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Project	Gloucester Coal Seam Gas Project	From	Penny Barker
Subject	Community Consultative Committee	Tel	2 9239 7100
Venue/Date/Time	Friday May 27 2010 Gloucester Country Club, 11am – 1pm	Job No	21/17714
Copies to	All attendees		
Attendees	Tim Hickman – Community Representative Councillor Richard Webb – Gloucester Shire Council Councillor Karen Hutchinson – Great Lakes Council Councillor Peter Ainsworth – Dungog Council Marianne Johnson – The Gloucester Project Glen Wilcox – Gloucester Shire Council Terry Kavanagh – Dungog Shire Council Rod Williams – Community Representative David Mitchell – Avon Valley Landcare Ed Robinson – Lower Waukivory Residents Group Stuart Galway – AGL Mark Bonisch - AGL Ian Shaw – AGL Penny Barker – GHD (Facilitator)	Apologies	Sally Whitelaw – Port Stephens Council Garry Smith – BGSPE Glen Hanford – Great Lakes Council

1. Introductions & Confirmation of Previous Minutes	**Action**
Ed Robinson was welcomed as a new member of the Committee. There were no comments raised from the previous minutes.	

2. Environmental Assessment Update	
Stuart Galway (SG) provided an overview of the environmental assessment exhibition phase. He reported that 147 submissions had been received including 77 formed letters, 49 individual responses from community members, 10 from community groups and 11 responses from government departments. The submissions report has taken 4 months to compile and was lodged with the Department of Planning on 24 May 2010. The submissions report will be reviewed by the Department of Planning for adequacy, and will be available to the public on the Department's website in about 2 – 3 weeks. AGL will inform the committee when the Report is available, and can provide print or CD copies to committee	AGL to inform committee members when the Submissions Report is available.

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members. The main issues raised were: • Groundwater • Water quality • Fraccing chemicals • Roads • ecological impacts • Visual impact	
Terry Kavanagh (TK) raised concerns regarding the information left to be included in the Management Plans, in particular the location of construction camps. Terry asked if the construction camps will be determined as part of a 3A process or as a DA process. TK thought that the 3A process did not allow for community input as would a DA. SG stated that a Construction Environmental Management Plan (CEMP) will have to be to be prepared and approved by DoP prior to construction commencing. The CEMP would outline how environmental impacts would be managed. SG also stated that the plan was to keep the pipeline camps away from the towns. The build time would be 9 - 12 months. Glen Wilcox asked if Local Government could be included in discussions during the development of the CEMPs. SG will follow up with the Department of Planning.	SG to check with the Department of Planning as to level of involvement Council can have in the preparation of the CEMPs.
Ed Robinson asked if the camps included drilling and construction crews. SG responded by saying that there may be two separate camps: • One for drilling and the construction of the Central Processing Facility. • One for the pipeline. The drilling will be staged and therefore may not require a camp and will be dependent on the gas sales targets at the time, with May 2013 as the current proposed target date for gas on. SG noted that the geotechnical studies will be carried out during Front End Engineering and Design (F.E.E.D.) to understand where the rock areas are situated which will assist with planning how the pipeline will be constructed and therefore assist with determining the location of a pipeline construction camp.	
3. Exploration Programme Update	
SG stated that the 2D seismic survey has been completed with information sessions to be held for landholders next week on 31 May, 1st and 2nd June. The 3D survey over the Stage 1 field area commenced in late February and is one week from completion. Most landowners reported that the surveys were not as intrusive as they anticipated and AGL received favourable feedback from most landowners.	
David Mitchell (DM) asked if there will be any further stages (beyond Stage 1) . SG stated that the concept plan in the EA sets out the potential area for which AGL is seeking concept approval for, and includes up to 300 wells. The area for the next stage is not known at this stage and is dependant upon further exploration results. Any future developments plans will require project approval which will include an Environmental Assessment process similar to what was just been completed.	

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Ed Robinson (ER) stated that exploration wells have covered most of the area. There has not been enough exploration at this stage to know where the next stage may be located. Mark Bonisch stated that data gained through the seismic surveys help AGL to optimise the well layout. Optimising the well layout may help to reduce the number of wells that are actually required. Further exploration drilling may be required to gain a better understanding of the geological basin to determine where future stages may be located.	
Richard Webb (RW) asked if will there be feedback to the Committee on the 3D seismic survey. SG stated that geologists will provide a presentation when the data has been accumulated. It will take 3 -4 months for the geologists to process the data and build the model. AGL will aim to have a presentation at the appropriate CCC meeting.	AGL to arrange for the geologist to be present at the appropriate Committee meeting.

4. Drilling Programme Update

Mark Bonisch (MB) reported that: • Wards River 5 well on Glen Road should be completed by mid June. • The drill rig will return to Wards River 4 to redrill using a different drilling technique to prevent the drill jamming which has occurred in the Weismantel seam at about 500 metres. • There may be a 4 well pilot with a decision on the location to be determined with the assistance of the seismic and exploration drilling.	
ER asked what will be the impact of the current Gloucester Coal drilling programme. MB stated that all the drill holes will be P and A'd with concrete to prevent any possible gas migration concerns. Due diligence requires AGL to cement any old coal holes which intersect seams that AGL will test. This cementing will prevent any leakage occurring.	
Tim Hickman asked if there was a loss of water during coring then would it not possible for gas to flow the other way. MB stated that drilling mud is heavier than gas or water and would flow out into the formation without the reverse occurring. Each situation needs to be reviewed individually.	
RW asked if there was migration how do you monitor safety conditions? MB stated that records held by Department of Industry and Investment–Minerals Division show the location of all coal holes and registered bores. AGL will ensure coal holes are Plugged with cement and registered bores are in shallow acquifers which are not targeted as part of gas extraction. The registered bores will be monitored as part of the Hydrogeological study.	

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5. 60 Minutes Story 16th May

SG – Land Access

- Large areas of exploration by Santos, Origin Energy and Queensland Gas Company (QGC).
- AGL do not enter peoples property without an agreement.
- In NSW, the Petroleum Onshore Act requires a Landholder Agreement prior to entry. AGL respects landowners rights and always try to negotiate in good faith with each landowner.

MB – Well Heads

- All our wells are cased in steel and cement including a surface casing for a minimum of 10% of the hole depth which is not perforated in any way.
- All wells are leak tested.
- Operations staff use gas meters around completed wells which detect gas at .5%.
- AGL undertake annual testing of the wells and gas lines by independent consultants who test in Parts per Million(p.p.m) .
- The critical number to remember is that methane is explosive between 5% and 15% in air and also it is lighter than air so does not settle but goes up very quickly hence the potential for ignition is very small. Refer to attached plume modelling for AGL flares.
- Pipelines are pressure tested with water to the Australian Standard to ensure there are no leaks prior to the line being filled with gas.

MB - Tara and Chinchilla water bores producing gas

- Water bores do produce gas without any other form of stimulation as the removal of water for agricultural use lowers the hydraulic pressure in the coal seam the same as for the gas extraction process. The bores used in the Gloucester area are all from shallow aquifers and AGL ensures they are not intersected by completed seams.
- The change in regulations in QLD in 2000 now requires all water bores to be cemented.
- AGL are proactive in seeking out both licensed and unlicensed bores.
- AGL may consider completing seams by different methods such as under reaming rather than fraccing.

MB - the contents of fraccing fluids

- APPEA and the Qld government are developing a full response to chemicals which are used for fraccing in Australia. Once this is complete AGL will provide a list of the items used locally from that list.
- In our local fraccs 90% is water, 9.5% sand and .5% other products are injected into the coal seam to fracture it. Once the pumps are turned off we expect to recover a majority of the water back into our pits. The remainder is pumped out by the down hole pumps as the well is put on production hence we do not expect any soluble chemicals to remain in the wellbore.

AGL will compile a list of locally used fluids used for fraccing, based on the APPEA and Qld government comprehensive list.

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Marianne Johnson (MJ) stated that there are claims that there have been 149 chemicals identified in fluids in the USA of which 80% cause problems for humans. MB stated that AGL have a duty of care to their employees as well as to the community to ensure safety. These products are not stored at well sites, they are only used for approximately 1 day while the well is being fracced and then removed to safe storage. It is proposed that the pond water will be treated by reverse osmosis to an irrigation standard.	
Rod Williams and Richard Webb asked if AGL could place protocols on fraccing and information regarding the 60 Minutes report onto a Fact Sheet for distribution to the community to dispel genuine concerns.	AGL to produce a Fact Sheet
DM noted that on the Landline programmes of 2nd and 9th May it was claimed that the Queensland Valuer General was discounting property values by 12% if the property had one well.	Stuart Galway to follow up this point.
Rod Williams stated that he had general concerns with weed spread. Wash down has been instituted on a case by case basis. This was mainly done during the 3D survey on the tractor and slasher which was the lead vehicle and also if requested by the landholder. ER asked if a map had been created of GPG for the landholders. Due to the extensive exercise of trying to map GPG via ground survey it was deemed impractical and therefore AGL decided to change its approach by determining which properties are known to contain GPG. GPG was raised during the initial negotiations with each landowner. Where GPG was not known to exist or the landowner was actively trying to manage the spread of GPG within their property, vehicle washdown was undertaken prior to entry. GW suggested a follow up with landholders in the next growing season.	
Rod Williams asked what is the ongoing pipeline maintenance. SG said the contractor has responsibility for their work for 12 months after completion and then it becomes the responsibility of the pipeline owner to address any problems after that time for the life of the pipeline's use. The pipeline is regularly patrolled once it is in use.	
5. Legacy Program / update from community	
Ian Shaw stated that the Youth Support programme is moving ahead. Currently recruiting for a coordinators role 1/day a week. The focus will be on mentoring/ training youth , and building the capacity of youth.	
6. Next Meeting	
	AGL will notify the committee of the date of the next meeting.

Penny Barker

GHD - Stakeholder Solutions

8.0 Plume Rise Assessment

8.1 Background

The Gloucester Gas Project (the Project) is a proposal to extract Coal Seam Methane (CSM) gas from the Gloucester Basin for use as an energy source for customers in NSW. The Project was originally developed by a joint venture between Lucas Energy Pty Ltd and Molopo (Gloucester) NL, who provided much of the information used in this assessment. The Project was subsequently acquired by AGL Energy Limited (AGL).

AECOM Australia Pty Ltd (hereafter referred to as AECOM) was commissioned by AGL to undertake an Environmental Assessment (EA) for the Project. The potential effects of the Project on local air quality have been addressed as part of the EA (AECOM, 2009).

Plume emitting stacks within 15 km of an airport require the authorisation of the Civil Aviation Safety Authority (CASA) to assess compliance with civil aviation requirements for air space safety. The proposed gas compression and treatment facility for the Project, known as the Central Processing Facility (CPF), is located approximately 4.5 km from an active airfield and AGL is therefore required to submit an Impact Assessment Report that provides the data upon which CASA will base its hazard assessment, and determine whether the plume should be classified as a 'hazardous object' under Civil Aviation Safety Regulation (CASR) Part 139.

This report provides the assessment prepared in accordance with the Guidelines for Conducting Plume Rise Assessments (June 2004) issued by CASA, with data generated using the plume rise assessment module of The Air Pollution Model (TAPM).

8.2 Project Description

8.2.1.1 Location

The proposed CPF would be located at one of two proposed locations near the town of Stratford, approximately 90 km north of Newcastle and 11 km south of Gloucester. The location of the proposed CPF is within Petroleum Exploration Licence (PEL) 285, issued under the *Petroleum (Onshore) Act 1991*. The project location including the two potential CPF locations (designated CPF1 and CPF7) are shown in **Figure 6**.

8.2.1.2 Nearby Airfield

As discussed above, there is a small airfield in the general area as shown in **Figure 6**.

8.3 CASA Requirements

8.3.1 Background

Guidelines for conducting plume rise assessments are recommended in the Advisory Circular (AC) 139-05(0). The level of assessment depends on the type of source and proximity to an aerodrome and it should be noted that Advisory Circulars are intended to provide recommendations and guidance to illustrate a means but not necessarily the only means of complying with the regulations. This section summarises the guidelines relevant to this assessment.

The purpose of the AC is to provide guidance to aerodrome operators and persons involved in the design, construction and operation of the facilities with exhaust plumes about the information required to assess the potential hazard from a plume rise to aircraft operations. CASA has identified that there is a need to assess the potential hazards to aviation because the vertical velocity from gas efflux may cause airframe damage and/or affect the handling characteristics of an aircraft in flight.

Aviation authorities have established that an exhaust plume with a vertical gust in excess of 4.3 m/s may cause damage to an aircraft airframe, or upset an aircraft when flying at low levels. As a result, CASA requires the proponent of a facility with an exhaust plume, which has an average vertical velocity exceeding the limiting value (4.3 m/s at the aerodrome Obstacle Limiting Surface (OLS) or at 110 m above ground level anywhere else) to be assessed for the potential hazard to aircraft operations.

8.3.2 The Use of Different Plume Models

The Air Pollution Model (TAPM) is a combined predicted meteorological module, and plume dispersion module, which provides for realistic estimates of plume rise and lateral dispersion/displacement. This combination provides a three dimensional grid type simulation model which is most suited in estimating frequencies of occurrences. TAPM, run in meteorology mode, reliably simulates the complex three dimensional behaviour of the atmosphere and predicts site-specific hourly-averaged meteorological data. In the plume rise mode, TAPM analyses plume behaviour in the meteorological conditions which are likely to be experienced at the site.

CASA considers that TAPM provides the ability for realistic plume modelling where there is no reliable meteorological data available from measurements/observations.

Attachment A of the AC recommends the input parameters and data analysis and presentation requirements for the modelling assessment.

8.4 Assessment Methodology

Prediction of the plume rise statistics as required by the CASA AC has been undertaken using the TAPM prognostic dispersion model. Stack parameters along with expected plume merging parameters were used to predict the plume velocity and plume extent for every hour over a 5 year time period. The vertical velocity targeted by this investigation was 4.3 m/s and the modelling parameters used are summarised in this section.

Modelling data used in this plume rise assessment incorporates the same time period as used in the Air Quality Impact Assessment previously prepared for the Project to ensure consistency.

The TAPM model inputs and settings were based on the requirements outlined in the CASA AC “Guidelines for Conducting Plume Rise Assessment”. Aspects of the assessment and their relative compliance with the CASA circular have been listed in **Table 16**. The latest version of TAPM (v4) was used for this assessment.

Table 16: TAPM Parameters

Parameter	Model Data	Compliant with CASA Guidelines (Y/N)
Modelling period	1 Jan 2003 – 31 Dec 2007	Y
Grid centre coordinates	-32.1083°,151.95°	Y
Local values	400396 m, 6447077 m	N/A
Grid points	25 x 25	Y
Outer grid spacing	30 km x 30 km	Y
Vertical levels	25	Y
Domains	30 km, 10 km, 3 km	Y
Terrain	AUSLIG 9 second DEM	Y

The source parameters for each of the proposed stacks are shown in **Table 17.** The plumes from the three groups of stacks (i.e. G1 to G5, C1 to C8, and ALT, TEG1 and TEG2) would be expected to merge due to their proximity to each other, which may increase the buoyancy of the plume, and was accounted for in the dispersion modelling through the application of a buoyancy enhancement factors to the emissions from each gas stack. The value for the buoyancy enhancement factors was obtained from Manins, Carras and Williams (1992) and entered into the TAPM model.

As both CPF1 and CPF7 are to be constructed to a similar footprint, modelling the two locations separately was not deemed necessary. The results for the plume rise were applied to both locations and the impacts assessed in this context.

Table 17: Summary of Stack Parameters

Source Name	Stack Height (m)	Stack Temperature (°C)	Diameter (m)	Stack Tip Velocity (m/s)	Buoyancy Emission Factor
G1 – G5	10	375.0	0.60	32.4	2.91
C1 – C8	12	447.8	0.98	15.0	3.34
ALT	12	447.8	0.69	15.0	2.34
TEG1	8	250.0	0.20	15.0	2.34
TEG2	12	250.0	0.20	15.0	2.34

The modelled locations of the stacks are shown in **Table 18**.

Table 18: Stack Locations

Source Name	CPF1	
	Easting (m)	Northing (m)
G1	402210.8	6449176.3
G2	402212.2	6449184.5
G3	402213.3	6449193.1
G4	402214.6	6449201.8
G5	402216.0	6449211.1
C1	402289.7	6449197.2
C2	402290.9	6449203.8
C3	402292.0	6449212.0
C4	402293.1	6449218.6
C5	402294.3	6449227.0
C6	402295.2	6449233.7
C7	402296.6	6449242.7
C8	402297.7	6449249.3
ALT	402351.2	6449177.4
TEG1	402345.2	6449178.2
TEG2	402338.7	6449179.7

8.5 Modelling Results

The objective of the analysis of the data obtained from the TAPM model is to establish the critical height at which the plume vertical velocity is below the 4.3 m/s threshold. Data analysis was performed to calculate the critical vertical velocity profile in accordance with CASA (2004). For each of the five years assessed, the maximum vertical velocity and corresponding plume rise height was extracted from the TAPM output files and is shown below in **Table 19**.

Table 19: TAPM Modelling Results

Year	Maximum Plume Height at Critical Velocity (m)
2003	43
2004	48
2005	38
2006	48
2007	43

A summary of the plume characteristics for the CPF for all five years is provided in **Table 20**, which shows the maximum, minimum and average heights below which the plume vertical velocity exceeded 4.3 m/s (critical height). Plume characteristics shown in addition to the plume height include the maximum, minimum and average spreads of the plume in the horizontal and vertical directions.

Table 20: Critical Plume Extents – Central Processing Facility

Statistic	Critical Height (m)	Horizontal Plume Spread (m)	Vertical Plume Spread (m)	Horizontal Plume Displacement (m)[1]	
				X	Y
Maximum	48	5	3	9	7
Minimum	16	2	1	0	0
Average	18	3	2	1.3	1.3

[1] Note that the plume displacement value does not indicate direction, merely the degree to which the plume moved away from the source.

The results of the TAPM modelling found the plume height where the plume velocity was 4.3 m/s was 48 m. The maximum horizontal displacement away from the source location is estimated to be 9 m. As the closest proposed CPF is located approximately 4.5 km from the airfield, impacts from the plume on the airfield are not expected to occur (and by inference the more distant CPF to the south would also not result in impacts on the airfield). Furthermore, it was decided no further analysis was necessary as the plume height where the maximum plume vertical velocity occurred was well below 110 m.

8.6 Plume Rise Findings

Investigations into plume rise dynamics of the two potential CFP locations were conducted in accordance with CASA (2004). TAPM results were analysed to assess the height at which a vertical plume velocity of 4.3 m/s was exceeded and whether the subsequent plume height exceeded 110 m (CASA criteria). The results indicate that the plume characteristics from the proposed CFP are predicted to be in compliance with CASA (2004) requirements.

9.0 Conclusions

AGL proposes to develop a CSG extraction project at Stratford, approximately 90 km from Newcastle, NSW. The proposed activities include the extraction and purification of CSG from a number of gas wells at a Central Processing Facility (CPF), and transport of the gas via pipeline to Hexham, where it will be connected to the Sydney - Newcastle gas pipeline.

Air quality emissions from the proposed CPF facility and gas wells include emissions of dust during construction, and emissions of combustion products during operation of the CPF and flaring of the gas wells during commissioning. Odour was not considered likely to be an issue for the Project as natural gas is odourless, and odorant would not be added to the gas at the CPF. As such, odour modelling was not undertaken for the Project.

The CPF sources assessed were five 3 MW small scale ancillary power generators, eight compressors, an alternator, and a triethylene glycol re-boiler and regeneration skid. Construction emissions were not assessed quantitatively; rather, this assessment recommends the development and implementation of a Construction Environmental Management Plan.

The effects of the CPF, WBH and gas flare emissions on local air quality were assessed through dispersion modelling using AUSPLUME, together with meteorological data either sourced locally or generated by TAPM. Due to the inherent variability and relatively low likely emissions levels, fugitive emissions were not taken into account in the modelling.

Pollutants investigated were products of the combustion of natural gas; i.e.:

- Nitrogen dioxide (NO_2);
- Carbon monoxide (CO);
- Fine particulates (PM_{10});
- Volatile organic compounds (VOCs); and
- Formaldehyde.

The CPF emissions were assessed at two proposed locations – CPF Site 1 and CPF Site 7 – assuming operation for 24 hours per day, 365 days per year. The gas wells were modelled by assuming continuous flaring of a single well for a year, at an indicative location. Information used to determine emission rates and stack parameters were obtained from AGL, manufacturers' specifications, and National Pollutant Inventory emission factors. Catalytic converters were assumed to be fitted to all power generators and compressors to reduce pollutant emissions by up to 90% (relative to the NPI emission factors). Ground level pollutant concentrations predicted by the dispersion modelling were compared to DECCW criteria. Ambient pollutant concentrations were expected to be negligible due to the lack of pollutant sources near the site; as such, the model predictions were taken to be representative of cumulative pollutant concentrations.

The dispersion modelling predicted that all ground level pollutant concentrations resulting from operation of the proposed facilities would be below the relevant DECCW criteria for both proposed CPF sites at all modelled locations within the modelling domain (including both gridded and sensitive receptors).

Additionally, emissions resulting from the flaring of the wells during commissioning were also predicted to be below the DECCW criteria, with the exception of PM_{10}, where exceedances of cumulative pollutant concentrations were predicted for the area immediately surrounding the wells. Given that the PM_{10} concentrations fall to levels below the assessment criteria within 150 m of the wells and that the background pollutant concentrations assumed for this assessment are expected to be higher than those actually occurring at the site, no adverse impacts are expected to result from the Project.

The results of the dispersion modelling suggest that the proposed facilities should operate within acceptable air quality guidelines, provided that proposed mitigation measures are implemented, particularly the installation of catalytic converters on the generators and compressors with up to 90% reduction efficiency for air pollutant emissions.

All concentrations from the WBH are predicted to fall below the assessment criteria for all pollutants modelled. It should be noted that even with all the NO_X assumed to be NO_2 predicted levels are less than the assessment criteria. On this basis the Hexham Delivery Station is not expected to detrimentally impact on local air quality.

During the flaring of the wells (during commissioning) emissions of NO_X and PM_{10} have the potential to cumulatively impact on the environment. Provided well separation distances are maintained at 500m for wells constructed in a line or 800m for wells constructed in a grid pattern, impacts are not expected.

A plume rise assessment undertaken for the proposed CPF operation has demonstrated that the plume characteristics from the proposed CFP are predicted to be in compliance with CASA (2004) requirements.

Overall, the Gloucester Gas project is not expected to result in air quality emissions that will have detrimental impacts on the environment surrounding the CPF, Stage 1 GFDA, the pipeline or the Hexham delivery station.