review.
17.4	Flooding	Recommended a flood emergency response plan be prepared.	Noted. A flood emergency response plan for the Hexham receiving station site will be prepared. The Hexham receiving station site will not be permanently staffed. The available warning times are sufficient to advise maintenance staff to evacuate or not to attend the site.
17.5	Stormwater	Stormwater impact from the Hexham receiving station would be minor, solutions utilising onsite drainage swales could be provided.	Noted. It is likely that the site would require some form of stormwater detention, which may be able to be contained in rainwater tanks, or drainage swales as suggested by NCC. The final requirements will be determined during the detailed design phase. AGL will prepare a stormwater management plan for the Hexham receiving station.
17.6	Traffic	Recommended the proposed construction traffic management plan be prepared in accordance to the road authority's requirements.	Noted. AGL will prepare a construction traffic management plan in accordance with the road authority's requirement.
17.7	Parking	Recommended that a single on-site parking space be provided for service/maintenance vehicles associated with the receiving station.	Noted. AGL will make use of the existing infrastructure on the site where possible, noting there is existing parking on the site.
17.8	Access	Advised that existing site access to the adjoining Jemena transfer facility will be suitable accessing the site provided legal rights of access are provided.	Noted. AGL will make use of the existing infrastructure on the site where possible to access the Hexham receiving station.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 17: (cont'd) City of Newcastle (NCC)			
17.9	Recommended Conditions of Approval	Identified 19 conditions which the Council would like imposed on the grant of any project approval.	AGL generally agrees with the draft 19 conditions of consent. However, AGL has provided a more detailed response to the following conditions: Condition 4 and 5 – AGL will make use of the existing infrastructure on the site where possible. Where new vehicular crossings are required across public footways these will be at no cost to NCC and be in accordance with NCC requirements. Condition 8 and 9 - AGL will make use of the existing infrastructure on the site where possible. If new parking is required this will be designed and constructed in accordance with NCC requirements.
Submission 18: Office of Environment and Heritage (OEH)			
18.	Environmental Protection Licence	States that the Project will require an environmental protection licence under the *Protection of the Environment Operations Act 1979* (NSW) (POEO Act) and notes that the OEH considers that it could issue an environmental protection licence for the Project if identified air impact issues are addressed. Draft proposed conditions of the environmental protection licence are annexed to the submission.	AGL is continuing to liaise with OEH in relation to the licensing requirements for the Project under the POEO Act and the proposed draft conditions for the environmental protection licence.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 18: (cont'd) Office of Environment and Heritage (OEH)			
18.1	Air quality	Consider that emission discharge limits, and monitoring, for sulphur dioxides, oxides of nitrogen, solid particles and volatile organic compounds on two discharge stacks are necessary, along with a post commissioning air emissions report. Appropriate conditions are included in Attachment A of the submission.	AGL is continuing to liaise with OEH in relation to the conditions which will be imposed on any environmental protection licence issued for the Project.
18.2	Air quality	Requested further information on the implications of under-prediction of calm weather conditions modelled by CALMET. Need to address the discrepancy of how CALMET predicts almost 50% lower of calm conditions compared to observed data (how does this discrepancy affect modelling outcomes?).	OEH have queried why the CALMET generated windroses presented in the report have lower % of calm conditions (19.1%) than the measured data recorded at the TAC weather station (32.3%) and would like some discussion around the implications for the modelling results. Firstly, it is important to note that CALMET is not a steady state model; rather it produces three dimensional meteorological fields that vary across the entire domain. The wind conditions (including % calm conditions) therefore vary across the domain. The windroses presented in the AQIA for CALMET are extracted for a single grid point across the modelling domain (at the NGSF site) and are used to show how the model compares with observed data. The windroses are a simplification of the meteorological conditions used by the model to predict pollutant dispersion. Therefore, the percentage calm conditions presented in the report are not necessarily applicable across the entire modelling grid. The CALMET wind roses presented in the report are for a location at the proposed NGSF site, not at a location representative of the TAC weather station. A subsequent CALMET extract at the TAC whether station shows a % occurrence of calms of 23%, which is closer to the observed data (19%).

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 18: (cont'd) Office of Environment and Heritage (OEH)			
18.2 (cont'd)	Air quality (cont'd)		It is also noted that the % occurrence of calm conditions at the TAC site varied across the 5 years analysed and the average across all 5 years is closer to the CALMET predictions. It cannot be concluded that CALMET is under predicting calm conditions and no further analysis of the meteorological conditions under which the highest concentrations are predicted and the implications for the modelling results is considered necessary.
18.3	Air quality	Glycol solutions are generally used to dehydrate natural gas and glycol regeneration may release quantities of BTEX and other less toxic organics. Need to clarify if glycol hydrator vent stream(s) would be present at the LNG plant and if so, include this aspect in the modelling.	Chemicals and analytes, including glycol, used across the Project for dehydration, rehydration and refrigeration will be monitored and modelled. The results of the monitoring will be provided to OEH.
18.4	Air quality	Scenario 3 modelling (start up/shut down, Table 2) appears to include natural gas flaring as the only emission source. Clarify why the gas-fired heater and LNG vaporiser (and hence liquefaction and re-gasification) as well as the sour gas flare were not included in this scenario.	OEH have queried why liquefaction, re-gasification and sour gas emissions where not modelled for scenario 3 (start up/shut down). During shutdown there will not be any gas venting other than during an emergency. During start-up there will be a small amount of venting of gas. The fired heater on the Amine unit will run during this time but at a reduced rate and a small amount of sour gas venting would occur as gas is prepared for liquefaction. Therefore, there would be a small amount of additional emissions to air, other than the flare (as modelled). However, these additional emissions would be less than those predicted under scenario 1, where all predictions were demonstrated to be less than 1% of the impact assessment criteria.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 18: (cont'd) Office of Environment and Heritage (OEH)			
18.5	Air quality	Fuel chemical composition: Whilst there is no mention in the EA of the H_2S concentration in sour gas, an SO_2 emission rate of 0.11 g/s has been assumed for the sour gas flare tip. The EA should provide fuel analysis information to clarify the assumptions made in arriving at the emission rate. Based on the AP42 Chapter 5 equation for determining the SO_2 emission factor (below) the assumed H_2S concentration appears to be 0.005 mole% (50 ppm). EF (SO_2) = S*26.98/1000 m^3 sour gas [S = mole or volume% sour gas].	OEH have requested the fuel analysis to clarify the H_2S concentration / assumptions used in arriving at the emissions rate for SO_2 from the sour gas flare tip. OEH have also requested typical chemical composition for the natural gas expected to be processed at the LNG plant. Since the publication of the EA, a revised composition of H_2S in the sour gas has been provided by the preferred contractor for the plant design (0.00008 (expressed as a mole fraction) as per, Appendix 1). Using this and the US EPA emission factor for the acid gas incineration gives an emission rate as follows: • 0.00008* 26.98 = 0.0022 kg/1000 m3 gas processed. • Gas processed = 13,477 m3/hr. • Emission Rate (g/s) = 13.477* 0.0022*1000/3600 = 0.01 g/s SO2. This is significantly lower than what was modelled (0.11 g/s). The composition of the gas for various streams is provided in, Appendix 1 noting that: • Stream 1 is the feed gas. • Stream 4 is the sour gas from the Amine unit. • Stream 26 is fuel gas flow for flare purge.
18.6	Air quality	Editorial issue: Stack temperatures for the liquefaction (hot oil heater) and LNG vaporiser listed in Tables 7.1 and 7.3 (of EA Main Report) appear to be inconsistent with each other. A 320°C temperature is used in Table 7.1 and 320 degrees Kelvin in Table 7.3. Any subsequent errors in the calculated emission rates should be identified and rectified.	The assumed temperatures and those modelled are 320^oC (593 K) for the liquefaction (hot oil heater) and 40^oC (313 K) for the LNG vaporiser. Table 7.1 is correct and Table 7.3 contains the incorrect units (^oC). The incorrect units did not result in calculation errors.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 18: (cont'd) Office of Environment and Heritage (OEH)			
18.7	Air quality	Numbers from Table 7.2 were compared against an OEH analysis of emission rates of NOx, CO and VOC for a normal process flare tip. The EA emission rates appear to be underestimated by an order of magnitude when compared to OEH estimates of the same. This issue should be clarified.	Since the preparation of the EA, revised emissions data have been provided by the preferred contractor for the plant design, including emissions data for the flare and the fired heaters. The revised emission data are provided in Table 3.1. The revised emission data are lower than presented in the EA for some sources and parameters and higher for others. This has not changed any of the findings or conclusions presented in the EA. The revised modelling with the revised emission data is attached as Appendix 1.
18.8	Noise and vibration	The EA notes that during the detailed design of the Hexham receiving station widely used additional noise controls will be implemented to ensure that the Project goals are met.	Noted.
18.9	Noise and vibration	Recommended environmental protection licence and consent conditions are included in Attachment B.	AGL is continuing to liaise with OEH in relation to the proposed draft noise conditions.
18.10	Noise and vibration	Recommended that a traffic noise management strategy be implemented and this is included as a consent condition in Attachment C.	Noted. A traffic noise management plan will be prepared within the construction traffic management plan.
18.11	Water	Aware of recent negotiations between HWC and the proponent which involve treatment of stormwater via a gross pollutant trap and wetland/holding pond prior to pumping stormwater to the street drainage system of Old Punt Road. It is anticipated this discharge will be of good quality and will not be licensed by OEH and must not result in pollution of waters.	Noted. Stormwater from the site will be treated in accordance with PSC's 'Urban Stormwater and Rural Water Quality Management Plan for New Developments' and will therefore be of equivalent (or better) quality than stormwater from other sites in the shire.
18.12	Water	Disposal of hydrostatic test water is addressed as a condition of consent.	AGL is currently investigating the hydrostatic test water issue in consultation with relevant agencies. Disposal of hydrostatic test water will be managed under the surface water management plan which will be prepared in consultation with relevant agencies including OEH, NOW and HWC.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 18: (cont'd) Office of Environment and Heritage (OEH)			
18.13	Ecology	Pipeline option over SEPP 14 Coastal Wetlands has been removed from the Project.	Noted.
18.14	Ecology	There is a lack of detail about an offsets package to compensate threatened species. OEH does not draw the same conclusions as those presented in the EA ecological assessment which concludes that the Project will not have significant impact on threatened species, their habitat and ecological communities. An offset is deemed as necessary.	Please refer to the further information on biodiversity offsets contained in section 4.4 of this Report.
18.15	Ecology	Need information on the additional targeted flora searches for wetland/aquatic species that may be impacted upon if indirect activities adversely affect their habitats.	Noted. Although it is unlikely that there will be any adverse impacts on the specified wetland/aquatic species as a result of indirect activities, as requested by OEH, AGL will carry out targeted surveys for *Persicaria elatior*, *Maundia triglochinoides* and *Zannichellia palustris.* The surveys will determine if there is physical incursion and/ or any adverse indirect impacts including pollution, surface runoff and frac-out to occur or likely to occur to any of the habitats of these species. This is in particular to the Freshwater Wetland Complex and Phragmites Rushland vegetation communities (see Figure 7.12 Vegetation Communities in EA Main Report). The results of these further surveys will be provided to the OEH and the DP&I when the surveys have been undertaken.
18.16	Floodplain and water management	The EA does not make reference to relevant flood policies. The EA is to refer to: • NSW Government's Flood Prone Land Policy; • NSW Floodplain Development Manual 2005; • Chapter 5, Part 2 of the Water Management Act 2000; • PSC flood policies and DCPs; and • NCC flood policies and DCPs.	Noted. The relevant flood policies have been identified and have informed the flood impact assessment carried out for the Project by Worley Parsons (see Appendix 5, EA Volume 3).

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 18: (cont'd) Office of Environment and Heritage (OEH)			
18.17	Floodplain and water management	Minister consent required under section 256(1)(b) of the Water Management Act for construction of a flood work on a floodplain, in relation to Hunter Valley flood mitigation works. Formal request on consent to OEH is required (not received by OEH by 29 July 2011).	Section 256(1)(b) of the *Water Management Act 2000* (NSW) provides that consent is required to construct a 'flood work' on a 'flood plain'. 'Flood work' is relevantly defined to mean work (such as a barrage, causeway, cutting or embankment) which is situated within a floodplain and is of a size or configuration such that it is likely to have an effect on the flow of water to or from a river, estuary or lake, or the distribution or flow of floodwater in times of flood. No flood work is proposed as part of the Project. In this regard, the Flood Impact Assessment which forms Appendix 5 to the EA Main Report confirms that the works proposed as part of the Project will not have a significant impact on the flood storage or local flood characteristics at the gas plant site or have an impact on peak levels of flooding at the Hexham receiving station up to the 100 year ARI event.
18.18	Aboriginal Cultural Heritage	Satisfactory and subject to recommended conditions of approval 5 to 11.	Noted. The issues by the recommended conditions of approval 5 to 11 will be addressed in a cultural heritage management plan. This will be prepared in consultation with Aboriginal stakeholders and the OEH prior to construction and incorporated into the construction environmental management plan.
(18.19) Attachment B	Environmental Protection Licence Conditions	Environmental Protection Licence Conditions.	Ongoing discussions are being carried out between AGL and OEH in relation to the proposed draft conditions for the environmental protection licence.
(18.20)	Environmental Protection Licence	Mandatory conditions for all environmental protection licences.	Noted.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 18: (cont'd) Office of Environment and Heritage (OEH)			
(18.21) Attachment C	Recommended Conditions of Approval – Threatened Species	Threatened species: • Point 1 – Flora surveys. • Point 2 – Biodiversity offset package. • Point 3 – Rehabilitation offset package.	1. Targeted surveys - AGL will undertake targeted surveys in appropriate seasons for the identified species. 2. Biodiversity offsets package - A detailed biodiversity offset strategy is being prepared for the site in consultation with OEH and DSEWPaC. Please see section 4.4 of this Report. 3. Rehabilitation offsets package - A detailed rehabilitation offset strategy for the impacted Earp's gum trees will be prepared for the site in consultation with OEH and DSEWPaC.
	Recommended Conditions of Approval – Water	Point 4 – Water disposal must not pollute water as per the POEO Act.	Noted. Disposal of water will be in accordance with the POEO Act.
	Recommended Conditions of Approval – Aboriginal Cultural Heritage	Aboriginal cultural heritage: • Point 5 – Sustain consultation and involvement with registered local Aboriginal representatives. • Point 6 – Cultural heritage management plan to be implemented. • Point 7 – Provide opportunities to local Aboriginal stakeholders to monitor disturbances at or near Aboriginal sites. • Point 8 – Action plan for new Aboriginal object findings. • Point 9 – Action plan for unexpected human remain findings. • Point 10 – Avoidance of impacts on Aboriginal cultural heritage and Aboriginal site impact recording and mitigation measures. • Point 11 – Development of an Aboriginal cultural education program and records.	Please refer to the response to item 18.18 above.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 18: (cont'd) Office of Environment and Heritage (OEH)			
(18.21) Attachment C (cont'd)	Recommended Conditions of Approval – Traffic	Traffic noise impact: • Point 12 – Prepare a traffic noise management strategy ('Driver Code of Conduct') prior to commencement of construction.	Noted. AGL will prepare a traffic noise management strategy.
Submission 19: Hunter-Central Rivers Catchment Management Authority (CMA)			
19.1	Policy and legislation	The principles of the catchment action plan and the *Native Vegetation Act 2003* should still apply to the Project.	As the CMA correctly notes in its submission, the *Native Vegetation Act 2003* (NSW) does not apply to the Project.
19.2	Ecology	Clearing of vegetation must include offsets.	Please refer to the further information on biodiversity offsets contained in section 4.4 of this Report.
19.3	Ecology	CMA cannot support the Project until details of an offset is provided for review/comment. The CMA supports either the Environmental Outcomes Assessment methodology or the Biobanking methodology.	Please refer to the further information on biodiversity offsets contained in section 4.4 of this Report.
19.4	Pipeline option	Supports amendment to pipeline option 1.	Pipeline option 1 is no longer proposed.
19.5	Ecology	Encourages compliance with re-planting and mitigation actions associated to the footprint of the gas storage facility.	Please refer to the further information on biodiversity offsets contained in section 4.4 of this Report.
19.6	Groundwater	In line with CMA's guiding principles for groundwater management, groundwater shall be monitored in and around the development. Groundwater monitoring is required before and throughout the life of the Project.	Noted. A substantial groundwater monitoring program has already commenced for the Project. This will address both water level and water quality attributes of the shallow sand aquifer. A groundwater baseline monitoring program is currently underway before construction commences and will continue during construction and operations. Groundwater monitoring will be carried out throughout the life of the Project within the gas plant site.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 19: (cont'd) Hunter-Central Rivers Catchment Management Authority (CMA)			
			Drawdown associated with any dewatering during the pipeline construction is expected to be very localised, very minor (drawdowns of <1 m are expected) and short term. All extracted water is expected to be re-injected into the shallow aquifers at nearby sites.
19.7	Groundwater	Groundwater management plan (GMP) to be implemented. GMP to include a response plan to any spills and a contingency plan to respond appropriately to any drawdown consequence of drilling activities.	Noted. AGL will, in consultation with relevant agencies, prepare a groundwater management plan. It is unlikely that groundwater flows will be altered by the minor dewatering associated with pipeline construction and Hunter River HDD.
19.8	Groundwater	GMP should include monitoring of terrestrial vegetation.	Noted. The best indicator of potential impacts on the terrestrial vegetation is groundwater level and groundwater quality monitoring – monitoring different vegetation types for changes would be inconclusive as to whether any observed changes were caused by groundwater. Baseline monitoring is underway across the Project site to determine the seasonal variance of groundwater levels and water quality.
Submission 20: Port Stephens Council (PSC)			
20.1	Section 94A Contributions Plan	PSC requested section 94A contributions from the development.	In the event that it is determined to impose a condition requiring the payment of a developer contribution under section 94A of the EP&A Act, on the grant of any approval for the Project under Part 3A, the provisions of the *Port Stephens Section 94A Development Contributions Plan* (Contributions Plan) must be considered.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 20: (cont'd) Port Stephens Council (PSC)			
20.1 (cont'd)	Section 94A Contributions Plan (cont'd)		The Contributions Plan applies to *'Commercial, Retail and other Employment based Development, or non residential development or subdivision, including mixed use that would create a demand for public amenities and services where the proposed cost of carrying out the development is greater than $100,000'.* The Contributions Plan does not apply to the Project as the Project will not create a demand for public amenities and services. Impacts to community infrastructure and services are assessed in section 7.9 of the EA Main Report. The EA states that: • Impacts to social infrastructure such as regional recreational and sporting infrastructure are expected to be minimal. • Temporary impacts to road infrastructure attributed to the Project during construction would be made good by AGL. Further, it is submitted that it is not appropriate to impose a condition requiring the payment of a developer contribution on the Project. This is because the Project has been declared to be a critical infrastructure project which is essential to NSW for economic, environmental and social reasons.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 20: (cont'd) Port Stephens Council (PSC)			
20.2	Traffic	Prepare a construction traffic management plan.	Noted. AGL generally agrees with the measures proposed by PSC for inclusion in the construction traffic management plan, with the exception of requirement (i). AGL believes 'containing heavy vehicle movements to off-peak hours when traffic volumes are typically at a minimum' is unreasonable. Rather, AGL commits to transporting equipment and machinery likely to cause delays to traffic flows outside of peak traffic flows, wherever practicable.
20.3	Stormwater	PSC has no objection to the proposed. PSC requested conditions 1 to 5 be included within the conditions of consent.	Noted. AGL agrees with Conditions 1 to 5.
20.4	Wastewater	PSC does not support tanker removal.	The Project anticipates approximately 10kL of human sewage per week will be generated and removed from site during operation. HWC have recently confirmed with AGL and PSC that a pump out from this site is more appropriate than an onsite treatment system due to the ability to closely monitor the tank and local soil and groundwater conditions. PSC and HWC have confirmed that the tankering of wastewater from this site is acceptable with the following conditions: • The system will have a telemetered level sensor that alarms when over range. • The tank will be included on the regular site inspection and reporting program that is being negotiated at present between HWC and the proponent. • There will be a groundwater monitoring peizometer downstream of the tank that is regularly sampled for pathogens and nutrients.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 20: (cont'd) Port Stephens Council (PSC)			
20.5	Ecology	The proposed asset protection zones need to be modified to comply with Planning for Bushfire Protection.	AGL is taking a conservative approach by ensuring that vegetation is kept below 0.05 m in height within the proposed asset protection zones for safety reasons. The Project will be a major hazard facility and a conservative bushfire protection regime will be adopted. However, it has been determined that Earp's gum will be retained if they fall within the asset protection zone.
20.6	Water	Water supply infrastructure to ensure minimal impact to on-site vegetation.	Construction water will either be sourced via tanker from nearby sources or the water main extension. AGL is currently investigating the source of construction water for hydrostatic testing.
20.7	Site suitability	Any future plans for re-development shall seek Council's approval to ensure adequate management of site's communities and threatened species.	Any future plans of redevelopment will be sought via a modification of the critical infrastructure project approval from DP&I and would be subject to environmental assessment.
20.8	Ecology	Vegetation removal on-site to comply with any relevant management plan and legislation on protected, endangered or threatened communities and/or species.	The ecological impacts of the Project have been further reduced. In particular: • The number of Earp's gum species being removed has been reduced from 67 to up to 15 trees, subject to survey. • There will now be no direct disturbance to the Freshwater Wetlands Endangered Ecological Community (EEC), Riverflat Eucalypt Forest EEC and Swamp Sclerophyll Forest that are located along Old Punt Road (due to pipeline realignment and choice of construction technique). Please refer to the further information on ecological impacts and biodiversity offsets contained in section 4.4 of this Report.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 20: (cont'd) Port Stephens Council (PSC)			
20.9	Vegetation	Management of the red-gum-Apple-Banksia Forest to comply with the Port Stephens Comprehensive Koala Plan of Management (PS-CKPoM) and SEPP14.	Noted. The ecological assessment of the gas pipeline access corridor was based on a width of 37 m. The actual proposed width of the corridor is 30 m which has allowed for reduced clearing in the Redgum-Apple-Banksia community (that contains *Eucalyptus tereticornis*) from 0.85 ha to 0.69 ha. Please refer to the further information on ecological impacts and biodiversity offsets contained in section 4.4 of this Report.
20.10	7-part test	Future development proposals to refer to the 7-part test and to prevent impact on Earp's gum, Swamp Sclerophyll Forest and koala.	The Project is currently limited to the land specified in the EA and this Report. Any future development of other land in the area, would be the subject of separate assessments.
20.11	Buffers	Part of the offset for this proposal to include securing the Swamp Sclerophyll Forest EEC and Earp's gum habitat.	Please refer to the further information on biodiversity offsets contained in section 4.4 of this Report.
20.12	Hollow trees	Between 300 and 400 hollow bearing trees will be removed as part of this proposal.	Please refer to the further information on biodiversity offsets contained in section 4.4 of this Report. In addition, a habitat management plan will be prepared to ensure that appropriate mitigation measures i.e., soft-felling techniques, ecologist present during tree-felling and a fauna displacement protocol are implemented to reduce any impacts on inhabiting fauna.
20.13	Access road	Council prefers the alternative option for AGL to negotiate with TAC to relocate the proposed road so it transverses around the north of the koala EEC habitat.	AGL has realigned pipeline option 2 (preferred pipeline option) so that clearing for the pipeline will not impact the Swamp Sclerophyll Forest EEC along Old Punt Road (reducing clearing in this community from an original maximum of 1.09 ha to 0.64 ha). The access road has been designed so as to accommodate the site constraints including land access, physical location, hazard management, environmental impacts, engineering aspects and future site development. The final route was selected on the basis that it best balances the needs of all of these issues.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 20: (cont'd) Port Stephens Council (PSC)			
20.14	Ecology	Remnant EEC habitat within the Tomago Aluminium site to be substantially conserved by TAC.	The Project is currently limited to the land specified in the EA and this Report. Any future development of other land in the area, would be the subject of separate assessments.
20.15	Access	Supplementary koala habitat, buffers and linking areas will be affected. The effect of the APZs around the processing plants is unclear.	The ecological assessment of the gas pipeline access corridor was based on a width of 37 m. The actual proposed width of the corridor has been reduced to 30 m which has reduced clearing in the Redgum-Apple-Banksia community (that contains *Eucalyptus tereticornis*) from 0.85 ha to 0.69 ha. AGL has redesigned the layout of the gas storage facility footprint to reduce the number of Earp's gum requiring removal from 67 to up to 15, subject to survey. Please refer to the further information on biodiversity offsets, including for Earp's gum, contained in section 4.4 of this Report.
20.16	Offsets	A biodiversity offset assessment report to be provided to Council's Natural Resources Section, including appropriate offset/s methodology, vegetation management plan (VMP) and planning to secure restoration of the offset area.	Please refer to the further information on biodiversity offsets contained in section 4.4 of this Report.
20.17	Offsets	No future plans to expand the facility should be approved in order to conserve in perpetuity the remnant EEC.	Any future plans for redevelopment will be sought via a modification of the critical infrastructure project approval from DP&I and would be subject to environmental assessment.
20.18	Water supply	The construction of water supply infrastructure should limit vegetation disturbance and ensure rehabilitation.	Noted. See response to 20.6 above.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 20: (cont'd) Port Stephens Council (PSC)			
20.19	Recommended Conditions of Approval – Natural Resources	The PSC's Natural Resources section recommended a number of proposed conditions relating to ecology impacts be imposed on any consent issued.	The issues raised by these recommended conditions are also addressed in the draft conditions proposed by OEH. Please refer to submission 18 of this Report which addresses OEH's flora and fauna issues and the proposed mitigation measures. The EA and follow up survey by Ecobiological have determined that there will be no impact on native vegetation as a consequence of the proposed stormwater management.
Submission 26: Roads and Traffic Authority (RTA)			
26.1	Traffic issues	A construction traffic management plan shall be prepared and submitted to PSC, NCC and RTA before commencement of construction.	Noted.
26.2	Traffic issues	AGL must comply with the RTA's general guidelines for pipeline construction within classified roads.	Noted. AGL generally agrees with the guidelines for construction of pipelines within classified State road reserves, with the exception of condition 14 – Public Risk Insurance Policy (see response to item 26.5 below).
26.3	Traffic issues	The RTA prefer pipeline option 2 route with a modification to the proposed alignment of pipeline option 2 around the Tomago Road and Old Punt Road intersection.	Noted. AGL's preferred pipeline route is option 2. Under this option, AGL will carry out HDD beneath the Old Punt Road and Tomago Road intersection to avoid disruption to traffic during the Project construction phase.
26.4	Traffic issues	A works authorisation deed agreement with the RTA will be required prior to commencement of any work.	No consent from the RTA is required under section 138 of the *Roads Act 1993 (NSW).* Accordingly, there is no requirement for a works authorisation deed agreement with the RTA.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 26: (cont'd) Roads and Traffic Authority (RTA)			
26.5	Traffic issues	Condition 14 – public risk insurance policy.	Noted. With regard to item number 14, AGL will arrange for a public liability policy to cover the RTA and the relevant Council for public liability in relation to this contract/works for an amount of $20 million.
Submission 27: Major Hazard Unit (DP&I)			
27.1	Proximity to detention centre	Concerned about the distance between the pipeline and the detention centre.	The proposed pipeline will not affect the detention centre along Tomago Road as it is located approximately 2 km away from the detention centre. As this distance, the individual risk of fatality is $<1x10^{-10}$ per year which is well below the risk criteria for sensitive development.
27.2	Sensitive land uses	Compliance with risk criteria for sensitive land use should be provided.	The quantitative risk assessment (QRA) showed that all land use criteria, as defined by the DP&I (in their HIPAP 4, *Risk criteria*) are met. The risk at any nearby residential areas, open spaces and sensitive development is well below the maximum tolerable risk criteria. This includes the Gas Storage Facility, the NGSF pipeline and the NGSF receiving station. The risk associated with the NGSF does not preclude further industrial development in the vicinity of the site.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 28: NSW Office of Water (NOW)			
28.1	Licensing	NOW requested a condition to ensure water licences are held to authorise the taking of groundwater by dewatering activities.	AGL will continue to liaise with NOW, HWC and OEH regarding water licensing requirements and ensure that all statutory water licensing requirements are complied with.
28.2	Pipeline corridor	NOW requested that the potential impacts of the pipeline crossing of Water Feature 4 be assessed and be in accordance with NOW's Controlled Activities: Guidelines for Water Crossing.	The route for the gas pipeline will be along the HWC land ((i.e., the northern site access). Water feature 4, a wet area within the unnamed south western (ephemeral) watercourse, will not be impacted by the gas pipeline. There are no plans to cross water feature 4 as this is located wholly within TAC lands to the south of the site access (the preferred pipeline route is approximately 300 m to the north). Therefore there will be no need for water feature 4 to be assessed for a pipeline crossing.
28.3	Constructed wetland	NOW requested clarification that the constructed wetland/holding pond will be designed to deal with the volume of runoff from the uncovered and general plant areas.	The holding pond is designed to take all stormwater from impervious areas across the Project site (i.e., all areas except the gas storage tank, electrical switchyard and pervious area outside of the operational zones). It is sized to capture (and retain) surface flows up to a 100-year storm 72-hour event (as per Worley Parsons Review of Stormwater Disposal Options Report – see Appendix 3.
28.4	Recommended conditions of approval	NOW recommended conditions of approval pertaining to water licensing, the stormwater management plan and the groundwater management plan.	The surface water management plan for the CEMP is currently underway. AGL has and will continue to consult with NOW, OEH and HWC in relation to the stormwater management plan and the groundwater management plan.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 29: Hunter Water Corporation (HWC)			
29.1	Recommended conditions of approval - stormwater management plan	A peer reviewed Stormwater Management Plan, endorsed by Hunter Water, must be in place before any construction commences (including clearing, earthworks or building).	HWC has confirmed, following further consultation, that peer review of the engineering design of the stormwater management system is what is desired, not peer review of the Stormwater Management Plan document. AGL agrees to have the engineering design of the stormwater management system peer reviewed.
29.2	Recommended conditions of approval - groundwater monitoring strategy	A groundwater monitoring strategy with scientifically justified monitoring bore placement and monitoring frequency must be in place. HWC to endorse prior to commencement of works.	AGL considers that the groundwater management plan that is proposed for the CEMP will provide sufficient justification for the proposed groundwater network and program. A more detailed reassessment of the Project's infrastructure and associated monitoring requirements will be completed prior to the commissioning and operation of the site, and an updated strategy with suitable justification will be included in the groundwater management plan for the OEMP.
29.3	Recommended conditions of approval - waste	Illegal dumping strategy for the site and any access road and tracks. This strategy is to be in place before commencement of the construction phase.	Noted. AGL will install fences and security gates to ensure illegal dumping will be minimised. The fencing will be to the full perimeter of the works. The Groundwater Management Plan and Surface Water Management Plan set out the process to be followed if illegal dumping is detected, to ensure no harm to surface water or groundwater quality.
29.4	Recommended conditions of approval – Deed of Agreement	Deed of Agreement for ongoing management of the drinking water aquifer, including stormwater management, groundwater monitoring and reporting during construction and operational phases.	AGL has revised the statement of commitments to include a number of additional commitments relating to stormwater management, groundwater monitoring and reporting during construction and operational phases. Please refer to the revised statement of commitments contained in section 7 of this Report. In light of these further commitments, HWC has indicated to AGL that it no longer requires a separate Deed of Agreement.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 30: DP&I			
30.1	Electrical Supply	New substation is shown adjacent to the boundary in Figure 1.3. Does the location of this substation mean that additional clearing is required to reduce bushfire risk outside of the proposed boundary?	There will not be any additional clearing outside the boundary. Allowance has been made in the design to cater for spacing the substation to reduce the risk of bushfire.
30.2	Water Supply	There are inconsistencies in the document with regard to the water source for construction. Please clarify which water sources are to be sourced for during construction. i.e., Bore water, HWC Bore 20 water, HWC treated water system on Old Punt Road or water tankered on to site.	It is currently envisaged that water for construction and operation will be supplied by HWC from the water main located at Old Punt Road. AGL is currently investigating the source of hydrostatic test water in consultation with relevant agencies including OEH, HWC and NOW. Sourcing and disposal of hydrostatic testing water will be managed under the groundwater and surface water management plan in consultation with relevant agencies. It is likely that the water required for hydrostatic testing will be potable from existing HWC water supply infrastructure, untreated water from HWC station 20 bores, groundwater locally abstracted from new bores or a combination of these.
30.3	Flare Stack	The height of the flare stack is inconsistent throughout the EA – please clarify the height of the structure.	Further detailed design on the gas plant components has resulted in the reduction of the flare stack height from up to 45 m to approximately 15 m.
30.4	Soils	Unexpected and non-typical result for fluoride shown in Table 7.5 – was this further investigated – is there a reason why this value was so high?	No further investigations were undertaken for fluoride given this is not an identified emission source from the Project. Please see Volume 2 of the Environmental Assessment - Appendix 1 'Preliminary Contamination Assessment' section 9.1.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 30: (cont'd) DP&I			
30.5	Waste	What is the expected size of the trade waste tank as shown in Figure 7.5?	The current expected size of the trade waste tank is approximately 20 kL. This will be further reviewed during the detailed design process and may be varied depending upon operational constraints.
30.6	Stormwater	It is understood that there are changes to the management of stormwater than that proposed in the EA. These changes along with an assessment of the release of the stormwater and any construction impacts will need to be assessed as part of the Preferred Project and Submissions Report	Changes to stormwater management for the Project are outlined in section 5.2.2.
30.7	EA Clarification	What does LOR mean in the table column heading for Table 7.7?	Limit of Reporting (Laboratory analysis language).
30.8	Ecology	Quantities and totals in the Table 7.10 do not always add up.	This has now been addressed and forms Table 5.1 in section 5.3 of this report.
30.9	Ecology	Based on the groundwater level modelling and predicted changes to the groundwater level how would this impact the groundwater dependent ecosystems in the area?	This has been addressed in section 5.3.7 of this report.
30.10	Ecology	Table 7.19 does not include the residual quantity of impact to SEPP 44 koala habitat.	This has been addressed in section 5.3.2 of this report.
30.11	Ecology	Draft ASS management plan is required prior to the Commonwealth assessing the project.	Noted. A draft ASS Management Plan has been prepared and will be submitted to DP&I and DSEWPaC.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 30: (cont'd) DP&I			
30.12	Bush Fire	It is not clear why an APZ of 25 m is selected when a radiant head above 23 kW/m^2 could trigger building structural failure. The APZ of 25 m would expose structures to a radiant heat of 29.36 kW/m^2 above the DoP recommendation. With the changes proposed to the design will there be any changes to the APZ required?	For general plant areas and buildings, the APZ was sized to provide a Bushfire Attack Level (BAL) of 29 kW/m^2. This level is considered appropriate for an industrial situation, and industrial building materials are readily available that can achieve a BAL of 29 kW/m^2. The majority of the site buildings have a greater distance to the fire, with only the perimeter buildings having a minimum APZ of 25m. With regards to the LNG Tank, there are two sources to determine the APZ. The European LNG Code, EN 1473:2007 recommends a radiant heat less than 15kW/m^2, which requires an APZ of 43m. The Department of Planning recommends a radiant heat less than 23kW/m^2, which requires an APZ of 31m. The current site layout has a APZ of 46m (minimum), including the slashing zones, and therefore satisfies both requirements.
30.13	Pipeline	Placement of pipes with loss to agricultural production. The proposed placement of pipes appear to be outside of areas with agricultural production. Please clarify if this is not the case.	We confirm the proposed placement of pipes will be outside the areas with agricultural production.

Table 4.1 Summary of issues raised by government agencies during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 30: (cont'd) DP&I			
30.14	Air Quality	Is the Air Quality data for 2010 available?	In relation to Section 7.13.2 of the main body of the EA, DP&I have queried if the meteorological data for 2010 were available. At the time of the AQIA, a complete year of 2010 data were not available. However, following initial discussions with OEH, additional modelling for 2010 was conducted and meteorological data for 2010 (to September 2010) was used in this assessment. This was presented in the appendices to the AQIA. PAEHolmes reviewed 5 years of recent meteorological data and 2008 was chosen as representative and the most complete dataset.
30.15	Cultural Heritage	The inclusion of the methodology for surveying the East-West Trending Dune for Aboriginal heritage impacts should be included in the PPR and Submissions Report.	This issue will be addressed in the cultural heritage management plan (CHMP) which will be prepared in consultation with Aboriginal stakeholders prior to construction and incorporated into the CEMP. At present the CHMP is still in draft format and is being considered by the registered local Aboriginal stakeholders.

4.6 Submissions by Community Groups and Individuals Response Table

A summary of the issues raised in the community groups and individuals' submissions and the proponent's response to each of the issues raised is presented in Table 4.2 below. As the submissions are often paraphrased, the reader is advised to refer to the relevant submission itself, which can be found on DP&I's website.

Table 4.2 Summary of issues raised by community groups and individuals during EA exhibition and responses

Submission Number	Category	Issue	AGL Response
Submission 1: Gimbay Gatigaan Aboriginal Corporation (GGAC)			
1.1	Cultural heritage	GGAC stated that the Project should not proceed due to aboriginal cultural heritage concerns.	In preparing the environmental assessment, and the Aboriginal cultural heritage assessment, AGL complied with the 2010 Aboriginal Cultural Heritage Consultation Requirements. This required, amongst other things, public notification of the Project. GGAC did not register as a stakeholder for the Aboriginal cultural heritage assessment. AGL will include GGAC in any future consultation regarding Aboriginal cultural heritage in relation to the Project.
Submission 2: Individual submission			
2.1	Coal seam gas	Objection to CSG exploration in the Port Stephens LGA.	Please refer to the further information on CSG exploration contained in section 4.4 of this Report.

Table 4.2 Summary of issues raised by community groups and individuals during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 5: Hunter Koala Preservation Society (HKPS)			
5.1	Air quality	HKPS stated there is the potential of pollution on eucalyptus leaves from liquefaction and re-gasification. HKPS requested a study be carried out on the effects of the Project's emissions on the Tomago Sandbeds flora and fauna.	The EA has identified all potential emissions that will be generated from the Project. Furthermore, the EA includes a comprehensive flora and fauna assessment. Results from modelling of air emissions, as highlighted in section 7.13 of the EA, indicate that emissions from the Project will be minor for all pollutants when assessed against impact assessment criteria. The predictions incorporate a level of conservatism and the actual ground level concentrations would be expected to be lower than during liquefaction. A cumulative assessment indicates that the operation of the Project would not result in any additional exceedence of impact assessment criteria. Given the low level of air emissions predicted from the Project (refer to section 7.13 of the EA Main Report for a summary), it is not envisaged that any impacts will arise to Tomago Sandbeds flora and fauna as a result of air emissions from the Project.
5.2	Ecology	Damage from constructing the access road and utility corridor will destroy koala habitat.	Approximately 0.97 ha of Redgum-Apple-Banksia Forest and 0.64 ha of Swamp Mahogany-Paperbark Swamp Forest will be removed by the Project. However, to further reduce the impacts of the Project and to respond to the submissions relating to this issue, the location of the internal access road into the gas plant site has been redesigned to greatly reduce the number of affected Earp's gum (*Eucalyptus parramattensis subsp. decadens*), from 67 trees to up to below 15 trees, subject to survey.

Table 4.2 Summary of issues raised by community groups and individuals during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 5: (cont'd) Hunter Koala Preservation Society (HKPS)			
5.2 (cont'd)	Ecology (cont'd)		A detailed biodiversity offset strategy is being prepared which will ensure a net gain in protected habitat within the Port Stephens LGA. Please refer to the further information on biodiversity offsets contained in section 4.4 of this Report. In addition, perimeter fencing around the gas plant site will be designed in accordance with the requirements of PSC's Comprehensive Koala Management Plan 2002. Fences around the access roads and pipeline corridor will be typical three strand stock fencing. Fencing around the facility will be vermin proof security fencing to prevent fauna entering the site.
5.3	Ecology	Concerns about loss of habitat suitable for the New Holland mouse and green and golden bell frog.	The pipeline option crossing the SEPP 14 wetlands has been removed from the Project, removing any potential impacts on the green and golden bell frog. A biodiversity offset strategy is being prepared in consultation with DSEWPaC that will address the loss of habitat for the New Holland mouse. Please refer to the further information on biodiversity offsets contained in section 4.4 of this Report for more information on the proposed biodiversity offset strategy.
5.4	Ecology	Concerns about loss of habitat for migratory species.	A detailed biodiversity offset strategy is being prepared for the site, which will address habitat loss for terrestrial migratory species such as the satin flycatcher, rufous fantail and black-faced monarch. Please refer to the further information on biodiversity offsets contained in section 4.4 of this Report for more information on the proposed biodiversity offset strategy. The pipeline option crossing the SEPP 14 wetlands has been removed from the Project alleviating concerns about impacts on wetland species.

Table 4.2 Summary of issues raised by community groups and individuals during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 5: (cont'd) Hunter Koala Preservation Society (HKPS)			
5.5	Ecology	Questions where the offsets can be found within the Port Stephens LGA and who will maintain them.	Please refer to the further information on biodiversity offsets contained in section 4.4 of this Report.
5.6	Bushfire	The 1994 bushfire were extensive and destroyed koala habitat.	Noted.
5.7	Groundwater	Risk of contamination to the Tomago aquifer water supplies from the Project.	Please refer to the further information on the protection of the Tomago Sandbeds aquifer contained in section 4.4 of this Report.
5.8	Ecology	Questioned the statements made that in the EA 'restoration of koala habitat will be undertaken in consultation with PSC' and that 'no residual impacts are envisaged'.	Instead of restoration, provision of adequate offsets to compensate for the loss of koala habitat will be part of AGL's proposed biodiversity offset strategy. Please refer to the further information on biodiversity offsets contained in section 4.4 of this Report.
5.9	Ecology	The loss of 24ha of habitat will not help the residual koala population.	A redesign of the Project footprint has reduced the amount of habitat to be removed from 24 ha to 17.3 ha (1.61 ha Preferred; 15.69 ha Supplementary). A detailed biodiversity offset strategy is being prepared for the site. Please refer to the further information on biodiversity offsets contained in section 4.4 of this Report.
5.10	Ecology	Asked how AGL can compensate for the loss of Earp's gum, which is important part of koala habitat?	AGL has redesigned the Project footprint to minimise the removal of Earp's gum from 67 trees to up to less than 15 trees, subject to survey. It is proposed that the biodiversity offsets package which is being prepared for the Project will include a rehabilitation project to offset the loss of these Earp's gum. A vegetation rehabilitation management sub plan will be prepared which will detail the management and ongoing protection of the remaining Earp's gum within the PPA.

Table 4.2 Summary of issues raised by community groups and individuals during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 5: (cont'd) Hunter Koala Preservation Society (HKPS)			
5.11	Climate change	As a result of greenhouse gas emissions the Project will not be a suitable industry within PSC. Did not agree that this Project will bring significant environmental, social and economic benefits to the region.	AGL disagrees with this comment. Natural gas has lower greenhouse intensity than other fossil fuels such as coal and diesel. Section 7.14.3 of the EA Main Report identified the likely greenhouse gas emissions from the Project and the proposed management and mitigation measures to minimise emissions. Further, the Project will be located within a site zoned 'Industrial-General A' within the PSC's Local Environmental Plan 2000 and is a permissible use. The Project will be located within close proximity to existing industrial areas and therefore, is an appropriate Project for the area. On 28 October 2010 the Minister of Planning declared that the Project will be assessed under 'critical infrastructure'. In order to be classified under this category the Project is required to meet the test of bringing significant environmental, social and economic benefits to the region. Section 3 of the EA outlines the strategic justification for the Project. The key benefits of the Project include: • Providing adequate capacity to deliver gas for domestic and industrial users. • Improving gas security to NSW by providing an alternative gas source. • Providing a substantial investment in regional NSW. • Providing improved availability of gas that has lower greenhouse intensity than other fuels such as coal and diesel. • Providing efficient storage of natural gas within NSW, which will displace natural gas being imported from interstate conventional gas fields that have substantially higher greenhouse gas intensity.

Table 4.2 Summary of issues raised by community groups and individuals during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 5: (cont'd) Hunter Koala Preservation Society (HKPS)			
5.12	Noise	Noise pollution from the Project.	All representative sensitive receptors monitored within the Tomago and Hexham areas are currently exposed to a certain level of industrial and traffic noise sources. AGL acknowledges there will be some noise and vibration emissions during the construction and operation of the Project. As identified in the section 7.12 of the EA Main Report, construction activities will be undertaken with a focus on noise and vibration control at source, noise attenuation and in consultation with potentially affected receptors to minimise the risk of construction noise exceeding noise criteria and disturbing sensitive receptors. Noise and vibration management plans will be prepared as part of the construction and operations environmental management plans to ensure construction and operations noise levels are adequately controlled and any impacts managed.
5.13	Air quality	Impact of air pollution on (on-site) workers and residents around the site.	Fugitive dust will be the main emission to the atmosphere during Project construction. Dust emissions from construction are expected to be relatively short lived across different areas of the site and generally manageable through commonly applied dust control measures. An air quality management plan will be prepared as part of the construction environmental management plan to air pollution is adequately controlled and any impacts managed. The main emissions to the atmosphere during operations will be combustion gases from the liquefaction and re-gasification processes during operations.

Table 4.2 Summary of issues raised by community groups and individuals during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 5: (cont'd) Hunter Koala Preservation Society (HKPS)			
5.13 (cont'd)	Air quality (cont'd)		Results from modelling of air emissions, as highlighted in section 7.13 of the EA Main Report, indicate that emissions from the Project will be minor for all pollutants when assessed against impact assessment criteria. The predictions incorporate a level of conservatism and the actual ground level concentrations would be expected to be lower than during liquefaction. A cumulative assessment indicates that the operation of the Project would not result in any additional exceedence of impact assessment criteria. The impact of air pollution on on-site workers and residents will be negligible. As part of the Project operations, AGL will be required to conduct air emissions monitoring as expressed by OEH within the EPL conditions. Furthermore, an air quality management plan will be prepared for operations. There will be no emissions from the Hexham receiving station or pipeline during normal operations.
5.14	Hazards	Potential for hazardous incidents from flammable gases.	As discussed in section 8.4 of the EA, a thorough hazard and risk assessment has been carried out. The Project is well within all recommended Australian and NSW hazard and risk guidelines for major hazard facilities. AGL will continue to consult with all relevant agencies through the detailed design and Project operation phases. Please refer to the further information on risk and hazards contained in section 4.4 of this Report.
5.15	Water	Hydrostatic test water should not be allowed to infiltrate into the Tomago Sandbeds aquifer.	The EA outlines a number of options to dispose of hydrostatic test water. This potentially includes reinjection into the Tomago Sandbeds aquifer. AGL will continue to work closely with all relevant agencies, including HWC, NOW and the OEH, to identify the preferred option for disposing of hydrostatic test water.

Table 4.2 Summary of issues raised by community groups and individuals during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 5: (cont'd) Hunter Koala Preservation Society (HKPS)			
5.16	Traffic	Stated that 1,000 trucks movements per year were excessive and asked if AGL will pay PSC a levy to cover costs for road repair.	AGL does not agree with this comment. As stated in section 7.11 of the EA Main Report, construction and operation traffic will have a minimal impact on PSC, NCC and RTA roads. It should be noted, 1,000 truck movements per year equates to less than 3 truck movements per day. Temporary impacts to road infrastructure by the Project during the construction phase would be rehabilitated and reinstated by AGL.
Submission 6: Individual submission			
6.1	Energy	Opposed to promoting fossil fuels.	The Project will provide improved availability of gas, which has lower greenhouse gas intensity than coal and diesel. This is mentioned in section 7.14 of the EA Main Report.
6.2	Coal seam gas	Opposed to promoting coal seam gas.	This Project is independent of any CSG exploration that is occurring within NSW. Please refer to the further information on CSG exploration contained in section 4.4 of this Report.
6.3	Ecology	Concerned about loss of koala and ecosystem habitat.	Please refer to the further information on biodiversity offsets contained in section 4.4 of this Report.
Submission 7:			
7.1	General	Opposed to the development.	Noted.
Submission 8: Individual submission			
8.1	General	Opposed to the development.	Noted.

Table 4.2 Summary of issues raised by community groups and individuals during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 11:			
11.1	Hazard and risk	Concerned about highly flammable gas and nearby chemical facilities in relation to natural disasters including earthquakes.	As discussed in section 8.4 of the EA Main Report, a thorough hazard and risk assessment has been carried out. The Project is well within all recommended Australian and NSW hazard and risk guidelines for major hazard facilities. AGL will continue to consult with all relevant agencies through the detailed design and Project operation phases. Please refer to the further information on risk and hazards contained in section 4.4 of this Report. Section 8.5.3 of the EA Main Report discusses the issue of seismic hazard. The storage facility will be designed according to Australian and/or international standards to meet the required earthquake characteristics of the site.
Submission 12: Individual submission			
12.1	Gas storage facility site and access road and utility corridor	Requested that the Project site be relocated 200 m to the west and the access road 100 m to the west to avoid clearing prime koala habitat.	The footprint of the gas storage facility has been relocated approximately 20 m to the north so as to reduce clearing of habitat and allowing the retention of minimum 52 Earp's gum trees. The access road has been designed so as to accommodate the site constraints including land access, physical location, hazard management, environmental impacts, engineering aspects and future site development. The final route was selected on the basis that it best balances the needs of all of these issues. Biodiversity offsets will be provided to offset the vegetation communities being cleared. Please refer to the further information on biodiversity offsets contained in section 4.4 of this Report.

Table 4.2 Summary of issues raised by community groups and individuals during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 12: (cont'd) Individual submission			
12.2	Hazard and Risk	Requested a rigorous plan to be prepared to address the event of compounding incidents leading to catastrophic failure of the Project leading to widespread damage and loss of life.	An emergency plan will be prepared to comply with clause 174ZC of the *Occupational Health and Safety Regulations 2001* (NSW). The emergency response plan will be compiled in accordance with NSW Department of Planning and Infrastructure guidance note HIPAP 1, *Emergency Planning.* Please refer to the further information on risk and hazards contained in section 4.4 of this Report.
Submission 13: Individual submission			
		Still preparing formal objection.	General objection to the Project noted but no further submission has been received as yet.
Submission 14: Individual submission			
		Still preparing formal objection.	General objection to the Project noted but no further submission has been received as yet.
Submission 15: Ironstone Community Action Group Inc			
		Still preparing formal objection.	General objection to the Project noted but no further submission has been received as yet.
Submission 16: Individual submission			
16.1	Coal Seam Gas	Concerned the Project will destroy the lives of people within Gloucester Valley and opposed CSG.	This Project is not located within the Gloucester locality. Please refer to the further information on CSG exploration contained in section 4.4 of this Report.

Table 4.2 Summary of issues raised by community groups and individuals during EA exhibition and responses (cont'd)

Submission Number	Category	Issue	AGL Response
Submission 21: Individual submission			
21.1		Still preparing formal objection.	General objection to the Project noted but no further submission has been received as yet.
Submission 22: Rivers SOS			
22.1		Still preparing formal objection.	General objection to the Project noted but no further submission has been received as yet.
Submission 23: Australian Water Campaigners			
23.1		Still preparing formal objection.	General objection to the Project noted but no further submission has been received as yet.
Submission 24: Rising Tide Newcastle			
24.1		Still preparing formal objection.	General objection to the Project noted but no further submission has been received as yet.
Submission 25: Individual submission			
25.1		Still preparing formal objection	General objection to the Project noted but no further submission has been received as yet.

5. PROPOSED DESIGN CHANGES

5.1 General

Since exhibition of the EA, the Project design has been refined in some areas to minimise environmental and social impacts and to improve constructability and operational effectiveness. Most of these design changes have been made in direct response to government, community and stakeholder feedback. The following section outlines the proposed design changes and provides a brief background for the reasons behind the changes. The new or amended impacts of the proposed design changes are assessed in this section.

5.2 Revised Layout of Newcastle Gas Storage Facility

The layout of the gas storage facility has been revised since the EA was prepared so as to minimise the environmental impact of the facility. These changes are proposed to address the issues raised during stakeholder consultation, including the submissions received in response to the public exhibition of the EA and ongoing consultation with the regulatory agencies.

The section below describes the revised layout of the facility and its components and the reduced environmental impacts that have occurred as a result of the changes.

5.2.1 Reconfiguration of Gas Storage Facility Footprint

In response to the submissions received which raised concerns regarding the number of Earp's gum to be cleared by the Project, the footprint of the gas storage facility has been relocated and reduced in area to minimise the clearing of Earp's gum within the gas plant facility. The proposed changes to design:

- Shift the gas plant facility's southern boundary to the north by a further 20 m.
- Reconfigure the alignment of the internal access road to the facility.

The relocated footprint is still within the area originally proposed and assessed for clearing in the EA. However, the relocation of the footprint of the facility in this manner. This will result in the retention of a minimum of 52 Earp's gum that were to be removed under the original design documented in the EA. As a result of these design changes, it is envisaged that up to 15 Earp's gum will need to be removed (subject to further survey). No Earp's gum will be removed to provide and maintain the amended bush fire protection zone areas**.**

- Although the change to the gas plant footprint will result in additional clearing of the Coastal Sand Apple-Blackbutt forest the total vegetation removed will be less – see Table 6.1.

- That the reconfigurations will not increase the visual impact of the facility.

5.2.2 Removal of Constructed Wetland and Infiltration Ponds

The constructed wetland and infiltration ponds initially proposed as part of the Project have been replaced by a single holding pond along the western boundary to collect stormwater runoff. A pump station will be connected to the holding pond and will transport stormwater from the gas storage facility, via a 1.6 km underground (225 mm diameter) pipeline, to Old Punt Road along the proposed Access Road and Utility Corridor (see Figure 2.13).

The proposed discharge point will be along the western side of the existing crossing on Old Punt Road. It will comprise of a concrete head wall with associated erosion prevention mitigation

measures. Discharged stormwater will follow the existing water course under Old Punt Road, flow west pass the Pacific Highway and into the Hunter River.

The three stormwater infiltration ponds proposed along the southern boundary in the EA have been removed from the proposed design due to concerns raised by HWC pertaining to the quality of water infiltrating into the Tomago Sandbeds aquifer.

5.2.3 Main Power Electrical Connection

The mains power supply will provide primary power for the gas storage facility. The power supply infrastructure has been amended from that set out in section 4.2.8 of the EA Main Report.

An existing 33 kV transmission line is located to the north of the site, along the existing Ausgrid easement. It is now proposed that the main power supply will tap into this 33kV transmission line and an underground cable will run south along the Ausgrid easement to the midpoint of the northern boundary. It will then terminate in a 33 kV switch room and a return underground cable will then run in the same trench back to the 33 kV transmission line. Adjacent to the 33 kV switch room will be a 33 kV/6.6 kV substation consisting of two transformers which will feed the main switch room and switchboard.

All works required to effect the electrical connection will be carried out within the Ausgrid easement and on land owned by HWC (Lot 2 DP 748716) to the north of the gas plant site northern boundary. Figure 2.10 shows the indicative location of the substation. The Ausgrid easement has already been cleared and, accordingly, there will be no impact to existing vegetation as a result of this change.

5.2.4 Reduced Flare Stack Height

Further detailed design on the gas plant components has resulted in the reduction of the flare stack height from up to 45 m to 15 m (see Figure 2.11). This will reduce the visual impact of the flare on the neighbouring Hunter Botanical Gardens. Though DoD and CASA did not raise this as an issue in their submissions, the reduction in height will also reduce potential hazard for aircraft that use the Williamtown airbase facility. AGL will notify these agencies of the revised height of the structures.

5.3 Access Road and Utility Corridor

5.3.1 General

To enhance security and prevent illegal dumping of waste, a gate will be erected along the access road, approximately 170 m from the TAC Northern Access Road intersection. The gate will prevent unauthorised access to the site and minimise illegal dumping of waste in the area.

A stormwater discharge pipeline is now proposed to be installed underground within the utility corridor. The addition of the stormwater discharge pipeline will not result in any increase of the disturbance footprint.

Two new road splays will be constructed along both sides at the corner of the TAC Northern Access Road and the Access Road and Utility Corridor intersection. This will enable sufficient space for turning of larger vehicles during construction and operations. It is proposed the splays will be approximately 7.5 m wide. The two splays will be constructed within existing cleared areas so no clearing of native vegetation will be required.

5.3.2 Access Road Gate Power Supply

A power supply for the gate is required at the entry of AGL Access Road. A 33 kV transmission line is located at the corner of Old Punt Road and TAC Northern Access Road. Poles and overhead cables will be constructed from this point towards the intersection of TAC Northern Access Road and AGL Access Road and then run under the intersection to the gate location. The underground cable will then feed a transformer substation located on a pole adjacent to the gate. This power supply will feed the gate and will also be used to supply power for lighting at the intersection of TAC Northern Access Road and AGL Access Road and along AGL Access Road.

5.4 Preferred Pipeline Corridor (Option 2 in EA)

The preferred gas pipeline route for the Project will be option 2 (see Figure 2.1). Gas pipeline option 1 and the hybrid option are no longer proposed as part of the Project.

Option 2 has been selected in response to submissions received by the OEH, the RTA, PSC and SEWPAC who raised concerns about the potential impact of option 1 and the hybrid option on the Pacific Highway, threatened flora and fauna habitats, cultural heritage artefacts and the coastal wetlands areas protected under SEPP 14 Coastal Wetlands.

AGL is considering the option of using either HDD or horizontal boring along the pipeline corridor to avoid any clearing of the Alluvial Tall Moist Forest located along Old Punt Road. Geotechnical requirements will determine the final construction method, following further investigation.

5.5 Hexham Receiving Station

There is an existing pipeline easement by Macquarie Generation along the eastern side of the Soccer Federation building at Hexham. To mitigate any complications associated with this easement, AGL has proposed as a secondary option to tap into the Hexham receiving station at the southern end (rear) of the Soccer Federation building. The preferred pipeline alignment will enter the receiving station via the front boundary of the property (see Figure 2.6).

This proposed route alignment option will traverse mostly hardstand areas and will not require clearing of native vegetation.

5.6 Subdivision Plan

As discussed in section 4.3.1, two road splays are proposed at the corner of the Access Road and Utility Corridor and TAC Northern Access Road intersection to allow for turning of larger vehicles during construction and operations.

AGL propose to widen the existing road easements along both the TAC Northern Access Road towards the Old Punt Road intersection. This will provide additional area to install the required utilities to service the Access Road and Utility Corridor functions. There will be no clearing of native vegetation.

A subdivision plan will be prepared and submitted to DP&I.

5.7 Low Pressure Pipeline

AGL is currently exploring the possibility of supplying tail gas from the gas storage facility to service local industry. This is still in its early stages and is not currently proposed to be included in the project. Any future low-pressure pipeline for supplying tail gas will be separately assessed and consent sought to this modification.

6. CONSTRUCTION AND OPERATION ACTIVITIES

6.1 Water Management

6.1.1 Groundwater Management and Monitoring

AGL has proposed a comprehensive groundwater monitoring program to monitor both the groundwater level and quality prior to construction (baseline data), during construction and also during operation. The baseline data will determine the seasonal variance of groundwater levels and groundwater quality in and around the gas plant site and near the Hunter River crossing.

Four groundwater monitoring bores (MW8, MW9, MW10 and MW11) were installed in the vicinity of the HDD entry and exit points adjacent to the Hunter River as part of the drilling program conducted in June 2011. It is envisaged that drawdown associated with any dewatering during the pipeline construction will be localised, minor (drawdowns of less than 1 m are expected) and be short term. All extracted water is expected to be reinjected into the shallow aquifers at nearby sites, and is not expected to result in any adverse impacts on groundwater dependent ecosystems.

Currently for the gas plant site, there are 11 groundwater monitoring bores:

- Seven boundary monitoring bores (MW1, MW2, MW3a, MW4, MW5, MW6, and MW7).
- Four internal monitoring bores (BH4, BH8, BH11, and BH15).

Once further detailed understanding of the location of potential high risk construction activities is known, additional bores will be installed to ensure monitoring of impacts from such activities is possible. The risk assessment will also consider whether additional groundwater monitoring bores are required along the northern boundary of the gas plant site, however additional monitoring bores along this boundary are unlikely until the plant is commissioned and operational. High risk activities may include but not be limited to:

- Areas where chemicals are to be stored or handled.
- Sediment or holding ponds.
- Refuelling area/s.
- Ablution facilities.

The groundwater monitoring network will be reassessed prior to the operation of the site once the locations of holding ponds, interceptors, chemical storage areas and other sensitive sites within the plant and Project area are known. This information will be determined during detailed design. Fate and transport modelling will be undertaken again at this time and included in the draft groundwater management sub plan (GMWSP) which will form part of the OEMP. It is expected that some of the monitoring bores used during the construction program will be retained but that additional sites will be required for operations.

The GWMSP is currently being prepared for the Project. It will outline the strategies for managing groundwater during the baseline and construction phases of the Project.

The target relating to the GWMSP is to have zero incidents relating to changes to the groundwater environment and to ensure there is no groundwater contamination during the construction phase of the Project.

The GWMSP will be referenced in the CEMP and OEMP. The plan outlines a spill response plan and a contingency plan to respond to any spills or measured groundwater contamination during Project construction or operations.

A groundwater baseline monitoring program is currently underway before construction commences and will continue during construction and operations. This includes measurement of groundwater levels and quality. Groundwater monitoring will be carried out throughout the life of the Project within the gas plant site.

6.1.2 Surface Water Management and Monitoring

Dedicated surface water monitoring locations and periodic monitoring is proposed on the gas storage facility site only. Site inspections at all other construction locations will be conducted to ensure that stormwater is directed away from the active work site and that no sediment/surface water impacts occur as a result of construction.

A six-month baseline monitoring program will be conducted by AGL prior to construction works commencing. This program has commenced and the baseline data comprises six sets of data from monthly monitoring events at the two on-site surface water features number 1 (SW1) and number 2 (SW2).

Monitoring of surface water quality will be conducted monthly during the construction phase of the Project. The construction monitoring program will comprise of water quality monitoring at SW1 and SW2 and also include new on-site locations where there is surface water ponding or surface water collection prior to off-site disposal or groundwater infiltration. These locations will include the proposed stormwater holding pond area. Collection of the holding pond area water samples will be at a location in proximity to the outlet prior to pumping off-site via the stormwater pipeline to Old Punt Road.

Monitoring of hydrostatic test water will also be carried out prior to off-site disposal.

Once completed, AGL will provide a report presenting data and analysis of the six months of baseline water quality data (both groundwater and surface water) to HWC, OEH and NOW. The baseline report will review the interim thresholds and develop the final thresholds for water quality criteria for both the CEMP and OEMP.

During the first 12 months of construction, monthly reporting of water level and water quality data to AGL will be provided. It is envisaged that a report on a six-monthly basis will be produced, however final requirements will depend on the specific planning approvals (and associated reporting requirements to different agencies) for surface water and groundwater monitoring.

The construction monitoring program will be reviewed after 12 months to determine whether analytical suites and frequencies should be increased or decreased.

The draft surface water management sub plan (SWMSP) is currently being prepared for the Project. It will outline the strategies for managing surface water during the baseline and construction phases of the Project.

The target relating to this SWMSP is to have zero incidents relating to changes to the surface water environment and to ensure there is no surface water contamination during the construction phase of the Project. This is because, at the gas plant site, surface water is linked to the shallow water table in the dune sands.

6.1.3 Stormwater Management and Monitoring

A revised concept for stormwater management is proposed for the Project. It is now proposed that stormwater from the active plant areas of the site be captured and stored in an onsite holding pond prior to water quality testing, and offsite pumping and disposal via a dedicated pipeline to Old Punt Road. This revised scheme was based on feedback from HWC on the original stormwater management strategy in the EA. This stormwater management plan is currently being reviewed by HWC and other relevant NSW government agencies.

It is expected that stormwater will be discharged following periods of high rainfall at a rate of no more than 75 L/minute for between 15 minutes to six hours (see Figure 2.13). The holding pond will be approximately 3,700 m^2 (7,500 m^3), and the final size will be determined during the detailed design phase in consultation with HWC.

Other Modifications to Stormwater Management

- The grading of the site has been modified to allow the majority of the site to drain towards the southwestern corner of the site, with the exception of the gas storage facility tank and the switchyard. Both of these areas are considered low pollutant risks and will be bunded in accordance with the relevant Australian Standards.
- Rainfall on roof areas will be directed to tanks for reuse (e.g., toilet flushing). Overflows may be directed to infiltration beds or the broader stormwater system as described above.
- Enclosed workshops will be drained directly to the trade waste system.
- Plant areas (approximately 2.3 ha) will be bunded to contain the 20-year average recurrence interval (ARI) 24-hour storm event and comply with the relevant Australian Standards. Runoff from this area will be captured at an inspection tank where it will be manually tested prior to release. In the event it is polluted, the water will be pumped to the trade waste system for disposal. Where the water quality is satisfactory, the water will be pumped to the stormwater system. It is likely that the plant area will be divided into smaller areas based on risk to minimise the volumes of polluted water being disposed of via trade waste.
- Runoff from the sites impervious (hardstand) areas will be directed via by a piped drainage system to a wet sump gross pollutant trap and then onto the holding pond. This excludes the gas storage tank, electrical switchyard and pervious areas outside of operational zones. Surface flows up to the 100-year ARI storm event will also be directed to the holding pond. The holding pond will comprise of three zones:

    1. Wetland zone – This will be sized to achieve the water quality objectives of PSC's 'Urban Stormwater and Rural Water Quality Management Plan for New Developments'. Based on the current layout a permanent wetland volume in the order of 1,500 m^3 is anticipated.
    2. Holding zone – An additional holding volume is provided to contain runoff from the catchment up to the 1-year ARI 24 hour duration storm event. Based on the current layout a holding volume of approximately 4,500 m^3 is anticipated. Water quality will be inspected and, if satisfactory, discharged from site via a pump station. If the water quality is unsatisfactory, the water will either be disposed via the trade waste system, or treated prior to being discharged from site via a pump station.
    3. Retention zone – A further volume will be provided to prevent overflows up to the 100-year ARI 72 hour duration storm event. If the water level rises to this zone, the pump station will switch on automatically and discharge water from the site. A pump flow rate of about 75 L/second is anticipated, as this is between the 1-year and 2-year ARI for the site, but is

subject to approval from PSC. Based on this an additional active storage volume of 1,500 m^3 is required.

AGL has been liaising closely and consulting with HWC about the revised stormwater management strategy. AGL has also provided a copy of the stormwater management strategy NOW, OEH, PSC, the RTA and DSEWPaC.

AGL will continue to work with NSW government agencies to ensure all issues are addressed prior to detailed design.

6.1.4 Wastewater Management and Monitoring

Due to the long distance to the nearest HWC infrastructure, and because that onsite sewage disposal was not considered suitable in the vicinity of the Tomago Sandbeds aquifer, AGL propose to tanker wastewater off site.

AGL has been advised by HWC and PSC that tankering wastewater offsite will be supported if in accordance with the following conditions:

- The system will have a telemetered level sensor that alarms when over range.
- The tank will be included on the regular site inspection and reporting program that is being negotiated at present between HWC and the proponent.
- There is a groundwater monitoring peizometer downstream of the tank that is regularly sampled for pathogens and nutrients.

AGL supports and will implement these conditions.

6.2 Flora and Fauna Management

Several amendments and revisions relevant to ecological considerations at the study area have been made since the public exhibition of the EA. These are discussed below:

6.2.1 Vegetation Removal

The proposed development footprint has been reduced since the EA lodgement. Details of the revised flora and fauna impacts are outlined in Appendix 4. The revised quantum of vegetation to be removed for the Project area is shown in Table 6.1.

Table 6.1 Removal of vegetation within the Project area (in ha)

Project Component/Vegetation Community	Original EA	Revised Impact Footprint
Access Road		
Coastal Sand Apple-Blackbutt Forest	1.02	0.96
Coastal Sand Apple-Blackbutt Forest-mesic Variant	1.08	1.08
Seaham Spotted Gum-Ironbark Forest	0.45	0.45
Swamp Mahogany-Paperbark Swamp Forest	0.64	0.64
Woodland Rehabilitation	0.25	0.26
Total vegetation removal	*3.44*	*3.39*

Table 6.1 Removal of vegetation within the Project area (in ha) (cont'd)

Project Component/Vegetation Community	Original EA	Revised Impact Footprint
Gas Plant Footprint		
Coastal Sand Apple-Blackbutt Forest	8.06	9.62
Woodland Rehabilitation	4.54	1.71
Total vegetation removal	*12.6*	*11.33*
Gas Pipeline Access Corridor		
Coastal Sand Apple-Blackbutt Forest	2.36	2.02
Coastal Sand Apple-Blackbutt Forest-Mesic Variant	1.95	1.61
Redgum-Apple-Banksia Forest	0.85	0.69
Total vegetation removal	*5.16*	*4.32*
Preferred Pipeline (Conventional Trenching)		
Alluvial Tall Moist Forest (conventional trenching will occur within road reserve)	0.19	0
Planted Swamp Oak	0.01	0.06
Redgum-Apple-Banksia Forest	0.12	0.28
Seaham Spotted Gum-Ironbark Forest (conventional trenching will occur within road reserve)	0.60	0
Swamp Mahogany-Paperbark Swamp Forest (conventional trenching will occur within road reserve)	0.22	0
Total vegetation removal	*1.14*	*0.34*
Total	**22.34**	**19.38**

A reduction of 2.96 ha of vegetation to be cleared has been achieved by redesign of several Project components. A 2.83 ha reduction in the amount of Woodland Rehabilitation which contains Earp's gum (*Eucalyptus parramattensis subsp. decadens*), has been achieved by shifting the gas plant's southern footprint further north by approximately 20 m. This has resulted in a reduction in the number of individual Earp's gum requiring removal from 67 to up to 15 trees (subject to survey).

The realignment of the preferred gas pipeline corridor, as well as the use of HDD as a construction method, has reduced the amount of vegetation to be cleared by 0.8 ha. The clearing of native vegetation along Old Punt Road within the 30 m wide pipeline easement will mostly be avoided by locating the gas pipeline and associated services within the existing road easements and cleared areas at the junction of Old Punt Road and the TAC Northern Access Road.

6.2.2 Reduced Removal of Koala Habitat

A redesign of the gas plant site's footprint has reduced the amount of preferred and supplementary koala habitat to be removed to 16.9 ha (1.61 ha of preferred habitat and 15.29 ha of supplementary habitat).

A total of 0.97 ha of Redgum-Apple-Banksia Forest and 0.64 ha of Swamp Mahogany-Paperbark Swamp Forest will be removed. The reconfiguration of the internal access road within the gas plant facility will significantly reduce the number of Earp's gum to be cleared from 67 trees to up to 15 trees (subject to survey).

A detailed biodiversity offset strategy is being prepared which will result in a net gain in protected koala habitat within the Port Stephens LGA.

AGL will ensure that on-site fencing will not compromise the safe movement of koalas and will minimise the threat to koalas crossing the access road and pipeline easement by restricting motor vehicle speeds on the Access Road and installing koala crossing signage. The Access Road and Utility Corridor and the Gas Pipeline Access Corridor will be fenced on both sides along their entire lengths with 3-strand plain wire fencing. This is considered acceptable under the *Comprehensive Koala Plan of Management 2002* (PSC Koala Plan of Management). This will allow koalas and other native fauna to continue to move between habitat areas to the north and south. Fencing around the gas plant facility will be vermin proof security fencing to prevent pest animals and fauna from entering the site.

6.2.3 Habitat for Migratory Species, Threatened Raptors and Waterbirds

The gas pipeline options that required clearing of SEPP 14 Coastal Wetlands (i.e., Phragmites Rushland vegetation community) have now been removed from the proposal. Therefore, there will be no direct impact on these species and their habitats as a result of the Project. Mitigation measures for the potential indirect impacts have been identified in section 7.5 of the EA Main Report.

6.2.4 Reduction in Clearing of Earp's Gum

AGL have redesigned the Project footprint to minimise the removal of Earp's gum. This has reduced the number of trees to be cleared to up to 15 (subject to final survey confirmation).

In addition, AGL appointed ecological consultants have undertaken seed collection from Earp's gum within the site in August 2011 as part of the proposed biodiversity offset strategy. This seed has been provided to the Hunter Botanic Gardens who have agreed to propagate the seed and plant the seedlings on their property.

A habitat management sub plan will also be prepared which will detail the management and ongoing protection of the remaining Earp's gum within the site.

6.2.5 New Holland Mouse Mitigation Measures

It was originally proposed to carry out a low intensity burn within the Project's gas plant footprint prior to clearing to relocate the New Holland Mouse into adjoining vegetation. This method is no longer proposed. AGL has liaised with consultants Ecobiological and DSEWPaC to devise an alternate method. It is proposed that Ecobiological initially carry out a targeted trapping regime and habitat assessments within the development footprint to determine the presence of the species and preferred habitat characteristics, in conjunction with trapping and habitat assessments within AGL's proposed offset land. Prior to construction commencing, further trapping will be undertaken within the development footprint and any New Holland Mouse trapped will be translocated into areas safe away from development. This will be done in consultation with DSEWPaC.

6.2.6 Alluvial Tall Moist Forest Assessment

Port Stephens Council queried whether the Alluvial Tall Moist Forest mapped in the study area constitutes the EEC River-Flat Eucalypt Forest on Coastal Floodplains. Ecobiological conducted flora quadrant surveys during August 2011. An assessment of this community is appended in Appendix 4. The results of the fieldwork and assessment found that the vegetation is also considered to be consistent with the definition of 'River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions' as

defined by the final determination of the NSW Scientific Committee. Application of the assessment of significance (7-part test) found that the Project is unlikely to have a significant impact on this EEC, given that only minor disturbance during surface trenching will occur as part of the proposed activities.

The proposed action may cause minor changes in the site hydrology; however it is unlikely to have adverse effects on water quality such as increased nutrients and sedimentation, flood mitigation or drainage works. The following mitigation measures have been recommended (Appendix 4) to protect the integrity of the remaining area of Alluvial Tall Moist Forest:

- Best practice erosion and sedimentation control methods should be adopted, enforced and maintained throughout the construction footprint to avoid having a negative downstream impact on the Alluvial Tall Moist Forest.
- The construction site should be managed so that no accidental incursions occur into areas that are not part of the proposal area.
- The pipeline route shall avoid impact to the Alluvial Tall Moist Forest where possible.
- Horizontal directional drilling and horizontal boring should be conducted where possible instead of open trenching to avoid damaging tree roots.
- Where open trenching must occur, the drip lines of trees will be avoided where possible.
- A qualified arborist will be present onsite to monitor tree root damage and implement appropriate mitigation measures (particularly along Old Punt Road).
- A vegetation management plan and weed management plan have been recommended to reduce the long-term impacts on endangered ecological communities (see section 5 of the EA Main Report).

These measures will be implemented if the Project is approved.

6.2.7 Groundwater Dependent Ecosystems

AGL's proposed groundwater monitoring program will monitor both the groundwater level and quality prior to Project construction commencing (baseline data), during construction and also during Project operation. The baseline data will determine the seasonal variance of groundwater levels and water quality in and around the gas plant site and near the Hunter River crossing.

It is envisaged that there will be no adverse impacts on groundwater dependent wetlands or adjacent vegetation as a result of water management activities.

Drawdown (less than 1 m are expected) associated with any dewatering during the pipeline construction is expected to be localised and short term. All extracted water is expected to be reinjected into the shallow aquifers at nearby sites, and should not result in any adverse impacts on groundwater dependent ecosystems.

6.3 Cultural Heritage

Several amendments and revisions relevant to cultural heritage considerations within the study area have been made since exhibition of the EA. These are discussed below:

6.3.1 Main Power Electrical Connection

Section 2.2.8 discusses the supply of main power to service the gas storage facility. The works will be carried out within the Ausgrid easement and land owned by HWC to the north of the gas plant site northern boundary known as Lot 2 in DP 748716.

An Aboriginal due diligence assessment was carried out by cultural heritage specialists RPS (see Appendix 5) on 24 August 2011, in partnership with Worimi Local Aboriginal Land Council, Mur-Roo-Ma Inc and Nur-Run-Gee Pty Ltd and AGL. The archaeological field survey indicated that the proposed area containing the electrical connection had been subjected to high levels of disturbance and modification associated with the creation of the Ausgrid electrical easement (formerly Energy Australia easement). The field survey investigation found no Aboriginal cultural heritage items. The participants were satisfied with the field survey coverage upon the conclusion of the of the field survey.

6.3.2 Cultural Heritage Management Plan

A cultural heritage management plan (CHMP) will be prepared in consultation with Aboriginal stakeholders and government agencies prior to construction and incorporated into the CEMP. The CHMP would address:

- The impact mitigation and management requirements for Aboriginal and historic heritage.
- Details of any additional archaeological investigations to be undertaken and any associated licences or approvals required.
- Procedures to be implemented if previously unidentified Aboriginal or historic objects are discovered during construction.
- An education program for construction personnel on their obligations for Aboriginal cultural materials and historic items.

Survey of East-West Trending Dune

A cultural heritage inspection program is required for Area A, or the east-west trending dune. This will be detailed in the CHMP. Heritage inspection of this area was requested by the Aboriginal community stakeholders following vegetation clearing and prior to the commencement of civil earthworks for the Project area.

7. REVISED STATEMENT OF COMMITMENTS

This section contains a revised statement of commitments, which has been amended to address some of the key issues raised in the submissions received.

7.1 Soils

The following mitigation measures will be implemented to avoid and manage any impacts to soils for the Project.

7.1.1 Soil Contamination

To minimise the risks of Project activities causing soil contamination impacts, the following measures will be implemented:

PRECONSTRUCTION

- Include a spill response plan in the emergency response plan and ensure that there is adequate spill response equipment stored onsite. Personnel will be trained on the emergency response plan and correct use of the spill response equipment.

CONSTRUCTION

- Ensure concrete mixers and pump trucks are not washed on-site.
- Store PASS capable of producing leachate within lined bunds.
- Contain excess construction materials, drill fluids and cuttings using appropriate methods such as plastic-lined pits, skips or holding tanks for appropriate reuse or off-site disposal. HDD fluids will be contained within the bunded HDD work area.
- Provide workforce inductions and training to ensure personnel have knowledge of the correct use of refuelling systems and chemical handling procedures.
- Restrict vehicle movements to sealed or dedicated areas and roadways, as far as practical.
- Ensure drainage around vehicle and equipment servicing areas, workshops and chemical storage areas is directed to sumps.
- Use licensed contractors to collect, transport and dispose of hazardous materials such as waste solvents, paints, mercury absorption medium and hydrocarbons to a licensed off-site facility in accordance with EPA guidelines.
- Remove wastewater and sewage from site by an EPA licensed operator for treatment at an EPA-approved wastewater treatment facility.
- Regularly inspect hazardous material containment facilities to ensure their integrity.
- Ensure potential contaminants at the Hexham receiving station are stored within flood-protected facilities.

OPERATION

- Use licensed contractors to collect, transport and dispose of hazardous materials such as waste solvents, paints, mercury absorption medium and hydrocarbons to a licensed off-site facility in accordance with EPA guidelines.
- Remove wastewater and sewage from site by an EPA licensed operator for treatment at an EPA-approved wastewater treatment facility.
- Regularly inspect hazardous material containment facilities to ensure their integrity.
- Ensure potential contaminants at the Hexham receiving station are stored within flood-protected facilities.

To minimise the risk of contaminated soil unearthed by Project activities contaminating the environment, AGL will:

PRECONSTRUCTION

- Perform an assessment (in accordance with the SEPP 55 and NEPM 1999) to confirm the contaminant type, concentrations and extent of contamination in the event of unearthing historically contaminated soil. Action will then be undertaken in accordance with relevant EPA requirements and land use criteria to either remediate the impacted area or remove the contaminants.
- Investigate the current status of the existing sewage management system at the western boundary of the Hexham receiving station site.

CONSTRUCTION

- Include inductions to construction personnel that outline measures on how to deal with suspected contaminated soil.

7.1.2 Soil Erosion

PRECONSTRUCTION

- A construction surface water management plan that describes erosion and sediment control will be prepared in accordance with NSW DECC Managing Urban Stormwater: Soils and Construction – Volume 2A Installation of Services 2008 (DECC, 2008) and Managing Urban Stormwater: Soils and Construction (The Blue Book) (Landcom, 2004). All erosion control and drainage works will be designed in accordance with Urban and Sediment Control Guidelines (DLWC, 1992).

7.1.3 Acid Sulfate Soils

PRECONSTRUCTION

An ASS management plan will be prepared and implemented in accordance with the Acid Sulfate Soils Manual (ASSMAC, 1998) and submitted to NCC for their review. To minimise the risk of potential impacts from ASS during construction, the plan will include the following:

- Conduct a detailed ASS assessment at the Hexham receiving station site prior to construction at this site to determine the natural buffering capacity of the soil and ascertain that site works meet the requirements of clause 25 of the Newcastle Local Environmental Plan 2003 (Newcastle LEP 2003).

- Minimise disturbance and exposure of ASS.
- Store excavated ASS in conditions that simulate its natural state, or treat and store away from waterbodies and drainage lines.
- Treat excavated ASS using agricultural lime with machinery sufficient to perform adequate mixing, where practicable.
- Bund areas where ASS are exposed, including at the HDD entry and exit points for the pipeline beneath the Hunter River, to prevent leachate entering the wider environment.
- Undertake any potential ASS remediation works in accordance with clause 25 of the Newcastle LEP 2003, the Port Stephens Council Local Environmental Plan 2003, the Port Stephens Council Acid Sulfate Soils Policy, 2004 and the Acid Sulfate Soils Manual (ASSMAC, 1998).

7.1.4 Monitoring

PRECONSTRUCTION

Soil monitoring programs will be developed as part of the CEMP and OEMP.

The CEMP and OEMP monitoring program will include:

- Inspecting and monitoring hazardous material containment facilities to ensure their integrity.
- Inspecting and maintaining erosion and sedimentation control structures.
- Inspecting and monitoring of all works to ensure soil erosion or contamination is not occurring.
- Monitoring soil quality around Project works prior to and during construction to ascertain the presence of contaminated soil or ASS.

7.1.5 Modifications to Management and Mitigation Measures for Soils

In addition to the above, AGL will ensure:

- An ASS assessment is conducted to check the natural buffering capacity of the soil and to satisfy the requirements under clause 25 of the Newcastle Local Environmental Plan 2003.
- A hazardous material survey is carried out prior to demolition of the existing building at the Hexham receiving station site.
- A CEMP is prepared that includes procedures for the management and disposal of fill material, procedures for unexpected finds and an ASS management plan, if required.
- Ensure that the banks of watercourses are not disturbed during construction.

The following commitments have been superseded by the commitments by the changes proposed to the Project design and the additional commitments above and are no longer proposed to be part of the Project:

- Ensure that the banks of watercourses are not disturbed during construction, except for Water Feature 4.

7.2 Surface Water

The following mitigation measures will be implemented to avoid and manage any impacts to surface water for the Project. These may include the following measures that are outlined below.

PRECONSTRUCTION

A construction surface water management plan (CSWMP) is being prepared and implemented prior to construction commencing on site. The CSWMP will be prepared in consultation with HWC, NOW, OEH and PSC. The plan will describe best practice surface water control measures to reduce the risk of contamination of surface water and shallow groundwater, or the alteration of surface water flows. The plan will be supported by a surface water monitoring network as described in section 9.2.3 of the EA Main Report.

The surface water management plan will be prepared and implemented as part of the CEMP and OEMP.

CONSTRUCTION

Water Supply and Disposal

The following measures will be implemented as part of the CEMP to minimise the impacts of water supply and disposal:

- Minimise water use.
- Source water from existing water supply infrastructure. Until the permanent water supply is available, it is currently proposed that this will be supplied to construction sites by either water tankers or from a standpipe such as a HWC metered standpipe along Old Punt Road.
- Develop hydrostatic test management measures in consultation with HWC, OEH and NOW. The management measures will address:
  - Hydrostatic test water supply. This is likely to be potable water from existing HWC water supply infrastructure, untreated water from HWC Station 20 bores, groundwater locally abstracted from new bores or a combination of these.
  - Assessment of potential changes to groundwater levels if groundwater is abstracted from existing HWC and new AGL bores.
- Transport amenities wastewater offsite by a licensed operator to a licensed disposal facility.
- Test and treat water generated by dewatering of trenches or excavations if required, and infiltrate back into the groundwater table at designated infiltration areas, or alternatively transport offsite to a licensed disposal facility.

Surface Water Flow and Flooding

The following measures will be implemented to minimise the risk of altered surface water flow impacts during construction:

- Divert runoff from outside the work area to existing drainage lines to prevent the formation of new surface flow paths.
- Install culverts under new roads to maintain existing surface drainage flows.
- Restrict vehicle movements to formed access roads and sealed roads to avoid surface compaction where practicable.

- Monitor the potential for flooding by observing weather reports and river levels during potential flood events.
- Store equipment securely when not in use to prevent it being washed away in a flood.
- Avoid unnecessary clearing of vegetation and excavation works.

The following measures will be implemented to ensure that the Project does not change flood levels and flows and to minimise the risk that the operating Project will be impacted by floods:

- The gas storage facility will have a minimum floor level equivalent to the 100-year ARI flood level (approximately 4.6 m AHD) plus a freeboard of 0.5 m (i.e., at least 5.1 m AHD). The preliminary design for the facility has a finished floor level of 6.3 m AHD.
- The design of the Hexham receiving station has a minimum floor level equivalent to the 100-year ARI flood level (approximately 3.9 m AHD) plus a freeboard of 0.5 m (i.e., at least 4.4 m AHD). No additions to the existing building are currently proposed.

Runoff, Erosion and Sediment Control

The CEMP surface water management plan will describe erosion and sediment control measures in accordance with NSW DECC Managing Urban Stormwater: Soils and Construction – Volume 2A Installation of Services 2008 (DECC, 2008) and Managing Urban Stormwater: Soils and Construction (The Blue Book) (Landcom, 2004). All erosion control and drainage works will be appropriately designed in accordance with Urban and Sediment Control Guidelines (DLWC, 1992).

The following measures will be implemented to minimise soil loss and subsequent sedimentation runoff into surface water during construction:

- Restrict construction traffic movement to formed access tracks to avoid excess disturbance to soil and creation of bare areas where practicable.
- Select construction equipment to minimise the disturbance to soils.
- Minimise duration of subsoil (including stockpiles) exposure to weather.
- Secure disturbed bare soils by re-spreading topsoil, revegetating or applying a geo-fabric (or similar), as soon as practicable after reinstatement of earthworks.
- Revegetate exposed soils as soon as possible to reduce potential for sediment-laden runoff.
- Provide wind-breaks (or equivalent control measures) around exposed areas and stockpiles to prevent wind erosion.
- Place soil stockpiles upslope of excavations and not in drainage lines.
- Construct roadside swales to capture runoff from the Primary Project Area access roads during construction.
- Design drains to minimise water velocities.
- Install velocity reduction devices, such as sandbags, in drains and sloped drains to reduce erosion.
- Install sediment capture devices, such as silt fences and bunding, down-slope of exposed soils and soil stockpiles.

- Construct suitably lined sediment control ponds down-slope of construction work areas upfront. These will subsequently be developed into permanent wetlands during the operations stage.
- Treat construction tracks to minimise surface degradation, e.g., compaction or topping with gravel.
- Stabilise the banks of any disturbed watercourses adjacent to Old Punt Road using measures such as rock rip-rap, diversion berms, sediment fences, jute matting and reseeding.
- Divert runoff upstream of disturbed areas to existing drainage lines to prevent the risk of increasing erosion and requiring further sediment control measures.
- Undertake daily inspections of all runoff, erosion and sediment control structures during the construction period.
- Maintain runoff, erosion and sediment control structures according to appropriate standards.
- Ensure silt fences are in a vertical position and securely fixed and remove sediment or residue behind sediment control barriers.
- Monitor earthwork areas regularly for signs of erosion.
- Install and commission at the operations phase, runoff, erosion and sediment control measures as soon as practical.

Discharge of Contaminated Water, Spills and Leaks

CONSTRUCTION

The following measures will be implemented to prevent discharge of contaminated water, spills or leaks entering the environment during construction:

- Minimise the volume of hazardous chemicals stored on site.
- Store and transport hazardous materials according to their material safety data sheet (MSDS).
- Store potentially contaminating chemicals according to the appropriate standards, including measures such as impervious bunded areas capable of capturing 110% of the maximum spill volume.
- Prepare a spill response plan and ensure adequate spill kits are available at all construction sites and personnel are trained in their use.
- Maintain all construction equipment appropriately and inspect machinery for leaks.
- Ensure concrete mixers and pump trucks are not washed out on-site.
- Provide designated areas for parking of construction equipment and vehicles to prevent the risk of soil contamination due to leaks.
- Bund HDD entry points to prevent the release of leachate from drill cuttings, drilling fluids, or spills entering the surrounding environment, including the Hunter River.
- Implement hydrostatic test water management measures in consultation with HWC and NOW to determine and address requirements for testing and treating of this hydrostatic test water prior to re-use or disposal. Disposal options include infiltration to groundwater or discharge to an existing watercourse.

Frac-out

PRECONSTRUCTION

A detailed geotechnical investigation will be undertaken prior to HDD under the Hunter River. This will include drilling investigation bore holes and shallow seismic surveys to provide detailed understanding of the geological strata under and adjacent to the river.

7.2.1 Operations Surface Water Management

Water Supply and Disposal

OPERATION

The following measures will be implemented as part of the OEMP to minimise the impacts of water supply and disposal during operations:

- Minimise water use.
- Capture rainwater runoff where possible from roofs for use in toilet flushing.
- Source water from existing water supply infrastructure in consultation with HWC.
- Transport trade wastewater, amenities wastewater and waste process water offsite by a licensed operator to a licensed disposal facility.

Surface Water Flow

The measures implemented during construction to minimise the risk of altered surface water flow impacts will also be implemented as required during operations to minimise these risks.

Runoff, Erosion and Sediment Control

The measures implemented during construction to minimise the risk from runoff, erosion and sedimentation impacts will be also implemented as required during operations to minimise these risks.

Surface Water Management Measures

The operations surface water management plan will describe measures to prevent contamination of surface water during Project operations. Specific surface water management measures will be undertaken for each of the seven areas within the gas plant and access road, as outlined below.

OPERATION

- **Pervious Areas.** This water will not be treated as these areas will not be exposed to potential spills, leaks or fire fighting water runoff.
- **Roof Areas.** This water will not be treated. This water will be collected for re-use in toilets and other non-potable uses. Excess roof water will be directed to an infiltration tank or infiltration trenches.
- **Roads and Car Parks.** Designated areas for parking vehicles will be provided. Runoff from the site access road will be discharged into road-side swales that will provide water quality treatment through flow attenuation. This will facilitate sedimentation of suspended sediments. Depending on the local soil conditions and road grades, collected runoff will be either infiltrated at source or conveyed as surface flow towards Water Feature 4.
- **Enclosed Workshops.** Small volumes of wastewater generated from activities such as cleaning workshop floors will be collected at source and disposed as trade waste.

- **Uncovered Plant Areas.** Rain (or fire fighting water) falling on uncovered plant areas will be retained within a primary bund. This primary bund will also capture any spills or leaks from the gas plant (other than LNG from the storage tank). Primary bunding will be designed in accordance with all applicable standards, with sufficient volume sized to capture 110% of the maximum possible spill or the rainfall from a 20-year ARI, 24-hour-duration rainfall event. The primary bund will be contained within the secondary bund. The secondary bund will be designed with sufficient volume sized to capture the firewater runoff or runoff volumes from a 100-year ARI (72-hour) storm event. The base of the secondary bund is proposed to be an impermeable high-density polyethylene (HDPE) liner and be graded towards a number of blind sumps where collected water will be pumped into a holding and inspection tank. This bunding concept may require revision at the detailed design phase of the Project. If the concept is revised, the broad design objectives (such as storage volumes and the provision of an impermeable liner) and functionality will be maintained.
- **General Plant Areas.** Rain or fire fighting water falling on general plant areas will be retained within a secondary bund.
- **Uncovered and General Plant Areas – Runoff into the Holding Pond.** Runoff collected from secondary bunded areas will drain to a blind sump, where a sump pump will direct collected water to a holding and inspection tank. The holding and inspection tank will be partitioned, separating runoff from uncovered plant areas and general plant areas. The sump pump switch will be manually operated, which will provide site operators with full control over pumping of the sump. This will enable any spill to be contained near the source and effectively remediated. Water from the holding and inspection tank will be tested and if within allowable quality criteria, will be manually released to the holding pond via a wet sump oil and grease separator. The holding pond will be fully lined to prevent any water infiltrating to groundwater. Water will only be required to be discharged from the holding pond during periods of extended high rainfall. A manual shut-off valve will be provided to facilitate full control of the discharge from the holding pond.
- **LNG Storage Tank Bund Area.** A bunded area around the LNG storage tank will be sized to capture 110% of the LNG storage volume. A small area around the pipe inlets may be subjected to spills, drips or leaks and will be provided with bunded collection facilities that drain to an impoundment sump. All runoff collected in the sump will be pumped to the holding and inspection tank as for runoff from the primary bund. The remaining LNG storage tank bund area will comprise a pervious surface and rain falling in this area will be infiltrated to groundwater.

In addition to these specific area controls, the following measures will be implemented to minimise the risk of discharge of contaminated water, spills or leaks impacting surface water (or groundwater) during operations:

- Minimise the volume of hazardous chemicals with the potential to contaminate surface water stored on site.
- Store and transport hazardous materials according to their material safety data sheet (MSDS).
- Store potentially contaminating chemicals according to the appropriate standards, including measures such as impervious bunded areas capable of capturing 110% of the maximum spill volume.
- Prepare a spill response plan and ensure adequate spill kits are available at all construction sites and personnel are trained in their use.

- Install fixed rotating equipment and machinery in enclosed workshops.
- Develop and implement a maintenance and operating plan to ensure that rotating equipment is well maintained and regularly inspected for leaks. Install fixed rotating equipment and machinery in enclosed workshops.

7.2.2 Monitoring

PRECONSTRUCTION

A surface water quality monitoring program will be developed as part of the CEMP and OEMP surface water management plan and in consultation with relevant authorities (OEH, NOW, and HWC). It will include preconstruction ('baseline'), construction and operations monitoring of water quality parameters.

Monitoring will be undertaken within the primary project area and at surface runoff control facilities (such as sediment ponds). The following monitoring locations are proposed:

- Sediment ponds (during construction only).
- Holding and inspection tanks.
- Outflow from the holding pond.
- Water Features 1 and 2.

The proposed stormwater containment and treatment system will be designed to provide treatment of surface water runoff from the site through containing, treating and adequately disposing of this runoff. Maintenance and monitoring will need to be undertaken to ensure discharges satisfy regulatory requirements.

Construction and operations monitoring results will be compared to target concentrations (trigger values) derived from baseline data. Where this is not possible due to insufficient data, the concentrations will be compared to recommended trigger value concentrations for protection of aquatic ecosystems (ANZECC, 2000).

The plan will also require inspecting water levels in and the integrity of surface runoff control facilities (such as holding pond, bio-retention systems, drains, sumps and sediment fences) monthly and following significant rainfall.

7.2.3 Modifications to Management and Mitigation Measures for Surface Water

In addition to the above, AGL will ensure:

- A surface water baseline monitoring program is carried out before construction commences.
- During the construction program, holding and sediment pond areas on site will be monitored monthly following the initial 12-month construction period. It is envisaged that a report on a six-monthly basis will be produced, however final requirements will depend on the specific planning approvals (and associated reporting requirements to different agencies) for surface water and groundwater monitoring.
- AGL will appoint a peer reviewer for the engineering design of the stormwater management system.
- Stormwater from the site will be treated in accordance with PSC's 'Urban Stormwater and Rural Water Quality Management Plan for New Developments' and will therefore be of equivalent (or better) quality than stormwater from other sites within the municipality.

- Holding pond will be sized to accommodate up to a 1 year ARI.
- Disposal of hydrostatic test water will be managed under the surface water management plan in consultation with relevant agencies.
- AGL will prepare a stormwater management plan for the Project.
- A flood emergency response plan will be prepared for the Hexham receiving station.
- The surface water management plan will be prepared in consultation with HWC, OEH and NOW, and will include, but not be limited to:
  - A description of the quantity and source of all surface water supplies relating to construction and operations.
  - Detailed baseline data on surface water quality.
  - Surface water quality impact assessment criteria and a protocol for the investigation, notification and mitigation of identified exceedences.
  - A program to monitor surface water quality.
  - Detailed design of all water crossings, culverts and instream works.
  - A program to monitor and manage watercourse crossings, culverts and instream works.
  - A protocol for the investigation, notification and mitigation of identified impacts associated with watercourse crossings, culverts and instream works.
- Water feature 4 is not disturbed by the preferred pipeline corridor.
- When wastewater is tankered:
  - The system will have a telemetered level sensor that alarms when over range.
  - The tank will be included on the regular site inspection and reporting program.
  - There is a groundwater monitoring peizometer that is regularly sampled for pathogens and nutrients, downstream of the wastewater holding tank.
- Ensure that the banks of watercourses are not disturbed during construction.
- That conditions 1 to 5 recommended by PSC are implemented for the Project.

The following commitments have been superseded by the changes proposed to the Project design and the additional commitments above and are no longer proposed to be part of the Project:

- Ensure that the banks of watercourses are not disturbed during construction, except for Water Feature 4.

7.3 Groundwater

The following mitigation measures will be implemented to avoid and manage any impacts to groundwater for the Project.

PRECONSTRUCTION

A groundwater management plan will be prepared in consultation with relevant agencies and implemented as part of the CEMP and OEMP. The groundwater management plan will describe best practice control measures to reduce the risk of contamination of shallow groundwater, or the substantial alteration of groundwater flows due to drawdown effects. The proposed (onsite) monitoring network will be effective in identifying any impacts during both the site construction and operation of the facility.

The groundwater management plan will define the groundwater monitoring network, analytes and frequencies, include a spill response plan and a contingency plan to respond to any spills or measured groundwater contamination during Project construction or operations. Groundwater levels will also be monitored at a selection of sites. It will also include a contingency plan to respond to any drawdown caused by HDD based on groundwater monitoring described in section 7.4.6 of the EA Main Report.

7.3.1 Groundwater Levels and Flow

The following management measures will be implemented to minimise impacts to groundwater levels or flows:

PRECONSTRUCTION

- Minimise groundwater use.
- Discharge excess groundwater pumped from trenches during construction where possible to minimise temporary changes in local groundwater levels.
- Replace material excavated from trenches to minimise changes to groundwater flows, as far as practical. Where possible, pipelines will be bedded on sand in the base of the trench.
- Undertake infiltration rate tests at the sites of proposed infiltration basins to determine local infiltration rates and the presence of indurated sand layers capable of inhibiting groundwater recharge.
- Monitor groundwater levels within and at the boundaries of the gas plant site.

CONSTRUCTION

- Monitor groundwater levels within and at the boundaries of the gas plant site.

7.3.2 Groundwater Quality

Construction and Operations Activities

PRECONSTRUCTION

A groundwater baseline monitoring program has commenced and will continue during construction and operations. This includes measurement of groundwater levels and quality. Groundwater monitoring will be carried out throughout the life of the Project within the gas plant site.

Measures for preventing contamination of surface water described in section 7.3.4 of the EA Main Report will assist in preventing the contamination of groundwater. Measures for preventing contaminated soils or ASS soils contaminating surface water are described in section 7.2.4 of the EA Main Report. These measures will prevent contamination of groundwater by negating the infiltration of contaminated surface water and the leaching of potential contaminants from the soil into the groundwater. A thorough geotechnical investigation will be completed prior to HDD

commencing to ensure that it is designed to prevent groundwater contamination during construction.

Water quality parameters to be monitored will be determined during development of the groundwater management plan and in consultation with HWC, OEH and NOW. A report presenting data and analysis of the six months of baseline water quality data (both groundwater and surface water) will be provided to HWC, OEH and NOW. The baseline report will review the interim thresholds and develop the final thresholds for water quality criteria for both the CEMP and OEMP.

Spills and Leaks

PRECONSTRUCTION, CONSTRUCTION AND OPERATION

The measures for preventing direct contamination of surface water include measures to prevent spills at the gas plant reaching groundwater.

7.3.3 Monitoring

PRECONSTRUCTION

Groundwater monitoring will be undertaken in accordance with the groundwater management plan throughout the life of the Project in the PPA and during construction only at the Hexham receiving station site and adjacent to HDD entry and exit points, assuming no changes beyond expected natural variation are observed in these bores.

Monitoring bores will be installed. There may be several phases of installation depending on the respective site and pipeline construction programs. A groundwater baseline will be established before construction commences (minimum six months at boundary locations).

The final monitoring locations will be defined during development of the Groundwater Management Plan for the site and determined in consultation with HWC, OEH and NOW.

A thorough geotechnical investigation will be completed prior to HDD commencing to ensure that it is designed to prevent groundwater contamination during construction.

Groundwater monitoring will be undertaken throughout the life of the Project in the PPA in accordance with the groundwater management plan. In addition the groundwater management plan will make provision for additional groundwater monitored at the Hexham receiving station site and adjacent to HDD entry and exit points during construction.

Water quality parameters to be monitored will be defined during development of the groundwater management plan for the site and determined in consultation with HWC, OEH and NOW.

Groundwater monitoring results will be evaluated against natural background concentrations (the primary comparison) and have relevance to ANZECC 2000 ecosystem trigger values and NHMRC 2004 Australian drinking water guidelines. Thresholds will be defined in the groundwater management plan for the site and determined in consultation with HWC, OEH and NOW. Exceedences above the final adopted thresholds would trigger responses as outlined in the contingency flow chart.

The indicative groundwater monitoring program schedule is outlined in the Table 7.1 below.

Table 7.1 Indicative groundwater monitoring schedule

Project Stage	Number of Monitoring Bores	Groundwater Level Frequency	Groundwater Quality Frequency	Reporting Frequency
Pre-construction*	14	Continuous data loggers	Quarterly	Bi-annually
Construction	14	Continuous data loggers	Monthly**	Monthly**
Operation	10*	Quarterly	Quarterly	Annually

Note: for Primary Project Area only (assumes HDD and Hexham locations are discontinued).

* 6 months of baseline monitoring proposed for boundary locations, slightly less for internal locations.

** to be reviewed after 12 months.

The groundwater management plan will include response plans which will be triggered if a significant chemical spill or leakage occurs, or if parameters measured exceed guidelines. It is currently proposed that the following measures will be included:

- Clean up the contamination source.
- Assess the groundwater quality with respect to relevant guidelines.
- Advise OEH, NOW and HWC of the spill or leakage.
- Undertake hydraulic containment using one or more downstream pumping bores.
- Install additional monitoring bores and increase monitoring frequency.
- Pump the contained water to a treatment facility for treatment and reinjection to groundwater if the water meets criteria.

7.3.4 Modifications to Management and Mitigation Measures for Groundwater

In addition to the above, AGL will ensure:

- A groundwater assessment based on site redevelopment details is carried out.
- NOW will be consulted regarding any construction dewatering of pipeline excavations to ensure that any extractions are properly licensed (if required).
- AGL will ensure compliance with all statutory licensing requirements, including those stipulated by the conditions of approval.
- All water supplies for construction and operations will be sourced from an authorised and reliable supply.
- A groundwater management plan will be prepared in consultation with HWC, OEH and NOW. The groundwater management plan will include, but not be limited to:
  - A description of the quantity and source of all surface water supplies relating to construction and operations.
  - A description of all dewatering activities including the quantity of groundwater to be taken.
  - In relation to the groundwater levels and quality.
  - A detailed baseline data on groundwater levels and quality.

  - Groundwater quality impact assessment criteria.
  - A program to monitor groundwater levels and quality.
  - A program to monitor the effects of any change in groundwater levels and quality on groundwater dependent ecosystems.
  - A protocol for the investigation, notification and mitigation of identified exceedences of the groundwater quality impact assessment criteria.
  - A strategy to prevent illegal dumping of waste on the site and any access roads or tracks.
- A groundwater monitoring peizometer will be installed and regularly sampled for pathogens and nutrients, downstream of the holding tank for wastewater.
- Groundwater monitoring data collected from the site will be provided to HWC, OEH and NOW.
- Monitor and assess groundwater quality with respect to background concentrations.
- Conduct a review of the analytical suite of groundwater monitoring parameters.
- Prepare remediation action plan which is likely to include hydraulic containment using one or more downgradient (new) pumping bores.

7.4 Flora and Fauna

The following mitigation measures will be implemented to avoid and manage any impacts to flora and fauna for the Project.

7.4.1 Flora

PRECONSTRUCTION

- Limit the width of the construction right of ways for the gas pipeline (up to 10 m) where significant species and vegetation remnants are located.
- Revegetate relevant sections of the right of ways with suitable native species that comply with pipeline license requirements (e.g., no large tree species) as soon as practicable following construction.
- Allow an appropriate buffer distance (to be determined when developing the CEMP) between any construction activity and remnant native vegetation, where practicable. In such situations, strict erosion controls will be implemented to prevent sediment-laden runoff entering the adjacent vegetation.
- Ensure vehicle and equipment parking areas and stockpile areas are identified and sited to avoid areas containing ecological value.
- Erect flagging tape to mark ‘no-go’ zones to ensure areas to be protected are clearly defined, identified and avoided.
- Identify appropriate biodiversity offsets consistent with ‘improve or maintain’ principles.
- Use native vegetation grown from local seed banks for revegetation where appropriate.
- Limit access to sensitive areas of riverbanks and riparian vegetation during construction of the pipelines where practicable to avoid inadvertent or unauthorised disturbance of adjacent vegetation.

CONSTRUCTION AND OPERATION

- Reinstate logs and rocks, which are removed for pipeline construction, along the right of ways or relocate them to appropriate nearby habitats.
- Trim vegetation where possible rather than removing it.
- Revegetate disturbed areas where possible, other than those required for permanent use, access to the easement or facilities or for bushfire protections areas. The following procedures will be followed during revegetation:
  - Reinstate topsoil.
  - Respread cleared vegetation in the Project area to facilitate natural regeneration of native vegetation, where appropriate.
  - Undertake weed control where necessary to promote the rehabilitation of revegetated areas.
  - In consultation with the landowner, fence rehabilitated areas until successful revegetation is evident or until such time as the landowner requests fencing to be removed.
  - Monitor rehabilitation success, and undertake supplementary active revegetation (as outlined above), if required.

7.4.2 Fauna

PRECONSTRUCTION, CONSTRUCTION AND OPERATION

- Prepare a detailed fauna translocation protocol to assist in the translocation of wildlife during the clearing process.
- Use HDD where warranted.
- Minimise the length of time that construction trenches remain open, particularly in areas where habitat for significant species has been identified nearby.
- Clear fauna from the right of way prior to vegetation clearing and implement mitigation measures where habitat is present.
- Remove habitat features, such as rocks and logs, from the right of way prior to clearing, and carefully stockpile prior to clearing and return during easement restoration. Inspect these features for signs of fauna and remove habitat features prior to clearing the right of way.
- Conduct pre-clearing surveys prior to any tree felling to identify hollow-bearing trees, which will be left standing, where practicable. Nesting boxes will be placed into nearby trees where hollow-bearing trees are removed.
- Conduct pre-construction trapping and relocation of targeted species where possible in specified ecologically sensitive locations.
- Monitor open sections of trenches as required for trapped animals, such as small ground-dwelling mammals, particularly in areas where sensitive habitat has been identified.
- Ensure fauna ramps are regularly incorporated into open sections of trench to allow animals that have fallen into the trench to make their way out.

- Revegetate disturbed areas where possible, other than those required for permanent use, access to the easement or facilities, or for bushfire asset protection. Replace terrestrial habitat features, such as rocks and logs, following construction with landowner approval. Where landowner approval cannot be obtained, replace rocks and logs in another suitable location.
- Manage revegetated areas (specific techniques to be developed as part of the CEMP to prevent overgrazing from native fauna and introduced pest animals.

A number of avoidance and minimisation measures have been incorporated into the Project design, for example, the rigorous route selection of the pipeline alignments to avoid significant species and habitat. These are detailed in Table 7.2.

Table 7.2 Avoidance and mitigation measures for flora and fauna

Project Component	Potential impacts	Mitigation Measures
PRECONSTRUCTION		
Gas plant site	• Removal of threatened fauna habitat. • Clearing TECs and EPBC listed Earp's gum and the New Holland mouse habitat prior to construction. • Noise, vibration and lighting associated with Project operation. • Prevention of fauna dispersal due to inappropriate fencing of the gas plant facility.	• Gas plant facility will be located at the western end of the gas plant site and partially on previously disturbed land to minimise clearing of established flora and fauna communities (including preferred koala habitat), east of the gas plant site. • Develop and implement comprehensive CEMP and OEMP. These documents will include detailed information about significant flora and fauna species, their management and ongoing conservation recommendations. • Clearing of Earp's gum will be minimised by: – Mapping location of individual Earp's gums within 100 m of facility. – Marking sensitive 'no go' areas. – Limiting amount of disturbance during construction phase. – Ensuring vehicles keep to designated tracks. • A biodiversity offsets strategy will be prepared and implemented in consultation with OEH and DSEWPaC.

Table 7.2 Avoidance and mitigation measures for flora and fauna (cont'd)

Project Component	Potential impacts	Mitigation Measures
PRECONSTRUCTION (cont'd)		
Gas plant site (cont'd)		• The CEMP will include management strategies to mitigate work-site lighting, dust suppression and noise associated with the construction phase of the Project. • A habitat management plan will be prepared to document offset areas. • The CEMP and OEMP will include vegetation and weed management plans to prevent spread of weed species and avoid disturbance on quality and functioning of sensitive ecological communities. • The OEMP will consider appropriate measures associated with lighting of facility, e.g., downward facing lighting, to minimise light pollution and impacts on light-sensitive fauna. • Surface water management plan will be implemented, particularly the best practice sediment and erosion control measures, to avoid impacts on surface water quality. • Implement a pest animal control program on areas owned and/or managed by AGL to prevent increase in pest animal populations in the vicinity of the gas plant site.
CONSTRUCTION AND OPERATION		
Gas plant site	• Removal of threatened fauna habitat. • Clearing TECs and EPBC listed Earp's gum & the New Holland mouse habitat prior to construction. • Noise, vibration and lighting associated with Project construction. • Prevention of fauna dispersal due to inappropriate fencing of the gas plant facility.	• Gas plant facility will be located at the western end of the gas plant site and partially on previously disturbed land to minimise clearing of established flora and fauna communities, east of the gas plant site. • Clearing of Earp's gum will be minimised by: – Mapping location of individual Earp's gums within 100 m of facility. – Marking sensitive 'no go' areas. – Limiting amount of disturbance during construction phase. – Ensuring vehicles keep to designated tracks. • Fencing will be in accordance with PSC's Koala Plan of Management to allow for fauna dispersion. Fencing around facility will be vermin proof security fencing to prevent fauna entering the site.

Table 7.2 Avoidance and mitigation measures for flora and fauna (cont'd)

Project Component	Potential impacts	Mitigation Measures
PRECONSTRUCTION		
Access road and utility corridor	• Removal of threatened fauna habitat including preferred koala habitat. • Removal of TECs and EPBC listed Earp's gum and the New Holland mouse habitat prior to construction. • Vibration and noise from vehicles. • Lighting from vehicles and street. • Slashing of regrowth and spraying of weeds to maintain the corridor. • Prevention of fauna dispersal due to inappropriate fencing of corridor.	• The access road and utility corridor will be partially located on land already cleared for fire trails and for electricity easements. This will minimise clearing of key flora and fauna communities within the Swamp Mahogany and Woodland Rehabilitation communities. • The alignment of the access road and utility corridor will avoid clearing of Earp's gum. • The CEMP will include management strategies to mitigate work-site lighting, dust suppression and noise associated with the construction phase of the Project. • The CEMP and OEMP will include vegetation and weed management plans to prevent spread of weed species and ensure avoid disturbance on quality and functioning of sensitive ecological communities. • Fencing around sensitive 'no go' areas will be erected and speed limits will be in accordance with PSC's Koala Plan of Management to avoid or minimise death or injury of wildlife. • The OEMP will consider appropriate measures associated with lighting of road, e.g., downward facing lighting, to minimise light pollution and impacts on light-sensitive fauna. • A biodiversity offsets strategy will be prepared and implemented in consultation with OEH and DSEWPaC.
CONSTRUCTION AND OPERATION		
Access road and utility corridor	• Removal of threatened fauna habitat including preferred koala habitat. • Removal of TECs and EPBC listed Earp's gum and the New Holland mouse habitat prior to construction. • Vibration and noise from vehicles. • Lighting from vehicles and street. • Slashing of regrowth and spraying of weeds to maintain the corridor. • Prevention of fauna dispersal due to inappropriate fencing of corridor.	• The access road and utility corridor will be partially located on land already cleared for fire trails and for electricity easements. This will minimise clearing of key flora and fauna communities within the Swamp Mahogany and Woodland Rehabilitation communities. • The alignment of the access road and utility corridor will avoid clearing of Earp's gum. • Provide escape ramps in trenches to prevent fauna from becoming trapped in the event they fall or climb into the trench. Monitor open sections of trenches as required for trapped animals, such as small ground-dwelling mammals, particularly in areas where sensitive habitat has been identified. • Perimeter fencing will be in accordance with PSC's Koala Plan of Management to allow fauna dispersion beyond the corridor.

Table 7.2 Avoidance and mitigation measures for flora and fauna (cont'd)

Project Component	Potential impacts	Mitigation Measures
PRECONSTRUCTION		
Gas pipeline access corridor	• Removal of koala habitat. • Slashing of regrowth and spraying of weeds to maintain the corridor.	• Clearing of Redgum-Earp's gum-Apple-Banksia Forest will be minimised by: – Marking 'no go' areas where possible. – Limiting amount of disturbance during construction phase. – Ensuring vehicles keep to designated tracks. • A biodiversity offsets strategy will be prepared and implemented in consultation with OEH and DSEWPaC. • The CEMP and OEMP will include vegetation and weed management plans to prevent spread of weed species and avoid disturbance on quality and functioning of sensitive ecological communities.
CONSTRUCTION AND OPERATION		
Gas pipeline access corridor	• Removal of koala habitat. • Slashing of regrowth and spraying of weeds to maintain the corridor.	• Perimeter fencing will be in accordance with PSC's Koala Plan of Management to allow fauna dispersion beyond the corridor. • Provide escape ramps in trenches to prevent fauna from becoming trapped in the event they fall or climb into the trench. Monitor open sections of trenches as required for trapped animals, such as small ground-dwelling mammals, particularly in areas where sensitive habitat has been identified.
PRECONSTRUCTION		
Preferred pipeline corridor (option 2)	• Clearing TECs, SEPP 14 Coastal Wetlands and SEPP 71 Coastal Protection Areas. • Decrease in water quality from earthworks and frac-out associated with HDD. • Slashing of regrowth and spraying of weeds to maintain the corridor. • Releasing of ASS and surface water runoff.	• Pipeline corridor will be located on previously disturbed land or alongside road easements to avoid removal of Swamp Mahogany-Paperbark Swamp Forest and Phragmites Rushland. • Selection of pipeline corridor (option 2) and HDD will be used to avoid removal of Phragmites Rushland, Hunter River, SEPP 14 Coastal Wetlands and SEPP 71 Coastal Protection Areas where practicable. • The CEMP will include an ASS management plan to minimise potential ASS. • The surface water management plan will be implemented to avoid disturbance from water runoff and erosion. • The CEMP and OEMP will include vegetation and weed management plans to prevent spread of weed species and ensure avoid disturbance on quality and functioning of sensitive ecological communities. • Geotechnical investigations, specialist site design and suitable management of required materials will be carried out to minimise frac-out associated with HDD.

Table 7.2 Avoidance and mitigation measures for flora and fauna (cont'd)

Project Component	Potential impacts	Mitigation Measures
CONSTRUCTION AND OPERATION		
Preferred pipeline corridor (option 2)	• Clearing TECs, SEPP 14 Coastal Wetlands and SEPP 71 Coastal Protection Areas. • Decrease in water quality from earthworks and frac-out associated with HDD. • Slashing of regrowth and spraying of weeds to maintain the corridor. • Releasing of ASS and surface water runoff.	• Pipeline corridor will be located on previously disturbed land or alongside road easements to avoid removal of Swamp Mahogany-Paperbark Swamp Forest and Phragmites Rushland. • Selection of pipeline corridor (option 2) and HDD will be used to avoid removal of Phragmites Rushland, Hunter River, SEPP 14 Coastal Wetlands and SEPP 71 Coastal Protection Areas where practicable. • Provide escape ramps in pipeline trench to prevent fauna from becoming trapped in the event they fall or climb into the trench. Monitor open sections of trenches as required for trapped animals, such as small ground-dwelling mammals, particularly in areas where sensitive habitat has been identified. • Ensuring that works occur when favourable weather conditions prevail. • Use sediment fences and/ore sterile straw bales down slope of exposed soil and stockpiles. • Undertake rapid seeding and revegetation of disturbed areas to limit the time soil is exposed to erosion.

Mitigation measures proposed for TSC Act-related flora and fauna constraints during Project construction and operation are shown in Table 7.3.

Table 7.3 Mitigation measures for TSC Act-related flora and fauna

Project Component	Mitigation Measures
PRECONSTRUCTION	
Threatened ecological communities (TECs)	***Gas Plant Site***
	• Gas plant facility will be located at the western end of the gas plant site and on previously disturbed land to minimise clearing of established TECs, east of the gas plant site. • Develop and implement comprehensive CEMP and OEMP. These documents will include detailed information about significant flora and fauna species, their management and ongoing conservation recommendations. • A biodiversity offsets strategy will be prepared and implemented in consultation with OEH and DSEWPaC. • The CEMP and OEMP will include vegetation and weed management plans to prevent spread of weed species and avoid disturbance on quality and functioning of sensitive ecological communities.

Table 7.3 Mitigation measures for TSC Act-related flora and fauna (cont'd)

Project Component	Mitigation Measures
PRECONSTRUCTION (cont'd)	
	Access Road and Utility Corridor
Threatened ecological communities (TECs) (cont'd)	• The access road and utility corridor will be partially located on land already cleared for fire trails. This will minimise clearing of key flora and fauna communities within the Swamp Mahogany and Woodland Rehabilitation communities. • The CEMP and OEMP will include vegetation and weed management plans to prevent spread of weed species and ensure avoid disturbance on quality and functioning of sensitive ecological communities. • A biodiversity offsets strategy will be prepared and implemented in consultation with OEH and DSEWPaC.
	Preferred Pipeline Corridor (Option 2)
	• Pipeline corridor will be located on previously disturbed land or alongside road easements to avoid removal of Swamp Mahogany-Paperbark Swamp Forest and Phragmites Rushland. • Selection of pipeline corridor (option 2) and HDD will be used to avoid removal of Phragmites Rushland, Hunter River, SEPP 14 Coastal Wetlands and SEPP 71 Coastal Protection Areas where practicable. • The CEMP will include an ASS management plan to minimise potential ASS. • The surface water management plan will be implemented to avoid disturbance from water runoff and erosion. • The CEMP and OEMP will include vegetation and weed management plans to prevent spread of weed species and ensure avoid disturbance on quality and functioning of sensitive ecological communities. • Geotechnical investigations, specialist site design and suitable management of required materials will be carried out to minimise frac-out associated with HDD.
CONSTRUCTION AND OPERATION	
Threatened ecological communities (TECs)	***Gas Plant Site***
	• Gas plant facility will be located at the western end of the gas plant site and on previously disturbed land to minimise clearing of established TECs, east of the gas plant site. • A biodiversity offsets strategy will be prepared and implemented in consultation with OEH and DSEWPaC.
	Access Road and Utility Corridor
	• The access road and utility corridor will be partially located on land already cleared for fire trails. This will minimise clearing of key flora and fauna communities within the Swamp Mahogany and Woodland Rehabilitation communities. • Perimeter fencing will be in accordance with PSC's Koala Plan of Management to allow fauna dispersion beyond the corridor.

Table 7.3 Mitigation measures for TSC Act-related flora and fauna (cont'd)

Project Component	Mitigation Measures
CONSTRUCTION AND OPERATION (cont'd)	
Threatened ecological communities (TECs) (cont'd)	***Preferred Pipeline (Option 2)***
	• Pipeline corridor will be located on previously disturbed land or alongside road easements to avoid removal of Swamp Mahogany-Paperbark Swamp Forest and Phragmites Rushland. • Selection of pipeline corridor (option 2) and HDD will be used to avoid removal of Phragmites Rushland, Hunter River, SEPP 14 Coastal Wetlands and SEPP 71 Coastal Protection Areas where practicable. • Ensuring that works occur when favourable weather conditions prevail. • Use sediment fences and/or sterile straw bales down slope of exposed soil and stockpiles. • Undertake rapid seeding and revegetation of disturbed areas to limit the time soil is exposed to erosion.
	Access Road and Utility Corridor
	• Perimeter fencing will be in accordance with PSC's Koala Plan of Management to allow fauna dispersion beyond the corridor. Fencing around the facility will be vermin proof security fencing to prevent fauna entering the site. • Worksite lighting will be kept to a minimum. • Explore implementing the following options: – Use of passive means of lighting, such as installing reflector roadway markers, lines, warning or information signs and attaching reflectors to furnishings. – Use of solar-powered light emitting diode studs to highlight roadways and paths of travel. – Use of directional lighting focused only upon areas to be illuminated and not mounted higher than an appropriate height from the ground. This will assist in reducing visual impacts from light spill.
OPERATION	
Threatened fauna species: • Eastern false pipistrelle. • Eastern freetail bat. • Greater broad-nosed bat. • Large-footed myotis. • Little bentwing bat. • Koala (see below).	• Explore implementing the following options: – Use of passive means of lighting, such as installing reflector roadway markers, lines, warning or information signs and attaching reflectors to furnishings. – Use of solar-powered light emitting diode studs to highlight roadways and paths of travel. – Use of directional lighting focused only upon areas to be illuminated and not mounted higher than an appropriate height from the ground. This will assist in reducing visual impacts from light spill.

Table 7.3 Mitigation measures for TSC Act-related flora and fauna (cont'd)

Project Component	Mitigation Measures
PRECONSTRUCTION AND CONSTRUCTION	
SEPP 14 Coastal Wetlands	• HDD will be used to avoid removal of SEPP 14 Coastal Wetlands for preferred pipeline corridor (option 2). • Geotechnical investigations, specialist site design and suitable management of required materials will be carried out to minimise frac-out associated with HDD. • The surface water management plan will be implemented to avoid disturbance from water runoff and erosion. • An ASS management plan will be implemented to ensure potential ASS is minimised during the construction phase of the Project. • The CEMP and OEMP will include vegetation and weed management plans to prevent spread of weed species and avoid disturbance on quality and functioning of sensitive ecological communities.
PRECONSTRUCTION AND CONSTRUCTION	
SEPP 71 Coastal Protection Areas	• HDD will be used to avoid removal of SEPP 71 Coastal Protection Areas where practicable. • Construction right of way will be reduced to 10 m to minimise removal of SEPP 71 Coastal Protection Areas. • Geotechnical investigations, specialist site design and suitable management of required materials will be carried out to minimise frac-out associated with HDD. • The surface water management plan will be implemented to avoid disturbance from water runoff and erosion. • The CEMP and OEMP will include vegetation and weed management plans to prevent spread of weed species and avoid disturbance on quality and functioning of sensitive ecological communities.
PRECONSTRUCTION AND CONSTRUCTION	
SEPP 44 Koala Habitat Protection	• The Project components will be sited to avoid or minimise preferred koala habitat where possible. • Clearing of supplementary koala habitat will be avoided or minimised through HDD or reducing construction right of way where practicable. • Identifying and restoring potential koala habitat will be undertaken in consultation with PSC. • Fencing around pipeline easements within Lot 105 will be in accordance PSC's Koala Plan of Management to ensure Koala movement beyond the Project area. • Provide escape ramps in pipeline trench to prevent fauna from becoming trapped in the event they fall or climb into the trench. Monitor open sections of trenches as required for trapped animals, such as small ground-dwelling mammals, particularly in areas where sensitive habitat has been identified. • Speed limits along the access road and utility corridor will be in accordance with PSC's Koala Plan of Management to minimise injury or death to koalas and other wildlife.

Table 7.3 Mitigation measures for TSC Act-related flora and fauna (cont'd)

Project Component	Mitigation Measures
OPERATION	
SEPP 44 Koala Habitat Protection	• Fencing around pipeline easements within Lot 105 will be in accordance PSC's Koala Plan of Management to ensure Koala movement beyond the Project area. Fencing around facility will be vermin proof security fencing to prevent fauna entering the site. • All activities associated with the operation of the gas plant facility will be restricted where possible within the existing building footprint. • Speed limits along the access road and utility corridor will be in accordance with PSC's Koala Plan of Management to minimise injury or death to koalas and other wildlife.
PRECONSTRUCTION AND CONSTRUCTION	
Habitat and corridors	• The Project components, where possible, will be sited on previously disturbed areas to avoid or minimise removal of established vegetation communities. • Construction right of way will be reduced, where possible, to minimise removal of sensitive vegetation and habitat. • The CEMP and OEMP will include vegetation and weed management plans to prevent spread of weed species and avoid disturbance on quality and functioning of sensitive ecological communities. • Provide escape ramps in pipeline trench to prevent fauna from becoming trapped in the event they fall or climb into the trench. Monitor open sections of trenches as required for trapped animals, such as small ground-dwelling mammals, particularly in areas where sensitive habitat has been identified. • Fencing around Project components will ensure fauna movement beyond the Project area will not be hindered.
OPERATION	
Habitat and corridors	• The OEMP will consider appropriate measures associated with lighting the access road to minimise impaction light-sensitive fauna while providing road safety for road users. • Fencing around Project components will ensure fauna movement beyond the Project area will not be hindered. • All activities associated with the operation of the gas plant facility will, where possible, be restricted within the existing building footprint. • Following construction, the access road and utility corridor will be serviced by low volume traffic with speed limits in accordance with PSC's Koala Plan of Management.
PRECONSTRUCTION	
Instream habitats	• Geotechnical investigations, specialist site design and suitable management of required materials will be carried out to minimise frac-out associated with HDD. • The surface water management plan will be implemented to avoid disturbance from water runoff and erosion. • An ASS management plan will be implemented to ensure potential ASS is minimised during the construction phase of the Project. • The CEMP and OEMP will include vegetation and weed management plans to prevent spread of weed species and avoid disturbance on quality and functioning of sensitive ecological communities.
PRECONSTRUCTION	
Groundwater dependent ecosystems	• The implementation of management measures identified in groundwater assessment, including implementation of groundwater management plan and surface water management plan to avoid disturbance from water runoff and erosion, will avoid measurable impacts to groundwater quality, levels or flow and on groundwater dependent ecosystems.

Table 7.3 Mitigation measures for TSC Act-related flora and fauna (cont'd)

Project Component	Mitigation Measures
PRECONSTRUCTION AND CONSTRUCTION	
Key threatening processes: • Loss of hollow-bearing trees. • Removal of dead wood and dead trees. • Spread of environmental weeds. • Alteration to natural flow regimes of rivers, streams, floodplains and wetlands.	• Conduct pre-clearing surveys on identified clearing areas. • The CEMP and OEMP will include vegetation and weed management plans to prevent spread of weed species and avoid disturbance on quality and functioning of sensitive ecological communities. • The implementation of management measures identified in groundwater assessment, including implementation of surface water management plan to avoid disturbance from water runoff and erosion, will avoid measurable impacts to groundwater quality, levels or flow relating to hydrological characteristics. • All hollow-bearing trees to be soft-felled by experienced machine operator. • Remove habitat features, such as rocks and logs, from the right of way prior to clearing, and carefully stockpiled prior to clearing and returned, where possible, during easement restoration.

Mitigation measures proposed for EPBC Act-related flora and fauna constraints during Project construction and operation are shown in Table 7.4.

Table 7.4 Mitigation measures for EPBC Act-related flora and fauna

Significant Species or Communities	Location	Mitigation Measure
PRECONSTRUCTION AND CONSTRUCTION		
Earp's gum	• Gas plant site. • Access road and utility corridor.	• The gas plant facility will minimise clearing of the Woodland Rehabilitation community to the northern portion. This will avoid fragmentation of the existing Earp's gum population. • Clearing of Earp's gum will be minimised by: – Mapping location of individual Earp's gum within 100 m of gas plant facility and access road and utility corridor. – Marking 'no go' areas where possible. – Limiting amount of disturbance during construction phase. – Ensuring vehicles keep to designated tracks. • The CEMP and OEMP will include vegetation and weed management plans to prevent spread of weed species and ensure avoid disturbance on quality and functioning of sensitive ecological communities.

Table 7.4 Mitigation measures for EPBC Act-related flora and fauna (cont'd)

Significant Species or Communities	Location	Mitigation Measure
PRECONSTRUCTION AND CONSTRUCTION		
Dwarf kerrawang	• Not located within Project components.	• No removal of potential dwarf kerrawang habitat is envisaged. However, clearing of potential suitable habitat will be limited to disturbed areas across the Project area. • The CEMP and OEMP will include vegetation and weed management plans to prevent spread of weed species and ensure avoid disturbance on quality and functioning of sensitive ecological communities.
PRECONSTRUCTION AND CONSTRUCTION		
New Holland mouse	• Potential to be located within Project components.	• The clearing of suitable New Holland mouse habitat, the Heath Rehabilitation community, will be avoided. • The Project will minimise the clearing of similar suitable habitat (including Coastal Sand Apple-Blackbutt Forest) by where possible locating Project components in disturbed areas or by reducing construction widths of right of ways. • The OEMP will consider appropriate measures associated with lighting to minimise impact on the light-sensitive New Holland mouse. • Prepare and detailed biodiversity offsets strategy that includes implementation of a recovery plan for the New Holland mouse in consultation with the OEH and DSEWPaC.
PRECONSTRUCTION AND CONSTRUCTION		
Migratory species	• Potential to be located within Project components.	• The Project components will be located on previously disturbed land where possible to avoid or minimise removal of vegetation communities. • HDD and reducing construction widths of right of ways will avoid or minimise removal of suitable habitat associated with regent honey eater, swift parrot, satin flycatcher, black-faced monarch and rufous fantail, respectively. These communities are: – Alluvial Tall Moist Forest. – Redgum-Apple-Banksia Forest. – Swamp Mahogany-Paperbark Swamp Forest. – Coastal Sand Apple-Blackbutt Forest.

Table 7.4 Mitigation measures for EPBC Act-related flora and fauna (cont'd)

Significant Species or Communities	Location	Mitigation Measure
PRECONSTRUCTION AND CONSTRUCTION		
Hunter estuary wetlands	• Approximately 2.5 km downstream from the Project site.	• Geotechnical investigations, specialist site design and suitable management of required materials will be carried out to avoid risk of frac-out associated with HDD. • The surface water management plan will be implemented to avoid disturbance from water runoff and erosion. • The CEMP will include an ASS management plan to avoid ASS entering the Hunter River. • The implementation of management measures identified in groundwater assessment, including the surface water management plan to avoid disturbance from water runoff and erosion, will avoid measurable impacts to groundwater quality, levels, flow and therefore on the Hunter Estuary Wetlands. • Ensure construction works occur when favourable weather conditions prevail. • Use sediment fences and/or sterile straw bales down slope of exposed soil and stockpiles. • Undertake rapid seeding and revegetation of disturbed areas to limit the time soil is exposed to erosion. • Noise attenuation measures associated with HDD will be considered to minimise impacts on significant bird species.

7.4.3 Monitoring

PRECONSTRUCTION

Inspection and monitoring will be undertaken to ensure the proposed management and mitigation measures are effectively implemented and to ensure residual impacts on flora and fauna are as low as possible. The individual responsibilities for the monitoring and inspection activities will be outlined in the CEMP and OEMP. The following inspection and monitoring is proposed:

- Inspect 'no-go' areas to ensure they are clearly marked prior to clearing activities.
- Conduct pre-clearing surveys prior to any tree felling to identify hollow-bearing trees, which will be left standing, where practicable. Nesting boxes will be placed into nearby trees where hollow-bearing trees are removed.
- Conduct pre-construction trapping and relocation of targeted species in specified ecologically sensitive locations.

CONSTRUCTION AND OPERATION

- Supervise construction activities in sensitive areas to ensure procedures for spread move around, reduced right of way, HDD etc. are being implemented, where required.

- Monitor rehabilitated areas periodically to evaluate the success of rehabilitation procedures within Project components.
- Monitor trenched sections daily for trapped animals such as reptiles and small ground-dwelling mammals, particularly in areas where sensitive habitats have been identified.

7.4.4 Biodiversity Offsets

AGL will secure a biodiversity offsets package for the Project in consultation with OEH, DP&I and the DSEWPaC prior to the commencement of construction.

It is currently proposed that the Biodiversity Offset Package will comprise:

- Offsets which will be assessed in accordance with the Biobanking assessment methodology to ensure reasonably 'like for like' principle and vegetation types to those impacted by the Project.
- Additional rehabilitation to offset loss of up to 15 *Eucalyptus parramattensis* (Earp's gum) from the development site.

A number of potential offsets sites have been identified and AGL is committed to continuing to assess these sites and consult with landowners and the OEH, DP&I and DSEWPaC to determine the final preferred offsets.

AGL is committed to securing the selected offsets in perpetuity with appropriate management regimes and financial security via one or more of the following mechanisms:

- Conservation agreement under the *National Parks and Wildlife Act 1974* (NSW) (NPW Act).
- Dedication of land under the NPW Act.
- Planning agreement under the EP&A Act.
- Trust agreement under the *Nature Conservation Trust Act 2001* (NSW).
- Biobanking agreement under the Threatened Species Conservation Act 1995 (NSW).

7.4.5 Modifications to Management and Mitigation Measures for Flora and Fauna

In addition to the above, AGL will ensure:

- The internal access road into the gas plant site will be redesigned to greatly reduce the number of Earp's gum requiring removal.
- Seed collected from Earp's gum within the site will be provided to the Hunter Botanic Gardens to propagate the seed and plant the seedlings on their property. A habitat management sub plan will be prepared which will detail the management and ongoing protection of the remaining Earp's gum within the site.
- A vegetation rehabilitation management sub plan will be prepared which will detail the management and ongoing protection of the remaining Earp's gum within the PPA.
- Additional targeted surveys will be undertaken in the appropriate season for *Asperula asthenes, Galium australe, Lindernia alsinoides, Persicaria elatior, Zannichellia palustris* and *Maundia triglochinoides* in areas of suitable habitat within the final development footprint prior to construction. Should any species be likely to be impacted by the proposal then such species will be adequately compensated for in the form of offsets.

- A habitat management plan will be prepared (in consultation with the OEH and DSEWPaC) and implemented for the offsets and the development footprint.
- In order to protect Earp's gum, individual trees will be retained within the APZ.
- There will be no direct disturbance to the Freshwater Wetlands Endangered Ecological Community (EEC), Riverflat Eucalypt Forest EEC and Swamp Sclerophyll Forest that are located along Old Punt Road (due to pipeline realignment and choice of construction technique).
- The proposed width of the gas pipeline access corridor will be reduced to 30 m which will reduce clearing in the Redgum-Apple-Banksia community (that contains *Eucalyptus tereticornis*) from 0.85 ha to 0.69 ha.
- Any New Holland Mouse trapped will be translocated into areas safe away from development. This will be done in consultation with DSEWPaC.

The following commitments have been superseded by the changes proposed to the Project design and the additional commitments above and are no longer proposed to be part of the Project:

- Identifying and restoring potential koala habitat will be undertaken in consultation with PSC.
- Consider carrying out a slow controlled cold fire burn to ensure species leave area prior to construction works for the New Holland mouse.
- HDD will be used to avoid clearing the Freshwater Wetland Complex and Phragmites Rushland communities and instream habitat for the green and golden bell frog.
- Clearing of other suitable habitat for the green and golden bell frog will be avoided.

7.5 Bush Fire

The following mitigation measures will be implemented to avoid and manage any impacts as a result of bush fire for the Project.

7.5.1 Minimal Defendable Space

OPERATION

Asset protection zone will be maintained in accordance with Inner Protection Areas standards to ensure vegetation is kept at less than 0.05 m in height.

7.5.2 Emergency Planning

PRECONSTRUCTION

An emergency response plan will detail required actions at construction sites for approaching bush fire danger. This emergency response plan will be consistent with the RFS Guidelines for the Preparedness of Emergency/Evacuation Plan and be in compliance with AS 3745-2002 'Emergency control organisation and procedures for buildings, structures and workplaces'. The plan will be prepared prior to construction.

A CEMP will include measures for working in a bush fire-prone area. AGL will apply its standard procedures during construction e.g., hot work permits.

7.5.3 Access and Egress

PRECONSTRUCTION

The design of the access road and utility corridor will be sufficiently wide to allow attending emergency vehicles and evacuating vehicles to pass unimpeded in case of fire. It will be accessible in all weather conditions and will be designed to have a minimum load rating to accommodate fire-fighting units. The gas pipeline access corridor will serve as an alternative access/egress road. It will be designed for one way traffic and for light vehicles only.

The access road and emergency access road will include adequate outer radius-turning circles at the entry of the gas plant site and vertical clearance will be maintained above the access road.

7.5.4 Project Design

PRECONSTRUCTION

The gas plant is classified as a Class 10 building under the BCA. The construction of buildings and infrastructure will be in accordance with AS 3959-2009 ‘Construction of Buildings in Bush Fire Prone Areas’.

OPERATION

The operation of the pipeline will be in accordance with an OEMP, AS 2885 and the Australian Pipeline Industry Association Code of Environmental Practice – Onshore Pipelines (APIA, 2005). An emergency response plan will be developed for the Project.

Appropriate measures will be in place to monitor any potential leaks or ruptures, and regular maintenance will help to minimise potential incidents occurring.

7.5.5 Water and Services

PRECONSTRUCTION

The bush fire fighting water supply for the gas plant site will exceed the minimum volume requirement of 20,000 L (0.02 ML). The firewater tank will be able to direct water for fire suppression and cooling within the plant for a minimum of two hours. Fixed pumping systems, one electric and one diesel-engine driven, will be used. The water tank will be close to the southern boundary of the site and unimpeded access for emergency vehicles will be provided. Connections to the water tank will be provided for fire fighting teams.

7.5.6 Landscape and Vegetation Management

PRECONSTRUCTION

A bush fire management plan will be prepared for the PPA. The plan will address the management and maintenance of bush fire mitigation infrastructure. Clearance within the easements will be maintained to ensure fuel loads are kept to a minimum.

7.5.7 Monitoring

OPERATION

Regular inspections of easements and the APZs will be undertaken for fuel load levels and ongoing monitoring associated with Fire Danger Ratings applicable to the area.

Monitoring of the PPA will be done in accordance with the RFS Guidelines.

7.5.8 Modifications to Management and Mitigation Measures for Bush Fire

In addition to the above, AGL will ensure:

- APZs will be sized to provide a Bushfire Attack Level (BAL) of 29 kW/m^2.
- An emergency plan will be prepared in accordance with clause 174ZC of the *Occupational Health and Safety Regulations 2001* (NSW) *and* the DP&I guidance note HIPAP 1, *Emergency Planning.*
- A fire safety study will be prepared and submitted to FRNSW for review and comment. The fire safety study will be compiled in accordance with NSW Department of Planning and Infrastructure guidance note HIPAP 2, *Fire Safety Study Guidelines.*
- The proposed emergency traffic arrangements will be reviewed and assessed to ensure compliance with the stated Emergency Vehicle Access Policy No. 4.
- With regards to the LNG Tank, there are two sources to determine the APZ. The European LNG Code, EN 1473:2007 recommends a radiant heat less than 15kW/m^2, which requires an APZ of 43m. The Department of Planning recommends a radiant heat less than 23kW/m^2, which requires an APZ of 31m. The current site layout has a APZ of 46m (minimum), including the slashing zones, and therefore satisfies both requirements.
- In order to protect Earp's gum individuals will be retained within the APZ.

The following commitments have been superseded by the changes proposed to the Project design and the additional commitments above and are no longer proposed to be part of the Project:

- A minimum APZ of 25 m will be provided around the gas plant site, increasing to 31 m, around the processing plant and storage tank.

7.6 Aboriginal Cultural Heritage

The following mitigation measures will be implemented to avoid and manage any impacts to Aboriginal cultural heritage for the Project.

7.6.1 Construction and Operations Measures

Mitigation measures will be implemented to avoid and manage any impacts to Aboriginal cultural heritage places, values and interests (archaeological and anthropological). These may include the following measures that will be finalised in consultation with Aboriginal stakeholders:

PRECONSTRUCTION AND CONSTRUCTION

- Maintain an Aboriginal cultural heritage site register.
- Record all Aboriginal cultural heritage sites within proximity of the Project area in the CEMP and OEMP.
- Train all employees and contractors as part of the induction process in the procedures to be followed in the event that Aboriginal cultural heritage sites, objects and/or remains are unearthed.

7.6.2 Modifications to Management and Mitigation Measures for Aboriginal Cultural Heritage

In addition to the above, AGL will ensure:

- Prepare a Cultural Heritage Management Plan (CHMP) in consultation with Aboriginal Stakeholders prior to construction for incorporation into the CEMP. The CHMP will address:
  - The impact mitigation and management requirements for Aboriginal and historic heritage.
  - Details of any additional archaeological investigations to be undertaken and any associated licences or approvals required.
  - Procedures to be implemented if previously unidentified Aboriginal or historic objects are discovered during construction.
  - Procedures if human remains are found.
  - An education program for construction personnel on their obligations for Aboriginal cultural materials and historic items.
- Conduct a field survey of the PPA when the current dense vegetation layer is removed. This will be undertaken by a qualified archaeologist and representatives from the Worimi Local Aboriginal Land Council, Mu-Roo-Ma Inc, Nu-Run-Gee Pty Ltd and the GGAC.
- Regular monitoring of implementation of Aboriginal cultural heritage procedures, including the CHMP, and relevant legislation will be conducted to ensure that they are followed by staff and contractors.

The following commitments have been superseded by the changes proposed to the Project design and the additional commitments above and are no longer proposed to be part of the Project:

- The CEMP will detail the procedure to be followed in the event that Aboriginal cultural heritage sites, objects and/or remains are unearthed during construction based on obligations under the NSW NPW Act. This will include ceasing all work within an area if Aboriginal sites are identified during construction, preventing further access to the area and informing the OEH Environment Line, relevant Aboriginal stakeholders and a qualified archaeologist.
- Conduct a field survey of the PPA when the current dense vegetation layer is removed. This will be undertaken by a qualified archaeologist and representatives from the Worimi Local Aboriginal Land Council, Mu-Roo-Ma Inc and Nu-Run-Gee Pty Ltd.
- If pipeline option 1 is selected in consultation with the Aboriginal stakeholders, implement a buffer zone around RPS PHWY AS2 to avoid impacts.
- Regular monitoring of implementation of Aboriginal cultural heritage procedures and relevant legislation will be conducted to ensure that they are followed by staff and contractors.

7.7 Non-Aboriginal Cultural Heritage

The following mitigation measures will be implemented to avoid and manage any impacts to non-Aboriginal cultural heritage for the Project.

7.7.1 Modifications to Management and Mitigation Measures for Non-Aboriginal Cultural Heritage

AGL will now ensure:

- The CHMP will include procedures in the event that significant non-Aboriginal cultural heritage material is unearthed during construction of the Project.
- All staff and contractors will be inducted and trained in cultural heritage procedures and the CHMP so they are aware of their obligations under the NSW Heritage Act.

The following commitments have been superseded by the changes proposed to the Project design and the additional commitments above and are no longer proposed to be part of the Project:

- The CEMP will include procedures in the event that significant non-Aboriginal cultural heritage material is unearthed during construction of the Project. As required under the *NSW Heritage Act 1977*, all works in the immediate vicinity will cease immediately and the NSW Heritage Branch will be notified. Works will not recommence until appropriate management measures approved by the NSW Heritage Branch are implemented.
- All staff and contractors will be inducted and trained in cultural heritage procedures so they are aware of their obligations under the NSW Heritage Act.

7.8 Socio-Economic Environment

The following mitigation measures will be implemented to avoid and manage any impacts to the socio-economic environment for the Project.

7.8.1 Local and Regional Economy

The following mitigation measures will be implemented to manage impacts to the local economy:

PRECONSTRUCTION, CONSTRUCTION AND OPERATION

- Employ a strategy that focuses on equipment suppliers, trades and services, within the Port Stephens and Newcastle LGAs, boosting the local economy.
- Meet the construction and operations noise goals of the Project to minimise disturbance to sensitive receptors.

The Project is expected to positively benefit the regional economy. Therefore, avoidance, management and mitigation measures will not be required.

7.8.2 Housing and Accommodation

The following mitigation measures will be implemented to avoid or reduce impacts on housing and accommodation:

PRECONSTRUCTION, CONSTRUCTION AND OPERATION

- Use local labour where appropriately qualified people are available to minimise the influx of workers to the area during construction and reduce the risk of subsequent potential impacts on rental prices.
- Outline accommodation options for workers during inductions and encouraged, where practicable, to share houses during construction.

- Consult with local accommodation providers and tourism industry representatives on an ongoing basis to manage potential impacts on short-term accommodation, particularly during peak construction periods.

7.8.3 Property

The following mitigation measures will be implemented to avoid or reduce impacts on property:

PRECONSTRUCTION AND CONSTRUCTION

- Access to properties will be maintained during pipeline construction works and pipeline trenches will be progressively reinstated to minimise impacts on the use of land.
- Minimise the requirement for roadworks along the section of Old Punt Road passing through the Tomago industrial estate between Kennington Drive and Old Punt Road and Laverick Avenue and Tomago Road intersections.

7.8.4 Employment, Training and Local Business

The following measures will be implemented to increase employment and training benefits for local residents and business opportunities:

PRECONSTRUCTION, CONSTRUCTION AND OPERATION

- Engage local businesses where possible to service the Project both during construction and operations. Detailed advanced notices of goods and services required by the Project will be issued to assist local businesses meet the needs of the Project.

7.8.5 Social Infrastructure

PRECONSTRUCTION, CONSTRUCTION AND OPERATION

- Community consultation will be ongoing during the life of the Project.
- Notify the local community by means of public notice publications and advertisements on the progress of the Project and the scheduling of works.
- Preventative occupational health and safety measures and awareness programs will be implemented.
- All staff, contractors and site visitors will undergo site inductions, be conversant with the construction safety management plan and the emergency management plan, as well as occupational health and safety requirements as specified by specialist contractors, professional bodies and unions.
- Working relationships will be developed with local area emergency services providers, including Raymond Terrace Police, Ambulance and Fire services, and regional hospitals to advise on risks relating to on-site work and prepare for emergencies. Assistance will be provided with emergency training. This process will begin prior to construction.
- A zero-tolerance on-site drug and alcohol policy will be enforced.
- As the Project will be classified as a Major Hazard Facility, the Project will comply with the requirements for hazard and risk management under the National Standard for the Control of Major Hazard Facilities administered by NSW WorkCover. The National Standard for the Control of Major Hazard Facilities requires that relevant community and employee groups are consulted.

- Prior to operation of the Project, a safety management system will be implemented, which will include an emergency response plan.
- Project design will provide sufficient open space for emergency vehicles and equipment including fire fighting and rescue.
- Two suitably qualified first aid officers (with access to basic medical facilities) will be on duty at all times during construction activities associated with the gas plant, the receiving station in Hexham and the pipeline corridor, and at all times at the gas plant during operations.

7.8.6 Monitoring

AGL will undertake monitoring of socio-economic parameters, such that effects of the Project on the socio-economic conditions can be quantified and additional management measures can be applied if necessary.

Potential parameters to be monitored include:

PRECONSTRUCTION, CONSTRUCTION AND OPERATION

- The number of jobs created by the Project for local residents during the construction period to assist in quantifying the positive impacts of the Project on workforce participation.
- Stakeholder feedback via the implementation of a community information line to ensure that issues associated with the Project are appropriately addressed.
- The local community's response and awareness of the Project as a result of the community consultation program.
- Long-term benefits to the community achieved by AGL's partnering with stakeholders.

7.8.7 Modifications to Management and Mitigation Measures for Socio-Economic Environment

The following commitments have been superseded by the changes proposed to the Project design and the additional commitments above and are no longer proposed to be part of the Project:

- Two potential pipeline corridor options are presented in this EA, as well as a hybrid pipeline corridor option. This EA will be used to assess which corridor option is most suitable for the Project, and will include consideration of impact on local properties and landowners.

7.9 Visual Amenity

The following mitigation measures will be implemented to avoid and manage any impacts to visual amenity for the Project. These may include the following measures that are outlined below.

PRECONSTRUCTION, CONSTRUCTION AND OPERATION

- Colour selection of office buildings will be considerate of the surrounding environment.
- Existing vegetation will be retained where possible to act as a visual screen.
- Additional screen planting will be undertaken on the front and side boundaries of the Hexham receiving station site. Planting will need to allow for the final site layout, location of underground infrastructure and any security surveillance requirements.

- On completion of the pipeline construction, disturbed areas of land will be rehabilitated and returned to previous use.

7.9.1 Monitoring

Given no significant visual impacts have been identified as a result of the Project no ongoing visual monitoring program is proposed.

7.9.2 Modifications to Management and Mitigation Measures for Visual Amenity

No modifications are proposed.

7.10 Traffic

The following mitigation measures will be implemented to avoid and manage any traffic impacts to for the Project.

PRECONSTRUCTION, CONSTRUCTION AND OPERATION

- A construction traffic management plan will be prepared for the Project to minimise any impacts on the road network. Measures in the construction traffic management plan will include:
  - Transportation of equipment and machinery likely to cause delays to traffic flows will be timed to avoid peak traffic flows, where practicable.
  - Ensure heavy vehicles meet the Australian Road Rules and RTA standards so that road safety is not compromised.
  - Transport oversized equipment and machinery in accordance with the RTA guidelines for oversized movements.
  - Implement appropriate signage to warn road users of the presence of construction vehicles as well as changes to the normal traffic conditions.
- Notify the local community by means of public notice publications and advertisements on the progress of the Project and the scheduling of works so as to inform the local community of any additional vehicles added onto the local road network.
- These measures will be developed and implemented in consultation with the RTA, Port Stephens Council and Newcastle City Council.
- It is anticipated that some Project components will be transported as over-dimensional loads during construction. Required permits will be obtained.
- The pipeline construction may necessitate the partial closure of traffic lanes along Old Punt Road during pipeline installation. Temporary decking will be implemented if required during the trenching works to allow vehicles to traverse the open trench. The construction traffic management plan will outline management measures to protect pedestrian, cyclist and vehicular movements.
- The pipeline construction may necessitate the partial closure of traffic lanes along Old Punt Road during pipeline installation. Temporary decking will be implemented if required during the trenching works to allow vehicles to traverse the open trench. The construction traffic

management plan will outline management measures to protect pedestrian, cyclist and vehicular movements.

- Operation traffic management controls will be implemented to ensure staff, contractor and public safety relating to vehicle transport. Safe driver conduct policies and standards will be applicable to all AGL staff and contractors. Other controls include:
  – Implement driver and pedestrian safety awareness programs.
  – Review speed limits across the Project sites for all vehicles.
  – Conduct a random alcohol and drug testing program.

7.10.1 Monitoring

- A detailed construction traffic management plan will be prepared and implemented.

7.10.2 Modifications to Management and Mitigation Measures for Traffic

In addition to the above, AGL will ensure:

- A number of temporary construction compounds will be required along the route of the pipeline for its construction. Safe traffic movement in and out of these sites will be described in the construction traffic management plan.
- Temporary impacts to road infrastructure by the Project during the construction phase will be rehabilitated and reinstated by AGL.
- AGL will carry out HDD beneath the Old Punt Road and Tomago Road intersection to avoid disruption to traffic during the Project construction phase.
- AGL shall arrange for a public liability policy to cover the RTA and the relevant Council for public liability in relation to this contract/works for an amount of $20 million.
- Use of the existing infrastructure of the Hexham receiving station where possible, noting that there is existing parking and access to the site.

The following commitments have been superseded by the changes proposed to the Project design and the additional commitments above and are no longer proposed to be part of the Project:

- A number of temporary construction areas will be required along the route of the pipeline for its construction. Safe traffic movement in and out of these sites will be described in the construction traffic management plan.
- Construction activities will progressively move along the pipeline alignment and traffic delays during construction will be temporary. Should option1 along the Pacific Highway be selected as the preferred route, construction will occur on adjacent private land bordering the road easement. This is not expected to directly impact the traffic flow on Pacific Highway.

7.11 Noise and Vibration

The following mitigation measures will be implemented to avoid and manage any impacts as a result of noise and vibration for the Project.

7.11.1 Noise

PRECONSTRUCTION, CONSTRUCTION AND OPERATION

A noise and vibration management plan will be prepared as part of the CEMP and OEMP to ensure noise levels are adequately controlled and any impacts managed. The traffic noise management plan will be prepared within the construction traffic management plan. It will be prepared in line with practices outlined in DECCW Interim Construction Noise Guideline 2009 and DECCW Environmental Criteria for Road Traffic Noise 1999 and in consultation with the Port Stephens Council, Newcastle City Council and OEH. The CEMP will be implemented by AGL and the construction contractors.

Noise emissions will be confirmed for equipment and infrastructure (including low frequency noise) during detailed design when final specifications are known. The potential for high-flow gas flaring at the gas plant site will be reviewed and noise assessment may be required to determine impacts of noise associated with high-flow gas flaring.

Construction and operation activities will be undertaken with a focus on noise control at source, noise attenuation and in consultation with potentially affected receptors to minimise the risk of noise exceeding noise criteria and disturbing sensitive receptors. The following measures will be implemented (where practical) to manage impacts of noise and ensure Project goals are met:

- Stage Project activities (and reduce simultaneous noise emitting practices) to reduce peak noise levels.
- Incorporate attenuation (such as mufflers) into the design of Project equipment and infrastructure.
- Orient equipment away from receptors.
- Restrict noise generating construction activities to daytime hours (7.00 a.m. to 6.00 p.m. Monday to Friday and 8.00 a.m. to 1.00 p.m. Saturday). In special circumstances, if noise generating evening or night work is required, a consultation process will be undertaken to ensure noise impacts can be adequately controlled. This will be the case for horizontal directional drilling works, which will occur 24 hours a day, 7 days per week.
- Schedule high noise generating activities for less sensitive times of the day (including periodic respite breaks from noise).
- Consult potential noise receptors (particularly those within 500 m of the gas pipeline works) about the nature of the noise emissions and avoidance and mitigation practices to be adopted. Complaints and feedback and will be recorded and addressed where practical.
- Ensure vehicles and equipment are in good working order and have effective noise reduction features.
- Ensure that best practices for noise attenuation (such as exhaust silencers, mufflers and enclosures) and noise minimisation are incorporated into the design of the gas plant and Hexham receiving station.
- Consult potential noise receptors about the nature of operations noise emissions and avoidance and mitigation practices to be adopted. Feedback and complaints will be recorded and addressed where practical.

- Monitor noise levels during operations to ensure localised noise creep (increase in local ambient noise) is not occurring due to the Project.

7.11.2 Vibration

CONSTRUCTION

Construction activities will be implemented with a focus on vibration control at source and consultation with potentially affected receptors.

The following measures will be implemented (where practical) to manage impacts of construction vibration and ensure Project goals are met:

- Use alternative, lower-impact equipment or methods where practicable.
- Operate high vibration equipment as far away from receptors as possible. Rock-breakers will not be used within 20 m of residences.
- Schedule vibration-causing equipment to be used at the least sensitive time of day (times of day to be determined in consultation with local stakeholders, including councils).
- Keep equipment well maintained.
- Reduce instances of simultaneous vibration activities.
- Isolate high vibration equipment on resilient mounds.
- Consult potential receptors about the nature of construction vibration and avoidance and mitigation practices to be adopted (particularly those within 500 m of the pipeline works, including the receptor R5 (217 Old Maitland Road)). Community feedback and complaints will be recorded and addressed where practical.

No vibration impacts are likely for Project operations.

7.11.3 Monitoring

PRECONSTRUCTION, CONSTRUCTION AND OPERATION

Noise and vibration monitoring programs will be developed as part of the noise and vibration management plan.

The programs will focus on monitoring:

- Noise emissions during construction and operations to ensure equipment is meeting noise certification and criteria requirements and detect any faulty or damaged equipment.
- Vibration levels during construction to ensure vibration criteria are being met.
- Responding to community complaints in line with EPA license conditions.

7.11.4 Modifications to Management and Mitigation Measures for Noise and Vibration

No modifications are proposed.

7.12 Air Quality

The following mitigation measures will be implemented to avoid and manage any impacts to air quality for the Project.

CONSTRUCTION AND OPERATIONS

Control measures will be implemented during construction and operation to minimise dust and other emissions:

- Minimise vegetation clearance to reduce the areas of exposed soil.
- Water construction sites during dry windy conditions as required, including cleared areas, soil stockpiles and unsealed roads.
- Undertake activities likely to generate dust during favourable meteorological conditions where practical. Earth moving activities will be modified when wind speeds exceed 30 km/h if excessive dust is generated.
- Prevent dirt being carried onto the TAC Northern Access Road or Old Punt Road from the access road where it could form dust.
- Load trucks transporting any potential dust generating material off site to below the height of the side and tail board and cover the load.
- Enforce vehicle speed limits on unsealed roads to reduce dust generation.
- Revegetate as soon as practical.
- Maintain trucks and construction equipment in accordance with the manufacturers' specifications and comply with all relevant regulations.
- Avoid unnecessary idling of trucks, plant and engines.
- Plan material deliveries to avoid congestion and excessive truck queuing and truck idling.
- Project equipment, machinery and vehicles will meet exhaust air quality standards and will comply with state regulations. Machinery will be fitted with the appropriate emission control equipment and will be maintained and serviced frequently.
- Project equipment will be designed to enable monitoring of operating performance to ensure the equipment is operating according to manufacturer's specifications.
- A monitoring program will be established to ensure regular (or continuous) monitoring of air emissions.
- The access road will be sealed during operations to prevent the generation of dust by vehicles using the road and to dirt being carried onto the TAC Northern Access Road or Old Punt Road where it could form dust.

7.12.1 Monitoring

Monitoring of the Project emissions will be in accordance with current AGL practice. Emissions of pollutants are reported annually in the National Pollution Inventory (NPI).

7.12.2 Modifications to Management and Mitigation Measures for Air Quality

In addition to the above, AGL will ensure:

- Chemicals and analytes, including glycol, used across the Project for dehydration, rehydration and refrigeration will be monitored and modelled.

- Liaison will continue with OEH in relation to the licensing requirements for the Project under the POEO Act and the proposed draft conditions for the environmental protection licence.
- There will not be any gas venting during shutdown other than in an emergency.

7.13 Greenhouse Gas Emissions

The design and construction of the Project will be in line with proven energy-efficient technology. Natural gas has advantages over other fossil fuels with respect to greenhouse emissions.

The following mitigation measures will be implemented to avoid and manage any impacts as a result of greenhouse gas emissions for the Project.

PRECONSTRUCTION, CONSTRUCTION AND OPERATION

- Design the site layout to reduce the extent of vegetation clearing required.
- Incorporate initiatives focusing on energy efficiency in the Project design. This may include high-efficiency motors, variable speed drives and high-efficiency lighting (e.g., motion sensors or passive lighting).
- Implement the AGL Climate Change Policy which is incorporated through the Health, Safety and Environment Management System including greenhouse abatement initiatives will be adopted for the Project.
- Establish measureable greenhouse gas emission reduction targets.
- Maintain vehicles appropriately to maximise their fuel efficiency.

7.13.1 Monitoring

In accordance with the Commonwealth *National Greenhouse and Energy Reporting Act 2007*, AGL will be required to report on greenhouse gas emissions, energy production and energy consumption. Greenhouse gas emissions will be monitored and reviewed on an annual basis.

7.13.2 Modifications to Management and Mitigation Measures for Greenhouse Gas Emissions

No modifications are proposed.

7.14 Hazard and Risk

The following mitigation measures will be implemented to avoid and manage any impacts as a result of hazard and risk for the Project.

7.14.1 Risk Management

PRECONSTRUCTION, CONSTRUCTION AND OPERATION

- Conduct a review of the hazard and risk assessment once detailed design and hazard and operability studies (HAZOPs) have been completed for the Project, this will ensure that the assumptions made in this hazard and risk assessment remain valid though conservative.
- Undertake an audit of the Safety (Health and Environment) Management System within twelve months of commissioning the gas plant. This audit will focus on the management of potential major hazards associated with the development and based on the DP&I Hazard Audit Guidelines.

- Develop an emergency response plan that will coordinate procedures with the Tomago Aluminium Smelter, other adjacent industrial facilities and any local emergency planning groups, fire brigades, state and local police and appropriate government agencies. This plan will include:
  - Contacts with state and local emergency response agencies.
  - Scalable procedures for the prompt notification of appropriate local official and emergency response agencies, based on the level and severity of potential incidents.
  - Procedures for notifying businesses, residents and recreational users within areas of potential hazard.
  - Evacuation routes/methods for residents, business and members of the public in the vicinity of the Project. Evacuation routes will include alternatives to the main access road.
  - The locations of permanent sirens and other warning devices.
  - Appointment of an emergency coordinator(s) to be available on site at all times.
  - Plans for initial and continued training of plant operators and local responders, along with provisions for periodic emergency response drills by emergency personnel, emergency response agencies and federal, state and local officials.
- Undertake a security assessment to ensure arrangements are acceptable for the gas plant site as per the current requirements for critical infrastructure in NSW and under the NSW Regulations for Major Hazards Facilities.
- Design the gas plant to ensure that any spills will drain into sumps, away from other plant items and infrastructure. Additional design features will also be incorporated to minimise the risk of cold metal brittle fracture and verify the adequacy of the design features during the HAZOP and safety integrity level (SIL) studies.
- Install an automatic shutdown system for use in the event of a leak.
- Evaluate additional mitigation of vapour generated in the impoundment system, such as the installation of insulating concrete inside the LNG impoundment trenches and sump.
- Install an air quality monitoring or other early warning system inside the compressor building.
- Determine the requirement for lightning protection for the top of the tank during detailed design.
- Install an overfill and overpressure protection system for tanker loading.
- Consult with air transport stakeholders to determine any requirements for restricting airspace above the gas plant and aircraft warning lights or other warning devices.
- Incorporate appropriate allowances in the Project design to ensure that multiple pipelines located in the same easement are separated by acceptable distances to ensure that radiant heat produced during an incident is not transferred to a neighbouring pipe.
- Undertake an audit of the Safety (Health and Environment) Management System within twelve months of commissioning the gas plant. This audit will focus on the management of potential major hazards associated with the development and based on the DP&I Hazard Audit Guidelines.

- Consult with air transport stakeholders to determine any requirements for restricting airspace above the gas plant and aircraft warning lights or other warning devices.

7.14.2 Safe Engineering Design

PRECONSTRUCTION

- The storage facility will be designed according to Australian and/or international standards to meet the required earthquake characteristics of the site.
- AGL will continue to consult with all relevant agencies through the detailed design and Project operation phases.
- Maximise separation distances to separate the most credible (though rare) leaks from ignition sources, physically isolate any fire, prevent its spread and minimise the risk to people and property.
- Minimise the inventory of LNG and of pressurised natural gas in process equipment.
- Minimise pumping rates and pressure levels in Project components external to the storage tank.
- Minimise vulnerability of equipment and processes through equipment selection and design.
- Ensure maximum integrity of flammable material containment.
- Minimise exposure to people by reducing process complexity and maintenance requirements.
- Ensure systems are available for rapid detection and prompt remote isolation of any leaks.
- Control all ignition sources.
- Minimise the opportunity for ignition sources in areas where hydrocarbon leaks are a possibility.
- Provide passive and active fire protection systems for the gas plant site.
- Consider the implications of cold metal brittle failure in the design of the plant. The likelihood of a catastrophic cold metal brittle failure event should be rendered negligible through design.
- Ensure that LNG transfer pipes which enter and leave the storage tank are positioned on the roof of the tank.
- Minimise the likelihood of over pressure, under pressure or overfill scenarios of the LNG storage tank by instigating appropriate measures in the design of the Project.

7.14.3 Modifications to Management and Mitigation Measures for Hazard and Risk

In addition to the above, AGL will ensure:

- Advise the Office of Airspace Regulation of the expected start date of the operation of the facility six months prior to commencement of operation.
- Reasonable measures will be taken to maintain security of the construction site to prevent third parties gaining unlawful access to the site. Measures will include secure fencing and lighting along the main access road and the pipeline corridor close to Old Punt Road.

- If any evidence of illegal dumping of wastes on the Project area is observed the dumped material will be removed immediately. If any liquid sludge or chemical waste is observed then appropriate sampling and monitoring will be implemented to determine whether any impact to groundwater has occurred.
- AGL will provide ‘as constructed’ drawings and details to RAAF.
- AGL will continue to consult with all relevant agencies through the detailed design and operation phases of the Project.
- An emergency plan will be prepared to comply with clause 174ZC of the Occupational Health and Safety Regulations 2001 (NSW).The emergency response plan will be compiled in accordance with DP&I guidance note HIPAP 1, Emergency Planning.
- The proposed emergency traffic arrangements will be reviewed and assessed to ensure compliance with the stated Emergency Vehicle Access Policy No.4.
- Compliance with the regulations applicable to major hazard facilities and will continue to consult with WorkCover in order to obtain details of its requirements for inclusion in the site risk assessment and safety report.
- AGL will prepare and submit the safety report to WorkCover six months prior to commissioning.

8. CONCLUSION

This Report addresses the issues raised by stakeholders during the public exhibition phase for the Environmental Assessment (EA) and outlines AGL's responses to these issues. This Report also provides details of proposed design changes that have been made since the EA exhibition.

The outcomes of the public exhibition phase have resulted in AGL revising some aspects of the Project components to minimise its environmental and social impact and to address issues raised in the submissions.

Section 3 provides an overview of the consultation process leading up to and during the EA exhibition period and subsequent consultation to the submissions being received.

Section 4 describes the environmental assessment submissions received during the public exhibition period. An overview of the types of submissions received, the key issues raised and AGL's responses are all discussed in this section.

The design of the Project has been revised in response to certain of the issues raised during submissions. For example, the footprints of several preferred Project components have been reconfigured to mitigate impacts on several environmental values of concern in the area. These revisions are discussed in section 5.

In addition, several other design changes relevant to environmental considerations have been made since exhibition of the EA and are discussed in section 4 and 5. These include the selection of pipeline route option 2 as the final preferred option. The design changes proposed to the Project have been justified by demonstrating how each modification is either relatively minor and/or provides additional benefits to the Project design described in the EA.

The final statement of commitments, which has been amended as a result of the submissions received and proposed design changes, demonstrates AGL's commitment to a comprehensive management approach to minimise environmental and social impacts. Commitments that have been superseded have also been delineated. These are outlined in section 6.

As stated in the EA, the Project will have significant environmental, economic and social benefits for NSW and the Hunter Region. AGL is committed to continue to listen and work with all interested stakeholders to ensure that the construction and operation of the Project is justified and is in accordance with the principles of sustainability.

9. GLOSSARY AND ABBREVIATIONS

The following words and abbreviations are defined in the context of their use in this EA. Some definitions have been adapted from the Macquarie Dictionary, online dictionaries and encyclopedias, and relevant specialist studies.

9.1 Units

°C *abbr.* degree Celsius

CO2-e *abbr*. Equivalent carbon dioxide

GJ *abbr.* Gigajoule

g/m^2/month *abbr*. grams per square metre per month

ha *abbr.* hectare

km *abbr.* kilometre

km/h *abbr.* kilometre per hour

km^2 *abbr.* square kilometre

kPa *abbr.* kilopascal

kV *abbr.* kilovolt

kW *abbr.* kilowatt

L *abbr.* litre

m *abbr.* metre

m/s *abbr.* metre per second

mg/L *abbr.* milligram per litre

mg/m^3 *abbr*. milligram per cubic metre

ML *abbr.* megalitre

ML/a *abbr.* megalitre per annum

ML/day *abbr.* megalitre per day

mm *abbr.* millimetre

MPa *abbr.* mega Pascal

MW *abbr.* megawatt

MWhr *abbr.* megawatt-hour

PJ *abbr.* petajoule

PJ/a *abbr.* petajoule per annum

ppm *abbr.* parts per million

TJ/day

t *abbr.* tonne

µg/m^3 *abbr.* microgram per cubic metre

µS/cm *abbr.* micro Siemens per centimetre

9.2 Glossary

A

aeolian*, adj.,* blown or borne by wind.

AHD *abbr*., Australian Height Datum.

airshed, *n.,* geographical area that shares the same air mass due to topography, meteorology and/or climate. As such, pollutants emitted into this area may interact or increase in concentration. It typically forms an analytical or management unit, used to discuss air pollution management in the same way that catchments or watersheds are used to discuss pollution in rivers.

alluvial, *adj.,* of or relating to deposition by streams.

ambient*, n.,* of the surrounding area or environment.

APZs*, abbr.,* asset protection zones.

aquifer*, n.,* a layer of underground water-bearing permeable rock from which water can be extracted.

aquitard*, n.,* a zone where groundwater flow is restricted from one aquifer to another.

ARI *abbr*., average recurrence interval. This is a measure of how rare an event is. A 100-year ARI event is one that is expected to occur once in 100 years.

ASS, *abbr.,* acid sulfate soils.

B

bagasse*, n.,* the fibrous residue remaining after sugarcane or sorghum stalks are crushed to extract their juice and is currently used as a renewable resource in the manufacture of pulp and paper products and building materials.

BCA*, abbr.,* Building Classifications Australia.

blowdown water, n., residual wastewater from the purification unit used to produce higher quality water for the amine unit.

BOM*, abbr.,* Australian Bureau of Meteorology.

C

CALMET/CALPUFF*, abbr., a*n advanced non-steady-state meteorological and air quality modelling system.

CEMP*, abbr.,* Construction Environmental Management Plan.

CO_2-e *abbr.* The concentration of CO_2 that would cause the same level of radioactive forcing as a given type and concentration of greenhouse gas.

cryogenic, *n.,* the production of very low temperatures.

D

dBA*, abbr.,* unit used to measure 'A-weighted' sound pressure levels. This A-weighting adjustment is made to the sound level to approximate the response of the human ear.

DECCW*, abbr.,* Department of Environment, Climate Change and Water.

DP&I*, abbr.,* Department of Planning and Infrastructure (formerly Department of Planning – DoP)

DGR*, abbr.,* Director-General's Requirements.

drawdown, *v.*, reduction of the watertable in an aquifer or groundwater system.

E

ESD, *abbr.,* ecologically sustainable development.

EPA*, abbr.,* Environment Protection Authority.

ephemeral, *adj*., short-lived or transitory.

embrittlement*, n.,* the loss of ductility or toughness in a metal or plastic with little change in other mechanical properties.

emission*, n.,* discharge of a substance (e.g., dust) into the environment.

equivalent tenement *n.*, a unit of estimating average flows in terms of a standard residential dwelling.

evapotranspiration *v.*, the sum of evaporation and plant transpiration.

F

FDI, *abbr.,* Fire Danger Index.

G

GDEs*, abbr.,* groundwater dependent ecosystems.

geofabric *n.*, a permeable synthetic fabric designed to protect soils, with such capabilities as filtration, reinforcement, draining or separation.

groundwater divide, *n*., the boundary between two adjacent groundwater basins and occurs as a high point in the watertable.H

HDD, *abbr.,* horizontal directional drilling.

humate*, n.,* a salt of humic acid, a major organic constituent of soil formed by the biodegradation of organic matter.

HWC*, abbr.,* Hunter Water Corporation.

hydraulic conductivity, *n.*, the ease with which water can move through pore spaces or fractures in groundwater systems.

I

indurated sand *n.*, hardened sand that often occurs in discontinuous layers.

L

$LA_{eq(15\ min)}$, *abbr.,* the equivalent continuous noise level. This is the level of noise equivalent to the energy average of noise levels occurring over a measurement period of 15 minutes.

$LA_{eq(9\ hr)}$, *abbr.,* the equivalent continuous noise level. This is the level of noise equivalent to the energy average of noise levels occurring over a measurement period of 9 hours.

LEP*, abbr.,* Local Environmental Plan.

liquefaction*, n.,* the process of condensing a gas into a liquid.

LNG*, abbr.,* liquified natural gas.

M

miscible, adj., capable of being mixed.

MSDS, *abbr*., material data safety sheet.

N

NEPM*, abbr.,* National Environmental Protection Measure.

NGSF*, abbr.,* Newcastle gas storage facility.

NO_2, *abbr.,* nitrogen dioxide.

NOW*, abbr.,* NSW Office of Water.

NPI*, abbr.,* National pollution inventory.

NSW, *abbr.,* New South Wales.

O

O_3*, abbr.,* ozone.

OEH*, abbr.,* Office of Environment and Heritage.

OEMP*, abbr.,* Operations Environmental Management Plan.

P

PAH, abbr., poly aromatic hydrocarbons.

palaeochannel, *n.*, an inactive underground channel with deposits of unconsolidated and semi-consolidated sediments.

particulate matter*, n.,* material 10 microns or less in size and capable of being breathed deep into the lungs, the amount of particulate matter in the air is used as an indicator of health risk.

PASS, abbr., potential acid sulfate soils.

PBP*, abbr.,* Bush Fire Protection.

pigging *v.*, the practice of maintaining, cleaning and inspecting pipelines using inspection gauges or ‘pigs’.

plume dispersion*, n., p*lume dispersion models link emissions from one or more sources to ambient concentrations.

$PM_{2.5}$, *n.,* the fraction of dust with a particle size of 2.5 µm or less; a health indicator for the very fine particles of respirable dust capable of deep penetration into the lungs and alveoli.

PM_{10}*, n.,* the fraction of dust with a particle size of 10 µm or less; a health indicator for the fine particles of respirable dust capable of being inhaled into the lungs.

PPA*, abbr.,* Primary Project Area.

Q

Quaternary*, adj.,* relating to the most recent geological period (most recent succession of geological strata), which constitutes the last main division of the Cainozoic era.

quartzose*, adj.,* comprised mainly or entirely of quartz.

R

RAAF*, abbr.,* Royal Australian Air Force.

RBL, *abbr.,* rating background level. This is the overall single-figure background level representing each assessment period (the mean of the measurements taken for each period: day, evening or night) over the whole monitoring period.

restiad, *n.*, plants from the Restionaceae family that decompose to form peat.

S

SEPP, abbr., State Environmental Planning Policy.

DSEWPaC*, abbr.,* Commonwealth Government Department of Sustainability, Environment, Water, Population and Communities.

SIL*, abbr.,* safety integrity level.

sour gas, n., the recovered hydrogen sulfide gas stream from natural gas processing.

SO_2*, abbr.,* sulphur dioxide.

SPOCAS, *abbr*., suspension peroxide oxidation combined acidity and sulfate.

swale, *n.*, a low tract of land, usually moist or marshy.

T

TAC*, abbr.,* Tomago Aluminium Company.

TAPM*, abbr.,* air pollution model.

temperature inversion*, n.,* an atmospheric condition where temperature increases with height above the ground.

Tomago Sandbeds sedimentary unit*, n.,* a sedimentary geological layer consisting of highly-permeable, fine-grained sands underlain by impervious clay and rock.

TPH*, abbr.,* total petroleum hydrocarbons.

V

VOCs*, abbr.,* volatile organic compounds.

10. REFERENCES

Coffey. 2011. Environmental Assessment Newcastle Gas Storage Facility Project.

Worley Parsons. 2011. Stormwater Management Philosophy.

Appendix 1

PAE Holmes Air Emissions Responses to NSW Office of Environment and Heritage Submission

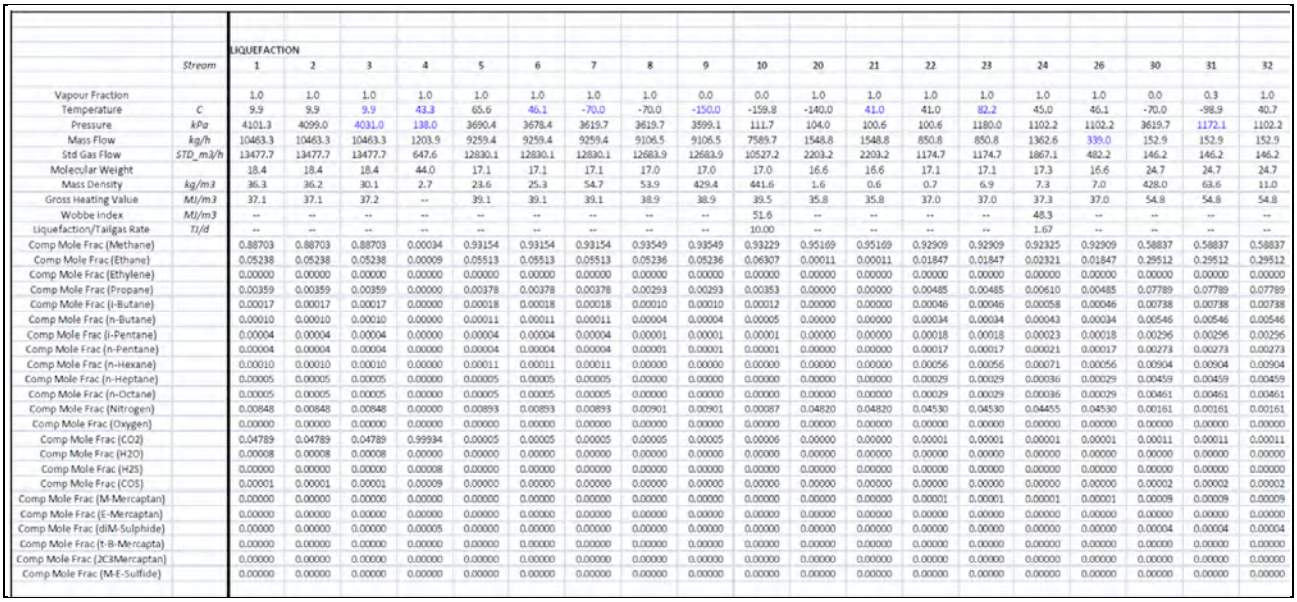
PAE HOLMES

AIR EMISSIONS RESPONSES TO

NSW OFFICE OF ENVIRONMENT & HERITAGE SUBMISSION

Fuel Analysis

Figure 1: Fuel Analysis



		LIQUEFACTION																	
	Stream	1	2	3	4	5	6	7	8	9	10	20	21	22	23	24	26	30	31	32
Vapour Fraction		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	0.3	1.0
Temperature	C	9.9	9.9	9.9	43.3	65.6	46.1	-70.0	-70.0	-150.0	-158.8	-140.0	41.0	41.0	82.2	45.0	46.1	-70.0	-98.9	40.7
Pressure	kPa	4101.3	4099.0	4031.0	138.0	3690.4	3678.4	3619.7	3619.7	3599.1	111.7	104.0	100.6	100.6	1180.0	1102.2	1102.2	3619.7	1172.1	1102.2
Mass Flow	kg/h	10463.3	10463.3	10463.3	1203.9	9259.4	9259.4	9259.4	9106.5	9106.5	7589.7	1548.8	1548.8	850.8	850.8	1362.6	339.0	152.9	152.9	152.9
Std Gas Flow	STD_m3/h	13477.7	13477.7	13477.7	647.6	12830.1	12830.1	12830.1	12683.9	12683.9	10527.2	2203.2	2203.2	1174.7	1174.7	1867.1	482.2	146.2	146.2	146.2
Molecular Weight		18.4	18.4	18.4	44.0	17.1	17.1	17.1	17.0	17.0	17.0	16.6	16.6	17.1	17.1	17.3	16.6	24.7	24.7	24.7
Mass Density	kg/m3	36.3	36.2	30.1	2.7	23.6	25.3	54.7	53.9	429.4	441.6	1.6	0.6	0.7	6.9	7.3	7.0	428.0	63.6	11.0
Gross Heating Value	MJ/m3	37.1	37.1	37.2	--	39.1	39.1	39.1	38.9	38.9	39.5	35.8	35.8	37.0	37.0	37.3	37.0	54.8	54.8	54.8
Wobbe Index	MJ/m3	--	--	--	--	--	--	--	--	--	51.6	--	--	--	--	48.3	--	--	--	--
Liquefaction/Tailgas Rate	TJ/d	--	--	--	--	--	--	--	--	--	10.00	--	--	--	--	1.67	--	--	--	--
Comp Mole Frac (Methane)		0.88703	0.88703	0.88703	0.00034	0.93154	0.93154	0.93154	0.93549	0.93549	0.93229	0.95169	0.95169	0.92909	0.92909	0.92325	0.92909	0.58837	0.58837	0.58837
Comp Mole Frac (Ethane)		0.05238	0.05238	0.05238	0.00009	0.05513	0.05513	0.05513	0.05236	0.05236	0.06307	0.00011	0.00011	0.01847	0.01847	0.02321	0.01847	0.29512	0.29512	0.29512
Comp Mole Frac (Ethylene)		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Comp Mole Frac (Propane)		0.00359	0.00359	0.00359	0.00000	0.00378	0.00378	0.00378	0.00293	0.00293	0.00353	0.00000	0.00000	0.00485	0.00485	0.00610	0.00485	0.07789	0.07789	0.07789
Comp Mole Frac (i-Butane)		0.00017	0.00017	0.00017	0.00000	0.00018	0.00018	0.00018	0.00010	0.00010	0.00012	0.00000	0.00000	0.00046	0.00046	0.00058	0.00046	0.00738	0.00738	0.00738
Comp Mole Frac (n-Butane)		0.00010	0.00010	0.00010	0.00000	0.00011	0.00011	0.00011	0.00004	0.00004	0.00005	0.00000	0.00000	0.00034	0.00034	0.00043	0.00034	0.00546	0.00546	0.00546
Comp Mole Frac (i-Pentane)		0.00004	0.00004	0.00004	0.00000	0.00004	0.00004	0.00004	0.00001	0.00001	0.00001	0.00000	0.00000	0.00018	0.00018	0.00023	0.00018	0.00296	0.00296	0.00296
Comp Mole Frac (n-Pentane)		0.00004	0.00004	0.00004	0.00000	0.00004	0.00004	0.00004	0.00001	0.00001	0.00001	0.00000	0.00000	0.00017	0.00017	0.00021	0.00017	0.00273	0.00273	0.00273
Comp Mole Frac (n-Hexane)		0.00010	0.00010	0.00010	0.00000	0.00011	0.00011	0.00011	0.00000	0.00000	0.00000	0.00000	0.00000	0.00056	0.00056	0.00071	0.00056	0.00904	0.00904	0.00904
Comp Mole Frac (n-Heptane)		0.00005	0.00005	0.00005	0.00000	0.00005	0.00005	0.00005	0.00000	0.00000	0.00000	0.00000	0.00000	0.00029	0.00029	0.00036	0.00029	0.00459	0.00459	0.00459
Comp Mole Frac (n-Octane)		0.00005	0.00005	0.00005	0.00000	0.00005	0.00005	0.00005	0.00000	0.00000	0.00000	0.00000	0.00000	0.00029	0.00029	0.00036	0.00029	0.00461	0.00461	0.00461
Comp Mole Frac (Nitrogen)		0.00848	0.00848	0.00848	0.00000	0.00893	0.00893	0.00893	0.00901	0.00901	0.00087	0.04820	0.04820	0.04530	0.04530	0.04455	0.04530	0.00161	0.00161	0.00161
Comp Mole Frac (Oxygen)		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Comp Mole Frac (CO2)		0.04789	0.04789	0.04789	0.99934	0.00005	0.00005	0.00005	0.00005	0.00005	0.00006	0.00000	0.00000	0.00001	0.00001	0.00001	0.00001	0.00011	0.00011	0.00011
Comp Mole Frac (H2O)		0.00008	0.00008	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Comp Mole Frac (H2S)		0.00000	0.00000	0.00000	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Comp Mole Frac (COS)		0.00001	0.00001	0.00001	0.00009	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00002	0.00002	0.00002
Comp Mole Frac (M-Mercaptan)		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00001	0.00001	0.00001	0.00009	0.00009	0.00009
Comp Mole Frac (E-Mercaptan)		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Comp Mole Frac (diM-Sulphide)		0.00000	0.00000	0.00000	0.00005	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00004	0.00004	0.00004
Comp Mole Frac (t-B-Mercapta)		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Comp Mole Frac (2C3Mercaptan)		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Comp Mole Frac (M-E-Sulfide)		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Revised Emissions Data from Preferred Contractor

Table 0.1: Revised Emission data from preferred contractor

Description	Duty / Flow	Liquefaction - g/s					Re-Gasification g/s				
Flare		NO_x	CO	SO_2	PM	VOC	NO_x	CO	SO_2	PM	VOC
- Pilot & Purge	3.82 Sm3/hr	0.002	0.001	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000
- Amine Vent	650 Sm3/hr (vent), 270 Sm3/hr (assist gas)	0.120	0.101	0.247	0.009	0.003	-	-	-	-	-
- MRL Comp. Seal Leakage	1.7/4.25 Idle/Running Sm3/hr	0.002	0.002	0.000	0.000	0.000	0.001	0.001		0.000	0.000
Flare Normal - Total		0.124	0.104	0.247	0.009	0.003	0.003	0.002	0.000	0.000	0.000
Amine System Heater	2200 kW	0.116	0.097	0.005	0.009	0.003	-	-	-	-	-
WEG Heaters	11080 kW each						1.133	0.381	0.000	0.010	0.038
EA Emission Rate Higher?											
	Flare - Normal	NO	NO	NO	NO	YES	NO	YES	YES	NO	YES
	Liquefaction	YES	NO	YES	NO	YES					
	Re-Gasificaiton						NO	NO	YES	YES	NO

Revised Emission Data for Liquefaction

Revised modelling results for these revised emission data for Liquefaction are provided in Table 3.2. All results except PM_{10} are less than the results presented in the EA modelling. This is as expected as the revised emission rates for PM_{10} are both higher than the EA. For other pollutants, such as NO_x and SO_2, although the flare emission rates are now higher, the fired heater emission rates are lower. As this emission source is emitted at a lower height and lower temperature, this is the dominant source in terms of ground level impact and therefore the higher flare emission rates is less significant.

Table 0.2: Revised Modelling Results for Liquefaction - Flare (Normal, Sour Gas) & Fired Heater at Amine Unit

Discrete Receptor ID	NO_x	NO_x	SO_2	SO_2	SO_2	PM_{10}	PM_{10}	VOCs
	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
	1-hour	Annual	1-hour	24-hour	Annual	24-hour	Annual	1-hour
	Assessment Criteria							
	246	*62*	*570*	*228*	*60*	*50*	*30*	
1	0.85	0.01	0.37	0.04	0.003	0.008	0.00053	0.02
2	0.71	0.00	0.29	0.04	0.002	0.006	0.00037	0.02
3	0.63	0.00	0.28	0.04	0.002	0.005	0.00035	0.02
4	0.67	0.00	0.35	0.03	0.002	0.006	0.00036	0.02
13	1.30	0.02	0.89	0.12	0.010	0.022	0.00165	0.03
14	1.52	0.02	1.14	0.12	0.011	0.013	0.00156	0.04
15	1.23	0.02	0.95	0.10	0.009	0.011	0.00124	0.03
16	1.52	0.02	1.19	0.09	0.012	0.011	0.00159	0.04
18	1.34	0.02	1.16	0.08	0.014	0.012	0.00187	0.03
23	0.40	0.00	0.21	0.02	0.001	0.003	0.00022	0.01
26	0.38	0.00	0.21	0.02	0.001	0.003	0.00020	0.01
30	0.69	0.01	0.48	0.05	0.004	0.012	0.00062	0.02

Revised Emission Data for ReGasification

Revised modelling results for the revised emission data for Re-Gasification are provided in Table 3.3. Results for SO_2 and PM_{10} are lower than presented in the EA, whereas results for NO_x and VOCs are higher than results presented in the EA. Notwithstanding, all results are significantly below the relevant air quality criteria for each pollutant.

Table 0.3: Revised Modelling Results for ReGasification - Flare (Normal, Sour Gas) & Fired Heater

Discrete Receptor ID	NO_x	NO_x	SO_2	SO_2	SO_2	PM_{10}	PM_{10}	VOCs
	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
	1-hour	Annual	1-hour	24-hour	Annual	24-hour	Annual	1-hour
	Assessment Criteria							
	246	*62*	*570*	*228*	*60*	*50*	*30*	
1	8.02	0.05	0.36	0.04	0.00	0.01	0.00	0.27
2	6.81	0.04	0.28	0.03	0.00	0.01	0.00	0.23
3	6.01	0.04	0.28	0.04	0.00	0.01	0.00	0.20
4	5.68	0.04	0.33	0.03	0.00	0.01	0.00	0.19
13	11.99	0.16	0.87	0.11	0.01	0.02	0.00	0.40
14	14.35	0.15	1.11	0.11	0.01	0.01	0.00	0.48
15	11.72	0.12	0.93	0.09	0.01	0.01	0.00	0.39
16	13.80	0.15	1.16	0.09	0.01	0.01	0.00	0.46
18	12.47	0.17	1.13	0.08	0.01	0.01	0.00	0.42
23	4.02	0.02	0.21	0.02	0.00	0.00	0.00	0.13
26	3.45	0.02	0.21	0.02	0.00	0.00	0.00	0.12
30	6.74	0.06	0.47	0.05	0.00	0.01	0.00	0.23

Revised In-stack Concentrations for Fired Heaters

The revised estimated in-stack concentrations for the fired heaters are presented in Table 3.4 and compared to those presented in the EA. The revised estimated emission concentrations are all lower than what was presented in the EA.

Table 0.4: Comparison to Emission Standards

Pollutant	Applicable Stack	Estimated Emission Concentration - EA	Revised Estimated Emission Concentration
NO_x	Fired Heaters – Amine Unit	< 250 mg/Nm^3	92 mg/Nm^3
	Fired Heaters –Vaporiser	< 170 mg/Nm^3	92 mg/Nm^3
Solid Particles	Fired Heaters – Amine Unit	< 5 mg/Nm^3	1 mg/Nm^3
	Fired Heaters –Vaporiser	< 40 mg/Nm^3	1 mg/Nm^3
VOC	Fired Heaters – Amine Unit	< 5 mg/Nm^3 VOC <100 mg/Nm^3 CO	3 mg/Nm^3 28 mg/Nm^3
	Fired Heaters –Vaporiser	<20 mg/Nm^3 VOC <125 mg/Nm^3 CO	3 mg/Nm^3 28 mg/Nm^3

Appendix 2

Response to Newcastle City Council Comments
Hexham Receiving Station

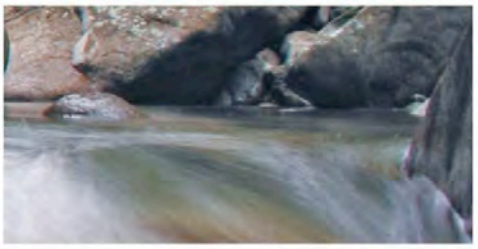
coffey environments
SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE

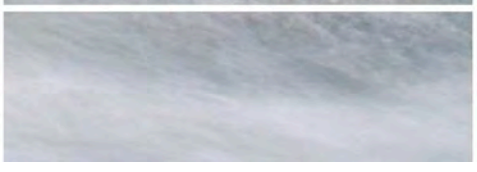
RESPONSE TO NEWCASTLE CITY COUNCIL COMMENTS HEXHAM RECEIVING STATION 235 OLD MAITLAND ROAD HEXHAM NSW

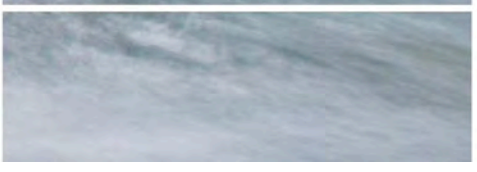
AGL Energy Limited

ENAUWARA04202AA-L01

16 August 2011







16 August 2011

AGL Energy Limited
Level 22, 101 Miller Street
NORTH SYDNEY NSW 2060

Attention: Arianna Henty

Dear Arianna

RE: RESPONSE TO NEWCASTLE CITY COUNCIL COMMENTS HEXHAM RECEIVING STATION 235 OLD MAITLAND ROAD HEXHAM NSW

Newcastle City Council has reviewed the Environmental Assessment for the proposed Gas Storage Facility at Tomago NSW and issued a letter dated 29 July 2011 outlining their recommended conditions and comments related to the Hexham Receiving Station (235 Old Maitland Road, Hexham NSW).

This letter outlines our response to the Council comments with respect to contamination following a review of our Report titled Preliminary Contamination Assessment for 235 Old Maitland Road Hexham NSW (ref ENVIWARA00561AA-R01) dated 17 January 2011.

Construction details are unknown at this stage and the level of disturbance to the fill and natural soils is also unknown. Given that the risk of widespread contamination within the fill is low, as indicated in our PCA, it is considered that the construction of the Hexham Receiving Station could be carried out using a Construction Environmental Management Plan (CEMP) that, amongst other relevant issues, would provide procedures on:

- The management and disposal of fill in accordance with the NSW DECCW (2009) Waste Classification Guidelines ;
- Management of unexpected finds; and
- Management of acid sulfate soil.

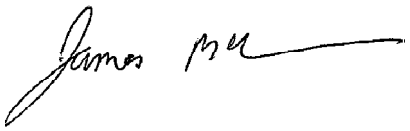
The site would be considered suitable for ongoing industrial use, provided the following recommendations were carried out:

- An Acid Sulfate Soil Assessment is conducted to check the natural buffering capacity of the soil and satisfy the requirements of Clause 25 of the Newcastle LEP 2003.

- A hazardous material survey is carried out prior to demolition of the existing building;
- A groundwater assessment based on site redevelopment details is carried out; and
- A CEMP is prepared that includes procedures for the management and disposal of fill material, procedures for unexpected finds and an Acid Sulfate Soil Management Plan, if required.

We trust that these comments are suitable for your current needs. Should you require further information of clarification of the above, please do not hesitate to contact either Laurie Fox or the undersigned

For and on behalf of Coffey Environments Australia Pty Ltd



James McMahon

Associate Environmental Scientist

Attachments:

Important Information about your Coffey Report

cc name
details

coffey environments
SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE

Important information about your **Coffey** Environmental Report

Uncertainties as to what lies below the ground on potentially contaminated sites can lead to remediation costs blow outs, reduction in the value of the land and to delays in the redevelopment of land. These uncertainties are an inherent part of dealing with land contamination. The following notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report has been written for a specific purpose

Your report has been developed on the basis of a specific purpose as understood by Coffey and applies only to the site or area investigated. For example, the purpose of your report may be:

- To assess the environmental effects of an on-going operation.
- To provide due diligence on behalf of a property vendor.
- To provide due diligence on behalf of a property purchaser.
- To provide information related to redevelopment of the site due to a proposed change in use, for example, industrial use to a residential use.
- To assess the existing baseline environmental, and sometimes geological and hydrological conditions or constraints of a site prior to an activity which may alter the sites environmental, geological or hydrological condition.

For each purpose, a specific approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible, quantify risks that both recognised and unrecognised contamination pose to the proposed activity. Such risks may be both financial (for example, clean up costs or limitations to the site use) and physical (for example, potential health risks to users of the site or the general public).

Scope of Investigations

The work was conducted, and the report has been prepared, in response to specific instructions from the client to whom this report is addressed, within practical time and budgetary constraints, and in reliance on certain data and information made available to Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on those instructions, requirements, data or information, and they could change if such instructions etc. are in fact inaccurate or incomplete.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man and may change with time.

For example, groundwater levels can vary with time, fill may be placed on a site and pollutants may migrate with time.

Because a report is based on conditions which existed at the time of the subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time.

Consult Coffey to be advised how time may have impacted on the project and/or on the property.

Interpretation of factual data

Environmental site assessments identify actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from indirect field measurements and sometimes other reports on the site are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of Coffey through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area.

This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered with redevelopment or on-going use of the site. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

coffey environments
SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE

Important information about your **Coffey** Environmental Report

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. In particular, a due diligence report for a property vendor may not be suitable for satisfying the needs of a purchaser. Your report should not be applied for any purpose other than that originally specified at the time the report was issued.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other professionals who are affected by the report. Have Coffey explain the report implications to professionals affected by them and then review plans and specifications produced to see how they have incorporated the report findings.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel), field testing and laboratory evaluation of field samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Contact Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to land development and land use. It is common that not all approaches will be necessarily dealt with in your environmental site assessment report due to concepts proposed at that time. As a project progresses through planning and design toward construction and/or maintenance, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Environmental reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents.

Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

Appendix 3

Newcastle Gas Storage Facility Revised Site Stormwater Management Philosophy

WorleyParsons
resources & energy

Infrastructure & Environment
3 Warabrook Boulevard
Newcastle, NSW 2304 Australia
PO Box 814 NEWCASTLE NSW 2300
Telephone: +61 2 4985 0000
Facsimile: +61 2 4985 0099
www.worleyparsons.com
WorleyParsons Services Pty Ltd
ABN 61 001 279 812

25 July 2011

Ref: 401020-03390-CI-REP-002_0
File: Warabrook

Hunter Water Corporation
PO Box 5171
HRMC NSW 2310

Attention Brendan Berghout and Emma Berry

Dear Sir/Madam

AGL ENERGY LIMITED
NEWCASTLE GAS STORAGE FACILITY
REVISED SITE STORMWATER MANAGEMENT PHILOSOPHY

As requested, WorleyParsons has prepared on behalf of AGL Energy Ltd this letter to outline the revised site stormwater management philosophy for the above development.

Based on feedback from Hunter Water Corporation on the original stormwater management strategy proposed for the site as part of the Environment Assessment, WorleyParsons has reviewed alternative stormwater management options for the development. The proposed alternate stormwater management strategy was presented at a meeting at Hunter Water's offices between Hunter Water Corporation, AGL, TAC and WorleyParsons at Hunter Water's offices on 21 July 2011.

At the meeting Hunter Water confirmed that it is supportive of AGL's revised concept to pump stormwater offsite. The purpose of this letter is to formalise the revised stormwater management philosophy to assist Hunter Water Corporation in providing a response to the Department of Planning for the development. The revised strategy is summarised below and outlined on the attached figures. It is noted that this strategy is only at a concept stage and still requires feedback from several stakeholders. The approval process for this option has not been confirmed. However this letter aims to define the principals upon which detailed design will be carried out.

Site Stormwater Management Principals.

- The site grading has been modified so that the majority of the site drains to the south-western corner of the site. The exceptions to this are the LNG Tank on the eastern side of the site (approx 1.6Ha) and the switch yard on the northern side of the site (approx 0.2Ha). Both these areas are considered low pollutant risks and will be bunded in accordance with the relevant Australian Standards.

- Roof areas will be directed to tanks for reuse (eg toilet flushing). Overflows may be directed to infiltration beds or the broader stormwater system described below.
- Enclosed workshops will be drained directly to the trade waste system.
- Plant areas (approx 2.3Ha) will be bunded to contain the 20 year ARI 24 hour storm event and comply with the relevant Australian Standards. Runoff from this area will be captured at an inspection tank where it will be manually tested prior to release. In the event it is polluted the water will be pumped to the trade waste system for disposal. Where the water quality is satisfactory, the water will be pumped to the stormwater system. It is likely that the plant area will divided into smaller areas based on risk to minimise the volumes of polluted water being disposed of via trade waste. A preliminary division is shown in the attached figures as "General Plant Areas" and "Uncovered Plant Areas".
- Runoff from the sites impervious areas will be directed via by a piped drainage system to a wet sump GPT and then wetland/holding pond (excluding the LNG Tank, electrical switchyard and pervious areas outside of operational zones). Surface flows up to the 100 year ARI storm event will also be directed to the wetland. The wetland/holding pond comprises three zones as follows:

    1. **Wetland Zone** - this will be sized to achieve the water quality objectives of Port Stephens Council's "Urban Stormwater and Rural Water Quality Management Plan for New Developments". Based on the current layout a permanent wetland volume in the order of 1500m^3 is anticipated.
    2. **Holding Zone** – an additional holding volume is provided to contain runoff from the catchment up to the 1 year ARI 24 hour duration storm event. Based on the current layout a holding volume of approximately 4500m^3 is anticipated. Water quality will be inspected and, if satisfactory, discharged from site via a pump station. If the water quality is unsatisfactory, the water will either be disposed via the trade waste system, or treated prior to being discharged from site via a pump station.
    3. **Retention Zone** – A further volume will be provided to prevent overflows up to the 100 year ARI 72 hour duration storm event. If the water level rises to this zone, the pump station will switch on automatically and discharge water from the site. A pump flow rate of about 75L/s is anticipated, as this is between the 1 year and 2 year ARI for the site, but is subject to approval from Council. Based on this an additional active storage volume of 1500m^3 is required.

- A pump station will be located adjacent to the wetland. The final configuration of this will depend on the final site layout. A duty and back up pump will be provided that the station and will be connected to the site's control system to indicate when inspection and/or maintenance is required. It is proposed that a 1660m long, underground 225mm diameter HDPE delivery main will be provided that will discharge adjacent to Old Punt Road. Erosion protection will be provided at the discharge point. Discharged stormwater will follow the existing water course under Old Punt Road, flow west and pass below the Pacific Hwy and west to the Hunter River.

- The site will be fenced to prevent access to areas outside of the site. This is for security but will also minimise the chance of unauthorised entry to areas of the site.
- AGL will prepare a facility operation management plan, which will cover maintenance of the above treatment train.

As noted the above strategy is subject to input from various stake holders and detailed design. Notwithstanding it is anticipated that AGL will maintain regular consultation with Hunter Water Corporation on this issue, and the broader project, as detailed design progresses.

Please don't hesitate to contact David Moss from AGL on 0417 861 056 if you have any queries or require further information.

Yours sincerely
WorleyParsons

Brian Oberdorf
Civil Engineer

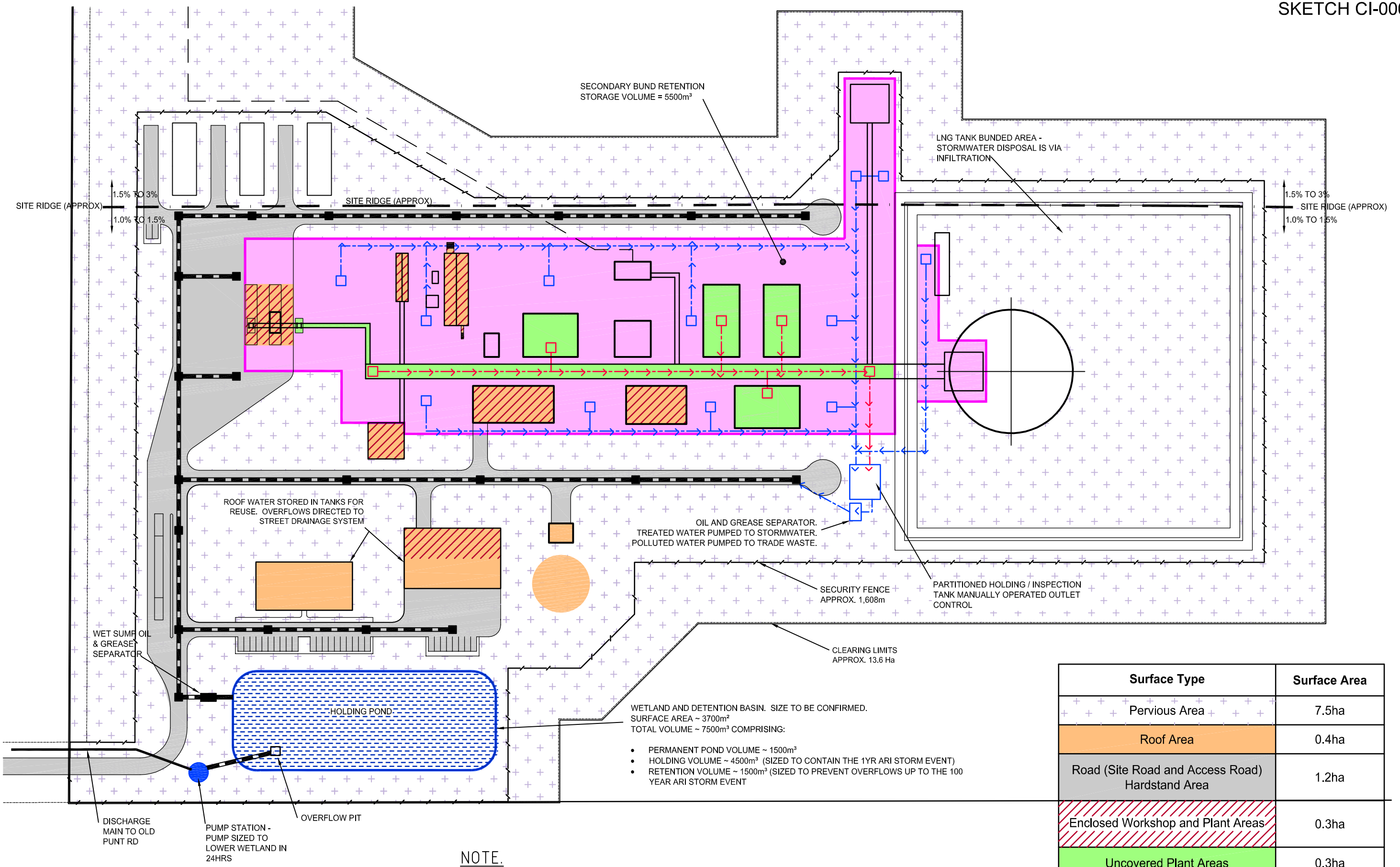
Glenn Swan
Manager Civil Infrastructure, Hunter

enc

- Figure 1 – Revised Conceptual Surface Water Management Plan
- Figure 2 – Concept Stormwater Discharge Location
- Figure 3 – Surface Water Management Flow Chart

cc David Moss – AGL
Arianna Henty - AGL

FIGURE 1
SKETCH CI-0002



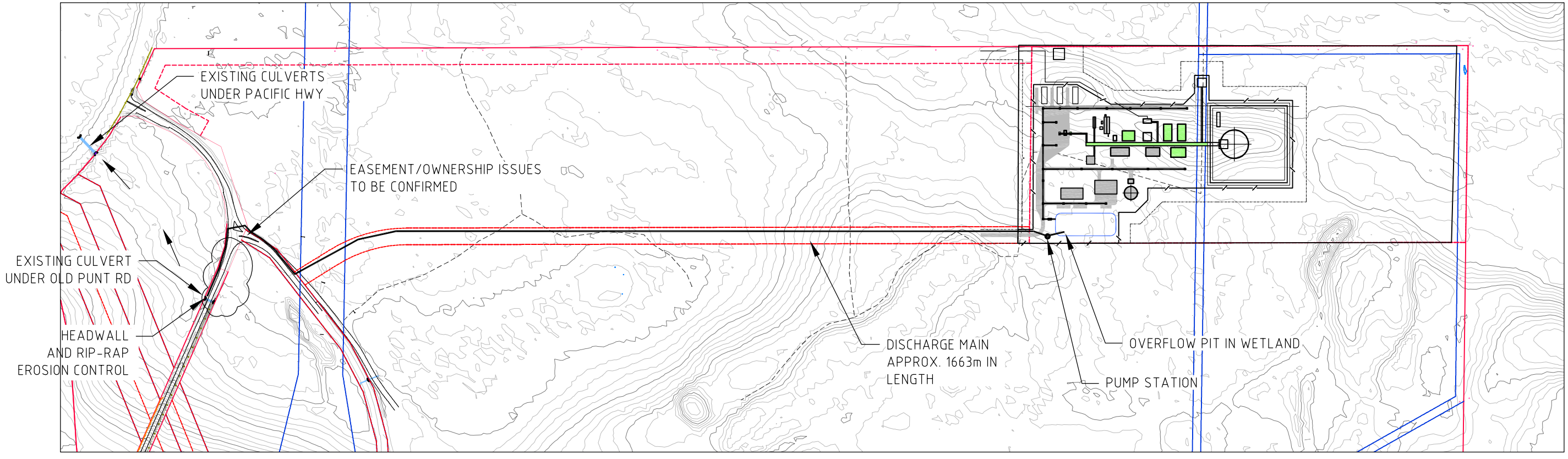
Surface Type	Surface Area
Pervious Area	7.5ha
Roof Area	0.4ha
Road (Site Road and Access Road) Hardstand Area	1.2ha
Enclosed Workshop and Plant Areas	0.3ha
Uncovered Plant Areas	0.3ha
General Plant Areas	2.4ha
LNG Tank Bund Area	1.6ha

NOTE.
SIZE OF STORMWATER TREATMENT TRAIN TO BE CONFIRMED BY DETAILED MODELING.

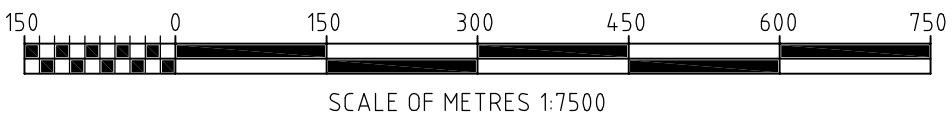
WorleyParsons
resources & energy

REVISED CONCEPTUAL SURFACE WATER MANAGEMENT PLAN
NEWCASTLE GAS STORAGE FACILITY - TOMAGO NSW

FIGURE 2
SKETCH CI-0003A



OPTION 1 - PUMPED SYSTEM



WorleyParsons
resources & energy

NOTE.
1. FINAL DETAILS OF STORMWATER SYSTEM TO BE CONFIRMED BY DETAILED MODELING.
2. NGSF SITE LAYOUT TO BE FINAILSED.

CONCEPT STORMWATER DISCHARGE LOCATIONS
NEWCASTLE GAS STORAGE FACILITY - TOMAGO NSW
OPTION 1

FIGURE 3
SKETCH CI-00004

Off Site Areas

Ancillary Site Areas

LNG Plant Area

Rainfall

Pervious Areas

Roof Areas

Roads and Car-Parks

Access Road

Re-use for Toilet Flushing

Rainwater Tank

Road side Swale

Infiltration to Groundwater

Infiltration to Groundwater

Evapo-transpiration Losses

Wet Sump Oil and Grease Separator *(within site only)* And Gross Pollutant Trap

No Rainfall (refer to Roof or General Plant Area)

Enclosed Work-shops

Trade waste only

Primary Bunding

Oil + Grease Separator

Disposal to Trade Waste

Overflow

General Plant Areas

Secondary Bunding *(Gravelled filled + lined)*

Option to dispose to trade waste if water quality is unacceptable

Evapo-transpiration Losses

Holding Pond

Pump Station

Overflow

Uncovered Plant Areas

Primary Bunding

Partitioned Holding and Inspection Tank

Oil + Grease Separator

LNG Tank Bund Area

LNG Tank Bunding

Infiltration to Groundwater

Legend

Bunded area with blind sump

Pump

Bunded area (infiltrates)

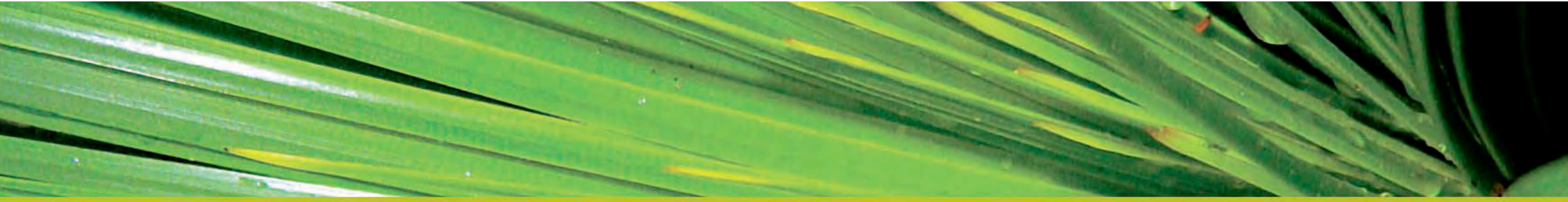
SURFACE WATER MANAGEMENT FLOW CHART

WorleyParsons

resources & energy

Appendix 4

Alluvial Tall Moist Forest – Assessment of Significance
Newcastle Gas Storage Facility Tomago NSW



ecobiological

Alluvial Tall Moist Forest – Assessment of Significance

Newcastle Gas Storage Facility project, Tomago, NSW

Alluvial Tall Moist Forest – Assessment of Significance

Newcastle Gas Storage Facility Project

Tomago, NSW

Report prepared for AGL Energy Limited

August 2011

Prepared by:

Gilbert Whyte
Botanist
NPWS Scientific Licence S12398

Reviewed by:

Dan Pedersen
Senior Botanist
NPWS Scientific Licence S12398

PO Box 585
64 Medcalf Street
Warners Bay NSW 2282

Tel 1300 881 869
Fax 1300 881 035

www.ecobiological.com.au

ABN 74 114 440 041

ecobiological

Table of Contents

ecobiological

1. Introduction

1.1. Floristic Overview

ecobiological was commissioned by Coffey Natural Systems Pty Ltd on behalf of AGL Energy Limited (AGL) to prepare an assessment of flora, fauna and threatened species for the proposed Newcastle Gas Storage Facility Project (the Newcastle GSF Project) at Tomago NSW. Field surveys of the study area were conducted between October 2009 and February 2011.

The floristic survey identified a total of 314 plant species, subspecies and varieties. Of these, 273 were native and 41 were considered exotic. One threatened flora species, Earp's Gum (*Eucalyptus parramattensis* subsp. *decadens*), was recorded in the Tomago Sand Swamp Woodland and the Woodland Rehabilitation Area.

Fourteen vegetation communities were also identified in the study area including the following:

- Coastal Sand Apple – Blackbutt Forest (Dry Variant);
- Coastal Sand Apple – Blackbutt Forest (Mesic Variant);
- Heath Rehabilitation Area;
- Woodland Rehabilitation Area;
- Mangrove Forest;
- Planted Swamp Oak;
- Seaham's Spotted Gum – Ironbark Forest;
- Redgum – Apple Banksia Forest;
- Tomago Sand Swamp Woodland;
- Swamp Mahogany – Paperbark Swamp Forest;
- Freshwater Wetland Complex;
- Phragmites Rushland;
- Salt Marsh; and
- Alluvial Tall Moist Forest.

Figure 1 shows the distribution of each of these vegetation communities within the study area.

Figure 1 - Vegetation Communities

Legend / Notes

- Study Area
- (1) - Alluvial Tall Moist Forest
- (2) - Cleared
- (3) - Coastal Sand Apple - Blackbutt Forest
- (3a) - Coastal Sand Apple - Blackbutt Forest - Mesic Variant
- (4) - Freshwater Wetland Complex
- (5) - Heath Rehabilitation
- (6) - Mangrove Forest
- (7) - Phragmites Rushland
- (8) - Planted Swamp Oak
- (9) - Redgum-Apple-Banksia Forest
- (10) - Saltmarsh
- (11) - Seaham Spotted Gum - Ironbark Forest
- (12) - Swamp Mahogany - Paperbark Swamp Forest
- (13) - Tomago Sand Swamp Woodland
- (14) - Woodland Rehabilitation

ecobiological
survey & assessment

Project Ref:	353-879
Plot Date:	31/01/2011 10:20
Revision:	JRN 03

Map Projection:
NSW Lamberts Conformal Conic

Data Sources:
NearMap - 2011
ecobiological - 2011

1.2. Threatened Ecological Communities

1.2.1. TECs within the Study Area

During the original ecological assessment, four of the vegetation communities within the study area were identified as being consistent with communities listed as threatened ecological communities (TECs) under the TSC Act.

The Freshwater Wetland Complex and Phragmites Rushland were identified as being consistent with the definition of the endangered *Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions*.

The Swamp Mahogany - Paperbark Swamp Forest was identified as being consistent with the endangered *Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions*.

The Saltmarsh community was identified as being consistent with the endangered *Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.*

Alluvial Tall Moist Forest

A small area (0.394 ha) in the north east corner of the study area was identified as being consistent with the Alluvial Tall Moist Forest vegetation type as defined by the Hunter Central Coast Regional Environment Management Strategy (HCCREMS).

Although quadrat flora data was not collected as part of the original ecological assessment, the classification of the vegetation was based on identification of the dominant canopy and midstorey indicator species; *Eucalyptus grandis*, *Syncarpia glomulifera* and *Glochidion ferdinandi.*

River-Flat Eucalypt Forest on Coastal Floodplains

It was later speculated that the Alluvial Tall Moist Forest vegetation was also consistent with the definition of '*River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*' as defined by the final determination of the NSW Scientific Committee. This vegetation community is listed as an Endangered Ecological Community under the TSC Act.

1.3. Potential Impacts Associated with Pipeline Construction

The proposed development footprint contains a pipeline corridor which will exit the site adjacent TAC Northern Access Road from the south-west corner of the subject site and extend south on Old Punt Road. Although the proposed pipeline corridor occurs directly adjacent to the Alluvial Tall Moist Forest (**Figure 1**), no clearing of vegetation is required during the construction phase. It is anticipated however that surface trenching and horizontal drilling may potentially disturb the roots of some of the larger trees nearest to Old Punt Road.

1.4. Potential Changes to Surface Hydrology

Construction of the Newcastle Gas Storage Facility is expected to cause changes in local surface hydrology. An increase in runoff from the site is expected due to the controlled discharge of small amounts of non-contaminated stormwater from the main overflow pit. It is expected that water will be discharged following periods of high rainfall at a rate of no more than 75L/minute for 15min - 6 hrs. The water will be discharged through a discharge main (1661m in length) which will exit the site through culverts at the northern end of Old Punt Road. Stormwater currently flows through these culverts into natural drainage lines and wetlands which occur south of the study area. The Alluvial Tall Moist Forest is one of the vegetation types adjacent to the culverts beneath Old Punt Road and it is anticipated that the vegetation may receive a greater amount of surface water as a result.

1.5. Aim

The aim of the current study is to examine the floristic characteristics of the Alluvial Tall Moist Forest within the study area and determine if it is also consistent with the final determination of '*River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*' as defined by the NSW Scientific Committee.

An 'Assessment of Significance' for the vegetation is also presented.

1.6. Legislation

The project was undertaken in accordance with the following Acts and Policies:

- *Commonwealth Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act);
- *NSW Threatened Species Conservation Act 1995 (TSC Act);*
- *NSW Threatened Species Conservation Amendment Act 2002;*
- *National Parks and Wildlife Act 1974 (NP&W Act);*
- *Environmental Planning and Assessment Act 1979 (EP&A Act);*
- *Native Vegetation Act 2003 (NV Act).*

1.6.1. Environment Protection & Biodiversity Conservation Act 1999 (EPBC Act)

Under the EPBC Act assessment an approval is required for actions that are likely to have a significant impact on matters of national environmental significance. An action includes a project, development, undertaking, activity, or series of activities. When a person proposes to take an action they believe may need approval under the EPBC Act, they must refer the proposal to the Australian Government Minister for the Environment. The Act identifies seven matters of national environmental significance:

- *World Heritage properties;*
- *National heritage places;*
- *Wetlands of international importance (Ramsar);*
- *Listed threatened species and communities;*
- *Migratory species listed under international agreements;*
- *Commonwealth marine areas; and*
- *Nuclear actions.*

1.6.2. NSW Threatened Species Act 1995 (TSC Act)

Schedules 1 and 2 of the TSC Act contain lists of flora and fauna species and communities, which have been determined by the NSW Scientific Committee as being under threat of serious decline that could ultimately lead to extinction. The TSC Act, pursuant to section 5A of the EP& A Act provides for a seven-part test of significance and impact to be applied to any of these listed species or communities that are found in an area subject to proposed development. Schedule 3 of the TSC Act contains a list of 'key threatening processes' deemed to be processes that have a negative impact on threatened species, populations or communities.

2. Methods

A site investigation was conducted by **ecobiological** in August 2011 in order to assess the floristic characteristics of the area identified as Alluvial Tall Moist Forest.

2.1. Flora Survey Techniques

Quadrats were used to assess the composition of plant species. Quadrat placement was conducted with the aim of sampling variation within the community (DEC 2004; Seidel and Briggs 2008).

Quadrats

Two quadrats (20m x 20m) were sampled within the Alluvial Tall Moist Forest (**Figure 2**).

All species were identified within each quadrat and the projective foliage cover (PFC) of each species was estimated using the Braun-Blanquet scale (Poore 1955, see below).

1 = <5% cover, rare, few individuals
2 = <5% cover, uncommon
3 = <5% cover, common
4a = <5% cover, very abundant
4b = 5 - 25% cover
5 = 26 – 50% cover
6 = 51 – 75% cover
7 = >75% cover

Defining the Vegetation Community

The vegetation community was identified by the dominant species in the overstorey, shrub and ground layers. The approach utilised for the vegetation classification involved the following:

- Determining floral species diversity; and
- Determining dominant species and vegetation structure.

A description of the plant community was then compared to vegetation descriptions in the literature in order to arrive at an accepted community identity (specifically targeting the definition of MU5 *Alluvial tall Moist Forest* - HCCREMS 2000 and the final determination of '*River-Flat Eucalypt Forest on*

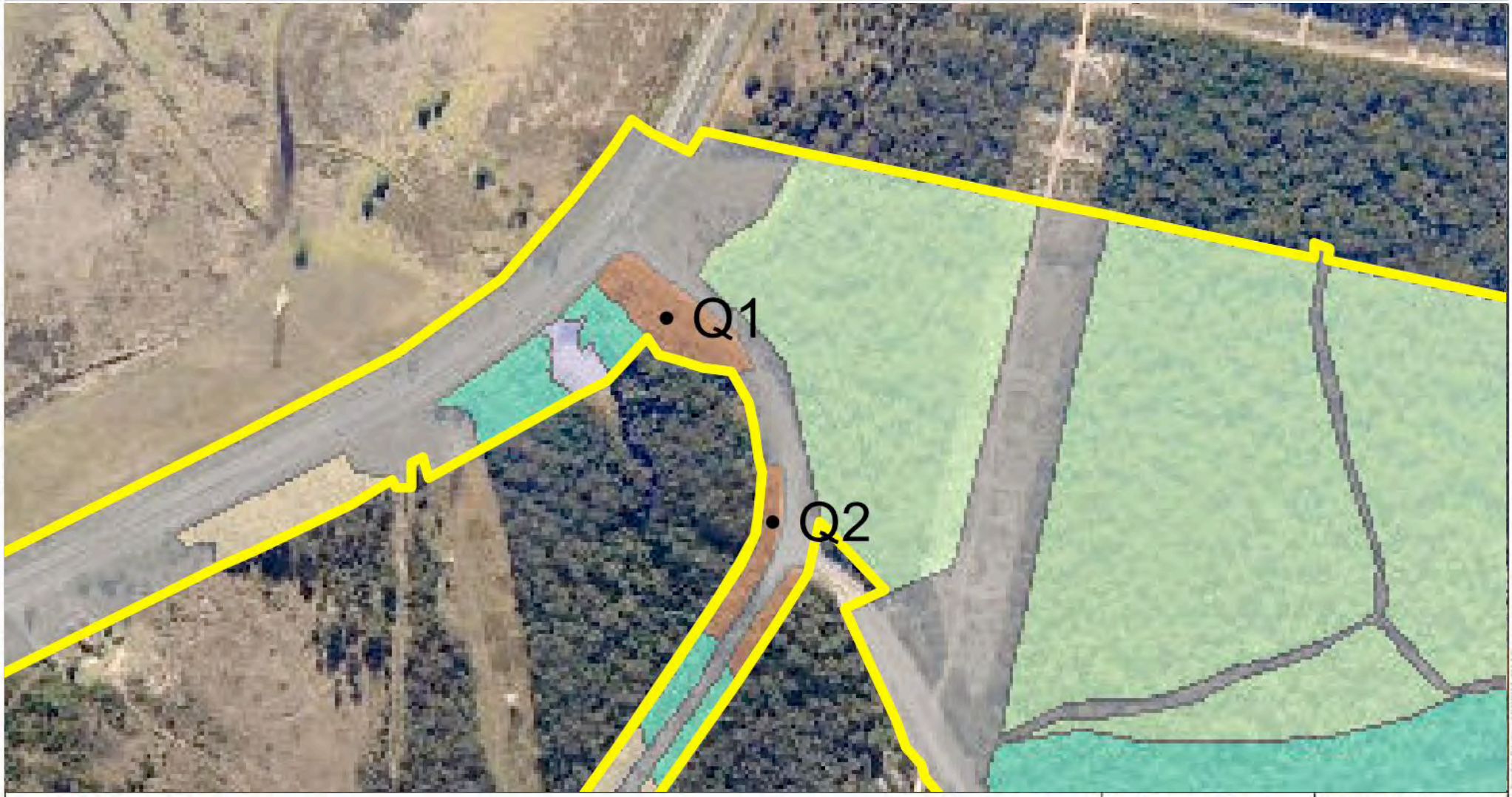
Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions').

Floristic Identification and Nomenclature

Floristic identification and nomenclature was based on Harden (1992, 1993, 2000 and 2002) with subsequent revisions as published on PlantNet (http://plantnet.rbgsyd.nsw.gov.au).

Where species were not able to be identified in the field, samples were taken and identified at a later date.

Figure 2 - Flora Quadrats - Alluvial Tall Moist Forest



Legend / Notes

- Study Area
- (1) - Alluvial Tall Moist Forest
- (2) - Cleared
- (3) - Coastal Sand Apple - Blackbutt Forest
- (3a) - Coastal Sand Apple - Blackbutt Forest - Mesic Variant
- (4) - Freshwater Wetland Complex
- (5) - Heath Rehabilitation
- (6) - Mangrove Forest
- (7) - Phragmites Rushland
- (8) - Planted Swamp Oak
- (9) - Redgum-Apple-Banksia Forest
- (10) - Saltmarsh
- (11) - Seaham Spotted Gum - Ironbark Forest
- (12) - Swamp Mahogany - Paperbark Swamp Forest
- (13) - Tomago Sand Swamp Woodland
- (14) - Woodland Rehabilitation

ecobiological
survey & assessment

Project Ref:	353-879
Plot Date:	31/01/2011 10:20
Revision:	JRN 03

Map Projection:
NSW Lambert Conformal Conic

Data Sources:
NearMap - 2011
ecobiological - 2011

3. Results

A total of 50 flora species were identified during the vegetation survey and subsequent identification analysis (**Appendix 1**). None of the species are listed as significant under the EPBC Act or the TSC Act. A total of 10 species were exotic. Two species are declared noxious weeds under the NSW *Noxious Weeds Act 1993*; Lantana (*Lantana camara*) and Fireweed (*Senecio madagascariensis*).

3.1. Vegetation Community Identity

General Vegetation Description

Examination of the vegetation structure revealed that the community had characteristic features in terms of species composition (Plate 1).

The dominant canopy species were generally tall (>30m) and included species such as *Eucalyptus grandis* (Flooded Gum) and *Melaleuca quinquenervia* (Broad-leaved Paperbark). Other canopy species which occurred to a lesser extent included *Eucalyptus acmenoides* (White Mahogany, *Eucalyptus pilularis* (Blackbutt), *Eucalyptus siderophloia* (Grey Ironbark) and *Eucalyptus tereticornis* (Forest Red Gum).

The dominant midstorey species were *Glochidion ferdinandi* var. *ferdinandii* (Cheese Tree) and *Casuarina glauca* (Swamp Oak). The shrub layer was largely dominated by Lantana (*Lantana camara*); however, native sedges and ferns such as *Gahnia sieberiana* (Red-fruit Saw-sedge) and *Pteridium esculentum* (Common Bracken) were abundant in several areas.

Vine species were abundant in both the canopy and midstorey (Plate 2). These included species such as *Parsonsia straminea* (Common Silkpod), *Eustrephus latifolius* (Wombat Berry), *Geitonoplesium cymosum* (Scrambling Lily) and *Stephania japonica* var. *discolor* (Snake Vine).

The ground cover was sparse in most areas and included herb species such as *Pratia purpurascens* (Whiteroot) and grasses such as *Oplismenus aemulus* (Basket Grass) (Plate 3).

Plate 1: Tall Flooded Gum over a Lantana dominated understorey

Alluvial Tall Moist Forest Definition

The floristic analysis of the current survey confirms that many of the species were key indicator species consistent with the '*Alluvial Tall Moist Forest*' description. Species which were identified in the vegetation community have been underlined in the following series of excerpts taken directly from the definition of Mu5 *Alluvial Tall Moist Forest*.

In terms of canopy species, HCCREMS states:

'*at Newcastle Eucalyptus grandis replaces E. saligna. As alluvial valleys fan outward, E. tereticornis becomes dominant*'.

In terms of midstorey species, HCCREMS states:

'The small tree stratum is typified by Glochidion ferdinandi, Acmena smithii, Melaleuca styphelioides, Ficus coronata, Melaleuca linariifolia, Callistemon salignus and Backhousia myrtifolia'.

In terms of vine species, HCCREMS states:

'The understorey in this community also supports a moderately high diversity of climbers and twiners (11 species), the most common being Geitonoplesium cymosum and Dioscorea transversa'.

In terms of ground cover species, HCCREMS states:

'The moderately dense ground layer is comprised of grasses, ferns and herbs such as Adiantum aethiopicum, Pseuderanthemum variabilis, Entolasia marginata, Lomandra longifolia, Oplismenus imbecillis and Pratia purpurascens'.

At this location the Alluvial Tall Moist Forest community occurs adjacent to a Swamp Mahogany - Paperbark Swamp Forest, which contains a similar composition of species and also occurs on the southern side of Old Punt Rd (**Figure 1**). In terms of related community types, HCCREMS states;

'*Alluvial Tall Moist Forest represents the gradient between well -developed rainforest on alluvium and Swamp Mahogany - Paperbark Swamp Forest*'.

In conclusion, the vegetation is considered to be consistent with '*Alluvial Tall Moist Forest*' as defined by the Hunter Central Coast Regional Environment Management Strategy (HCCREMS 2000).

River-Flat Eucalypt Forest on Coastal Floodplains

The floristic analysis of the current survey confirms that many of the species are consistent with the description of '*River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*' as defined by the final determination of the NSW Scientific Committee. Species which were identified in the vegetation community have been underlined in the following series of excerpts taken directly from the final determination.

In terms of canopy species, the final determination states that the vegetation consists of:

'*a tall open tree layer of eucalypts, which may exceed 40 m in height*'

'*the most widespread and abundant dominant trees include Eucalyptus tereticornis (forest red gum), E. amplifolia (cabbage gum), Angophora floribunda (rough-barked apple) and A. subvelutina (broad-leaved apple)*'

'*E. grandis (flooded gum) may occur north of Sydney*'

In terms of midstorey and shrub species, the final determination states:

'*A layer of small trees may be present, including Melaleuca decora, M. styphelioides (prickly-leaved teatree), Backhousia myrtifolia (grey myrtle), Melia azaderach (white cedar), Casuarina cunninghamiana (river oak) and C. glauca (swamp oak).*'

'Scattered shrubs include Bursaria spinosa, Solanum prinophyllum, Rubus parvifolius, Breynia oblongifolia, Ozothamnus diosmifolius, Hymenanthera dentata, Acacia floribunda and Phyllanthus gunnii.

In terms of groundcover species, the final determination states:

'The groundcover is composed of abundant forbs, scramblers and grasses including Microlaena stipoides, Dichondra repens, Glycine clandestina, Oplismenus aemulus, Desmodium gunnii, Pratia purpurascens, Entolasia marginata, Oxalis perennans and Veronica plebeia'.

Other factors which contribute to the likelihood that the vegetation is consistent with '*River-Flat Eucalypt Forest on Coastal Floodplains*' include the following points:

- The site occurs south of Port Stephens on the NSW North Coast where the vegetation type is known to occur elsewhere;
- The vegetation occurs on a floodplain which appears to be prone to periodic flooding;
- The soil of the site is a sandy loam which lacks a deep humic layer and has a low saline influence; and,
- The vegetation contains several eucalypt species but is not dominated by *Eucalyptus robusta* (Swamp Mahogany), *Melaleuca* species or *Casuarina* species.

Conclusion

In conclusion, not only is the vegetation consistent with '*Alluvial Tall Moist Forest*' as defined by the Hunter Central Coast Regional Environment Management Strategy (HCCREMS 2000) it is also considered to be consistent with the definition of '*River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*' as defined by the final determination of the NSW Scientific Committee.

Plate 2: Vegetation within Quadrat 1

Plate 3: Vegetation within Quadrat 2

3.2. Assessment of Significance (TSC Act)

Section 94 of the TSC Act and section 5A of the EP&A Act, as amended by the *Threatened Species Conservation Amendment Act 2002*, provides for the application of an 'assessment of significance' in the consideration of the likely impact of any development on threatened species, populations or habitats.

An Assessment of Significance was applied to the Alluvial Tall Moist Forest vegetation within the study area which is consistent with the final determination by the NSW Scientific Committee for '*River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*'.

3.2.1. River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Not applicable.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Not applicable.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Given that no clearing of the vegetation is to occur as part of the proposed action, it is unlikely that the extent of the endangered ecological community will be adversely affected. It is unlikely that the local occurrence of the endangered ecological community will be placed at risk of extinction.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

An increase in the availability of surface water within the vegetation may result due to periodic discharge of water from the subject site. Given that the amount of water to be discharged is low and will only occur during periods of high rainfall, it is unlikely that this will lead to "pooling of water" within the vegetation. Given that the vegetation occurs within a flood prone natural drainage line adjacent to a wetland, it is unlikely that a small increase in surface water availability would adversely modify the composition of the ecological community. It is therefore unlikely that the local occurrence of the ecological community would be placed at risk of extinction.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Given that no clearing of the vegetation is to occur as part of the proposed action, it is unlikely that the habitat of the endangered ecological community will be reduced or adversely affected.

> *(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*

Given that no clearing of the vegetation is to occur as part of the proposed action, it is unlikely that the habitat of the endangered ecological community will become further fragmented or isolated.

> *(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,*

No clearing, fragmentation or isolation of the vegetation is to occur as part of the proposed action. It is unlikely that proposed discharge of water during high rainfall events into the community would result in any significant modification to its structure or composition.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

The ecological community is not listed as critical habitat.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

There was no draft or final recovery plan in place at the time of survey for the ecological community.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The main threats to the ecological community as listed by the NSW Scientific Committee include:

- Further clearing for urban and rural development, and the subsequent impacts from fragmentation
- **Flood mitigation and drainage works**
- Landfilling and earthworks associated with urban and industrial development
- Grazing and trampling by stock and feral animals (particularly pigs)
- Changes in water quality, particularly increased nutrients and sedimentation
- Weed invasion
- Climate change
- Activation of acid sulfate soils
- Removal of dead wood
- Rubbish dumping
- Frequent burning which reduces the diversity of woody plant species

Of these, a change in the drainage regime into this community will occur but is unlikely to increase the impact of any key threatening process.

Conclusion:
The proposed Newcastle GSF Project is unlikely to have a significant impact on this EEC, given that only minor disturbance during surface trenching will occur as part of the proposed activities.

The proposed action may cause minor changes in the site hydrology; however it is unlikely to have adverse effects on water quality such as increased nutrients and sedimentation, flood mitigation or drainage works.

A Vegetation Management Plan and Weed Management Plan have been recommended in section 5 of the original ecological report to reduce the long-term impacts on this EEC. Further recommendations have been made in section 4 of this report.

References

Gilmore, P. (2006). Vegetation Communities of the Central Coast Region of NSW. In: McCauley, A. etal (2006) Vegetation of Regional Significance on the NSW Central Coast. HCR CMA and Hunter Councils Inc. NSW, 240 pgs.

House, S (2003). Lower Hunter & Central Coast Regional Biodiversity Conservation Strategy, Technical Report, Digital Aerial Photo Interpretation & Updated Extant Vegetation Community Map. Lower Hunter & Central Coast Regional Environmental Management Strategy, Callaghan, NSW.

Keith, D.A. and Scott, J. (2005). Native Vegetation of Coastal Floodplains. Pacific Conservation Biology Vol 11, pp 81-104.

McCauley, A., DeVries, R., Elith, J. and Gilmore, P. (2006). Vegetation of Regional Significance on the NSW Central Coast. Hunter Central Rivers Catchment Management Authority and Hunter Councils Inc. NSW. 308 pgs + appendices.

Miles, J. (2007). Recognition and Management of Endangered Ecological Communities in the South East Corner of NSW. Southern Rivers Catchment Management Authority 60 pgs.

NPWS (2000). Forest ecosystem classification and mapping for the Hunter Sub-Region in the Lower North East Comprehensive Regional Assessment. CRA Unit, Sydney Zone, National Parks and Wildlife Service.

NSW Scientific Committee (2004). River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - Endangered ecological community determination - final. DEC (NSW), Sydney.

4. Conclusion

The following recommendations are considered necessary to protect the integrity of the remaining area of Alluvial Tall Moist Forest:

- Best practice erosion and sedimentation control methods should be adopted, enforced and maintained throughout the construction footprint to avoid having a negative downstream impact on the Alluvial Tall Moist Forest;
- The construction site should be managed so that no accidental incursions occur into areas that are not part of the proposal area;
- The pipeline route shall avoid impact to the Alluvial Tall Moist Forest where possible;
- Horizontal directional drilling and horizontal boring should be conducted where possible instead of open trenching to avoid damaging tree roots;
- Where open trenching must occur, the drip lines of trees will be avoided where possible; and,
- A qualified arborist will be present onsite to monitor tree root damage and implement appropriate mitigation measures (particularly along Old Punt Road).

5. References

Briggs, J.D. & Leigh, J.H. (1995). *Rare or Threatened Australian Plants*, CSIRO.

DEC (2004). *Threatened Biodiversity Survey and Assessment: Guidelines for Development, Working Draft, July 2004*. Department of Environment and Conservation.

Harden, G.J. (ed) (1992). Flora of New South Wales Volume 3. NSW University Press: Sydney.

Harden, G.J. (ed) (1993). Flora of New South Wales Volume 4. NSW University Press: Sydney.

Harden, G.J. (ed) (2000). Flora of New South Wales Volume 1. NSW University Press: Sydney.

Harden, G.J .(ed) (2002). Flora of New South Wales Volume 2. NSW University Press: Sydney.

Leonard, G. (2007). Eucalypts of the Sydney region: a bushwalker's guide. UNSW Press, Sydney 77 pgs.

NPWS (2000). *Vegetation Survey, Classification and Mapping Lower Hunter and Central Coast Region.* Version 1.2. A project undertaken for The Lower Hunter and Central Coast Regional Environment Management Strategy CRA Unit Sydney Zone, National Parks and Wildlife Service.

Robinson, L (2003). Field guide to native plants of Sydney revised 3rd edition. Kangaroo Press 448 pgs.

Seidel, J. and Briggs, S. (2009) BioBanking Assessment Methodology and Credit Calculator Operation Manual. DECC, Sydney.

Appendix 1: Flora species

Family	Scientific Name	Common Name	Q1	Q2	Random Meander
Adiantaceae	*Cheilanthes sieberi* subsp. *sieberi*	Poison Rock Fern			4a
Apocynaceae	*Parsonsia straminea*	Common Silkpod	4a	4a	
Asteraceae	**Ambrosia tenuifolia*	Lacy Ragweed			3
Asteraceae	**Bidens pilosa*	Cobblers Peggs	3		
Asteraceae	**Senecio madagascariensis*	Fireweed			2
Asteraceae	**Tagetes minuta*	Stinking Roger			3
Asteraceae	*Sonchus oleraceus*	Common Sowthistle		2	2
Bignoniaceae	*Pandorea pandorana*	Wonga Wonga Vine			4a
Blechnaceae	*Blechnum indicum*	Swamp Water Fern	3	2	
Caryophyllaceae	**Petrorhagia nanteuilii*			2	
Casuarinaceae	*Casuarina glauca*	Swamp Oak	5	5	
Cyperaceae	*Gahnia sieberiana*	Red-fruit Saw-sedge	4a	4a	
Dennstaedtiaceae	*Pteridium esculentum*	Common Bracken	4b	4b	
Ericaceae - Styphelioideae	*Monotoca elliptica*	Tree Broom-heath		2	
Fabaceae - Faboidea	**Vicia sativa*	Narrow Leaved Vetch			3
Fabaceae - Faboideae	*Glycine clandestina*			2	
Fabaceae - Mimosoideae	*Acacia longifolia* subsp. *longifolia*	Sydney Golden Wattle			2
Fabaceae - Mimosoideae	*Acacia mearnsii*	Blackwattle		2	2
Lobeliaceae	*Pratia purpurascens*	Whiteroot	3	3	
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush		2	3
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry		2	
Luzuriagaceae	*Geitonoplesium cymosum*	Scrambling Lily	2	2	
Menispermaceae	*Stephania japonica* var. *discolor*	Snake Vine		2	
Myrtaceae	*Eucalyptus acmenoides*	White Mahogany		5	
Myrtaceae	*Eucalyptus grandis*	Flooded Gum	6	4	
Myrtaceae	*Eucalyptus pilularis*	Blackbutt		4b	
Myrtaceae	*Eucalyptus siderophloia*	Grey Ironbark			3
Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum	2	2	
Myrtaceae	*Melaleuca quinquenervia*	Broad-leaved Paperbark	5	5	
Orchidaceae	*Pterostylis nutans*	Greenhood		1	
Phormiaceae	*Dianella caerulea* var. *assera*	Blue Flax-lily		2	2
Phyllanthaceae	*Breynia oblongifolia*	Coffee Bush		2	2
Phyllanthaceae	*Glochidion ferdinandi* var. *ferdinandi*	Cheese Tree	5	5	
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum		2	
Plantaginaceae	**Plantago lanceolata*	Lamb's Tongues			4a
Poaceae	**Briza minor*	Shivery Grass			3
Poaceae	**Melinis repens*	Red Natal Grass			3

Family	Scientific Name	Common Name	Q1	Q2	Random Meander
Poaceae	**Panicum maximum var. maximum*	Guinea Grass			3
Poaceae	*Cymbopogon refractus*	Barbed Wire Grass			3
Poaceae	*Entolasia marginata*	Bordered Panic	3	2	
Poaceae	*Eragrostis brownii*	Brown's Lovegrass			3
Poaceae	*Oplismenus imbecillis*		4a	4a	
Poaceae	*Pennisetum clandestinum*	Kikuyu Grass			4a
Poaceae	*Sporobolus africanus*	Slender Rat's Tail Grass			3
Polypodiaceae	*Platycerium bifurcatum*	Elkhorne Fern		2	
Proteaceae	*Banksia integrifolia* subsp. *integrifolia*	Coast Banksia		2	3
Proteaceae	*Hakea sericea*	Needlebush		2	4a
Restionaceae	*Baloskion tetraphyllum* subsp. *meiostachyum*	Plume Rush	3		
Rosaceae	*Rubus parvifolius*	Native Raspberry		1	
Verbenaceae	**Lantana camara*	Lantana	7	7	

* denotes an introduced species

Appendix 2: Contributions and qualifications of ecobiological staff

Name	Qualification	Title	Contribution
Gilbert Whyte	B. Bio. Sc. (Hons). PhD.	Botanist	Flora survey, flora species ID and report writing.
Kristy Peters	B. Park Mgt (Hons)	Senior Ecologist (Ornithologist)	Report review.
Dan Pederson	B.Sc.	Senior Botanist	Community classification and mapping, report review.
Glenn Jeffs	B. App. Sc.; Cert. IV Geomatic Engineering	GIS Support	GIS mapping

Appendix 3: Licensing matters relating to the survey

ecobiological employees involved in the current study are licensed or approved under the *National Parks and Wildlife Act* 1974 (License Number: S12398, Expiry: 30 November 2011) and the *Animal Research Act* 1985 to harm/trap/release protected native fauna and to pick for identification purposes native flora and to undertake fauna surveys.

Appendix 5

Aboriginal Heritage Due Diligence Report Main Electricity Power Supply Connection for Newcastle Gas Storage Facility

Aboriginal Heritage Due Diligence Report

Main electricity power supply connection for Newcastle Gas Storage Facility

Prepared by:

RPS

PO Box 428
Hamilton NSW 2303

T: +61 2 4940 4200
F: +61 2 4961 6794
E: newcastle@rpsgroup.com.au
W: rpsgroup.com.au

Prepared for:

AGL Pty Ltd

PO Box 67
Menangle NSW 2568

Report No: 103386-3
Version/Date: Final / August 2011

Document Status

Version	Purpose of Document	Orig	Review	Review Date	Format Review	Approval	Issue Date
Draft A	Draft for Client Review	PS	DR	26.8.201	BJ 26.08.11	D. Rigby	
Final	Final report	DR	DR	30.8.2011	BJ 31.08.11	D. Rigby	30.8.2011

Disclaimers

Executive Summary

RPS has been engaged by AGL Energy Ltd to prepare an Aboriginal Heritage Due Diligence Report. The Study Area is located north of the NGSF Gas Plant Site and incorporates Hunter Water Corporation (HWC) land and the Ausgrid Electricity Easement. The Ausgrid electricity easement is proposed to be used by AGL to emplace a trench line that will be used to connect the electricity supply for the NGSF. This report has considered the relevant environmental and archaeological information, landforms, disturbances and the nature of the proposed activity in addition to formulating appropriate recommendations.

A search of the AHIMS database was conducted for the Study Area and its surrounds which identified a total of seven Aboriginal sites (refer Appendix 3). Artefact scatters are the most common site type for the Study Area with at least one known and recorded artefact scatter site situated in the NGSF Project Area (AHIMS #38-4-1291).

The archaeological field survey of the Study Area was conducted on Wednesday 24th August 2011 in cool and overcast conditions. The survey was undertaken by Philippa Sokol, RPS Archaeologist, in partnership with Richard Kime Site Officer for Worimi Local Aboriginal Land Council (WLALC), Anthony Anderson Site Officer for Mur-Roo-Ma Inc (MRM), Chris Collison Site Officer for Nur-Run-Gee Pty Ltd (NRG), and Aaron Clifton AGL Environment Manager.

The archaeological field survey indicated that the Study Area had been subject to high levels of disturbance and modification associated with the emplacement of the Ausgrid Electricity Easement (formally Energy Australia Easement). The field survey investigation identified no items of Aboriginal cultural heritage material. The Aboriginal community who participated in the survey (WLALC, MRM and NRG) were satisfied with the field survey and survey coverage upon conclusion of the works.

The following recommendations were developed for the NGSF Project Area:

Recommendation 1
All relevant AGL Energy Limited staff and contractors should be made aware of their statutory obligations for heritage under NSW NPW Act (1974) and the NSW Heritage Act (1977), which may be implemented as a heritage induction.

Recommendation 2
If Aboriginal site/s are identified in the NGSF Project Area during works, then all works in the area should cease, the area cordoned off and contact made with a suitably qualified archaeologist and the relevant Aboriginal stakeholders, so that it can be adequately assessed and managed.

Recommendation 3

In the event that skeletal remains are uncovered, work must cease immediately in that area and the proponent, AGL Energy Limited, will need to contact the NSW Police Coroner to determine if the material is of Aboriginal origin. If skeletal remains are determined to be Aboriginal, they must then contact OEH Enviroline 131 555 and relevant Aboriginal stakeholders in order to determine an action plan for the management of the skeletal remains prior to works re-commencing.

Recommendation 4

If, during the course of development works, significant European cultural heritage material is uncovered, work should cease in that area immediately. The Heritage Branch of OEH should be notified via Enviroline 131 555 and works only recommence when an appropriate and approved management strategy instigated.

Terms & Abbreviations

Abbreviation	Meaning
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
cal. years BP	Calibrated years before present, indicates a radiocarbon
DECCW	Department of Environment, Climate Change and Water
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act
GDA	Geodetic Datum Australia
GIS	Geographic Information System
HWC	Hunter Water Corporation
LALC	Local Aboriginal Land Council
LEP	Local Environment Plan
LGA	Local Government Area
MRM	Mur-Roo-Ma Inc
NGSF	Newcastle Gas Storage Facility Project Area
NPWS	National Parks and Wildlife Service
NRG	Nur-Run-Gee Pty Ltd
NSW	New South Wales
OEH	Office of Environment and Heritage
PAD	Potential Archaeological Deposit
REF	Review of Environmental Factors
WLALC	Worimi Local Aboriginal Land Council

Contents

Figures

Tables

Plates

Appendices

APPENDIX 1

Legislative Requirements

APPENDIX 2

AHIMS Search Results

1 Introduction

RPS has been engaged by AGL Energy Ltd to prepare an Aboriginal Heritage Due Diligence Report. The Study Area is located north of the NGSF Gas Plant Site and incorporates Hunter Water Corporation (HWC) land and the Ausgrid Electricity Easement. The Ausgrid electricity easement is proposed to be used by AGL to emplace a trench line that will be used to connect the electricity supply for the NGSF. The purpose of a due diligence report is to demonstrate that reasonable and practicable measures were taken to prevent harm to an Aboriginal object or place. This report has considered the relevant environmental and archaeological information, landforms, disturbances and the nature of the proposed activity in addition to formulating appropriate recommendations.

1.1 The Study Area

The study area is located at Lot 2/ DP748716 Old Punt Road, Tomago in the Port Stephens Local Government Area (LGA) (Figure 1-1).

1.2 Legislative Context

The following overview of the legal framework is provided solely for information purposes for the client, it should not be interpreted as legal advice. RPS will not be liable for any actions taken by any person, body or group as a result of this general overview, and recommend that specific legal advice be obtained from a qualified legal practitioner prior to any action being taken as a result of the summary below.

Aboriginal heritage (places, sites and objects) within NSW are protected by the *National Parks and Wildlife Act* (1974, as amended). Although there are other Acts protecting and managing cultural heritage in New South Wales (see Appendix 1), the due diligence procedure is only available to projects applicable under this Act.

1.2.1 National Parks & Wildlife Act (1974, as amended)

The NSW Government is working towards stand alone legislation to protect Aboriginal cultural heritage which will be a significant reform for NSW. The first stage of this work has been completed and includes significant changes in relation to this commission. The primary state legislation relating to Aboriginal cultural heritage in NSW is the *National Parks and Wildlife Act* (1974, as amended). The legislation is now overseen by the Office of Environment and Heritage (OEH) (formerly DECCW) as part of the NSW Department of Premier and Cabinet.

Changes to the NPWS legislation made effective on 1 October 2010 include:

- increased penalties for Aboriginal heritage offences, in some cases from $22,000 up to $1.1 million in the case of companies who do not comply with the legislation;
- ensures companies or individuals cannot claim ‘no knowledge’ in cases of serious harm to Aboriginal heritage places and objects by creating new strict liability offences

under the Act;

- introduces remediation provisions to ensure people who illegally harm significant Aboriginal sites are forced to repair the damage, without need for a court order; and
- unites Aboriginal heritage permits into a single, more flexible permit and strengthen offences around breaches of Aboriginal heritage permit conditions.

Along with new offences summarised above, there are new defences that have been introduced which will apply where a person harms an Aboriginal object without knowing what it was and without a permit from OEH. One of these defences is the 'due diligence' defence (s87(2)), which states that if a person or company has exercised due diligence to ascertain that no Aboriginal object was likely to be harmed as a result of the activities proposed for the site, then liability from prosecution under the NPW Act 1974 will be removed or mitigated if it transpires that an object was harmed. As a consequence of this provision, OEH released a publication entitled *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*. This publication sets out a minimum benchmark for acceptable due diligence investigations to be followed. These investigations include:

- the carrying out of a search of the Aboriginal Heritage Information Management System (AHIMS) database to ensure there are no registered sites within the study area;
- a review of previous archaeological investigations in the study area; and
- an assessment of the relevant landscape features and visual inspection to determine whether there are Aboriginal objects present within the study area or that they are likely.

One of the benefits of the due diligence provisions are that it provides a simplified process of investigating the Aboriginal archaeological context of an area without the need for an Aboriginal Heritage Impact Permit (AHIP). Aboriginal consultation is also not required for an investigation under due diligence. However, if the due diligence investigation shows that the activities proposed for the area are likely to harm objects or likely objects within the landscape, then an Aboriginal Heritage Impact Permit will be required with full consultation.

Further details on the relevant legislative Acts are provided in Appendix 1.

1.3 Aboriginal Community Consultation

As mentioned above, due diligence inspection relates to the physical identification of Aboriginal objects. Community consultation is only required once Aboriginal objects have been detected and an Aboriginal Heritage Impact Permit (AHIP) is deemed necessary. Section 5.2 of the 2010 Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW specifically states that:

> *'Consultation with the Aboriginal community is not a formal requirement of the due diligence process'* (2010:3)

Further details on the relevant legislative Acts are provided in Appendix 1.

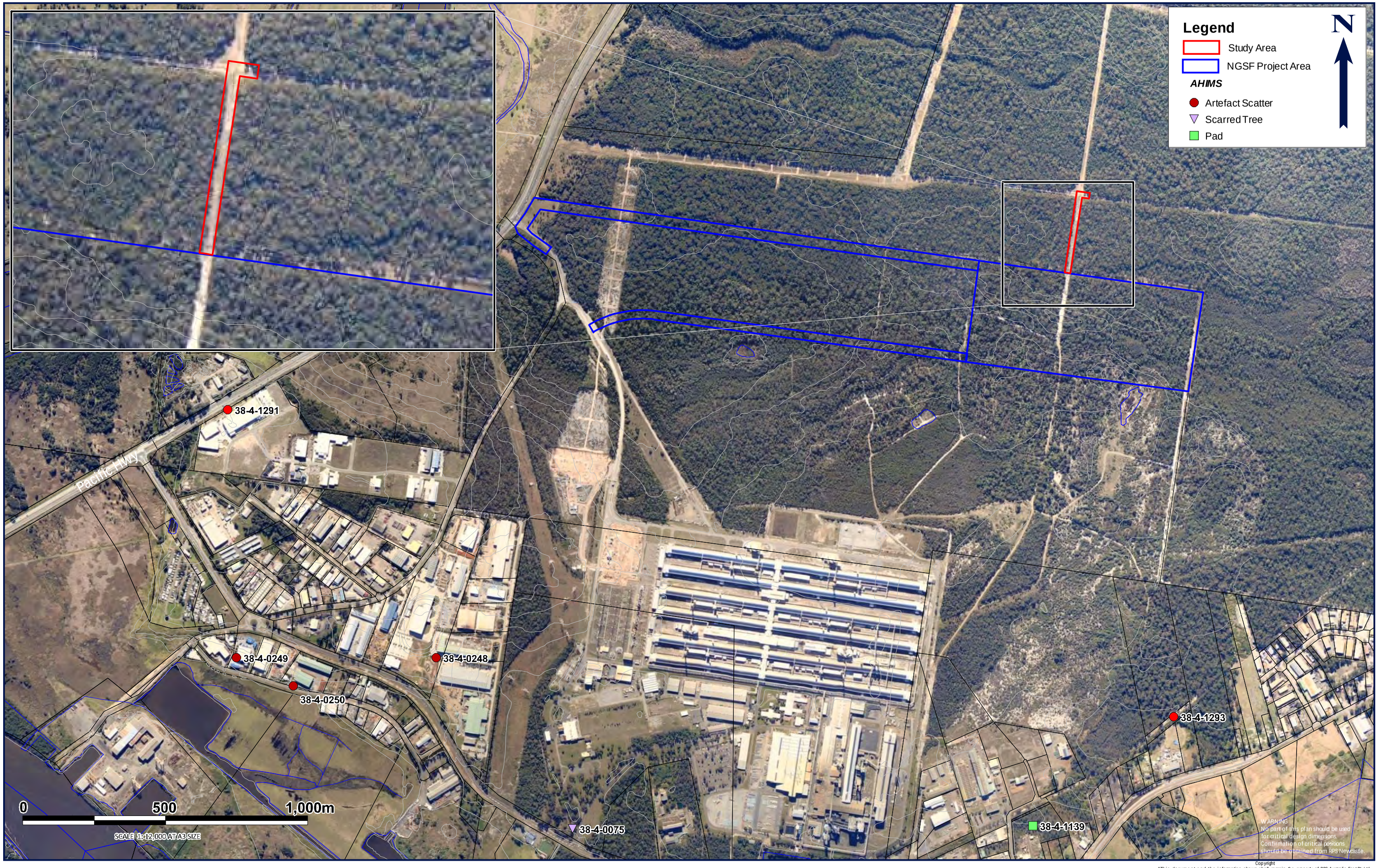
1.4 Authorship and Acknowledgements

This report was prepared by Philippa Sokol and reviewed by Darrell Rigby of RPS.

The RPS team acknowledges the assistance in preparing this report of various organisations and individuals, including but not limited to:

Table 1-1: Acknowledgements

Name	Organisation
Richard Kime	Worimi Local Aboriginal Land Council
Anthony Anderson	Mur-Roo-Ma Inc
Chris Collison	Nur-Run-Gee Pty Ltd



TITLE: FIGURE 1-1 PROJECT AREA WITH AHIMS

LOCATION: TOMAGO

DATUM: N/A
PROJECTION: MGA ZONE 56 (GDA 94)

DATE: 30/08/2011
PURPOSE: DUE DILIGENCE ASSESSMENT

LAYOUT REF: J:\JOBS\103k\103386 Tomago\10- Drafting\Archaeology Drafting\MapInfo Workspaces
VERSION (PLAN BY): B A3 (NW-PS)

CLIENT: AGL ENERGY LTD
JOB REF: 103386-3

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
T: 02 4940 4200 F: 02 4961 6794 www.rpsgroup.com.au

creativepeople
making a difference

RPS

2 Environmental and Heritage Context

Aboriginal heritage due diligence requires that available knowledge and information is considered. The purpose of reviewing the relevant environmental and heritage information is to assist in identifying whether Aboriginal sites or places are present within the study area.

2.1 Local Environment

The vegetation in the Study Area can be described as open forest and is mainly dominated by a coastal dune dry sclerophyll forest which includes trees like Sydney red gum, red bloodwood, blackbutt and some older dunal areas can contain scribbly gum. Common shrubs and grasses may include banksias, tree broom-heath, grass trees, woody pear, lily, bracken, rope-rush, mat-rush, and blady grass. Vegetation variation within the coastal dune dry sclerophyll forest can be influenced by whether vegetation is growing on old or young dunes and the contrasting soil contained within these dunes (Keith 2006).

The local geology for the borehole locations comprises quaternary deposits and includes the Tea Gardens and Shoal Bay soil landscapes (Aeolian deposited). The soil landscape which underlies the majority of the Study Area is a variant of the Tea Gardens soil landscape, which is generally represented by Pleistocene sandsheets with wet heath forest growth and sedgeland evident in places. The sedgeland portion of this landscape mainly populates the north east and south east. Characteristics of this landscape include a permanently high watertable, seasonal waterlogging, ground water pollution hazards, and strong to extremely acid soils of low fertility (Matthei 1995: 212).

The Shoal Bay soil landscape that occurs in the study area is characterised by steep high dunes, as well as poorly drained flats and depressions. This landscape only occurs in the north west portion of the study area where these soils are present and are characterised by high potential for wind erosion, with some localised occurrences of steep slopes, permanent waterlogging, permanent high water tables, seasonal waterlogging and generally contains acid sandy non-cohesive soils with very low fertility (Matthei 1995:208).

2.2 Aboriginal Heritage Information Management System (AHIMS)

A search was conducted of the OEH Aboriginal Heritage Information Management System (AHIMS) on 5th July 2011 (Refer Figure 1-1). The search results indicated that there were seven sites in the vicinity of the NGSF Project Area, with one of these sites having been identified and recorded in the Study Area (AHIMS #38-4-1291) by RPS. The majority of sites in the local area were stone artefacts sites known as artefact scatters (n=5), followed by a potential archaeological deposit (n=1), and scar tree (n=1).

Table 2-1: Summary of AHIMS Results

Site Type	Frequency
Artefact Scatters	5
Potential Archaeological Deposits	1
Scar Tree	1
TOTAL	**7**

2.3 Regional Archaeological Literature Review

A number of archaeological studies have been undertaken in the Port Stephens area in the NGSF Project Area locality. Archaeological investigations relevant to the Study Area are summarised below and this information will assist with predictions for Aboriginal cultural heritage of the Project Area.

Brayshaw 1981. Archaeological survey for the proposed Tomago Aluminium Smelter

An archaeological survey was undertaken for a proposed aluminium smelter development by Brayshaw (1981) who surveyed 496 hectares and described the area as lower than 10m above sea level. Ground surface visibility and exposure was generally low due to thick vegetation including paperbark. No Aboriginal sites were identified as a result of the survey (Brayshaw 1981).

Dean Jones 1990. Newcastle Bight Study.

This study was undertaken as a regional study, although part of the area investigated is in close proximity to the NGSF Project Area. The Newcastle Bight Study undertaken by Dean-Jones (1990) provides a concept pattern for past Indigenous land use throughout the region. The report highlights that there would have been a wide range of environmental landscapes facilitating Aboriginal populations to prosper due to the abundant resources present. Sand dunes stabilized by open dry sclerophyll woodlands provided habitat for numerous fauna species which the Aboriginal people were able to exploit, while freshwater wetlands would have provided an abundant habitat for bird, animal and plant life. The rich resources of these habitats are reflected in the density of artefacts recorded during the Bight Survey (Dean-Jones 1990).

RPS 2010. Archaeological Due Diligence Inspection of 25 Borehole Locations.

This assessment was undertaken for 25 proposed borehole locations within the boundaries associated with the NGSF Project Area. The report highlighted potential archaeological sensitivity zones for landforms where borehole investigations were proposed to take place, potential disturbances by these investigations and an evaluation made using archaeological landscape criteria. The local geology and soils were also reviewed which would assist in determining borehole locations that may have the likelihood to impact on potential *in situ* soils. The result of all of the borehole assessments found that the majority were located in gentle sloping ground, inundated areas, and

previously disturbed contexts. Five proposed borehole locations were re-located during the survey which was mainly due to vegetation restrictions and safe accessibility away from traffic areas (RPS 2010).

RPS 2011. Cultural Heritage Assessment for the Newcastle Gas Storage Facility Project.

RPS was commissioned by Coffey Natural Systems Pty Ltd to undertake a Cultural Heritage Assessment to support a development application for the AGL Energy Limited NGSF Project under Part 3A of the EP&A Act 1979. The NGSF Project Area was situated on south bank of the Hunter River and also north of it incorporating Tomago in the Port Stephens LGA and Hexham in the Newcastle LGA. The field survey of both areas was conducted over three days involving Aboriginal stakeholder participation from the Awabakal and Worimi regions. During the field survey one Aboriginal artefact scatter site was identified in the Tomago portion of the NGSF Project Area in a road verge to the east of the Pacific Highway (AHIMS #38-4-1291). Continued inspection was recommended for the site if impact associated with the project is predicted for the area (RPS 2011).

2.4 Synthesis of Environmental and Archaeological Context

The literature review presented above shows that the NGSF Project Area and environs has the potential to contain Aboriginal sites such as scarred trees, campsites, and stone tools comprising mainly tuff and siliceous material. Most of the Aboriginal sites surrounding the Study Area are characterised by artefact scatters, followed by a potential archaeological deposit and a single scar tree site. These sites, especially the artefact scatters, are mainly situated south of the borehole investigation area near to the tidal reaches of the Hunter River which would have provided an environment capable of producing stable resources suitable to support Aboriginal occupation in the area.

The potential for carved or scarred trees in the Study Area will depend on the retention of suitable mature age trees in a disturbed landscape. Previous land clearing associated with possible logging activities and sand mining, as well as the varied affects of erosion, previous bushfires and vegetation growth could have destroyed or displaced cultural material. These factors may affect site integrity and reduce the possibility for *in situ* cultural material to be identified or located.

3 Site Visit and Field Results

The field survey was undertaken to comply with due diligence requirement that a visual inspection of the Study Area is conducted.

The archaeological field survey of the Study Area was conducted on Wednesday 24th August 2011 in cool and overcast conditions. The survey was undertaken by Philippa Sokol, RPS Archaeologist, in partnership with Richard Kime Site Officer for Worimi Local Aboriginal Land Council (WLALC), Anthony Anderson Site Officer for Mur-Roo-Ma Inc (MRM), Chris Collison Site Officer for Nur-Run-Gee Pty Ltd (NRG), and Aaron Clifton AGL Environment Manager.

The Study Area was located north of the NGSF Gas Plant Site and incorporated Hunter Water Corporation (HWC) land and the Ausgrid Electricity Easement. The Ausgrid easement is proposed to be used by AGL to emplace a trench line that will be used to connect the electricity supply the NGSF Gas Plant Site, this will be situated immediately south of this easement. The length of the electricity connection was approximately 300 metres long trending on an approximate north to south axis. The field survey focused on the whole Study Area especially in areas of good ground surface visibility.

3.1 Field Results

The field survey investigation was undertaken using parallel north south transects covering the entire Project Area. The easement was approximately 20 - 30 metres wide and contained a gravelled vehicle access track which comprised imported gravel fill (Plate 1). The Study Area contained no tree or shrub vegetation; instead it was covered with scattered patches of grasses, except for tracked areas and at the base of electricity poles which were bare. Vegetation located outside of the Study Area was typical for the area, comprising open forest species of some spotted and scribbly gum, some with bushfire scarring, with an understory of shrubs and ferns.

The Study Area was situated on a lower sloped landscape which showed signs of water inundation due to recent rain (Plate 2). Approximately half way along the survey area small pieces of oyster fragments were noted at the base of an electricity pole (131 JS5), it was suggested by the Aboriginal community that the shell had been dug up during the emplacement of the electrical poles (Plate 3). The Aboriginal community considered the oyster fragments to not be an Aboriginal site and this was confirmed by the RPS archaeologist. Areas that held exposed soils were inspected for cultural material but none were identified, being comprised mainly of imported road base gravels (Plate 4).

3.2 Conclusion of Field Results

The archaeological field survey confirmed that the Study Area had been subject to high levels of disturbance and modification associated with the emplacement of the Ausgrid

Electricity Easement (formally Energy Australia Easement). As a result open forest vegetation in the area had been cleared and only surface grasses remained. Past disturbances to the area provided for good ground surface exposure and visibility which were allowed inspection for remnant cultural heritage material.

The field survey investigation identified no items of Aboriginal cultural heritage material. The Aboriginal community who participated in the survey (WLALC, MRM and NRG) were satisfied with the field survey and survey coverage upon conclusion of the works.

4 Conclusions and Recommendations

This report has considered the available environmental and archaeological information for the Project Area, the land condition, as well as, the nature of the activities. To limit ground disturbance and potential for buried archaeological material, the following management recommendations are proposed for works to be conducted by AGL:

Recommendation 1

All relevant AGL Energy Limited staff and contractors should be made aware of their statutory obligations for heritage under NSW NPW Act (1974) and the NSW Heritage Act (1977), which may be implemented as a heritage induction.

Recommendation 2

If Aboriginal site/s are identified in the NGSF Project Area during works, then all works in the area should cease, the area cordoned off and contact made with a suitably qualified archaeologist and the relevant Aboriginal stakeholders, so that it can be adequately assessed and managed.

Recommendation 3

In the event that skeletal remains are uncovered, work must cease immediately in that area and the proponent, AGL Energy Limited, will need to contact the NSW Police Coroner to determine if the material is of Aboriginal origin. If skeletal remains are determined to be Aboriginal, they must then contact OEH Enviroline 131 555 and relevant Aboriginal stakeholders in order to determine an action plan for the management of the skeletal remains prior to works re-commencing.

Recommendation 4

If, during the course of development works, significant European cultural heritage material is uncovered, work should cease in that area immediately. The Heritage Branch of OEH should be notified via Enviroline 131 555 and works only recommence when an appropriate and approved management strategy instigated.

5 References

Brayshaw, H. (1981). Archaeological Survey of Proposed Site of Tomago Aluminium Smelter Near Hexham, Tomago Aluminium.

Dean-Jones, P. (1990). Newcastle Bight Aboriginal Sites Study.

Keith, D. (2006). Ocean Shores to Desert Dunes: The Native Vegetation of New South Wales and the ACT. Sydney, Department of Environment and Conservation NSW.

Matthei, L. E. (1995). Soil Landscapes of Newcastle 1:100 000 Sheet. Sydney, Department of Land and Water Conservation.

RPS (2010). Archaeological Due Diligence Inspection of 25 Borehole Locations, Coffey Natural Systems Pty Ltd.

RPS (2011). Cultural Heritage Assessment: Newcastle Gas Storage Facility Project, Coffey Natural Systems Pty Ltd.

6 Plates

Plate 1: View north of the Study Area

Plate 2: Patches of water inundated areas

Plate 3: View of oyster shell fragments found at base of electricity pole

Plate 4: View of exposed soils and imported gravels

Appendix 1

Legislative Requirements

Summary of Statutory Controls

The following overview of the legal framework is provided solely for information purposes for the client, it should not be interpreted as legal advice. RPS will not be liable for any actions taken by any person, body or group as a result of this general overview, and recommend that specific legal advice be obtained from a qualified legal practitioner prior to any action being taken as a result of the summary below.

COMMONWEALTH

Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (ATSIHIP Act Amendment 2006)

The purpose of this Act is to preserve and protect all heritage places of particular significance to Aboriginal and Torres Strait Islander people. This Act applies to all sites and objects across Australia and in Australian waters (s4).

It would appear that the intention of this Act is to provide national baseline protection for Aboriginal places and objects where Stage legislation is absent. It is not to exclude or limit State laws (s7(1)). Should State legislation cover a matter already covered in the Commonwealth legislation, and a person contravenes that matter, that person may be prosecuted under either Act, but not both (s7(3)).

The Act provides for the preservation and protection of all Aboriginal objects and places from injury and/or desecration. A place is construed to be injured or desecrated if it is not treated consistently with the manner of Aboriginal tradition or is or likely to be adversely affected (s3).

The Australian Heritage Commission Act 1975

The Australian Heritage Commission Act (1975) established the Australian Heritage Commission which assesses places to be included in the National Estate and maintains a register of those places. Places maintained in the register are those which are significant in terms of their association with particular community or social groups and they may be included for social, cultural or spiritual reasons. The Act does not include specific protective clauses.

The Australian Heritage Council Act (2003) together with *The Environment Protection and Biodiversity Conservation Act (1999, amended)* includes a National Heritage List of places of National heritage significance, maintains a Commonwealth Heritage List of heritage places owned or managed by the Commonwealth and ongoing management of the Register of the National Estate.

STATE

It is incumbent on any land manager to adhere to state legislative requirements that protect Aboriginal Cultural heritage. The relevant legislation is NSW includes but is not limited to the summary below.

National Parks and Wildlife Act 1974 (NPW ACT)

The NPW Act provides statutory protection for all Aboriginal heritage, places and objects (not being a handicraft made for sale), with penalties levied for breaches of the Act. This legislation is overseen by the Office of Environment and Heritage (OEH), and specifically the Director-General of OEH. Part 6 of this Act is the relevant part concerned with Aboriginal objects and places, with Section 86 and Section 90 being the most pertinent. In 2010, this Act was substantially amended, particularly with respect to Aboriginal cultural heritage requirements. Relevant sections include:

Section 86

This section now lists four major offences:

(1) A person must not harm an object that the person knows is an Aboriginal object;

(2) A person must not harm and Aboriginal object;

(3) For the purposes of s86, "circumstances of aggravation" include:

  (a) The offence being committed during the course of a commercial activity; or

  (b) That the offence was the second or subsequent offence committed by the person;

(4) A person must not harm or desecrate an Aboriginal place.

Offences under s86 (2) and (4) are now strict liability offences, ie, knowledge that the object or place harmed was an Aboriginal object or place needs to be proven. Penalties for all offences under Part 6 of this Act have also been substantially increased, depending on the nature and severity of the offence.

Section 87

This section now provides defences to the offences of s86. These offences chiefly consist of having an appropriate Aboriginal Heritage Impact Permit (AHIP), not contravening the conditions of the AHIP or demonstrating that due diligence was exercised prior to the alleged offence.

Section 87A & 87B

These sections provide exemptions from the operation of s86; Section 87A for authorities such as the Rural Fire Service, State Emergency Services and officers of the National Parks & Wildlife Service in the performance of their duties, and s87B for Aboriginal people performing traditional activities.

Section 89A

If a person knows of the location of an Aboriginal object or place that has not been previously registered and does not advise the Director-General of that object or place within a reasonable period of time, then that person is guilty of an offence under this Section of the Act.

Section 90

This section authorises the Director-General to issue and AHIP.

Section 90A-90R

These sections govern the requirements relating to applying for an AHIP. In addition to the amendments to the Act, OEH have issued three new policy documents clarifying OEH's requirements with regards to Aboriginal archaeological investigations: *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* and *Code of Practice for Archaeological Investigations in NSW*. The Consultation Requirements formalise the consultation with Aboriginal community groups into four main stages, and includes details regarding the parties required to be consulted, advertisements inviting Aboriginal community groups to participate in the consultation process, requirements regarding the provision of methodologies, draft and final reports to the Aboriginal stakeholders and timetables for the four stages. The Due Diligence Code of Practice sets out the minimum requirements for investigation, with particular regard as to whether an AHIP is required. The Code of Practice for Archaeological Investigation sets out the minimum requirements for archaeological investigation of Aboriginal sites.

Aboriginal Heritage Impact Permits (AHIP)

OEH encourages consultation with relevant Aboriginal stakeholders for all Aboriginal Heritage Assessments. However, if an Aboriginal Heritage Impact Permit (AHIP) is required for an Aboriginal site, then specific OEH guidelines are triggered for Aboriginal consultation.

Aboriginal Cultural Heritage Consultation Requirements for Proponents

In 2010, the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (ACHCR's) were issued by OEH (12th April 2010). These consultation requirements replace the previously issued *Interim Community Consultation Requirements* (ICCR) for Applicants (Dec 2004). These guidelines apply to all AHIP applications prepared after 12th April 2010; for projects commenced prior to 12th April 2010, transitional arrangements have been stipulated in a supporting document, Questions and Answers 2: Transitional Arrangements.

The ACHCR's 2010, include a four stage Aboriginal consultation process and stipulate specific timeframes for each state. Stage 1 requires that Aboriginal people who hold cultural information are identified, notified and invited to register an expression of interest in the assessment. Stage 1 includes the identification of Aboriginal people who may have an interest in the Study Area and hold information relevant to determining the cultural significance of Aboriginal objects or places. This identification process should draw on reasonable sources of information including: the relevant OEH EPRG regional office, the relevant Local Aboriginal Land Council(s), the Registrar of Aboriginal Owners, Aboriginal Land Rights Act (1983), the Native Title Tribunal, Native Title Services Corporation Limited, the relevant local council(s), and the relevant catchment management authority. The identification process should also include an advertisement placed in

a local newspaper circulating in the general location of the project area. Aboriginal organisations and/or individuals identified should be notified of the project and invited to register an expression of inters (EoI) for Aboriginal consultation. Once a list of Aboriginal stakeholders has been compiled from the EoI's, they need to be consulted in accordance with ACHCR's Stages 2, 3 and 4.

For projects commenced before the 12th April 2010, Section 1 (Q1) of the transitional arrangements indicates that if Aboriginal consultation was commenced prior to the 12th April 2010 (including advertising and notification of stakeholders) then consultation is to be continued under the previous ICCR guidelines.

Interim Community Consultation Requirements (ICCR) for Applicants (Dec 2004) required a three stage process of which timeframes were stipulated for specific components. Stage 1 required the notification and registration of interests. Notification included an advertisement in a local print media, in addition to contacting the Local Aboriginal Land Council(s), the registrar of Aboriginal Owners, Native Title Services, local council(s) and the Department of Environment and Conservation. Stage 1 also required the invitation for expressions of interest (EoI) to be sent to interested Aboriginal parties and an Aboriginal stakeholder list compiled. Stage 2 required the preparation of an assessment design to be sent to the Aboriginal stakeholders for comment and review. Stage 3 required that the assessment report be provided to registered Aboriginal stakeholders for review and comment.

Environmental Planning & Assessment Act 1979 (EP&A Act)

This Act regulates a system of environmental planning and assessment for New South Wales. Land use planning requires that environmental impacts are considered, including the impact on cultural heritage and specifically Aboriginal heritage. Within the *EP&A Act*, Parts 3, 4 and 5 relate to Aboriginal heritage.

Part 3 regulates the preparation of planning policies and plans. Part 4 governs the manner in which consent authorities determine development applications and outlines those that require an environmental impact statement. Part 5 regulates government agencies that act as determining authorities for activities conducted by that agency or by authority from the agency. The National Parks & Wildlife Service is a Part 5 authority under the *EP&A Act.*

In brief, the *NPW Act* provides protection for Aboriginal objects or places, while the *EP&A Act* ensures that Aboriginal cultural heritage is properly assessed in land use planning and development.

Part 3A of the *EP&A Act* relates to major projects, and if applicable, obviates the need to conform to other specific legislation. In particular, s75U of the *EP&A Act* explicitly removes the need to apply for s87 or s90 permits under the *NPW Act*. This means that although Aboriginal cultural heritage is considered during the planning process, a permit is not required to disturb or destroy an aboriginal object or place. However, the Director-General of Planning must nonetheless consult with other government agencies, including OEH and National Parks & Wildlife Service, prior to any decision being made.

Aboriginal consultation under part 3A is required under the draft 2005 Part 3A *EP&A Act Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation*. This document stipulates that the ICCR process should be adhered to.

The Heritage Act 1977

This Act protects the natural and cultural history of NSW with emphasis on non-indigenous cultural heritage through protection provisions and the establishment of a Heritage Council. Although Aboriginal heritage sites and objects are primarily protected by the *National Parks & Wildlife Act* (1974, as amended), if an Aboriginal site, object or place is of great significance, it may be protected by a heritage order issued by the Minister subject to advice by the Heritage Council.

Other legislation of relevance to Aboriginal cultural heritage in NSW includes the *NSW Local Government Act (1993)*. Local planning instruments also contain provisions relating to indigenous heritage and development conditions of consent.

Appendix 2

AHIMS Search Results

AHIMS Web Services (AWS)
Search Result

Your Ref Number : PR109259-1

Client Service ID : 46165

RPS Australia East Pty Ltd
Accounts Payable Fortitude Valley PO Box 237
Brisbane Queensland 4006

Date: 05 July 2011

Attention: Philippa Sokol

Email: philippa.sokol@rpsgroup.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 56, Eastings : 376948 - 381710, Northings : 6366838 - 6369238 with a Buffer of 0 meters. conducted by Philippa Sokol on 05 July 2011

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

7	**Aboriginal sites are recorded in or near the above location.**
0	**Aboriginal places have been declared in or near the above location. ***

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

PO BOX 1967 Hurstville NSW 2220
43 BridgeStreet HURSTVILLE NSW 2220
Tel: (02)9585 6345 (02)9585 6741 Fax: (02)9585 6094

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref Number : PR109259-1

Client Service ID : 46169

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
38-4-0248	T 7;	AGD	56	378900	6367400	Open site	Valid	Artefact : -	Open Camp Site	1845
	Contact	**Recorders**	Pam Dean-Jones					**Permits**		
38-4-1291	RPS PHWY AS2	GDA	56	378274	6368460	Open site	Valid	Artefact : 8		
	Contact	**Recorders**	RPS Australia East Pty Ltd ,Miss.Philippa Sokol					**Permits**		
38-4-1293	RPS TAC AS1	GDA	56	381593	6367382	Open site	Valid	Artefact : -		
	Contact	**Recorders**	RPS Australia East Pty Ltd ,Miss.Philippa Sokol					**Permits**		
38-4-0075	Tomago;	AGD	56	379380	6366800	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	533,100499
	Contact	**Recorders**	Helen Brayshaw					**Permits**		
38-4-0249	T 8;	AGD	56	378200	6367400	Open site	Valid	Artefact : -	Open Camp Site	1845
	Contact	**Recorders**	Pam Dean-Jones					**Permits**		
38-4-1139	Minmet Pad	GDA	56	381100	6367000	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Mrs.Angela Besant					**Permits**	3026	
38-4-0250	T 8_A_(T9);	AGD	56	378400	6367300	Open site	Valid	Artefact : -	Open Camp Site	1845
	Contact	**Recorders**	Pam Dean-Jones					**Permits**		

Report generated by AHIMS Web Service on 05/07/2011 for Philippa Sokol for the following area at Datum :GDA, Zone : 56, Eastings : 376948 - 381710, Northings : 6366838 - 6369238 with a Buffer of 0 meters.Additional Info : To determine Aboriginal site localities in the vicinity to the project area. Number of Aboriginal sites and Aboriginal objects found is 7