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Environmental Management Advice
Planning Approvals
EPA Licensing Matters
Environmental Impact Statements Managed
and Prepared
Old Mine or Construction Sites Restored
Environmental Training Courses Prepared
and Presented
Environmental Management Systems
Prepared and Implemented
Environmental Monitoring

30th May 2011

FS13 P84 0001

The Director-General
NSW Department of Planning
GPO Box 39
SYDNEY NSW 2000

Attention: Mr. C Preshaw

Dear Clay,

**Re: Submissions for Project Approval Modification Apex Energy
Additional Borehole AI19**

Thank you for your email dated 26th May2011, which listed the latest submissions received through the Otford Protection Society website.

The new submissions essentially cover issues previously addressed and I am satisfied that our previous Response to Submissions covers the issues raised in these additional submissions.

Many of the new submissions focus on the fracking process and on gas production. The Project Approval modification application does not involve any fracking. In addition, it addresses an exploration program. Gas production activity will depend on the outcomes of the exploration program and will be subject to a separate approval process and review.

Please contact me if you require further clarification.

Yours faithfully,

David Olsen
Environmental Manager

Submitter	Submission	Draft Response									
DECCW	Unable to support the proposal in its current form because the loss of approximately 100 Prickly Bush-pea individuals and 0.66ha of habitat is not considered to maintain or improve environmental outcomes for the species.	<p>There is a significant difference between what Niche identified and described at the site and the data that DECCW are relying on. The species is far more abundant than officially recognised. The large size of the populations of this species is readily attested to by people who work in the area from both mining companies and Government groups.</p> <p>Populations of <i>Pultenaea aristata</i> within the region are not uncommon and, in suitable habitat the species is often found to be a dominant shrub, in excess of thousands of individuals (pers. obs.). There are many known large populations of this plant species occurring within the O'Hare's Creek Catchment to the south west of the borehole site (pers. obs.) which are not included in the NSW Wildlife Atlas data illustrated on Figure 4 of Niche Environment and Heritage (2010), indicating that the NSW Wildlife Atlas does not include all known records in the local area. A search of some recent reports detailing survey work for <i>Pultenaea aristata</i> within the regional catchment areas illustrates the density of local populations of the species in the region:</p> <table border="1" data-bbox="1317 879 2040 1377"> <thead> <tr> <th data-bbox="1317 879 1509 991">Location</th> <th data-bbox="1509 879 1749 991">Estimated population size of <i>Pultenaea aristata</i></th> <th data-bbox="1749 879 2040 991">Report</th> </tr> </thead> <tbody> <tr> <td data-bbox="1317 991 1509 1211">Dendrobium Area 3, east of Lake Avon and west of Lake Cordeaux</td> <td data-bbox="1509 991 1749 1211">Density estimate of ~27,550 individuals per ha (average of 177 to 424 plants per 10 x 10 m quadrat) within upland swamps.</td> <td data-bbox="1749 991 2040 1211">Biosis Research (2007) <i>Dendrobium Area 3 Species Impact Statement</i>. Report for BHP Illawarra Coal. October 2007.</td> </tr> <tr> <td data-bbox="1317 1211 1509 1377">Dharawal State Conservation Area, east of Appin</td> <td data-bbox="1509 1211 1749 1377">Estimated population size of 2,000 plants.</td> <td data-bbox="1749 1211 2040 1377">Biosis Research (2007) <i>Dendrobium Area 3 Species Impact Statement</i>. Report for BHP Illawarra Coal. October 2007. Data</td> </tr> </tbody> </table>	Location	Estimated population size of <i>Pultenaea aristata</i>	Report	Dendrobium Area 3, east of Lake Avon and west of Lake Cordeaux	Density estimate of ~27,550 individuals per ha (average of 177 to 424 plants per 10 x 10 m quadrat) within upland swamps.	Biosis Research (2007) <i>Dendrobium Area 3 Species Impact Statement</i> . Report for BHP Illawarra Coal. October 2007.	Dharawal State Conservation Area, east of Appin	Estimated population size of 2,000 plants.	Biosis Research (2007) <i>Dendrobium Area 3 Species Impact Statement</i> . Report for BHP Illawarra Coal. October 2007. Data
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				<p>quoted within above report from Biosis Research (2007) <i>West Cliff Colliery Stage 3 Coal Wash Emplacement Species Impact Statement</i>. Biosis Research, Sydney</p>
		<p>O'Hares Creek Catchment, Woronora Plateau,</p>	<p>Widely dispersed and locally common in the east of the study area. Estimated around 20 plants in marginal habitats to many thousands in suitable swamps. Large populations in the order of thousands of plants are common.</p>	<p>FloraSearch (2009) <i>Illawarra Coal Bulli Seam Operations Project Terrestrial Flora Assessment</i>. Prepared by Colin C. Bower PhD. July 2009.</p>
		<p>It is stated in Niche Environment and Heritage (2010): <i>The species was found to be a common shrub species both along the access track and at the borehole site as well as in the vegetation surrounding these areas. It was therefore not possible to either map the extent of the local population of this species or to accurately record the population size. It is estimated that many hundreds and possibly thousands of individual plants occur in the locality with only a small proportion of this larger population being subject to disturbance by the proposal.</i></p> <p>The DECCW estimate of 'a local population size upwards of 269 individuals' is likely to be an underestimate. The impact of the proposal on the local population of <i>Pultenaea aristata</i> is likely</p>		

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		<p>to be minimal given the extensive population in the immediate vicinity of the proposed disturbance and the fact that this species is known to colonise disturbed areas, as shown by the large numbers of the species recorded along the previously cleared fire trail in the Niche Environment and Heritage (2010) survey and assessment. Therefore, it is highly likely that the individuals impacted would recolonise after rehabilitation works have been undertaken along the access track and at the proposed borehole site.</p> <p>The following is a quote from the Niche Flora and Fauna Report included in the EA.</p> <p>The species (Prickly Bush-pea) is often associated with the upland swamp vegetation complex and has been recorded from several locations within the sub-communities of Banksia Thicket and Restioid Heath. The species is also known to occur in association with areas of impeded drainage and creek lines within sandstone woodland and gully forest plant communities (NPWS, 2003).</p> <p>The species was found to be a common shrub species along the access track and at the borehole site as well as in the vegetation surrounding these areas. Niche estimated that many hundreds and possible thousands of individual plants occur in the locality with only a small proportion of this larger population being subject to disturbance by the proposal.</p> <p>This species is known to occur in localised but none the less quite large populations on the Woronora Plateau with some populations estimated to be in the thousands and possibly tens of thousands.</p>
<p>Sydney Catchment Authority.</p>	<p>SCA has concerns about the proposed borehole location. The SCA has an established preference that any mining exploration activities proposed for SCA land, including site access, should be located on previously disturbed or cleared sites and only where the environmental assessment can demonstrate that the proposed activities are likely to have a neutral or beneficial effect on water quality.</p>	<p>Apex selected the proposed site based on the need to determine gas presence in this area and the existing disturbed nature of the vegetation. Apex acknowledges that vegetation will be disturbed but also emphasises that the proposed site is centred on the closed fire trail that supports regenerating vegetation. The closed road has previously been disturbed.</p>

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	<p>As establishing the proposed borehole and site access will require primary vegetation disturbance and re-clearing along a closed fire road, the SCA would prefer the borehole not be located as proposed. The SCA has no operational reasons to re-open the fire road.</p> <p>The SCA is also aware that Apex has identified and evaluated an alternative strategy for obtaining their required information from a previously approved borehole (AI06)</p>	<p>The site and access track will be rehabilitated at the completion of activity in the area.</p> <p>It is incorrect to state that Apex has an alternative strategy for obtaining their required information from a previously approved borehole (AI06). Apex understands that the SCA view is based on an internal Apex report that identifies AI06 as a fall back option if AI19 is not approved.</p> <p>Apex already has approval for 15 exploration boreholes, including AI06. Borehole AI19 is subject to a current application (not yet approved) to modify the original project approval for the 15 boreholes. It is prudent planning on Apex's behalf to have alternatives should AI19 not be approved for proper and correct reasons. The document that SCA refers to does this. However, it clearly states that:</p> <ul style="list-style-type: none"> • AI19 is an ideal location. • AI06 will not give the same extent of resource definition as AI19. The coverage is reduced by approximately 28 square kilometres and potential reserves of 20 PJ. <p>AI06 is a possible contingency site only and is only relevant should AI19 not be approved for fair and valid reason. It is not an alternative for obtaining the best information.</p>
<p>Sydney Catchment Authority.</p>	<p>SCA is aware of the DECCW submission which does not support the current proposal due to the potential impacts on Prickly Bush-pea which is listed as threatened under the Threatened Species Conservation Act 1995.</p> <p>The SCA considers the impacts identified by DECCW are not considered consistent with the protection of ecological integrity, which is one of the SCA's main goals in the management of the Special Areas.</p>	<p>Covered by meeting with SCA/DECCW.</p>
<p>Sydney Catchment Authority.</p>	<p>If the above objections by SCA are not accepted, the SCA recommends that the following issues be considered.</p> <p>Soil and Water management be undertaken in accordance with that described in the EA.</p>	<p>Emphasises the need to establish that AI19 cannot be replaced by AI06.</p>

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<p>NSW Office of Water</p>	<p>The SCA then state that, “As borehole AI06 is located at a cleared site with appropriate access, the SCA recommends this modification application not be approved”.</p> <p>Provided comments with the following recommended conditions of approval that are additional to those already imposed by the original determination for the project.</p> <p>An authorisation under the <i>Water Act 1912</i> or the <i>Water Management Act 2000</i> is to be obtained from the NSW Office of Water with the appropriate purposes identified for any activity relating to the taking of or interception of groundwater prior to that activity commencing.</p> <p>Structures for the containment of drilling water and produced groundwater are to be either above ground or fully lined. Off-site disposal of these materials should be addressed in the Water Management Plan.</p> <p>Construction of all wells must be undertaken by a driller holding a water driller’s licence, valid in New South Wales.</p> <p>A groundwater quality and quantity monitoring plan is to be established and maintained which incorporates a monitoring schedule and adopted parameters to be monitored and agreed to by the NSW Office of Water.</p> <ul style="list-style-type: none"> • The monitoring program should establish appropriate sites for monitoring bores. • Monitoring bores should monitor discreet aquifers and not be open hole. All major aquifers should be monitored using data loggers, with emphasis on the aquifers where extraction occurs or the environment relies on groundwater (e.g. baseflow to rivers, Groundwater Dependent Ecosystems). • The monitoring program should include reporting of water level and quality in both the target and overlying aquifers. • The results of the monitoring are to be reported to the NSW Office of Water regularly, at a frequency consistent with the reporting arrangements required by other authorities or agencies to avoid duplication of effort where practical. 	<p>Apex will utilise the services of a licensed group to dispose of all drilling water and produced groundwater. Transpacific Industries Group Limited of Unanderra has been approached to provide these services. They have advised that water with less than 20% solids can be disposed at either Transpacific Waste Services facility in Homebush or at the LVRA facility in Appin. These facilities can receive up to 60 tonne and 20 tonne per day respectively. Material that contains greater than 20% solids can be taken to the Transpacific Technical Services facility in Newcastle.</p> <p>The mud pits and drill sumps would be constructed by excavation into the Hawkesbury Sandstone. These pits and the sump are on a small scale (totalling less than 100 cubic metres in volume) and are designed to enable accurate monitoring to identify if losses of recirculating water are occurring or inflows of water are being experienced. The Apex Groundwater Contingency Plan details how water levels in the mud pits and drill sump would be suitably monitored to detect small volume losses or gains. SCA, DECCW and NOW have never before required the lining of mud pits and sumps during drilling operations on the Woronora Plateau because it is commonly accepted that the transmissivity of the weathered Hawkesbury Sandstone was sufficiently low.</p> <p>Well construction will be undertaken by a driller holding a water driller’s licence, valid in New South Wales.</p> <p>The Soil and Water Management Plan details under what conditions monitoring of the both the quantity and quality of produced groundwater would be undertaken in this Exploration Program and has assessed the maximum degree of loss of drilling fluid to any aquifers encountered.</p> <p>The assertion that there are ‘coal seam aquifers’ in the</p>

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		<p>Southern Coalfield is untrue. The typical maximum storativity of such seams is well know from underground mining assessment and is of the order of 3 – 4% and the horizontal transmissivity of such seams is very low. It has been known for over 100 years that the Southern Coalfield is not characterised by ‘wet coal seams’. This supposed issue (of ‘coal seam aquifers’) has been comprehensively assessed, and debunked by Dr. Noel Merrick and other competent hydrogeologists in various reports which are in the public domain and are known to have been provided from time to time to NOW.</p> <p>Establishment of a ‘network of monitoring bores around the site to collect baseline data’ would be highly complex (requiring the packing off of water-bearing intervals and numerous other construction detail demands). It would also require additional disturbance to the exploration sites, which would contradict the objective of minimising disturbance during exploration activities.</p> <p>Given that there are no recognised aquifers in the Southern Coalfield, the demand by NOW for a water quantity and quality monitoring plan to support what is just an exploration program is unrealistic and unreasonable. Apex make this statement supported by the knowledge that the exploration proposals are in detail little different to numerous prior coal seam quality and seam gas content assessment programs carried out in the same area over the last century, none of which have caused any adverse hydrogeologic impact.</p>
Heritage Branch NSW Planning.	The Heritage Branch has no comments.	No response required.
NSW Industry and Investment.	<p>I&I NSW supports the proposed modification subject to the following 7 conditions being met.</p> <ul style="list-style-type: none"> • A Surface Disturbance Notice must be submitted to I&I prior to commencement of any activities on site. • Clearing of intact native vegetation communities should be avoided, or at least minimised. 	<p>Apex will submit Surface Disturbance Notice as requested.</p> <p>Proposals are based on avoiding or minimising disturbance to intact native vegetation.</p> <p>Drilling proposals incorporate isolation of encountered aquifers.</p>

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	<ul style="list-style-type: none"> • Aquifers encountered in the drilling must be isolated to ensure there is no mixing of waters. • Boreholes when no longer required must be grouted for the full length of the hole ensuring (1) isolation of aquifers, (2) no gas is escaping, and (3) mine safety. • A method of determining rehabilitation success must be described in the Surface Disturbance Notice. • Before and after photographs are to be submitted with the Exploration Rehabilitation and Relinquishment Report (EDG13), which is required upon completion of the Exploration Program. 	<p>Boreholes no longer required will be grouted for the full length.</p> <p>Surface Disturbance Notice will include methodology for determination of rehabilitation success.</p> <p>Before and after photographs will be submitted with the Exploration Rehabilitation and Relinquishment Report which will be submitted at the completion of the Exploration Program.</p>
<p>Wollongong City Council.</p>	<p>To ensure that all the recommendations in the consultant's report are complied with.... it is recommended that all the proposed activities be supervised and certified by a qualified environmental consultant.</p>	<p>The following management structure is included in the Environmental Management Strategy adopted by Apex for the proposed Exploration Project.</p> <p>The Apex Energy NL (Apex) Gas Exploration Project was approved by the Minister for Planning on 23rd September 2009 under the Environmental Planning and Assessment Act 1979. Since that time Apex has investigated bringing involvement of other groups into the Project, and an operating structure has now been agreed to enable implementation of the project. This section describes that structure.</p> <p>A Farm-in and Purchase Agreement was concluded between Apex and Ormil Energy Limited (ASX OMX), and its operating subsidiaries, in September 2010. Subsequently the Petroleum Exploration Licences 442, 444 and 454, plus other interests in the southern Sydney Basin, are held 80% by Apex and 20% by Ormil Energy (via subsidiary Sydney Basin CBM Pty Ltd). In addition, under the farm-in and Joint Venture arrangements, Ormil shall fund a three staged Works Program for a total \$10.5 million to earn up to a further 30% interest.</p> <p>Ormil Operations Pty Ltd (subsidiary of Ormil Energy Ltd) has been appointed the Project Operator and an oversight Committee will be formed under the Joint Operating Agreement.</p> <p>The parties have appointed Mr Gerard Pol as Exploration</p>

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		<p>Manager under the Petroleum (Onshore) Act 1991 and he holds the same position on behalf of the Joint Venture to manage the operations in accordance with their objectives.</p> <p>The Apex Energy/ Ormil Energy Joint Venture will establish the following Project Management Structure to ensure that the objectives of this EMS are met.</p> <p>The JOA Committee will manage the project on behalf of the Joint Venture partners.</p> <p>The EM will have the day to day responsibility of ensuring that all site activities are undertaken by employees and contractors in accordance with this EMS.</p> <p>The Joint Venture Exploration Manager (EM) is responsible for all matters relating to Environmental Management of the Project.</p> <p>The EM will appoint or commission environmental experts for any advice and recommendations in order to undertake an internal auditing/inspection and consulting role as required.</p>
	<p>The Vegetation Clearing and Rehabilitation Management Plan should include the requirement for an ecologist who is familiar with <i>Pultenaea aristata</i> and <i>Cryptostylis hunteriana</i> to be present on site during clearing operations. Ideally, a rapid, pre-clearing survey should be carried out by the ecologist prior to commencement of clearing.</p>	<p>Apex has always proposed a Pre-construction site inspection involving a number of stakeholders including a qualified ecologist. One of the objectives of this inspection was to confirm that identified species were avoided during clearing. The Pre-construction site inspection would define the final site layout and Apex will circulate copies of the Final Site Layout following the Pre-construction site inspection.</p>
	<p>The Vegetation Clearing and Rehabilitation Management Plan should also refer to DECCW (2009) Infection of Frogs by amphibian chytrid causing the disease chytridiomycosis and Threatened Species management Information Circular No 6- Hygiene Protocols for the Control of Disease in Frogs. A Hygiene Protocol according to these publications should be included in the Plan.</p>	<p>Apex would be prepared to discuss this matter with DECCW and SCA at the Pre-construction site inspection and act according to their requirements. The Environmental Assessment does not identify Frogs as being susceptible to the activity. In addition DECCW have not raised this issue. The cited materials apply to collection of frog and tadpole specimens and do not appear to be relevant to the proposal.</p>

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	<p>Visibility splays at the access entrance are to be maintained in accordance with AUSTRROADS, "Guide to Traffic Engineering Practice, Part 5: Intersection at Grade".</p>	<p>All traffic display signs will be maintained as specified by Council and RTA requirements.</p>
	<p>The proposed security gate at the intersection of the fire trail is to be located at least 12.5m back from the road to allow vehicles to wait safely without obstructing traffic while the gate is unlocked and opened. The proposed gate should be designed to open inwards so as not to obstruct a waiting vehicle.</p>	<p>This can be implemented provided SCA agree.</p>
<p>Otford Protection Society. Typical submission. Felix Bronnenberg.</p>	<p>Apart from the extensive bushland clearing and risk of pollutant waste water, exploration will lead to applications for commercial extraction – an – enterprise that should never be allowed in such a highly biodiverse conservation and water catchment region. The risk of methane and heavy salt poisoning the catchment, combined with subsidence is far too great.</p>	<p>Apex has adopted a site selection process based on avoiding or minimising disturbance to intact native vegetation.</p> <p>The exploration program will not inevitably lead to an application for commercial extraction. It will determine whether there is potential for commercial extraction and what that could possibly be.</p> <p>Commercial extraction would require a new application and assessment procedure and Apex have always understood that to be the case. If an application is made for commercial extraction Apex would follow all the appropriate procedures for making the application and undertaking an Environmental Assessment, including issues of pollution and subsidence.</p>
<p>Otford Protection Society. Typical submission. Ian Fletcher. Ron Hensen. Guy Reynolds. Simone Seeley. Julius and Felicity Timmerman.</p>	<p>The Sydney Water Catchment land is also home to several endangered wildlife species and forms part of the essential remaining wildlife corridor linking the National Parks to the Illawarra Escarpment and Dharawal SCA. To fragment it further by clearing bushland and fencing will place these species in greater jeopardy.</p>	<p>The proposal for an exploration well at AI 19 does not fragment bushland in a way that affects wildlife corridors. Apex's EA has identified endangered flora and fauna matters and provides appropriate management responses for any identified issues.</p>
<p>Otford Protection Society. Typical submission. Felix Bronnenberg.</p>	<p>It should also be noted that Borehole AI19 is stated as a Borehole type 3. The current EA statement only briefly refers to early clarifying documents, however, Type 3 Boreholes (as per Apex Energy's documentation) require hydraulic fracturing (fracking) as the drilling will take place on unworked coal seas devoid of 'goaf' gas.</p>	<p>Exploration borehole AI19 will not require fracking.</p> <p>Apex Energy NL intends to carry out business in an environmentally and socially sustainable manner. The company does not intend to utilise the well completion</p>

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		technique known as hydraulic fracturing (fracking) in PEL's 444, 442, 454 and any other area in the Sydney Basin.
Denis Wilson.	Risk of contamination of groundwater.	<p>Apex has assessed the potential for groundwater contamination and in accordance with the original approval for 15 exploration bore holes are required to prepare a Water Management Plan. This Plan has to be submitted prior to the commencement of construction activities at the first borehole site. It must include measures to minimise impacts on groundwater quality, including the potential for cross-contamination. It must include a Groundwater Contingency Plan to address groundwater brought to the surface that exceeds the capacity of on-site detention structures. It must be prepared in consultation with SCA and DECCW by a qualified expert. A draft of the Plan is currently being discussed with SCA and DECCW prior to submission to DoP.</p> <p>Apex has understood that the proposed additional borehole AI19 will be subject to the same condition if approved.</p>
Denis Wilson. Jeremy Townend. Greer Taylor. Anthony Phillips. Daniel Osborne. Eleanor McPhee. Anne Kennedy. Nikki Hensen. Karin Hensen. Catherine Hensen. Patricia Gauci. Maurice Dowson. Juliet Dingle. Stephen C Dillon. Ben Crosby. Kay Blanch. Heather Fisher. Heather Seigh.	Requests Department of Planning to immediately stop all Part 3A applications.	Decision for Department of Planning.

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<p>Denis Wilson. Jeremy Townend. Greer Taylor. Anthony Phillips. Daniel Osborne. Eleanor McPhee. Anne Kennedy. Nikki Hensen. Karin Hensen. Catherine Hensen. Patricia Gauci. Maurice Dowson. Juliet Dingle. Stephen C Dillon. Ben Crosby. Kay Blanch. Heather Fisher. Heather Seigh.</p>	<p>Requests Department of Planning to include all previous submissions opposing inappropriate development in this area.</p>	<p>Decision for Department of Planning. Apex does not agree with the contention that exploration in this area is inappropriate development.</p>
<p>Denis Wilson. Jeremy Townend. Greer Taylor. Anthony Phillips. Daniel Osborne. Eleanor McPhee. Anne Kennedy. Nikki Hensen. Karin Hensen. Catherine Hensen. Patricia Gauci. Maurice Dowson. Juliet Dingle. Stephen C Dillon. Ben Crosby. Kay Blanch. Heather Fisher. Heather Seigh.</p>	<p>A two week period for submissions on such an important issue is clearly not in the public interest. I look forward to the premier personally intervening to stop this project.</p>	<p>Decision for Department of Planning. Apex has followed the legislated procedures for Project Application and Application to Modify a Project Approval. This submission topic should be reviewed in light of this being a modification application that has been subject to a review process involving public submissions. The original Project Application was on public display for a longer period (approximately 1 month in early 2009).</p>
<p>Greer Taylor.</p>	<p>Fracking puts the environment at risk.</p>	<p>AI19 proposed modification does not include fracking. Nor</p>

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Karin Hensen. Maurice Dowson. Ian Fletcher.		does any exploration work for the already approved 15 boreholes.
Karin Hensen.	Opening cracks in the surface rock can only further exacerbate the loss of water from dams.	Apex does not expect that undertaking AI19 (and the already approved 15 boreholes) will result in cracking of surface rock.
Maurice Dowson.	The film GasLands exposed the hitherto unrecognised risks to public health, drinking water supplies and un-audited releases of methane to the atmosphere.	Apex has assessed environmental impact in a scientific way and does not expect adverse public health or water quality impacts as a result of construction and operation of AI19.
Juliet Dingle.	There are too many unknown consequences of gas seam mining associated with groundwater quality and quantity.	Groundwater quality and quantity impacts will be managed in accordance with Water Management Plan as discussed above.
Juliet Dingle.	The gas mining companies should not be allowed to make enormous profits and breach MSDA and pollution regulations at the cost of our present and future wellbeing.	Apex plans to comply with MSDA (Material Safety Data Sheet) and pollution regulations. Apex will be investing (not making enormous profits) during the exploration phase. The data will be made available to the Stage Government and will provide base data for future energy sources for the State.
Total Environmental Centre.	The process to develop the NSW Coal and Gas Strategy has commenced. The TEC have outlined their position in the formulation of the Strategy including a moratorium on new CSM extraction in NSW, and establish areas that are off-limits to longwall mining and CSM extraction including Sydney's Metropolitan Special Areas.	Apex is not aware of any moratorium on new CSM extraction projects in New South Wales.
Total Environmental Centre.	<p>The proponent's previous project approval in this area appears to have breached some very basic conditions of its approval. A number of plans were required of the proponent and environmental monitoring plans and results were required to be displayed on the company's website. As of February 2011, the proponent had still not displayed any results and in September 2010 stated that no fieldwork had taken place.</p> <p>Not only is this a breach of the consent conditions for the initial project but also it denies the public and other entities the ability to properly assess the current proposal in what is a highly sensitive environment. This is unacceptable.</p>	Apex acknowledges that it has to prepare a number of plans. These plans have to be produced generally, "prior to the commencement of construction activities at the first borehole". Construction activities have not commenced and consequently Apex has not breached the Project Approval. Drafts of all the plans have been submitted to the Department of Planning for review and discussion. Plans that are being developed in consultation with SCA and DECCW have been forwarded to those organisations for similar review and discussion. Following review and discussion, these plans will be finalised and lodged with the Department of Planning for approval as required by the Project Approval dated 23rd September 2009, prior to the commencement of construction activities.

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		<p>In addition, they will be made available on the company web site once they have been approved. This is also in accordance with the Project Approval.</p>
<p>Total Environmental Centre.</p>	<p>TEC also believes that no boreholes or the clearing of native vegetation for these should encroach upon upland swamps in the project area. Twelve of the fifteen boreholes proposed appear to be in close proximity to upland swamps.</p>	<p>Apex will install water control systems to avoid adverse impact to any nearby swamps. The access track to AI19 traverses an area identified as Upland Swamp, but the access track will follow the existing alignment of the closed fire road and will avoid clearing any new alignment.</p> <p>In relation to the 15 boreholes already approved the area of Upland Swamp potentially affected is a maximum of approximately 0.56 ha. It is emphasised that this is the maximum potential area potentially affected. Final site design and operational layout will minimise the area eventually affected.</p>
<p>Total Environmental Centre.</p>	<p>The details of how much contaminated groundwater will be brought to the surface where it will be transported and the impacts of truck movements on what have until now been little used fire trails is also insufficient. The project should not be approved unless the chances of an overflow of groundwater in extreme rainfall are completely nullified.</p>	<p>Apex believes their proposals for groundwater management as described and committed to in the Water Management Plan address groundwater impacts. It is acknowledged that the Water Management Plan is currently in draft form, however it will be finalised in consultation with DECCW and SCA before approval by the DoP.</p>
<p>Total Environmental Centre.</p>	<p>With policy in this area steering towards an examination of cumulative impacts, TEC recommends that consideration of surface disturbance by pipelines, holding ponds, contaminated groundwater etc. Be undertaken in the context of a fully functioning gasfield, which according to the proponent's website is clearly what the company expects approved. The impacts of the existing longwall mining operation in the project area should also form part of this consideration.</p>	<p>Apex contend that the impacts need to be assessed for this project i.e. exploration well AI19. Should the exploration prove encouraging any further work (which could be additional exploration to the already approved 15 boreholes or a gas production exercise) would be subject to another application, environmental assessment and project approval process. Mining at AI19 was undertaken approximately 20 years ago and used the pillar extraction method. AI19 is targeting a remnant coal pillar and is not subject to any influences from longwall mining.</p>
<p>Peter Turner.</p>	<p>The assessment of the exploration well proposal should include an assessment of that well then becoming a production well. It would be folly to approve a gas mining exploration well without assessing whether the project area was suitable for subsequent gas extraction by horizontal hydraulic fracturing or fracking.</p>	<p>The exploration borehole at AI19 will be filled with cement at the completion of exploration. If the site is to be used for any future gas extraction a new borehole would be required and a new Project Application and associated Environmental</p>

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	<p>Apex Energy documents indicate that fracking would be used at the well for which approval is being sought, well AI19, should that well prove commercially viable. Further, as is now recognised in the US and UK, the full project envelope and its likely cumulative impacts have to be taken into consideration, and not just the individual well being considered for approval. A 'case by case' approach is inadequate, irresponsible and not in the public interest. A recent edition of the ABC Four Corners documentary series has highlighted the 'foot in the door' approach of gas mining companies.</p>	<p>Assessment and approval process would be initiated.</p> <p>Fracking will not be used for AI19 exploration. It is not Apex's intention to use fracking for future gas extraction.</p> <p>This is not a foot in the door approach. Apex needs to determine gas reserves in order to decide whether a viable gas project is possible. This decision will include environmental as well as commercial considerations.</p>
<p>Peter Turner.</p>	<p>The submission lists a number of shale gas mining areas where moratoria have been implemented and inquiries initiated. The submission then goes on to state, "Shale gas and coal seam gas (CSG) mining have in common the technique of horizontal hydraulic fracturing or 'fracking'. Apex documents show that the company will use fracking at the AI19 well and other wells should they prove commercially viable, as anticipated.</p>	<p>Apex will not be using fracking at AI19 during exploration. It is Apex's intention to not use fracking for future extraction should a gas extraction project ever be proposed.</p>
<p>Peter Turner.</p>	<p>A moratorium on coal seam gas exploration and mining in the Illawarra, NSW and Australia should be put in place until an independent and comprehensive inquiry establishes the requirements and boundary conditions for environmentally safe and financially viable operations. The broader impacts of gas mining must also be considered, including the green-house gas footprint.</p>	<p>Apex has the PEL and associated rights to explore for gas. It has yet to establish that a viable gas reserve exists. It does not have the right to develop a gas extraction project. This right would only be properly granted by appropriate review and assessment of any proposal by State and Federal Governments and the acquisition by Apex of appropriate Mining Title.</p>
<p>Peter Turner.</p>	<p>The submission lists the following impacts and hazards associated with CSG mining and fracking.</p> <ul style="list-style-type: none"> • Aquifer contamination by fracking fluid additives and contaminants leached from strata, including naturally occurring radioactive materials. It's recently been reported that only two of the more than twenty chemicals used for fracking in Australia have been assessed by the national industrial chemical regulator. In NSW there is currently no regulation of fracking. • Catchment contamination by so called produced water returned to the surface for storage or treatment. The amount of fluid returned varies between 15 and 80 percent of that injected. • Drainage of surface waters and aquifers. Departmental advice to the federal government expresses concern that the Great Artesian Basin aquifers may not recover for 1000 years. • Sourcing, use and contamination of very large volumes of water that will 	<p>Fracking will not be used by Apex for AI19 during exploration. It is not Apex's intention to use fracking for future gas extraction exercises. Consequently, the comments about returned water volumes and impacts on the great Artesian Basin are not relevant to this application.</p> <p>Fracking will not be used. Apex water consumption estimates are able to be supplied as required by water tanker. Consequently, there will not be high levels of traffic either.</p> <p>Apex has considered rig noise during drilling of AI19. (Refer Section 4.6 and Appendix 3 of EA). Apex will incorporate management practices to reduce noise levels. Monitoring will also be undertaken to confirm noise criteria are achieved. Action will be undertaken to address noise issues and should</p>

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	<p>subsequently require treatment. Each stage in a multi-stage hydraulic fracturing requires some 1 to 2 megalitres of water and the entire multi-stage fracturing operation for a single well requires around 9 to 29 megalitres of water. A single site may have six production wells, requiring between 54-174 megalitres of water for the first fracking operation. The fracking may later be repeated.</p> <ul style="list-style-type: none"> • High levels of truck traffic associated with water delivery and/or its removal for treatment. • Rig noise in the vicinity of dwellings. • Methane gas emissions from leaking wells, inadequate capping of abandoned wells, ground fissures, storage tanks and gas pipelines. • Methane is a highly flammable gas and the Apex Energy gas wells are in a high conservation value area that will suffer increasing numbers of severe bush fires as a result of global warming. 	<p>they not be able to be rectified, drilling would be limited to periods where criteria are met after implementation of amelioration measures.</p> <p>Apex intends to carry out all operations including well design, construction and maintenance in line with best industry practice under the supervision of appropriate government agencies. Apex has a current well situated within PEL444 that demonstrates the standard of construction intended and demonstrates the ability to construct sites that are fit for purpose, including fire prevention and protection aspects. Apex has already consulted with RFS officers in the Illawarra and Wollondilly areas on fire prevention, protection and fire proofing and any future operations and/or construction will occur following proper risk management and consultation with key stakeholders. These measures are required by law.</p> <p>SCA in their response dated 2/3/11 state that they consider the fire prevention and protection measures proposed by Apex to be adequate. The SCA would require Apex to meet its requirements relating to Bushfire Season and Hot Works on SCA land. These requirements should be specifically included in a Project Commitment or Condition of Approval. Apex supports this requirement.</p>
<p>Peter Turner.</p>	<p>The new well is identified as AI19 and is located within the upper reaches of the Forest Gully catchment, and is within a Sydney Catchment Authority Special Area. The envelope of the Apex Energy project submitted in 2007 (07_0103) encompasses PEL 442 and PEL 444 and CCL703 through a joint venture agreement with Peabody Energy. Apex documents from 2010 relevant to and discussing the joint venture and its future confirm Apex aspirations to mine gas in CCL703, with the cooperation of joint venture partner Peabody. These plans include pipelines and a gas fired power station near Darkes Forrest. CCL703 includes the Metropolitan mine expansion area approved in 2009, and this area lies under Woronora Dam and its catchment water ways, including the Waratah Rivulet. The now damaged Waratah Rivulet has in the past supplied about 29% of the water flow to Woronora dam.</p>	<p>Apex Energy NL has a JV with Peabody only in relation to Metropolitan Colliery tenures. No JV exists between the companies for any other areas. Apex's relationships with other organisations are clearly stated on its web site www.apexenergy.com.au.</p> <p>The Apex document frequently referred to is an internal document referring to Apex's ongoing feasibility studies and its relationship with Metropolitan Colliery. The Sydney Morning Herald report on this JV and actions taken in relation to Part 3A submissions is incorrect. The contradictions in Apex's response to the Sydney Morning Herald article result from the article's inaccuracies. Apex provided the SMH with written</p>

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	<p>The project for which Apex Energy is now seeking an expansion was approved in 2009, the same year that the Metropolitan Coal Project proposal to expand the Helensburgh coal mine was approved, again following delegation by then Planning Minister Keneally. That is, both projects were being assessed by the Department of Planning at much the same time. Although in the same area of the Illawarra, neither project assessment and approval makes reference to the other. It is now widely known that the Metropolitan Mine expansion proponents, Peabody Pacific, are joint venture partners in the Apex Energy project and that Peabody have sought to keep their association with the gas mining project hidden from public attention in order to avoid scrutiny and hindrance to their project application and mining activities in the area. This included the temporary withdrawal from the Apex Gas exploration Project application of three well sites on areas operated by Peabody, specifically to avoid any “ ... possible disruption to the then Metropolitan mine Part3A (now approved)” and “ Subsequently Peabody asked Apex if it would remove the three planned wells on CCL703 from its application so as not to provide added complication for the mine in its planning approval process.” The intention being to reinstate those three wells at a later date. That the two projects were each considered for approval in isolation, knowing their relationship, reflects a serious lapse of responsibility on the part of the NSW Department of Planning.</p> <p>The response from Apex to the Sydney Morning Herald reporting of the Apex, Peabody and Department of Planning discussions, directly contradicts Apex documents, and so calls into question their credibility.</p> <p>The Southern Coalfield Inquiry (SCI) and the 2009 NSW Planning Assessment Commission review of the Metropolitan Coal Project (MCP) make clear the damage caused by longwall mining in the Illawara, and this includes ruptured and drained watercourses, and the release of methane and carbon dioxide gases. The 2009 mine expansion review notes “<i>The environmental consequences for watercourses impacted by subsidence can be severe. There is abundant evidence of this in the reaches of the Waratah Rivulet that have been undermined by previous longwalls.</i>” The Waratah Rivulet is within CCL703, where Apex Energy aspires to mine gas, including the use of fracking.</p> <p>Gases released by mining activity travel upwards through any cracks in the strata and may escape from surface fissures. Where the cracks emerge under surface waters, gas bubbles can be seen. The Southern Coalfield Inquiry documents include photographs of gas bubbling out of the Cataract and St</p>	<p>responses to questions and spoke verbally to the SMH reporter Apex’s information was not incorporated into the article. Furthermore, the SMH were provided with a written response to its inaccurate reporting (see Apex web site news articles) and declined to publish this response.</p> <p>In consultation with Metropolitan Colliery management and immediately prior to the submission to the DoP of both Part 3A applications, it was recognised that the extraction of gas from Metropolitan Colliery tenures for commercial use had not been addressed. For this reason Peabody consulted with Apex to assess the criticality of the three potential borehole sites sited on CCL703 contained within Apex’s preliminary submission. Subsequently Apex determined that the three sites were low priority and indeed impracticable. Two of the three sites in question were in the path of the new longwall blocks and the third site was in a highly geologically disturbed region. Therefore in consultation with the DoP, Apex withdrew its application for these three sites from its final Project Application and proceeded with 15 potential sites in its Part 3A submission.</p> <p>Any future CSG activity within the boundaries of the Metropolitan Colliery tenures would be subject to further planning activities and subject to stakeholder approval.</p> <p>Apex must assess project feasibility. Apex has done many desk top studies of the regions in which it operated including the Darke Forest and Helensburg areas. However, these studies are simply desk top studies as stated in the documents. Clearly any desk top study only represents a high level assessment of possibilities and would be subject to far more in depth future studies and stakeholder consultation. Apex holds Petroleum Exploration Licenses granted by the NSW Government. These licenses not only entitle Apex to explore and assess feasibility, they <u>require</u> Apex to explore and assess feasibility. The desk top studies and other exploration activities are in accordance with these obligations placed on Apex by the terms of the licenses.</p>

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	<p>Georges rivers.</p> <p>The southern coal fields suffer both conventional and non-conventional subsidence, and the MCP review makes it clear that non-conventional subsidence is poorly understood and cannot be reliably modelled or predicted. The expansion of the Metropolitan mine is therefore an experiment being conducted in an important catchment area with little real understanding of the acknowledged risks. The introduction of gas mining in the same region will compound the manifest risks associated with longwall mining, and an assessment of a gas mining project must surely include any compounding or multiplier effect arising from coal mining in that same region.</p> <p>Not only must the full project envelope be taken into consideration when assessing the Apex project modification application, the full context of the project must be taken into consideration and this includes coal mining operations and impacts in the area.</p> <p>The MCP review notes <i>“The potential loss of catchment yield was a strongly contested issue that could not be resolved beyond doubt on the information available. However, the Panel’s view is that the risk of any significant loss is very low unless a major geological discontinuity is encountered during mining that provides a direct hydraulic connection between the surface and the mine workings. This is considered unlikely.”</i> The introduction of fracking in the same area may well provide a sufficient geological discontinuity. The current low level of the Woronora Dam has resulted in speculation of mining related damage, and the Metropolitan Mine is known to contain high volumes of water. Fracking in the same area compounds the risks to the Illawarra water catchment.</p>	<p>Apex agrees that detailed consideration should be given to combined gas extraction and longwall mining activities. It is for this very reason that the three exploration boreholes referred to in Apex’s preliminary Part 3A submission were removed in consultation with Metropolitan Colliery.</p>
Peter Turner.	<p>Green House Gas Emissions.</p> <p>The recently released Tyndall report on shale gas mining in the UK observes <i>“If carbon emissions are to reduce in line with the Copenhagen Accord’s commitment to 2°C, urgent decarbonisation of electricity supply is required.”</i> Investment in gas fired power stations, with a likely working lifetime of more than 20 years, will delay the introduction of renewable energy sources and so hinder or oppose rapid reductions in GHG emissions. Gas combustion can only be a low carbon energy source if coupled with carbon capture and storage technology (CCS) and there is little or no prospect of that being deployed on the scale required in the short to medium term, if at all. The Tyndall report points</p>	<p>Apex considers that this is a matter not directly relevant to an exploration proposal</p> <p>Apex is currently attempting to define if there is a gas resource in the PELs it holds. Only after gas quantities and quality is defined can thought be given to a specific future use, which may or may not be power generation. The assessment of that yet to be defined future gas project would rightly include a greenhouse gas assessment component.</p>

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	<p>out that in an expanding global economy gas fired power stations are more likely to augment than replace coal fired power stations. It's also worth noting that the Federal Governments Cleaner Future for Power Stations programme does not include gas fired power stations.</p> <p>While electricity generation from gas combustion produces around half as much carbon dioxide as does coal combustion, recent preliminary full life cycle studies suggest any potential benefit is significantly undermined, and perhaps negated, by energy consumption for well operations, truck movements, produced water treatment, and the leakage of methane gas from well sites, surface fissures, containers and pipelines. Referring to the same study, the World Coal Association recently made the same observation in a submission to the shale gas inquiry initiated by the UK Energy and Climate Change Committee and now underway.</p> <p>Apex plans recognise that CSG and goaf gas in the new Metropolitan Mine workings have high levels of carbon dioxide. They would mix this gas with gas having higher methane content from other Apex mining sources. Doing so would add to the green house gas burden of the Apex gas.</p>	
<p>Peter Turner.</p>	<p>NSW Regulation of Coal Seam Gas Mining.</p> <p>Coal seam gas mining and fracking are essentially unregulated in NSW. There is a restriction on well placement; CSG companies cannot drill a well closer within 200m of homes or within 50m of orchards, vineyards, rivers or streams. However, this does not include horizontal drilling which may extend several hundred meters from the central well. While Premier Keneally proclaimed <i>"tough new rules for coal seam gas exploration"</i> in December 2010, in reality they are largely ineffectual and change little:</p> <ul style="list-style-type: none"> • The requirement for the NSW Department of Industry and Investment to only "take into consideration" Department of Energy Climate Change and Water recommendations is much the same as was previously required of the DoP and is entirely inadequate. Given the risks, DECCW should have a matching approval role. • There is no significant change to community notification and consultation processes. • There is no requirement for documents to be made public, such as new work plans and the Review of Environmental Factors documents. <p>Fundamentally the approval process remains opaque.</p>	<p>Essentially a matter for the State Government.</p> <p>Apex will work within the NSW Planning and regulatory system in place now and in the future. It is committed to carrying out its business in an environmentally and socially responsible manner. Apex's current project and its permitted activities are for exploration only. No approach has been made to the NSW government in relation to fracking or any other gas production stimulation technique. Such production methods and approval for such methods is subject to future application.</p>

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	<ul style="list-style-type: none"> • There is no commitment to ban the use of BTEX fracking fluid additives; these additives have been banned in Queensland. • There is no commitment to develop legislation governing CSG mining. • There is no commitment to halt CSG mining while a cumulative environmental impact assessment is made for each of the effected regions in NSW. 	
Peter Turner.	<p>Concluding Remarks</p> <p>The Apex Project modification application is not just an application for an additional exploration well in the northern Illawarra catchment area. It's effectively an application for confirmation of the implicit determination made in the original Apex project approval, that the northern Illawarra is a suitable location for full production coal seam gas mining essentially collocated and undertaken concurrently with longwall coal mining. Apex documents make this clear, and a 'case by case' assessment is in adequate as experience in the US and now Queensland has demonstrated.</p> <p>Previous reports and reviews have highlighted the lack of knowledge and understanding of the risks associated with these activities. Past approvals have been in effect an expression of hope that everything will turn out 'OK'. The consequences of such hope being misplaced are dire. There must be a moratorium on CSG mining related activity in the Illawarra until the risks are better understood. This assessment must include the risks to water supply and the emission of green house gases arising from all mining activity in the region – including GHG arising from domestic combustion and the combustion of exported coal and gas.</p>	<p>The Apex application for AI19 is an Application to Modify a Project Approval. Appropriate exploration activity will enable the definition of the quality and quantity of gas within PEL. This is an essential pre-requisite before Apex can determine whether the resource is able to be developed further. Gas quality and quantity information will enable a correct, accurate and appropriate assessment of a future gas utilisation project.</p>
<p>Sally Chapman. Felix Bronnenberg. Ian Fletcher. Benjamin Hammond. Ron Hensen. Guy Reynolds. Simone Seeley. Julius and Felicity Timmerman.</p>	<p>Extensive clearing of pristine bushland will be required.</p>	<p>Extensive clearing of pristine bushland is not required. Refer EA Section 4.3.1.</p> <p>A total of 0.66 ha of vegetated area will be disturbed for the current proposal. The proposal will involve the primary disturbance of 0.16 ha of vegetation at the borehole site. Site works will involve levelling a drill pad, development of drill sumps and soil containment and erosion and sediment control. Approximately 0.50 ha of secondary disturbance of rehabilitated vegetation along the disused Fire Road is required (1000 m x 5 m wide).</p>

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		<ul style="list-style-type: none"> • The majority of the length of the overgrown Fire Road 9A traverses the Exposed Sandstone Scribbly Gum Woodland vegetation community. Further the borehole site is located within this vegetation community. In all an estimated total of 0.16 ha of this community will be disturbed for the development of the borehole site and a further 0.34ha of this vegetation community which is regenerating on the abandoned fire road will be disturbed by the proposal. • Approximately 250 m of the overgrown Fire Road 9A traverses the Upland Swamp Fringing Eucalypt Woodland vegetation community and could be considered to represent this community in its regenerating state. In all an estimated total of 0.13 ha of this community will be disturbed for the development on the abandoned fire road. • Within the study area, approximately 80m of the overgrown Fire Road 9A traverses the Upland Swamp-Banksia Thicket vegetation community and could be considered to represent this community in its regenerating state. In all an estimated total of 0.04 ha of this community will be disturbed for the development on the abandoned fire road.
<p>Sally Chapman. Darren Agar. Felix Bronnenberg. Ian Fletcher. Wendy Fuller. Benjamin Hammond. Ron Hensen. Guy Reynolds. Simone Seeley. Julius and Felicity Timmerman.</p>	<p>Proposal is located in a key Sydney water catchment.</p>	<p>All documentation submitted by Apex for this application clearly acknowledges the location as being within Sydney water catchment.</p>

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<p>Sally Chapman. Kim Freil. Ian Fletcher. Benjamin Hammond. Ron Hensen. Guy Reynolds. Simone Seeley. Julius and Felicity Timmerman.</p>	<p>The contamination of groundwater supplies is an identified risk in the process of “fracking”. Impact of BTEX chemicals.</p>	<p>Fracking will not be undertaken for A119. A119 is an exploration core hole location for strata sampling and assessment. Future activities are yet to be determined.</p>
<p>Sally Chapman.</p>	<p>The leaching of methane gas has serious health and climate effects.</p>	<p>Apex has both coal mine gas (CMG) and coal seam gas (CSG) within its tenures. CMG is gas produced by mining activity. Apex’s is committed to reducing fugitive CMG emissions. Any methane gas contained within and active or abandoned coal mine is a resource and for that reason it is Apex’s intention to capture as much of this gas as possible. Indeed Apex’s intention is to reduce total regional fugitive gas emissions. This makes good business sense. Furthermore, activities in relation to CSG exploration as well as any future commercial gas production can only be undertaken on the basis of effective risk management and engineering design. Any fugitive gas produced as a result of Apex activity will be addressed through effective management processes. In terms of the quantity of gas emissions produced as a result of Apex activities, it is anticipated that this quantity would be minute and that its fugitive gas emission capture initiatives would offset any fugitive CSG emission.</p>
<p>Debby Avis.</p>	<p>My home is located right next to a proposed well with the only access being my dirt road, this will ruin my lifestyle and my being.</p>	<p>The address given for this submission was 70 Princes Highway Helensburgh. A119 is located along Darkes Forest Road, Darkes Forest.</p>
<p>Sarah Daniel.</p>	<p>There is no purpose into exploration into this dangerous practice that is being marketed as the answer to our reliance on dirty coal. It is no better. The chemicals used are highly toxic and there are very high possibilities of these contaminating important water systems that we rely on for survival.</p>	<p>The purpose for this exploration is to determine whether a gas resource exists. Chemicals proposed to be used are KCL and a biodegradable drilling fluid polymer. Cement will also be used as well as livestock grade bran.</p>
<p>Kim Feil.</p>	<p>Please refrain from approving any drilling until the EPA water study is</p>	<p>Apex is not aware of any EPA water study underway or</p>

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	completed.	proposed.
<p>Heather Fisher. Justin Guest. Nikki Hensen. Ron Hensen. Yvette Johnson. Guy Reynolds. Dr Paul Rustomji. Simone Seeley. Julius and Felicity Timmerman.</p>	<p>Our water supply and ground water will become irrevocably contaminated.</p>	<p>Apex assessment does not reach this conclusion.</p>
<p>Ian Fletcher.</p>	<p>Exploration approval will lead to applications for full scale extraction which should never be allowed in this area.</p>	<p>The exploration program will not inevitably lead to an application for full scale extraction. It will determine whether there is potential for commercial extraction and what that could possibly be.</p> <p>Commercial extraction would require a new application and assessment procedure and Apex have always understood that to be the case. If an application is made for commercial extraction Apex would follow all the appropriate procedures for making the application and undertaking an Environmental Assessment.</p>
<p>Nikki Hensen.</p>	<p>Increased risk of fire in local area.</p>	<p>Apex acknowledges the need for fire control and management. SCA in their response dated 2/3/11 state that they consider the fire prevention and protection measures proposed by Apex to be adequate. The SCA would require Apex to meet its requirements relating to Bushfire Season and Hot Works on SCA land. These requirements should be specifically included in a Project Commitment or Condition of Approval. Apex supports this requirement.</p>
<p>Yvette Johnson.</p>	<p>The risk to the local community of Helensburgh, Otford and Stanwell Park is unacceptable.</p>	<p>Construction and operation of an exploration well at A119 (and the already approved 15 exploration boreholes) does not pose a risk to Helensburgh, Otford and Stanwell Park.</p> <p>Risks associated with any future developments (should they be</p>

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		shown to be feasible) will be appropriately assessed at that time.
Yvette Johnson.	This is the first paper work I have seen in relation to this project and I received it today 22nd February 2011, one day before the submissions close. The date on one of the forms was 2007. I object to the fact that there has been no consultation with the community until now.	Matter for Department of Planning.
Charmaine Knight.	I am very concerned regarding the proposal and its devastation it will place on the environment and surrounding communities as well as the additional traffic with trucks on our roads which are not adequate to support this proposal.	Apex contends that there will not be devastation associated with AI19 (or the already approved 15 boreholes). Additional truck traffic will be minimal for the exploration activity
Leila Kraushaar.	<p>Not completed sufficient research into coal seam gas mining to establish whether or not it is safe, and assess what implications it will have on the environment.</p> <p>I am terrified of the potential environmental consequences of expansion of gas exploration and mining. Having seen a recent 4 Corners program into the myriad of problems being faced by Queensland land owners, I believe this technology is either not ready to be used, or that companies are not bothering to utilise the technology safely.</p>	Apex emphasise our commitment and willingness to cooperate fully with regulators and other stakeholders to ensure that operations are carried out in an environmentally sustainable manner.
Dr Anne Young.	<p>I object to the approval of this proposal on several grounds:</p> <ul style="list-style-type: none"> • Apex NL has not demonstrated its ability to deliver acceptable environmental outcomes for the project 07-0103 already approved • there is no provision for community scrutiny of the existing project and thus no community confidence that an environmentally valued area is being protected • the environmental impacts, especially on swamps and under extreme rainfalls, may be significant • approval further encourages the company to expect to develop resources in a highly sensitive area (as shown by its listing under SCA and National Parks & Wildlife Service) and indeed in an area from which another company has just withdrawn following public outcry. 	Apex has not demonstrated its ability to deliver acceptable environmental outcomes for the project 07-0103 already approved because those operations have not yet commenced. However, systems are being devised in consultation with relevant experts and government agencies as Apex moves towards drilling activities. When such activities commence, Apex will demonstrate its ability to deliver acceptable environmental outcomes as it works within its detailed and thorough management system put in place in line with the requirements of Project 07_0103.

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Dr Anne Young.	<p>Performance of already approved drilling operations The Project 07-0103 approved in September 2009 envisaged a 3-year project, base on an 11 week period for each of 15 boreholes. The Approval for the Project required, among other matters, a water management plan, an erosion and sediment control plan, and a vegetation clearing and rehabilitation plan. Also, within one month of the approval, the environmental monitoring plans and a summary of monitoring results of the project were to be publicly available on the company's website.</p> <p>The website http://www.apexenergy.com.au/illawarraregion/ describes the assets in PEL 444 and 442 but has no information about any activities. I understand that the company submitted an AEMR in September 2010 stating that no fieldwork had taken place. Presumably this is still the case.</p>	<p>Apex acknowledges that it has to prepare a number of plans. These plans have to be produced generally, "prior to the commencement of construction activities at the first borehole". Construction activities have not commenced and consequently Apex has not breached the Project Approval. Drafts of all the plans have been submitted to the Department of Planning for review and discussion. Plans that are being developed in consultation with SCA and DECCW have been forwarded to those organisations for similar review and discussion. Following review and discussion, these plans will be finalised and lodged with the Department of Planning for approval as required by the Project Approval dated 23rd September 2009, prior to the commencement of construction activities.</p> <p>In addition, they will be made available on the company web site within one month of their approval which is in accordance with the original Project Approval.</p>
Dr Anne Young.	Dr Young expresses concerns about her previous requests not being included in the Consent Conditions.	Apex responded in detail to Dr Young's previous submission. Appendix A to this submission includes the original response prepared by Apex.
Dr Anne Young	<p>Proximity to an upland swamp The location of the proposed borehole A119 is constrained by the old workings and geological anomalies below the site, and its proximity to the upland swamp has been taken into account. However avoiding damage to the swamp depends on the runoff controls and especially any stored subsurface water being contained. The controls may well be in accordance with set standards but I reiterate and emphasise the concerns I expressed in respect to the original project and I quote:</p> <p>p 2. Although the drill sites are mainly near or on existing tracks, and the total area to be cleared is not large, this does not mean that environmental impacts are negligible. As the Google images on pp 20-26 show clearly, only A114, A116 and A118 are on wooded ridges. All other sites are beside upland swamps, and a 50-60m radius of disturbance as indicated on p31 would encroach into the swamps. This means that there would be a</p>	<p>This is quoted from Dr Young's submission on the original Environmental Assessment for the 15 borehole drilling programme. The following is an extract from Apex's response to Dr Young's original submission and all references in it refer to the original EA, not to the EA for A119 currently under assessment as part of a Project Modification application.</p> <p>The area of disturbance of each vegetation type by the proposed development is identified in Section 5.1 (p53) of the Biosis Research Flora and Fauna Assessment.</p> <ul style="list-style-type: none"> In the original EA, a total of 1.2 ha of Upland Swamp vegetation had been identified as being disturbed by the proposal. Apex has revisited and re-assessed Borehole Site A110 and decided to relocate the borehole to more

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	<p>significant increase in the existing disturbance, and the additional impacts of compaction and channelled runoff across the surface. Also, while many of the sites lie beside existing fire trails, these trails are not heavy duty access roads. To give the drill rigs and other large vehicles access along them is likely to cause significant widening and disturbance, especially for the work-over rigs (p40). This project will NOT simply operate without any noticeable change in the local environment. Similarly, the comment that these corridors would be used for subsurface reticulation of any developed wells (p9) glosses over the impacts of the traffic needed to dig trenches, lay pipes etc. And as is shown by Figure 3.5 (p32) and the details of sumps etc on p 56, there will be drains, bunds and levelled areas constructed, not just a small area 'cleared'.</p>	<p>elevated land immediately south of the Fire Road. This removes the site from Upland Swamp and reduces the area of Upland Swamp potentially affected to 0.56 ha. It is emphasised that this is the maximum potential area potentially affected. Final site design and operational layout will minimise the area eventually affected</p> <ul style="list-style-type: none"> It is emphasised that access to lay trenches etc is not part of this current proposal. Any additional works will be subject to a separate and subsequent approvals process and they will be assessed on their merits. Any future development application will be required to consider cumulative impacts of any and all previous development/disturbance (including the current proposal). <p>Apex selected the sites to minimise vegetation disturbance. The sites were selected initially to meet drilling operational requirements and geological targets. The selected sites were then inspected over three days between 3rd to 5th September 2008 by a team consisting of the Apex representative, a drilling contractor representative, three representatives from the Aboriginal community, fauna and flora specialists, surface and groundwater specialists, archaeologists and Apex's Environmental Consultant. During the inspections and in response to actual site conditions, the selected sites were then re-located if necessary to avoid potential impacts.</p> <p>In addition, Apex committed to implementing a similar review and selection process, (including a representative from SCA as appropriate) at the final site selection immediately prior to drilling set up.</p> <p>Immediately prior to site set up, the site layout would be confirmed with an objective to maximise use of disturbed area eg along tracks and fire roads, the site layout can be "stretched" and narrowed to maximise utilisation of the already cleared land associated with the track or road.</p>

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		<p>The comment about subsurface pipelines and associated traffic relates to a potential future EA that may, or may not, be submitted depending on the exploration results. The information about pipelines was provided in the current EA to enable the proposed exploration and monitoring program to be understood in the context of potential future development. It is not directly relevant to impact assessment of the proposed works. (Refer EA Section 2.2).</p>
<p>Dr Anne Young</p>	<p>Groundwater Contamination.</p> <p>p32. There is too little detail here to judge the impacts of groundwater transfer to the surface. For example, there is no indication of how much groundwater make is expected. This is not a small issue. The groundwater is expected to be contaminated, as detailed on p52. If this is to be removed by tanker, where is it to be sent? If extreme rainfalls cause an overflow, what will the impacts on the nearby environment be?</p>	<p>This is quoted from Dr Young’s submission on the original Environmental Assessment for the 15 borehole drilling programme. The following is an extract from Apex’s response to Dr Young’s original submission and all references in it refer to the original EA, not to the EA for A19 currently under assessment.</p> <p>Apex will utilise the services of a licensed group to dispose of all drilling water and produced groundwater. Transpacific Industries Group Limited of Unanderra has been approached to provide these services. They have advised that water with less than 20% solids can be disposed at either Transpacific Waste Services facility in Homebush or at the LVRA facility in Appin. These facilities can receive up to 60 tonne and 20 tonne per day respectively. Material that contains greater than 20% solids can be taken to the Transpacific Technical Services facility in Newcastle.</p> <p>Extensive detail has been provided in the EA on site containment of drilling fluid (which, below the Hawkesbury Sandstone, would generally be 3% potassium chloride (3% KCl). This additive is required to both ensure drilling through hard and dispersive clay shales <u>and to provide weighting to the fluid</u> so that it overcomes any pressure of water exogenous to the hole which may have gas pressure behind it.</p> <p>All spent drilling fluid, including any groundwater adventitiously transferred to the surface with the recirculating fluid will be tankered off site.</p>

Submitter	Submission	Draft Response
Dr Anne Young.	<p>The sensitivity of the area The proposed borehole is in an environmentally sensitive area. The location maps (figures 1 and 2 of the main document) give no indication of this. Yet in the Appendix dealing with flora and fauna (p 33), the location is - properly! - shown as very close to the Dharawal State Recreation Area and the major swamps of that protected area such as Iluka and Dahlia Swamps. Another company has just withdrawn application for longwall mining under these areas, and I appreciate that Apex envisages no significant subsidence if full-scale gas extraction were to occur in the future.</p> <p>BUT the problem is that extraction of any gas reserves proven from the area would involve very significant surface disruption. How closely spaced would extraction boreholes be? How much surface disruption would there be also from connecting pipelines to transport the gas, and from access roads for maintenance vehicles and tankers to remove contaminated water from bunds? Even if the pipes are laid in trenches, the trenches need to be cut and then revegetated. Would there need to be power lines to each drillhole/ pumping point? Where would the material taken from multiple boreholes be disposed of? The approved exploration project will disturb 9 ha in total, of which about half is undisturbed native vegetation. And even the 'disturbed' areas are largely re-grown from previous disturbance. Obviously a fullscale development would require many holes in undisturbed native vegetation. The bushland in much of the area is pristine because it has been set aside for water catchment. Are we now to undo this good by permitting extensive surface disruption?</p> <p>It is not good enough to simply argue that any such considerations can be left to the future when another major project application would be necessary. The reality is that companies, having received permission to explore and to prove up reserves, expect to be given permission to develop those resources. The present application values this one borehole as having a capital investment value of \$1 million, and the original project was valued at \$7.4 million. The company must be carrying out the project in clear expectation of approval to develop.</p>	<p>Apex acknowledges the sensitive nature of the area. It emphasises that this current proposal is for an exploration borehole. The matters raised by Dr Young would be properly considered should a Project Application be made for a gas extraction project.</p>

APPENDIX A

Excerpts from Submissions Response for Original EA highlighting Dr Anne Young's submission.

APPENDIX A.

Excerpt From EA Submissions Response Apex Energy Project Application No: 07_0103

Jointly Prepared by Apex Energy NL, EcoEngineers Pty Ltd, Biosis Research Pty Ltd and Olsen Consulting Group Pty Ltd

Submitter	Submission Item	Draft Response
<p>3. Dr Ann Young.</p>	<p>Dr Young has combined the gas exploration phase and the gas utilisation phase. These are two distinct and separate stages. Whether or not gas utilisation is eventually undertaken will depend on exploration results and will be subject to a separate application at some future time.</p> <p>3.1 Comment re p2 of EA. Questions the areas of disturbance.</p>	<p>The area of disturbance of each vegetation type by the proposed development is identified in Section 5.1 (p53) of the Biosis Research Flora and Fauna Assessment.</p> <ul style="list-style-type: none"> • In the original EA, a total of 1.2 ha of Upland Swamp vegetation had been identified as being disturbed by the proposal. Apex has revisited and re-assessed Borehole Site A110 and decided to relocate the borehole to more elevated land immediately south of the Fire Road. This removes the site from Upland Swamp and reduces the area of Upland Swamp potentially affected to 0.56 ha. It is emphasised that this is the maximum potential area potentially affected. Final site design and operational layout will minimise the area eventually affected • It is emphasised that access to lay trenches etc is not part of this current proposal. Any additional works will be subject to a separate and subsequent approvals process and they will be assessed on their merits. Any future development application will be required to consider cumulative impacts of any and all previous development/disturbance (including the current proposal). <p>Apex selected the sites to minimise vegetation disturbance. The sites were selected initially to meet drilling operational requirements and geological targets. The selected sites were then inspected over three days between 3rd to 5th September 2008 by a team consisting of the Apex representative, a drilling contractor representative, three representatives from the Aboriginal community, fauna and flora specialists, surface and groundwater specialists, archaeologists and Apex's Environmental Consultant. During the inspections and in response to actual site conditions, the selected sites were then re-located if necessary to avoid potential impacts.</p> <p>In addition, Apex committed to implementing a similar review and selection process, (including a representative from SCA as</p>

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Submitter	Submission Item	Draft Response
		<p>appropriate) at the final site selection immediately prior to drilling set up.</p> <p>Immediately prior to site set up, the site layout would be confirmed with an objective to maximise use of disturbed area eg along tracks and fire roads, the site layout can be “stretched” and narrowed to maximise utilisation of the already cleared land associated with the track or road.</p> <p>The comment about subsurface pipelines and associated traffic relates to a potential future EA that may, or may not, be submitted depending on the exploration results. The information about pipelines was provided in the current EA to enable the proposed exploration and monitoring program to be understood in the context of potential future development. It is not directly relevant to impact assessment of the proposed works. (Refer EA Section 2.2).</p>
<p>Dr Ann Young.</p>	<p>3.2 Comments re p3 of EA. Clarification of topsoil storage for rehabilitation and sediment controls/silt fences.</p>	<p>Site preparation will typically involve the disturbance of soils resulting from the development of drilling sumps (surface and subsurface soil disturbance) and through general site access and activity (surface soil disturbance).</p> <ul style="list-style-type: none"> ● Only soil liberated from the sumps will be stockpiled for any length of time (duration of the borehole development and drilling operation is typically 10 weeks maximum). ● Assuming the absolute maximum area cleared at 50 m x 60 m, the volumes of soil to be stockpiled at each site is in the order of 150 m³ of O horizon soil and 300 m³ of A horizon soil. ● Soils associated with Upland Swamps are typically very sandy and do not provide a suitable substrate for the development of drilling sumps. ● Section 5.2 (p54) of the Biosis Research Flora and Fauna Assessment identified the recommended amelioration measures to minimise impacts on terrestrial ecological values due to vegetation clearing and soil disturbance. <p>The recommendations included:</p> <ul style="list-style-type: none"> ● Sediment and erosion control measures should be implemented on all sites to prevent erosion during and after construction; ● Disturbance to native vegetation should be minimised, or, where disturbance is unavoidable, borehole sites should

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		<p>be rehabilitated using locally sourced tubestock and brush-matting. Rehabilitation should be undertaken by suitably qualified bush regenerators;</p> <ul style="list-style-type: none"> • Where clearing of native vegetation is unavoidable, native shrubs, logs and bush-rock should be stockpiled on the side of the proposed boreholes and access routes and replaced following completion of the works. • These recommendations will be incorporated into a site Environmental Management Plan that will include specific requirements for soil stock piling and vegetation stock piling. <p>The Environmental Management Plan may include but will not be limited to the following general best practise activities.</p> <p>Soil Translocation</p> <p>Background and Justification</p> <p>Soil translocation is likely to be the most successful and cost effective form of rehabilitation/revegetation for the project. Topsoil harvested from cleared remnants should be viewed as a valuable resource containing a significant supply of seed (and other propagules), beneficial soil micro-organisms and essential plant nutrients.</p> <p>It is estimated that > 65% of native plants within plant communities such as those of the study area are not readily propagated. As a result, revegetation projects which rely on planting only generally appear as highly simplified ecosystems. Large scale soil translocation has been successfully utilised on the Tomago sand beds and in different parts of south-eastern Australia for the rehabilitation plant communities with a similar composition and structure as those that appear within the study area.</p> <p>Soil Salvage and Handling</p> <p><i>Vegetation Clearing and Stockpiling</i></p> <p>Vegetation shall be removed from boreholes sites and stockpiled further downslope of the downslope runoff detention bund wall, to protect it from erosive effects in storm events. Further seed collection from felled trees will be undertaken immediately post clearing.</p> <p>Rocks and logs which may be disturbed will be stockpiled separately e.g. above or on the run-on diversion bund or in the downslope runoff detention bund wall.</p>

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		<p><i>Soil Stockpiling</i></p> <p>Where practical, soil stockpiling will be minimised. Soils will not be stockpiled for long periods of time (N.B. short term stockpiling [several weeks] will be crucial to maximising the level of success). If topsoil is stockpiled for greater than 3 months, testing will be undertaken to account for any potential changes in nutrient status.</p> <p>Soil horizons will not be removed during or immediately following rain in order to minimise the composting process during stockpiling. Soil stockpiles shall be no greater than 2 metres high, and located immediately downslope of the downslope runoff detention bund wall, where they cannot be impacted by water inundation or vehicle traffic.</p> <p>All stockpiles will be pegged and appropriately labelled. A register of all stockpiles (soil horizons and vegetative waste) shall be maintained with reference to dates, donor site locations and recipient site locations.</p> <p><i>Stripping of Soil Horizons</i></p> <p>Avoiding excessive mixing of soil horizons will be crucial to maximising vegetation re-establishment. Plant operators will ensure that appropriate machinery is utilised to effectively undertake the soil translocation. Small scale soil translocations have been previously been achieved using an excavator with tilting bucket and a truck.</p> <p>The top 50 mm of soil (O horizon) will then be stripped and stockpiled in a separate stockpile located immediately downslope of the downslope runoff detention bund wall, covered by either a plastic membrane or a layer of woody material. This layer of soil contains the majority of soil stored seed and propagules, plant nutrients and beneficial soil microbes.</p> <p>The next 100 mm of the topsoil layer (A horizon) will then be stripped and stockpiled in a separate stockpile located immediately downslope of the downslope runoff detention bund wall, covered by either a plastic membrane or a layer of woody material.</p> <p>Some minor stripping and stockpiling of subsoil horizons (e.g. B and C soil horizons) may then be undertaken depending on depth of bedrock. Similar material will be obtained from excavation of the two ~25 m³ sumps. This material being generally comprised of sandy soil and clayey material will be used to construct the downslope runoff detention bund wall and mechanically compacted.</p> <p>Soil Translocation</p>

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		<p><i>Respreading Soil Horizons</i></p> <p>Subsoil horizon material (B and C) will first be spread back over the allocated recipient sites (including back filling the sumps) <u>in an upslope direction</u>. Translocation of A horizon over B and C horizons will then be undertaken. Finally, the O horizon will be spread over the A horizon.</p> <p><i>Redistribution of Logs, Rocks and Seed Bearing Vegetation on Recipient Sites.</i></p> <p>All remaining stockpiles of rocks, logs and vegetation will then be redistributed over the recipient site. In the case where the area of disturbed soil is greater than the volume of vegetated material to be replaced over the top of the site, brush matting, involving the collection by hand of branches containing seed material (typically from myrtaceous plants or nearby native grasses) would be employed at the site. This is a relatively low cost, but effective mechanism of revegetation that has been successfully employed at drills sites throughout the Woronora Plateau, and across the entire Illawarra region.</p> <p>Avoiding excessive soil compaction (other than during construction of the downslope runoff detention bund wall) will be crucial to maximising plant establishment and all traffic should be excluded from the translocated soil horizons once all materials have been spread on the surface.</p> <p>Revegetation Supplementary to Soil Translocation – in the event that natural regeneration of the site is not progressing quickly.</p> <p>If necessary seed from nearby native vegetation could be collected prior to development and would then be spread over bare areas of the rehabilitating borehole sites in the unlikely event that natural regeneration did not result from the processes outlined above. Direct seeding will only be undertaken in spring and autumn where necessary.</p> <p>Where required (i.e. in areas that remain without any, or indeed poor natural regeneration for a period longer than 6 months), supplementary planting of local provenance tubestock may be undertaken to ensure vegetation is progressively reinstated.</p> <p>A list of suitable plant species for collection, propagation and installation has been derived from the terrestrial flora and fauna assessment.</p> <p>Where revegetation is required, site specific requirements will be identified including appropriate species mixes, planting densities and strategies. In order to achieve optimal species richness, structural diversity and genetic integrity at the borehole</p>

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		<p>site(s), a provenance native plant nursery would be engaged to undertake this work in consultation with the land owner.</p> <p>References:</p> <p>DITR 2006, <i>Mine Rehabilitation - Leading Practice Sustainable Development Program for the Mining Industry</i>, Commonwealth Government Department of Industry Tourism and Resources.</p>
<p>Dr Ann Young.</p>	<p>3.3 Comments re p5 of EA. The gas generation is predicted to supply only a 15MW turbine.</p>	<p>The comment about a 15 MW turbine relates to a potential future Major Project Application that may, or may not, be submitted depending on the exploration results. The information was included in the EA to enable the proposed exploration and monitoring program to be understood in the context of potential future development. It is not directly relevant to impact assessment of the proposed works. (Refer EA Section 2.2).</p> <p>This is an essential potential future stage of any logical development of the gas reserve.</p>
<p>Dr Ann Young.</p>	<p>3.4 Comments re p28 of EA. Ensure surface aquifers are not depleted.</p>	<p>The Hawkesbury Sandstone of the Woronora Plateau and the exploration area in particular is comprised of significantly weathered Hawkesbury Sandstone to depths of up to approximately 75 m maximum. The Sandstone often forms 'hillslope aquifers' with an average storativity around 0.05 and mean bulk hydraulic conductivity to at least 30 m depth typically in the $10^{-7} - 10^{-6}$ m/s range i.e. generally the most permeable strata. It is now recognised these hillslope aquifers sustain downslope upland swamps, particularly through periods of drought and during recovery from wild fires and provide baseflow to draining streams. Supporting studies in respect of this view are as follows:</p> <p>Gibbins, L. (2003) A geophysical investigation of two upland swamps, Woronora Plateau, NSW Australia: Unpublished BSc (Hons) thesis, Macquarie University.</p> <p>BHP Billiton Illawarra Coal (2004) Deep Borehole Investigations of Swamp 18a above Elouera Longwall Panels 9 and 10. April 2004. BHP Billiton Environment and Sustainable Development Dept.</p> <p>Ecoengineers Pty Ltd (2006) Assessment of Catchment Hydrological Effects of Longwall Mining by Elouera Colliery Stage 1: Establishment of a Practical and Theoretical Framework. Report 2006/05A for BHP Billiton, August 2006.</p> <p>Russell, G.N. (2007) Hawkesbury Sandstone groundwater attributes and geological features. Poster paper in CD Proceedings, Hydrogeology over the Years UTS/UNSW 20th Anniversary Symposium, July 2007.</p> <p>Hammond, M.S., 2007, Baseline Study of Hydrogeology above a Longwall Mine in Cordeaux Catchment Area. B.Env.Sci (Hons) thesis, Faculty of Science, University of Wollongong.</p>

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		<p>Ecoengineers Pty Ltd (2007) Surface Water Quality and Hydrology Assessment Dendrobium Mine Area 3. September 2007 (for Cardno Forbes Rigby Pty Ltd).</p> <p>Short, S. A., Waring, C. L., Peterson, M. A., Hammond, M. S., and Wood, J. (2009) Studies of near-surface hydrology and hydrogeology of the Woronora Plateau. Proceedings of the Groundwater in Sydney Basin Symposium. International Association of Hydrologists, Sydney 4 – 5 August 2009.</p> <p>Measures will be put in place to avoid contaminating these near-surface hillslope aquifers and their upland swamp and draining stream (shallow) groundwater dependent ecosystems or depleting them.</p> <p>The principal means of protection of the hillslope aquifers will involve:</p> <ul style="list-style-type: none"> • Drilling the Hawkesbury Sandstone with a Sydney drinking water-based drilling fluid which contains no additive other than possibly a biodegradable starch gel to at least the base of the Hawkesbury. • All wells drilled will have a surface casing set to a nominal depth of 100 m. This will case off (i.e. isolate with cement and steel casing) the upper Hawkesbury Sandstone (the top 75m of concern), from any further losses from the rest of the well. • Estimated drilling time through the Hawkesbury Sandstone is 24 hours. It is believed that the leakage of drilling fluid into the weathered bedding planes etc of the Hawkesbury Sandstone should be minimal over such period. • The incremental time of exposure from drilling for the Hawkesbury Sandstone formation, between setting surface casing at 75 m and 100 m depth, at which it is proposed, is less than 2 hours. Casing to the 100 m will provide safety on casing off the upper sections of concern. The extra efflux or influx during the two hours required to drill from 75 m to 100 m would be minimal.
Dr Ann Young.	3.5 Comments re p32 of EA. Too little detail to judge the impacts of groundwater transfer to the surface. Series of questions directed at practical drilling activities.	<p>Extensive detail has been provided in the EA on site containment of drilling fluid (which, below the Hawkesbury Sandstone, would generally be 3% potassium chloride (3% KCl). This additive is required to both ensure drilling through hard and dispersive clay shales <u>and to provide weighting to the fluid</u> so that it overcomes any pressure of water exogenous to the hole which may have gas pressure behind it.</p> <p>All spent drilling fluid, including any groundwater adventitiously transferred to the surface with the recirculating fluid will be tankered off site.</p>

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Dr Ann Young.	3.6 Comments re p38 of EA. How quickly can flaring be stopped?	<p>Flaring can be stopped instantaneously with manual valves and automatically operated valves that are designed to close during emergency fire events. The wellhead arrangements would be designed to withstand bushfire conditions. The proposed flaring unit is able to withstand fire and is designed to minimise the risk of fire escape.</p> <p>Apex recognises the risks associated with the exploitation of Coal Seam Methane and Coal Mine Methane. Apex's operational personnel are experienced drilling, mining and risk managers who have and will ensure that hazards are adequately identified and risks assessed and controlled. Apex recognises the need to work with the local community and local authorities such as the Rural Fire Service (RFS). Intensive liaison has already taken place between Apex and the RFS and this relationship will continue. Liaison so far includes RFS headquarters meetings, local meetings, liaison with local RFS personnel and an RFS presentation given by Apex to the Darkes Forest RFS personnel. Fire mitigation measures will also be developed by consultation with the Sydney Catchment Authority, the Department of Environment and Climate Change and the Department of Primary Industries.</p> <p>Flaring facilities will be provided by Apex to comply with appropriate legislation and for gas monitoring purposes. These are discussed below;</p> <p>Compliance with Schedule of Onshore Petroleum Exploration and Production Safety Requirements</p> <p>Clause 214 of the Schedule of Onshore Petroleum Exploration and Production Safety Requirements requires the following:</p> <p>Precautions Against Fire</p> <p>In all cases where internal combustion engines are used as prime movers for the operation of a drill rig and its ancillary-equipment, such engines, if permanently installed, shall be, if practicable, diesel engines. These shall be provided with efficient flame and/or spark arresters on their exhausts and be regularly checked and continuously used.</p> <p>No naked lights, smoking, or motor vehicles not provided with efficient flame and/or spark arresters shall be permitted within 30 metres radius of the hole provided that in any event requiring the use of welding plant or other equipment the site manager may permit the use of such motor vehicles, welding plant or blow torches under his personal supervision and subject to such special precautions as appear necessary.</p> <p>Where inflammable gas is met in a well and cannot be contained, it shall be conveyed away from the bore-hole head fittings by means of a flare line to a distance of not less than 30 metres from the well and ignited. The discharge end of such flare line shall set up in such a way that any condensate can be collected and the flame is contained so as no environment damage may result. The discharge end of such flare line shall be isolated so that no risk exists for people or animals.</p>

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		<p>Clause 728 of the Schedule of Onshore Petroleum Exploration and Production Safety Requirements requires the following:</p> <p>Approval to Vent or Flare The titleholder must ensure that except in an emergency the flaring or venting of petroleum is not carried out without approval.</p> <p>Therefore, in order to comply with the safety schedule as above as well as for testing purposes, Apex will be required to operate approved flaring facilities.</p> <p>Apex recognises that such flaring must take place in a controlled manner in order to protect persons associated with the drilling works, to protect the environment by mitigating the risk of bush fires being caused and adverse noise and light being emitted. In addition, the design and construction of the well head facilities must be fire proof with adequate intrinsic safety for the protection of personnel and the environment. The NSW Occupational Health and Safety Act 2000 requires construction work to be carried out after risk management processes have been applied to identify hazards, assess risk and control risk as appropriate. A full high level operational risk assessment was carried out for the drilling and construction phases in accordance with;</p> <ul style="list-style-type: none"> • AS NZS 4360 2004 Risk Management • MDG1010 Risk Management Handbook for the Mining Industry • MDG 1014 <p>The Apex operational risk assessment was completed on the 8th of April 2009 and included such measures as;</p> <ul style="list-style-type: none"> • Control of hotwork to mitigate the risk of bushfire • Liaison with the rural fire service (the RFS were invited to the risk assessment but did not attend) • Liaison with the Department of Primary Industry and the Sydney Catchment Authority on fire control matters and flare facilities as per the Petroleum Act. • The provision of surface facilities designed and constructed so as to prevent and be protected from fire. • The provision of safety devices such as automatic shut down valves (activated by fire to stop gas flow). • Provision of other safety devices such as non return valves. • The use of flare chambers for environmental protection (see below) <p>AGL Flare Chambers Apex has recognised the need to carry out flaring in a controlled manner so as to protect the public and the environment. There is a need to reduce flaring affects such as;</p> <ul style="list-style-type: none"> • Noise


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		<ul style="list-style-type: none"> • Light • Heat. <p>Apex plans to use a purpose designed flare chamber to meet the needs of Apex whilst operating around the Illawarra. This type of flare chamber is currently used by AGL at Camden. The provision of such a facility will follow detailed HAZOP analysis to assist in the design.</p> <p>The HAZOP analysis will address a range of issues including the following:</p> <ul style="list-style-type: none"> • Transportability • Visibility • Fire risk mitigation • Noise • Controllability • Safety devices • Materials • Training of personnel • Maintenance <p>Figure 1 shows a wide view of similar gas flaring facilities used near Camden.</p>

Submitter	Submission Item	Draft Response
		<div data-bbox="736 312 1491 884" data-label="Image"> </div> <p data-bbox="736 911 1341 938">Figure 1 – Wide view of Flare Box and Control Trailer</p> <p data-bbox="736 970 1106 997"><u>Description of General Facilities</u></p> <p data-bbox="736 1026 2056 1134">Flame control will be via an external and separate control facility as shown in Figure 2. This trailer arrangement contains the ignition control, flame arrestors, shut down facilities and indeed all the facilities needed to make the facility fully controllable remotely. This arrangement allows for the ignition of the facility manually and automatically to comply with legislation and the ability to shut down the flare automatically or manually.</p>

Submitter	Submission Item	Draft Response
		 <p data-bbox="734 1061 1025 1086">Figure 2 – Control Trailer</p> <p data-bbox="734 1118 2047 1230">Figure 3 shows the interior of the flare chamber. The chamber is lined with fire proof and noise absorbing material. Gas is flared by means of a burning element as shown in Figure 3. The gas entering the chamber is spread along a long burner arrangement and the gas exits into the chamber via a series of nozzles on the burner. This arrangement therefore does two things;</p> <ul data-bbox="786 1262 2047 1339" style="list-style-type: none"> • Reduces nozzle pressure and therefore noise • Reduces flame height and therefore height (this also serves to contain the flares within the chamber and thus gives flame control)

Submitter	Submission Item	Draft Response
		<p>Therefore in summary, these flare facilities are designed through engineering and environmental risk management and provide remote controllability. However, no flare will be lit whilst the facility is unattended and continuous liaison with the Rural Fire Service will take place during operations.</p>  <p>Figure 3 – Interior of Flare Chamber</p>

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Apex Energy. Coal Seam Gas Exploration Drilling and Gas Monitoring Program

Submitter	Submission Item	Draft Response
<p>Dr Ann Young.</p>	<p>3.7 Comment re p41 of EA. Clarification of groundwater quality and quantity matters. Surprised that there is no provision for analysis of the nature and volume of groundwater extracted.</p>	<p>This has been partly clarified in our response to DWE Item 2.1.</p> <p>However, it is also noted that:</p> <ul style="list-style-type: none"> • Groundwaters encountered during coal mining in the area over more than a century have been found to be of low flow/volume and variable quality. It is expected that only minor amounts of groundwater, perhaps driven by initial 'pulses' of gas pressure would be brought to the surface with recirculating drilling fluid. Any groundwater make will be continually monitored in real time through increased surface volume in pits/tanks, and water-diluted fluid returns. • It is not practical to either monitor-for, or sample for such minor amounts of groundwater. This results from the fact that the pH and salinity (Electrical Conductivity; EC) will be greatly affected by the geochemical effects of comminution of strata encountered, cation exchange of the majority potassium (noting the drilling fluid is 3% KCl below the Hawkesbury Sandstone) for other cations, and out gassing of dissolved CO₂. For these and other reasons it would therefore generally not be meaningful or productive to run a program of quality monitoring of any groundwaters encountered until well after completion, flushing with clean water and development of the wells for groundwater extraction. • EC measurements can be carried out but for the above reasons would generally not be too indicative of actual groundwater conditions. The drilling fluid system will be slightly overbalanced pressure-wise to the formation pressure (due to friction, rock chips, cuttings etc). It is typically difficult to see significant impact of formation waters into/on an overbalanced fluid system unless there is a <u>very</u> strong and productive (<u>high</u> flow rate) water 'kick' from a high pressure zone (e.g. artesian, gas over pressure) into the well. There is no reason to believe such conditions would be encountered in the exploration area. • As this is a coal seam gas exploration program there is no brief or need to flush completed boreholes with water or develop them for groundwater extraction.
<p>Dr Ann Young.</p>	<p>3.8 Comment re p46 of EA. Requests a clearly coordinated strategy for project monitoring incorporated into the approval conditions.</p>	<p>It is most likely that Apex will have to submit to the DoP an environmental monitoring program for approval prior to commencing operations. This would form part of the EMP.</p>

APPENDIX A Excerpt From Response to Submissions on Environmental Assessment

Apex Energy. Coal Seam Gas Exploration Drilling and Gas Monitoring Program

Submitter	Submission Item	Draft Response
Dr Ann Young.	3.9 Comments re p48 of EA. There is no indication of just how much community consultation occurred.	The community consultation undertaken by Apex was suitable for an exploration drilling program. Apex undertook several face to face meetings with landholders potentially affected by the project. Apex met with Darkes Forest Community at the initiation of Rural Fire Services and they gave a presentation of their proposals. Should a future Major Project Application be made as a result of the proposed gas exploration, a community liaison program suitable for that possible future development would be implemented.
Dr Ann Young.	3.10 Dr Young's first conclusion. A detailed and workable rehabilitation Plan be established for each site.	An Environmental Management Plan (EMP) will cover the entire operation. Site specific EMPs will be developed for each site by the contractor and these will be consistent with the overall EMP. The overall EMP will have a generic description of site rehabilitation procedures and objectives, while the site specific EMP will have a rehabilitation plan for each site. In addition, arrangements with landholders including SCA, will require Apex to rehabilitate the site. The DPI-Mineral Resources will hold an Apex rehabilitation bond, which would encourage appropriate rehabilitation performance and provision of finances for rehabilitation should the proponent fail to adequately rehabilitate any disturbed areas.
Dr Ann Young.	3.11 Dr Young's second conclusion. Drilling at each site should not commence before the previous site has been cleaned up, re-shaped where necessary, mulched or otherwise protected from rainfall, wind erosion and seeded or planted to begin re-vegetation.	This is unnecessary and would make the process discontinuous. SCA, DPI – Mineral Resources and landholders will be observing Apex's performance and there is appropriate control in that to ensure the rehabilitation performance is acceptable. Additionally, DPI-Mineral Resources will hold a rehabilitation bond to address rehabilitation performance and provide funds if the DPI have to repair any sites.
Dr Ann Young.	3.12 Dr Young's third conclusion. Extracted groundwater should be assessed for volume, quality and likely geological stratum source.	Refer to our responses to Items 3.5 and 3.7 above.

APPENDIX A Excerpt From Response to Submissions on Environmental Assessment

Apex Energy. Coal Seam Gas Exploration Drilling and Gas Monitoring Program

Submitter	Submission Item	Draft Response
Dr Ann Young.	<p>3.13 Dr Young's fourth conclusion.</p> <p>The proposed sites be re-assessed to prioritise them in order of likely significance so that if possible, fewer sites will be drilled.</p>	<p>Sites will be drilled in a priority order. Commercial reasons should ensure that Apex is unlikely to drill more sites than are necessary to define the resource.</p>
Dr Ann Young.	<p>3.14 Dr Young's fifth conclusion.</p> <p>A clear coordinated strategy for environmental monitoring by relevant authorities be imposed on the company, with approval for continuing operation dependent on satisfactory environmental management. Ideally, a community consultative committee to involve other stakeholders should be part of this strategy.</p>	<p>Apex expect Project Approval to include a condition requiring appropriate environmental monitoring.</p> <p>A community consultative committee is not justified for a 15 borehole gas exploration activity.</p>

APEX ENERGY NL

AI19 POSITIONING WITHIN PEL444

APRIL 2011



PRIVATE AND CONFIDENTIAL

Compiled on behalf of Apex Energy NL:

Chris Rogers

Chief Operating Officer

Apex Energy NL

EXECUTIVE SUMMARY

Apex Energy NL's (Apex) Illawarra Gas project area comprises Petroleum Exploration Licenses 454, 442 and 444. PEL 454 is in the Burratorang Region. PEL442 and PEL444 are in the Illawarra region. Apex was granted planning approval for a 15 well exploration project (DoP project # 07_103) on 23rd September 2009. In December 2010, Apex submitted a Section 75W variation to its project for the addition of one additional core hole in the North Western area of PEL444. This borehole is on Sydney Catchment Authority (SCA) land in its Special Area. Following the submission of the documentation required for the variation, SCA questioned the appropriateness of the proposed 16th drill site, believing that alternatives exist that did not require a hole to be drilled at the proposed site. At a meeting held on 30th March 2011 at the Department of Environment, Climate Change DECCW Wollongong the SCA representative Malcolm Hughes requested that Apex provide justification for the new site. This paper describes Apex's rationale behind the selection of proposed borehole site. The borehole is proposed to be a core sample hole for the purpose of sampling and testing the Illawarra coal measures.

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INTRODUCTION

Apex Energy NL (Apex) holds title to PELs 442 and 444 along with Sydney Basin CBM Pty Ltd (SBCBM) in the ratio of 80:20. The tenures lie between Helensburgh and Wollongong in the Illawarra region south of Sydney. These areas fall within the Southern Coalfield of New South Wales, and constitute the foundation for the company's Illawarra Gas Project. Within these licenses the company is investigating the potential for:

1. coal mine gas from abandoned colliery workings
2. coal seam gas from unmined seams
3. enhanced biogenic methane production within both abandoned workings and unmined seams.

It is proposed that produced gas will be used as feed for gas-fired power stations located within the area. Location of the project area, between the southern outskirts of the Sydney Metropolitan Area and Wollongong, is ideal with respect to infrastructure and markets.

In addition to ground held as PELs 442 and 444, the company has a joint venture agreement with Metropolitan Collieries Pty Ltd and Helensburgh Coal Pty Limited, operator and owner respectively of the Metropolitan Colliery, with the objective of exploring for and recovering methane from the Colliery Holding. This includes gas from abandoned parts of the workings, from un-mined seams and perhaps from the gathering of coal seam drainage gas currently extracted for safety purposes prior to mining. Tenements that comprise the Metropolitan Colliery Holding are CCL703, CL379, ML1610 and A2002.

A similar agreement was until recently in place with HTT Huntely Heritage Pty Ltd relating to CCL700 which is located 4 kilometres south-west of PEL442 and within 10km of TRUenergy's Tallawarra gas power station. Apex and Huntley are currently in discussions relating to the extension of the agreement.

On the 20th of August 2010, Apex and SBCBM signed a farm-in and purchase agreement with Ormil Energy Ltd (Ormil) and Ormil Operations Pty Ltd (Ormil Ops). Ormil Ops is a 100% subsidiary of Ormil. Subsequently Ormil purchased SBCBM and in doing so acquired a 20% responsibility for PEL444, PEL442 and PEL454. Apex and Ormil has appointed Ormil Ops as the Operator for the three PEL's. Figure 1 shows the organisational relationship. The partnerships described will hereafter be referred to as the JV.

PEL Responsibility

Operator

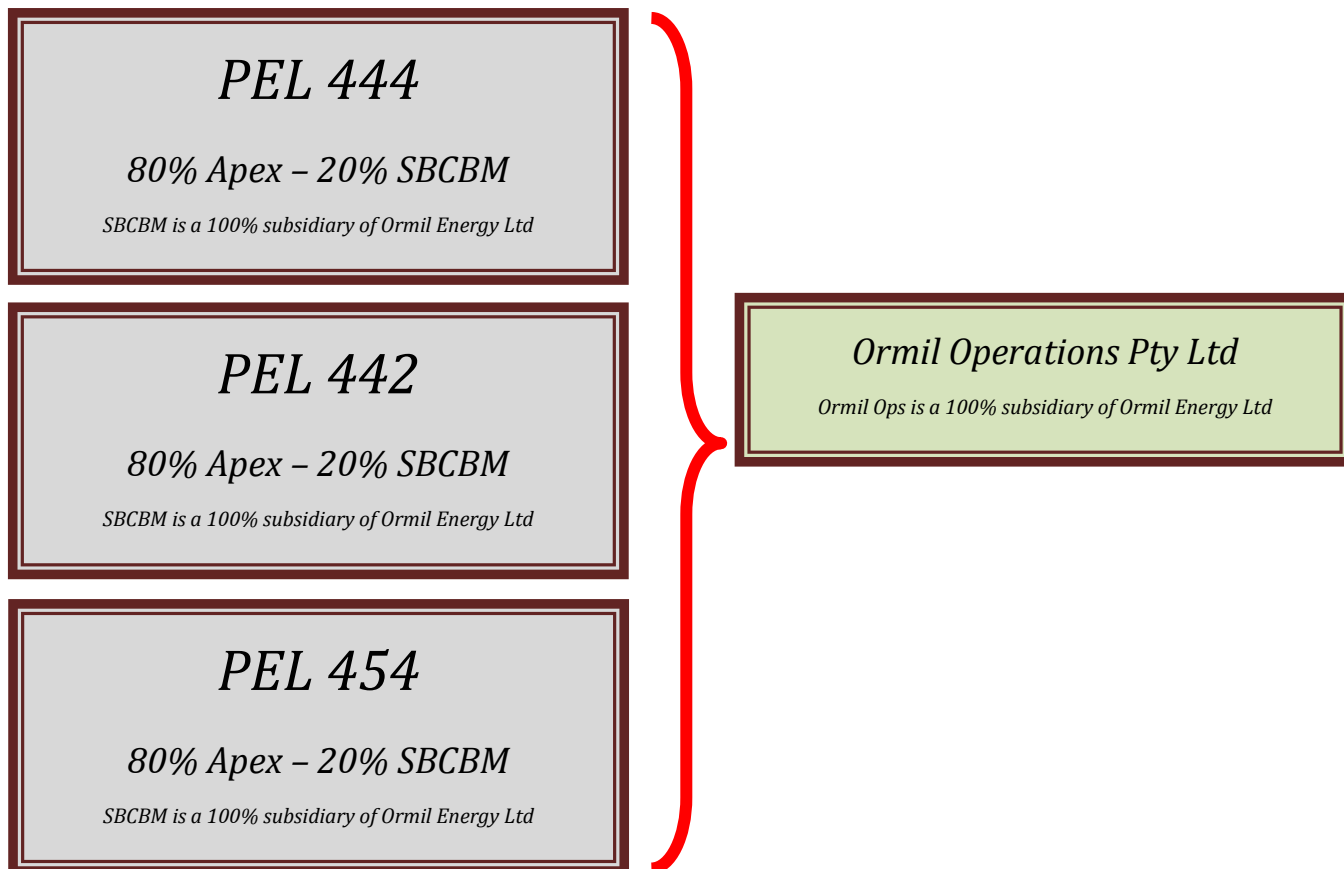


Figure 1- Exert from Apex/ Ormil Farmin and Purchase Agreement

Since the execution of the farmin and purchase agreement Apex and Ormil have worked closely to carry out the actions necessary to commence a 2 or 3 core hole exploration program which is planned to include a hole on PEL444 (AI16), a hole on PEL444 (AI19) and a hole on PEL 454 (AB DDH1). AI16 is a hole that is already approved subject to the conditions of the Part 3A Project 07_103 being complied with. However, AI19 is not part of the original 15 hole approved project and is therefore subject to a Section 75W variation in accordance with the NSW Planning and Assessment Act. This paper was written in order to fulfil a requirement from meeting held on 30th March 2011 between consultants representing the JV, representatives of the Department of Environment, Climate Change and Water (DECCW), the Sydney Catchment Authority (SCA) and an officer of the Department of Planning (DoP) who attended by phone conference. The purpose of the paper is to clarify why Apex and the JV consider the proposed position of AI19 as essential.

RESOURCE/RESERVE UPGRADE PLAN

Apex has previously engaged MHA Petroleum Consultant Inc of Denver Colorado USA (MHA) to carry out an assessment of its gas resource and currently holds an MHA statement defining the following reserves/resources;

Reserves/Resource

2P = 58 PJ

3P = 210 PJ

C = 1360 PJ (495 PJ in PEL442/444)

PJ = Petajoules, a unit of energy

Note:-

The reserve/resource classification shown is the SPE (Society of Petroleum Engineers) system commonly used worldwide. The system classifies gas reserves/resources in terms of the estimated commercial energy value of the gas in the area being considered. Typically the gas in place (GIP) is assessed first. This is the estimated gas that exists in the ground. This value can then be re estimated in terms of how much could be actually recovered. This is typically 50% of the GIP. This value is known as the contingent resource value (C). The contingent classification signifies a resource rather than a reserve status.

Further exploration is then carried out in order to define the probability of successful commercialisation. The "3 P" system is used. This relates to possible, probable and proved. 1P is proved, 2P is probable and proved. 3P is possible, probable and proved. Gas classified as 1P has been subjected to more exploration and proving work and is therefore the most valuable defined reserve. 2P gas is less proven and therefore usually less valuable. 3P is the lowest defined and thus lowest valued reserve classification.

Information used in this assessment included data from many existing boreholes, Apex's Darkes Forest #1 well, a Digital Magnetotelluric (DMT) Survey carried out by Apex and information from a number of sources regarding the status of the many abandoned coal mines contained within the PEL's. In order to improve its reserve status Apex must carry out further core drilling intended in particular to obtain permeability data via drill stem testing and/or fluid fall off testing. Reserve/resource upgrading depends on risk reduction via data evaluation and actual drilling/testing.

A meeting was held at Apex's Sydney office with Tim Hower of MHA on the 19th April 2010. The purpose of the meeting was for a plan to be formulated for reserve evaluation and progression. During the meeting several scenarios were discussed whereby exploration work could be evaluated and used as a basis, depending on results, for a resource/reserve upgrade. The existing approved drill sites were considered along with possible additional sites that could provide a more effective and efficient means of resource/reserve evaluation. The recommendation from the meeting was that at a minimum, two core holes should be drilled, one in PEL442 and one in PEL444 primarily for the purpose of permeability evaluation. Permeability data is not available for the Illawarra coal measures in the region and this is a primary factor in the evaluation of commercial gas flow potential. It was agreed that AI16 is an ideal location for a core hole within PEL442 as this site would enable the core hole to avoid any coal mine workings. The avoidance of such workings is a major risk reduction factor for Apex. It was also agreed that any hole drilled in PEL444 should be positioned as far to the North West in the license area as possible in order to be able to evaluate the gas production potential between AI16 and the PEL444 boundary. Furthermore, the Illawarra Coal Measures are known to become gassier to the North West as the seams go deeper distance increases from the escarpment. These factors highlight further why a North Western borehole is required for effective data evaluation.

Apex has two core hole sites near to AI19 which are already approved as part of its Illawarra Gas Project 07_103. These sites are AI06 and AI07. It has been suggested by SCA that AI06 could effectively replace AI19 as the Northern data borehole. These sites can be seen in Figure 2 and Figure 3. If AI06 was to replace AI19, circa 25 km² of area would not be able to be evaluated for reserve potential. The gas in place for this area has been assessed but the area now needs further evaluation by core sampling and testing. This area equates to around 1 billion tonne of coal in the Illawarra Coal Measures alone and approximately 20 PJ of recoverable gas using a 50% recovery factor.

Failure to explore and ultimately exploit the Northern area of PEL444 unnecessarily sterilizes approximately half of the areas resources of this PEL.

It is anticipated that the drilling of AI16 and AI19 will improve the reserve/resource position pending satisfactory permeability results to numbers approximately as follows;

Anticipated Reserves/Resource Upgrade

2P = 100 PJ

3P = 300 PJ

C = 1228 PJ (363 PJ in PEL442/444)

Furthermore, the results of permeability testing will be indicative of production viability and will assist the JV in evaluating commercial production potential. The results will also be evaluated by Ormil to determine its further investment commitment. Therefore the ongoing viability of the JV is affected by coring and testing results and subsequent resource/reserve assessment by MHA.

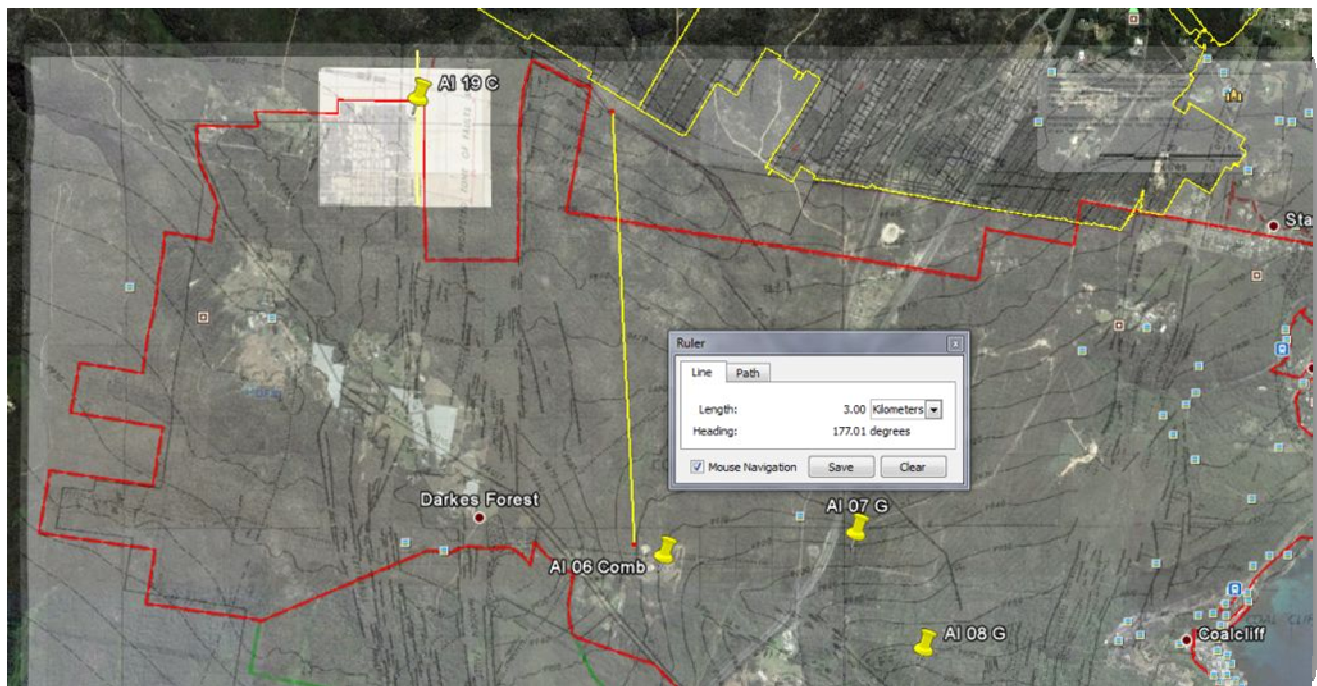


Figure 2 – Distance North of AI06 to PEL444 Boundary

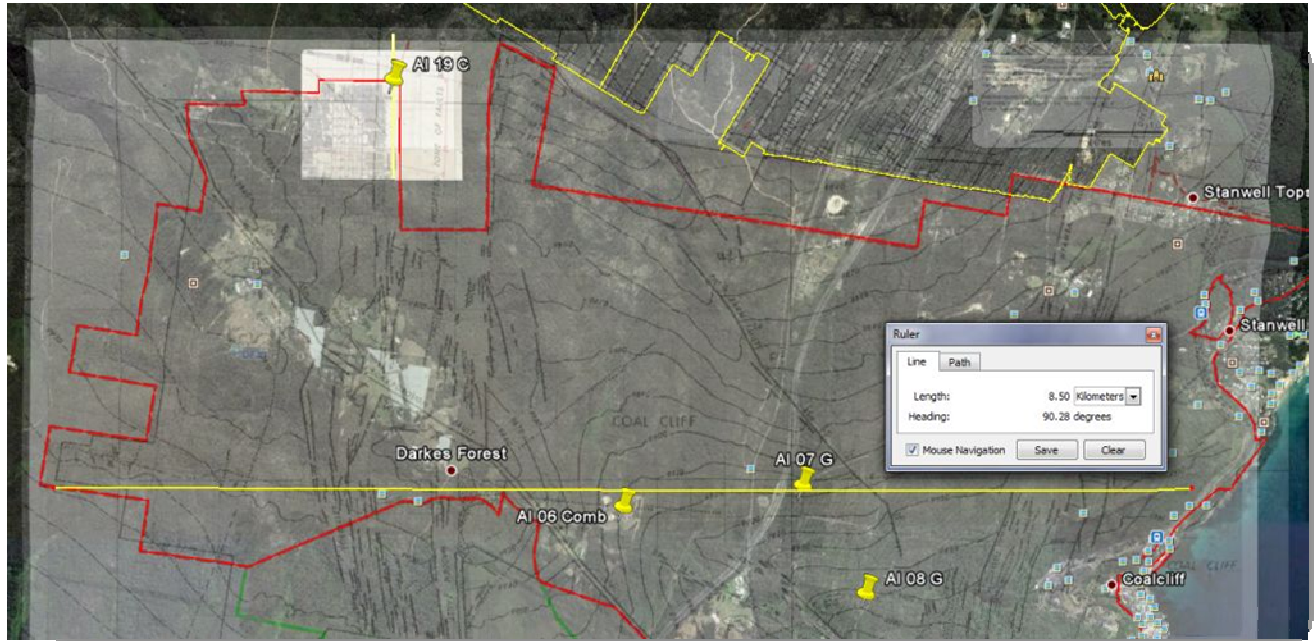


Figure 3 - Distance across PEL444

NORTHERN BOREHOLE LOCATION RATIONALE

The previous section describes the need for a far northern borehole within PEL444. Upon determination of the need for this borehole, Apex determined a suitable site based on the following pre-selection criteria;

- It must be on PEL 444.

Ideally both PEL442 and PEL444 must be evaluated as previously discussed. Apex has commitments to the government of NSW in relation to its PEL's.

- Borehole must be above remnant Bulli Seam Coal.

Figure 4 shows the AI16 site within PEL442. The picture shows surface features in relation to the underground mine workings of South Clifton Colliery and North Bulli Colliery. The site is within the Sydney Catchment Authority (SCA) Special Area. The site is approved as part of Apex's project 07_103 and Apex has negotiated successfully with the SCA for site access for drilling purposes. The site is ideal for the drilling of a data core hole due to its distance from the underground coal mine workings. Such workings represent a significant and unnecessary hazard to drilling operations at this stage of the exploration project. Any hazard reduction/risk management process would identify the need to avoid the mine workings as being a matter for risk mitigation. Future production and goaf wells would target mine workings (goafs and pillars) but for the purpose of core sampling such hazards should be avoided. Furthermore, the avoidance of geological features such as faults and igneous intrusions is also a risk mitigation necessity.



Figure 4 – AI16 Site wrt Surface and Underground Features

The concept of avoiding coal mine workings and geological features also applies to Apex’s proposed second core hole AI19. Apex has evaluated the areas along the Northern boundary of PEL444 for potential sites that avoid mine workings and geological features. Figure 5 shows the Northern boundary of PEL444 and the Darkes Forest/Coalcliff Colliery mine workings. In addition, geological mapping provided by ACIRL can be seen superimposed on the plan.

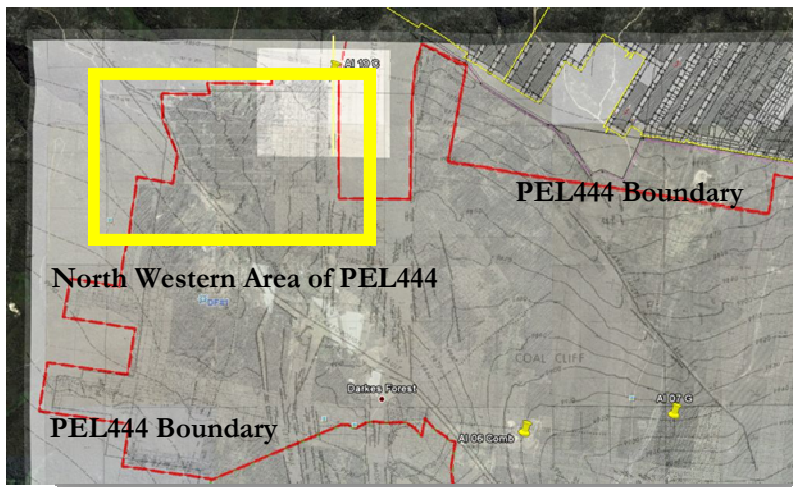


Figure 5 – PEL444 Boundary and North Western Area

- Avoid adverse geological features

The highlighted region in Figure 5 can be seen in more geological detail in Figure 6. Coal mining activity has identified several significant geological features in the area which have shaped the boundaries of coal mining activity. Drilling activities would avoid significant geological anomalies and features in the same way that coal mine workings should be avoided for core holes.

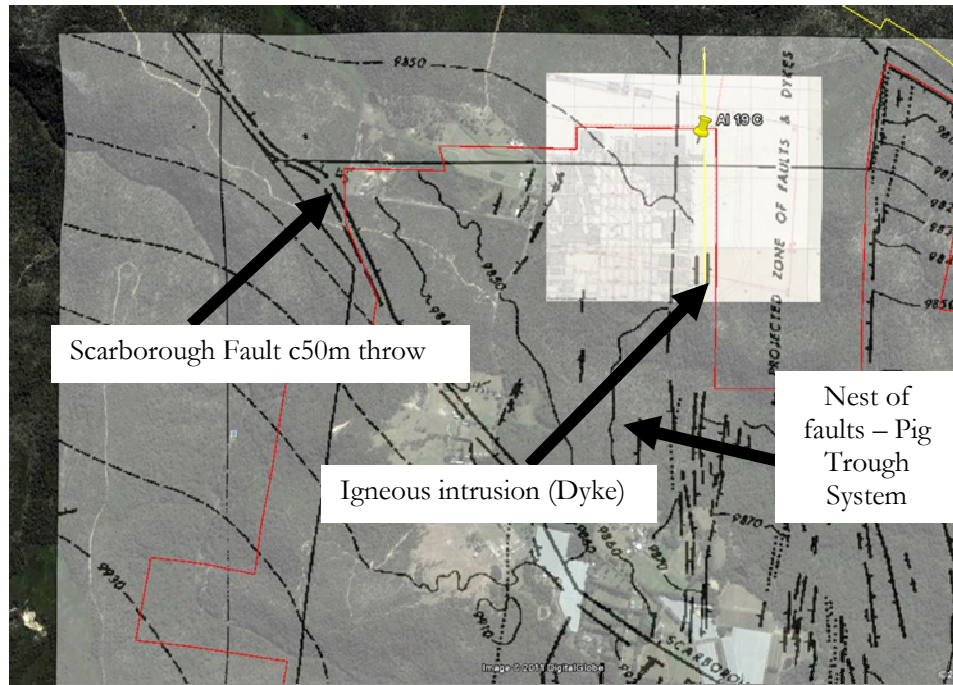


Figure 6 – ACIRL Geological Mapping of NW Area of PEL444

- Utilisation of previously disturbed sites

Apex undertook to avoid excessive clearing and to make use of existing tracks, roads and easements as part of its original Part 3A submission. The proposed positioning of AI 19 was in accordance with this philosophy.

It is also part of the approved project that a pre-construction site inspection be undertaken for all boreholes. This inspection would be attended by company representatives, the drilling operator, suitably qualified environmental experts, the landholder (in the case of AI 19 this would be SCA). The site inspection would enable finalisation of the detailed proposed site layout. Layout and clearing areas could be adjusted in response to observations made during the site inspection. Apex would circulate the agreed Site Layout Plan after the site inspection. This action will enable confirmation of avoidance or minimisation of environmental impact.

- Access to the site and traffic control

In accordance with the point above, access to any potential drill site would be via three possible roads and tracks and these tracks can be seen on Figure 7 below. Fire trail 9A along which AI19 is proposed to be sited can be clearly seen on Figure 7. Traffic control is catered for in Apex's Part 3A requirements.

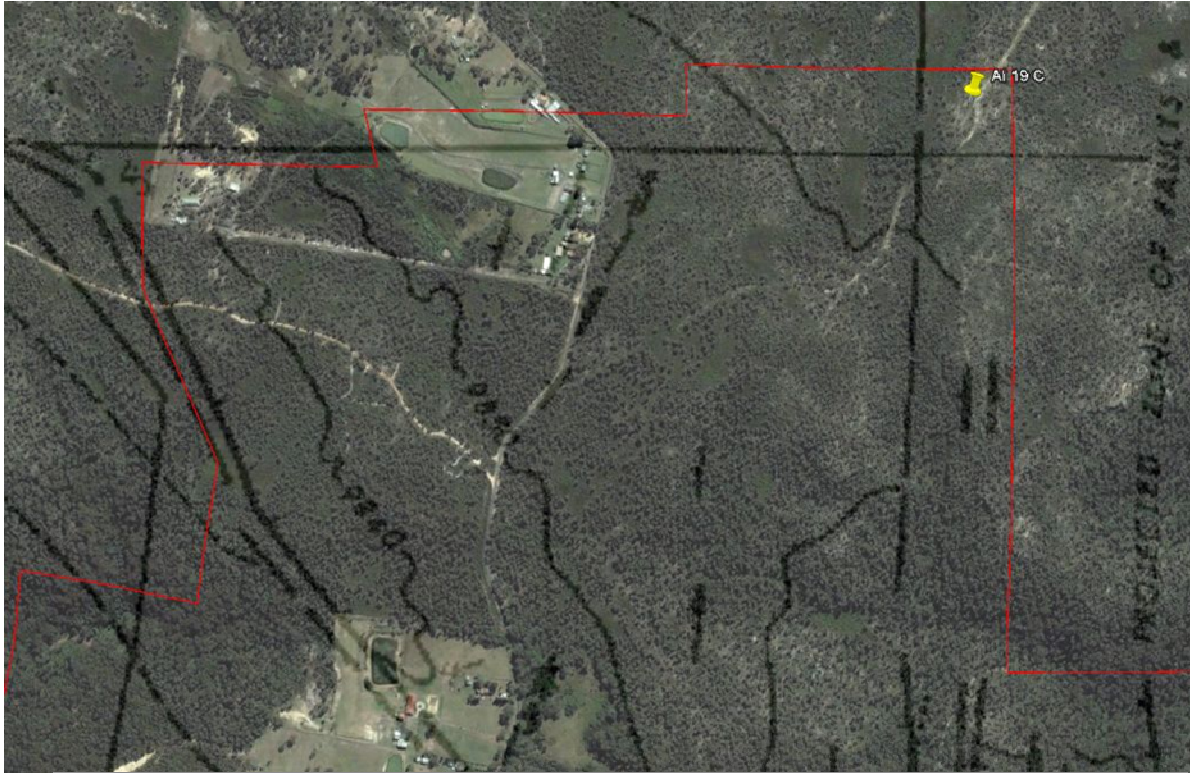


Figure 7 – Plan Showing Access Roads/Tracks to North Western Area of PEL444

Although it may be possible to deliver people to the site by helicopter this would not be suitable for delivering the drill rig, and supplies including delivery of water and the potential to remove ground water if required. These latter activities can only be undertaken by motor vehicles which require road access to the site.

In relation to the proposed AI19 site, truck passing bays were included in the proposal at the suggestion of the SCA representative at the original site inspection. It was intended that they be built on areas previously disturbed and rehabilitated. These can be removed from the proposal and traffic control along the access track be undertaken either by traffic signals or, due to the low level of traffic expected, it could be achieved by phone contact on site. Suitable traffic management arrangements can be implemented at the intersection of the fire trail and Darkes Forest Road. The traffic usage of Darkes Forest Road at this location is low and suitable arrangements will be readily available to ensure safety.

- Acoustic factors (proximity to residences etc).

Figure 8 shows residences, their proximity to established tracks and roads and the relative remoteness of the proposed site of AI19. The advantages of the proposed AI19 site in relation to acoustic factors can be clearly seen.

The proposed AI19 site is located approximately 1 km from the nearest residence. The acoustic study undertaken for the original 15 hole program identified that noise would not be an issue over this separation

distance. Site acoustic control measures will ensure that noise impact will not be problematic at the closest residence.



Figure 8 – Position of Residences in Relation to AI19

Proposed AI19 Site – Considering Above factors

In considering all the practical factors described above Apex has determined that the most viable drill site is the AI19 site as described in its Section 75W variation to its Illawarra project # 07_103.

Figure 9 shows AI19 in relation the boundary of PEL444 and the Darkes Forest Mine workings. Figure 10 shows a close up of AI19 and shows its location in relation to the known igneous intrusion (Dyke) and the mine workings. Therefore this site will enable the drilling operations to be conducted with reduced risk whilst fulfilling the requirements of Apex and MHA’s exploration philosophy.

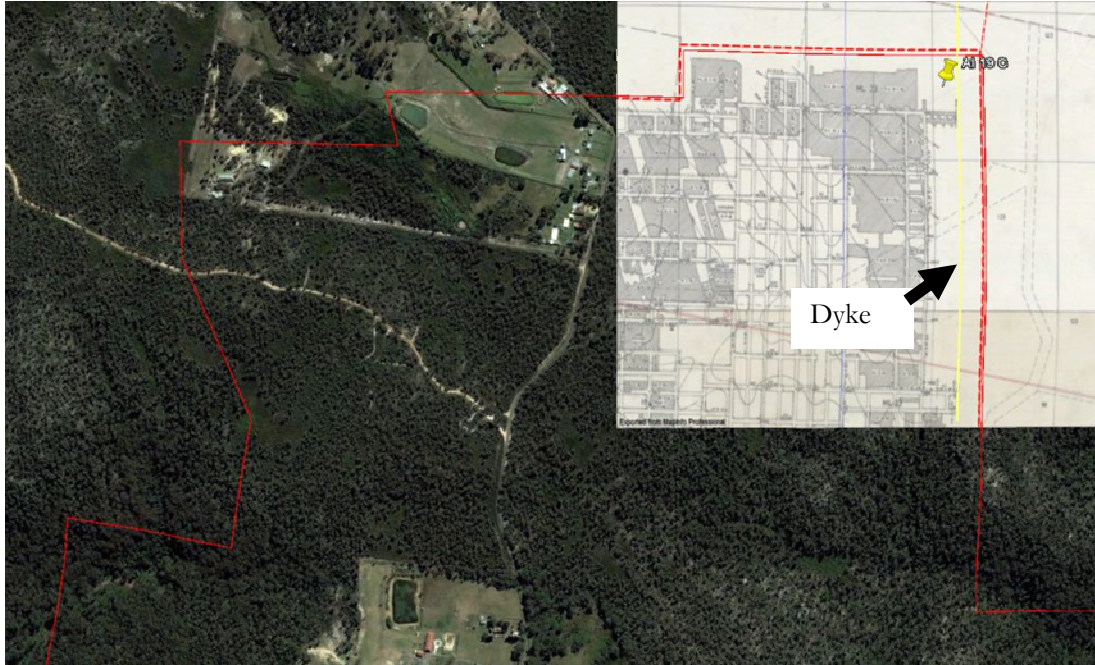


Figure 9 – AI19 and Associated Mine Workings

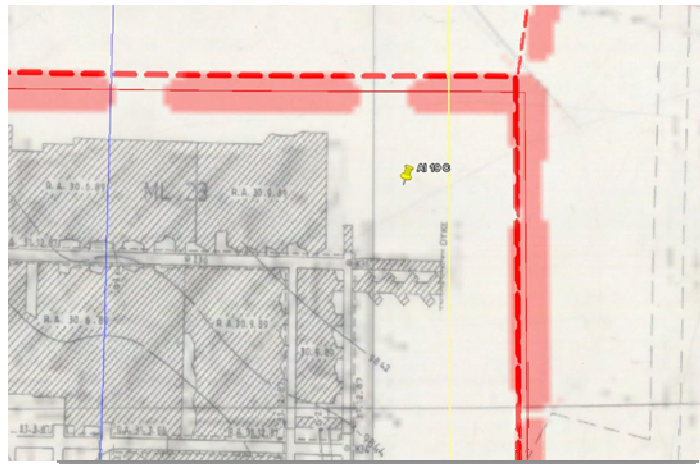


Figure 10 – Close up of AI19 and Associated Mine Workings

Following site selection based on the above criteria, the following criteria were also identified as critical;

- Surface water and groundwater control
- Flora and fauna
- Archaeology

The proposed borehole is similar to the 15 boreholes previously proposed and approved. Its construction and operation should not significantly alter the overall environmental impact of the Project. The current project

approval contains detailed environmental management, monitoring and reporting requirements to ensure appropriate environmental management of the exploration and gas monitoring program.

The site will be located on or adjacent to a closed fire trail. This will ensure any impacts on flora, fauna and archaeological or heritage material is minimised. A site inspection and the resultant environmental assessment determined the likely environmental impact. A pre drilling site inspection will also enable the best site to be selected within the approved area.

The approved site water control measures will be implemented for AI19. The pre drilling site inspection will determine detailed specific site water management requirements in accordance with an approved soil and water management system.

CONCLUSION

In considering the placement of its North Western proposed borehole, AI19, Apex considered positional factors including;

- Geology
- Coal mine workings
- Proximity to existing tracks and roads (to minimise necessary clearing)
- Acoustic/vibration impact
- Potential dust make
- Proximity to residences
- Archaeology
- Flora
- Fauna
- Water management (made and inherent)
- Transport requirements
- Rehabilitation requirements
- Resource evaluation requirements
- Government commitments (licence requirements)

Having considered all the above factors, Apex was able to identify the location proposed in its Section 75W variation as the most appropriate and fit for purpose location. Furthermore, Apex has submitted a detailed Environmental Management Strategy (EMS) and associated management plans to the DoP as part of its part 3A requirements for its Illawarra project. This EMS incorporates AI19 environmental management factors. The EMS and its associated management plans were devised by local consultants who are experts at managing local environmental factors and whom have successfully managed similar sites and situations in the region. Apex intends to continue to utilise this expertise in order to ensure that environmental factors are managed at industry best practice levels.

To: Dave Olsen - OCG

From: Chris Rogers – Apex Energy NL

Subject: AI19 Positioning – requested further information for DoP (19/4/2011)

Further to my recent report entitled ‘Apex Energy NL - AI19 Positioning Within PEL444’ I have provided further information below to reinforce the rationale behind the positioning of AI19 as shown on Figure 1, 2 and 3 below.

Figure 1 shows the surface features relative to the NW sector of PEL 444. Considering existing access to reduce environmental impact and the need to drill towards the Northern boundary in of PEL 444 for effective resource evaluation, the three sites below were examined.



Figure 1 – Alternate sites considered in report ‘Apex Energy NL - AI19 Positioning Within PEL444

Site A, Site B and Site C were considered not only in relation to surface access and PEL 444 boundary limits but also in relation to underground workings and geological features. The object was to avoid the workings and such geological features in order to reduce risk to operational activities.

Figure 2 shows surface features in relation to the underground workings of Darkes Forest Mine. The extent of the mine workings clearly restricts potential drilling operations which intend to avoid the mine workings. Figure 3 shows the mine workings in greater detail, the position of the potential sites and known geological features.

Conclusion

Site A – Unsuitable due to mine workings and 50m throw normal fault at that location.

Site B – Unsuitable to due to mine workings and lack of clear drilling space

Site C – The only suitable site. The site is between a known dyke defined by underground workings and surface features and the known mine workings.

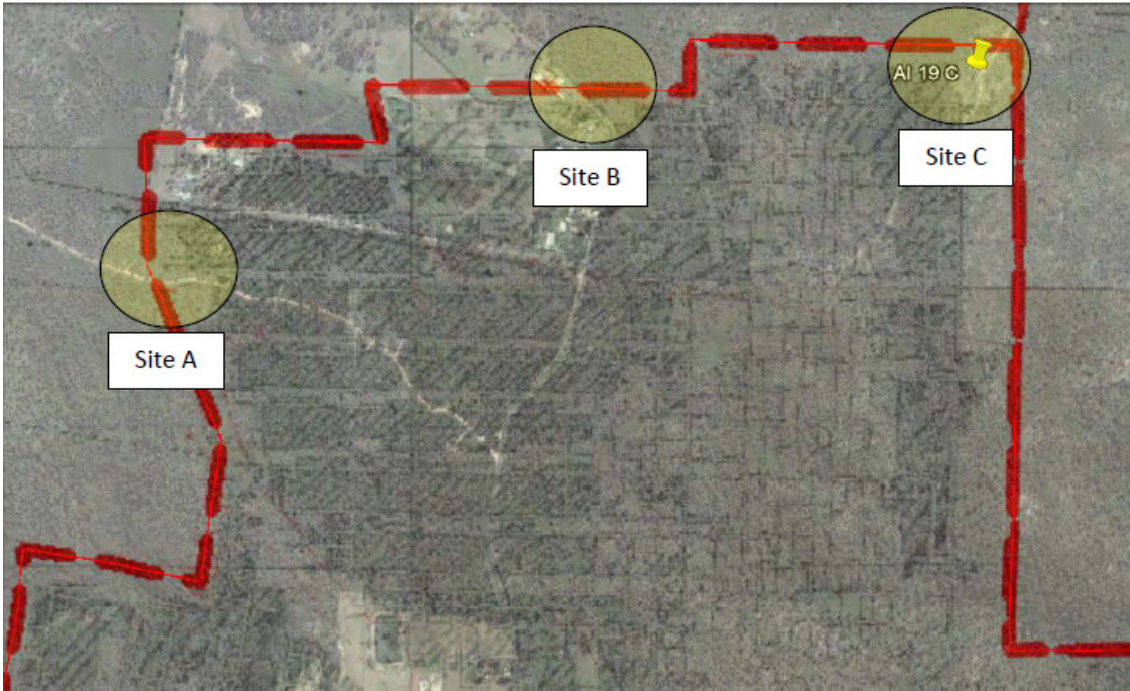


Figure 2 – Mine workings superimposed on surface features – NW sector of PEL 444

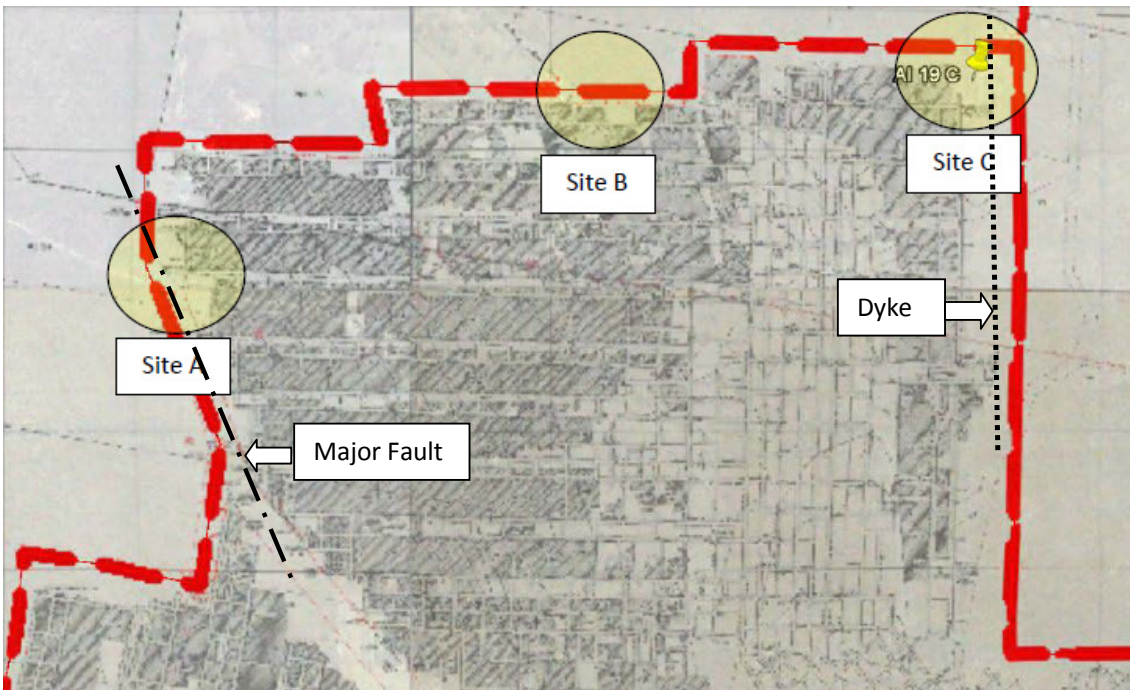


Figure 3 – Mine workings in NW sector of PEL 444




BOREHOLE AI19 - FURTHER ASSESSMENT OF *PULTENAEA ARISTATA*

Report Prepared for Apex Energy

April 2010

DOCUMENT CONTROL

Business Unit	Niche Environment and Heritage, Southern Sydney		
Project No.	1035		
Document Description	Further assessment of the proposed borehole AI19 specifically to quantify the impacts of the proposal on the threatened plant <i>Pultenaea aristata</i>		
	Name	Signed	Date
Supervising Manager(s)	Matthew Richardson		15 April 2011

Person managing this document	Person(s) writing this document
Matthew Richardson	Nathan Smith and Matthew Richardson

Internal Review	Name
	Matthew Richardson

External Review	Name
	David Olsen - Olsen Environmental Consulting Chris Rogers - Apex Energy

Document Status	Date
Final Report	15 April 2011

Prepared for:	Organisation
Apex Energy c/o David Olsen	Olsen Environmental Consulting Pty Limited davidolsen@ocg.net.au

Front Cover Photograph: *Pultenaea aristata* occurring within woodland adjacent to the access track to the proposed borehole AI19. Photo © Niche Environment and Heritage Pty Ltd.

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1 INTRODUCTION

1.1 Background

Apex Energy intends to develop a potential gas extraction borehole known as borehole AI19 to the east of Darkes Forest Road within the Woronora Catchment Area near Darkes Forest NSW (Figure 1).

In 2010 Niche Environment and Heritage Pty Ltd (Niche) were engaged by Apex Energy to undertake an Ecological and Cultural Heritage assessment of the proposed borehole site. The threatened plant species *Pultenaea aristata* was recorded at the site and described in the accompanying report in the following manner: “a common shrub species (occurring) both along the access track and at the borehole site as well as in the vegetation surrounding these areas”.

The previous assessment concluded that it was not possible to either map the extent of the local population of this species or to accurately record the population size. Further, that report estimated that many hundreds and possible thousands of individual plants occur in the locality with only a small proportion of this larger population being subject to disturbance by the proposal.

Subsequent to the 2010 assessment which accompanied a Development Application for the proposed development prepared under Part 3a of the *Environmental Planning and Assessment Act 1979* by Olsen Environmental Consulting (OEC) the NSW Department of Planning (DoP) received a number of submissions pertaining to the impacts of the proposed development of Borehole AI19 on the *Pultenaea aristata*. As part of the process of addressing those submissions representatives of OEC, Niche, DoP, the NSW Department of Environment, Climate Change and Water (DECCW) and the Sydney Catchment Authority (SCA) met on 30 March 2011 where it was agreed to pursue a further assessment of the proposed development. Specifically the further assessment was to attempt to quantify the local population of *Pultenaea aristata* in close proximity to the site of Borehole AI19 (and its associated infrastructure) and following that to revise the impact assessment of the proposal on this species. This document reports the outcomes of the further assessment. This report supplements the original ecological assessment and should be read in conjunction with that report.

1.2 The Proposal and the Study Area

The following has been retained from the original 2010 report in order to define the survey area for the current, revised assessment.

The proposal involves the development of a single borehole site which will require development of a drill site (approximately 40 x 40 m) and the reopening of an existing fire road (Fire Road 9A) (Figure 1). The fire road has been abandoned for many years and has substantially self-rehabilitated with native shrubs, sedges and grasses. Accessing the borehole site would involve clearing this vegetation and possibly upgrading the fire road to enable safe access to the site.

In summary, the proposal will involve the primary disturbance of 0.16 ha of vegetation at the borehole site. Site works will involve levelling a drill pad, development of drill sumps and soil containment, and erosion and sediment control.

Approximately 0.5 ha of secondary disturbance of rehabilitated vegetation along the disused fire road is required (1 km long x 5 m wide). A total of 0.66 ha of vegetated area will be disturbed for the current proposal.

2 PULTENAEA ARISTATA SURVEYS

Field Survey

The initial site assessment was undertaken on Monday 23 August 2010. Further surveys for threatened plant species were undertaken on Monday 30 August 2010. Threatened flora encountered were recorded using a hand held GPS (Garmin 60).

Supplementary counts for *Pultenaea aristata* were conducted on April 12 and 13, 2011 after discussions with DECCW and DoP utilising plot-based population estimates. Plot locations were selected randomly in the field based on the likely extent of the population from previous records and surveys. The average number was then extrapolated to the estimated extent of the population to arrive at the population estimate.

P. aristata is a distinctive low shrub and not a cryptic species and therefore carrying out this survey in the non-flowering period is not a limitation to the survey.

2.1 Results

Pultenaea aristata is a small erect shrub, usually less than 40 cm tall, with leaves 8 to 22 mm long and 1 to 2 mm wide. The leaves are linear with a distinctive long bristle tapering to a sharp point. Flowers of the Prickly Bush-pea appear in yellow to light orange terminal heads between September and October.

The species is often associated with the upland swamp vegetation complex and has been recorded from several locations within the sub-communities of Banksia Thicket and Restioid Heath. The species is also known to occur in association with areas of impeded drainage and creek lines within sandstone woodland and gully forest plant communities (NPWS, 2003).

The species was found to be a common shrub species both along the access track and at the borehole site as well as in the vegetation surrounding these areas.

Individual Records and Defining the Local Population of *P. aristata*

A total of 361 individuals of *Pultenaea aristata* were recorded from a total of seven 10m x 10m plots recorded in close proximity to the borehole site or the access track (see Figure 1). A total of 52 plants were located within the confines of the borehole site.

In a submission from DECCW to DoP dated 25 January 2011, DECCW noted that from a simple count of the data points identified as records of *Pultenaea aristata* from Figure 2 (green dots) of the 2010 Niche report a total of 100 individuals can be counted. Those individual records have been plotted on Figure 1 of this report. Further from the recent site visit for this report a further 140 (approx) individual records (apart from the records included in the 7 plots) were observed. A hand held GPS was used to record the distribution of the species along the access road and at the borehole site and within close proximity to these areas.

On top of this, the plotted data from the NPWS Atlas Data (also plotted in Figure 1 of this report) indicates a total of approximately 74 individuals have been recorded to the north-

east of the proposed borehole site along the same fire road that the borehole AI19 is proposed. It is noted here that in the DECCW correspondence of 25 January 2011 that the local population based on DECCW records within 1km of the study area totals 169. For the purposes of this exercise that population count has been omitted from the aggregate count below as the total of 169 is likely to include the 74 individuals counted to the north east of the study area.

Taken together these very rough counts (361 + 52 + 140 + 74) equate to a total of 627 individuals amassed from both accurate counts (from the 7 plots) and random mender or incidental records. It is readily acknowledged that this total of 627 individuals should not be viewed as an accurate count of the local population of *P. aristata* as not all of these data points (i.e. dots on maps) represent single individuals. Further, it is likely that simply counting the data points means that some individuals may be double counted as some may have been recorded in both the 2010 and 2011 surveys. This aggregate count should not be used as the basis for any local population count nor quoted as such in further correspondence.

The value of this count then lies in assisting to delineate the possible boundary of the local population of the species. That is, from the interpretation of the air photo which has the plotted records of *P. aristata* an approximate boundary of the localised habitat for the species may be extrapolated as shown in Figure 1 based on the distribution of similar habitat types along and adjacent to the disused fire trail. The shaded area in Figure 1 is 3.96ha.

The population estimate in this report has been arrived at by counting the number of individuals in 7 100 m² plots (10m x 10m), averaging the total of individuals per plot and extrapolating this to the likely extent of the local population.

Table 1 contains an estimate of the local population of *P. aristata* based on the plot counts. It is estimated that locally, *P. aristata* can reach densities of up to 9,600 plants per hectare and on average is estimated to be in the range of 5,100 plants per hectare. When this average is extrapolated over a conservative estimate of the local population extent (3.96 hectares), it is estimated that the local population is **approximately 20,200 plants**.

Table 1. *Pultenaea aristata* local population estimate

Plot Number	Number of Individuals	Individuals per 100m ²	Individuals per Hectare	Extent of Population (ha)	Population Estimate
001	14				
002	76				
003	96				
052	30	51	5,100	3.96	20,196
053	81				
054	40				
055	24				

2.2 Discussion

Comparison With Other Population Estimates of *P. aristata*

Populations of *Pultenaea aristata* within the region are not uncommon and, in suitable habitat the species is often found to be a dominant shrub, in excess of thousands of individuals per hectare (Matthew Richardson and Nathan Smith pers. obs.).

There are however few accurate records of actual population counts of the species in the region. Further there are few published papers or other publically available reference material which provide any comment on the population size of the species. Indeed the Scientific Community Determination listing the plant as a Vulnerable species on the *Threatened Species Conservation Act 1995* and the Spikey Bush-Pea Threatened Species Profile (DECC 2005) makes no mention of population sizes of this plant.

The conservation advice prepared by the then Department of Environment, Water Heritage and the Arts (DEWHA) regarding the species approved by the Commonwealth Minister for the Environment (DEWHA 2008) outlines the most comprehensive summary of the species distribution and habitat requirements in the following statement:

Pultenaea aristata is endemic to the Woronora Plateau in NSW, between Helensburgh and Mount Keira, and grows in low nutrient sandstone soils in both moist and dry areas. The species is often associated with the Upland Swamp vegetation complex (NSW NPWS, 2003) and has been recorded from several locations within the sub-communities of Banksia Thicket and Restioid Heath. The species is also known to occur in association with areas of impeded drainage and creek lines within sandstone woodland and gully forest plant communities (NSW NPWS, 2003; B. Smith, 2007, pers. comm.).

Pultenaea aristata has been recorded within Dharawal State Conservation Area, Heathcote National Park and the Illawarra State Conservation Area (NSW NPWS, 2007). Further protection is afforded to the species within the Sydney Metropolitan Catchment Areas, where populations are known from the O'Hares, Cordeaux and Avon Catchments (B. Smith 2007, pers. comm). This species occurs within the Hawkesbury-Nepean, Southern Rivers, and Sydney Metro (NSW) Natural Resource Management Regions (DECC, 2005).

A search of some recent reports (two of which were prepared at least in part by the current authors) detailing survey work for *P. aristata* illustrates the density of local populations of the species in the region. The results of those reports are summarised in Table 2.

Notably the Species Impact Statement for the Dendrobium Colliery - Area 3 employed the population estimate technique used in this report and recorded population densities approximately five times greater than that calculated to be in the vicinity of borehole AI19 or its access track. Similarly, Dr Colin Bower of Flora Search (Flora Search 2009) estimated populations reaching “many thousands in suitable swamps. Large populations in the order of thousands of plants are common”.

While it is not known the sample size of the report prepared by Flora Search (2009) it is apparent from at least several separate sources that local populations of *P. aristata* in the thousands (if not tens of thousands) are a common occurrence on the Woronora Plateau.

The estimates of the local population size of *P. aristata* in close proximity to Borehole AI19 and its access track are consistent with the only known population counts of the species from the region.

Table 2: Estimated Population Size of *Pultenaea aristata* - Recent Reports

Location	Estimated population size of <i>Pultenaea aristata</i>	Report
Dendrobium Area 3, east of Lake Avon and west of Lake Cordeaux	Density estimate of ~27,550 individuals per ha (average of 177 to 424 plants per 10 x 10 m quadrat) within upland swamps.	Biosis Research (2007) <i>Dendrobium Area 3 Species Impact Statement</i> . Report for BHP Illawarra Coal. October 2007.
Dharawal State Conservation Area, east of Appin	Estimated population size of 2,000 plants.	Biosis Research (2007) <i>Dendrobium Area 3 Species Impact Statement</i> . Report for BHP Illawarra Coal. October 2007. Data quoted within above report from Biosis Research (2007) <i>West Cliff Colliery Stage 3 Coal Wash Emplacement Species Impact Statement</i> . Biosis Research, Sydney
O'Hares Creek Catchment, Woronora Plateau,	Widely dispersed and locally common in the east of the study area. Estimated around 20 plants in marginal habitats to many thousands in suitable swamps. Large populations in the order of thousands of plants are common.	FloraSearch (2009) <i>Illawarra Coal Bulli Seam Operations Project Terrestrial Flora Assessment</i> . Prepared by Colin C. Bower PhD. July 2009.

The local population estimate is considered likely to be an underestimate for the following reasons:

- Extensive Upland Swamp vegetation (habitat for the species) is contiguous with that mapped within the study area (i.e., the boundary of the population represented here is likely to be artificial);
- Individuals in the population are likely to be in breeding contact with other individuals and or sub-populations in the local area
- There are many hundreds of records within the locality (i.e., 5 kilometres from the study area).

Regional Population

Table 2 outlines a population estimates and/or observations of very large populations of *P. aristata* in the region provided by qualified botanists. Figure 3 shows the distribution of known records of the species within a 10km radius of the site. It is noted that are many other known large populations of this plant species occurring within the O'Hare's Creek Catchment to the south west of the borehole site (Matthew Richardson pers. obs.) which are not included in the NSW Wildlife Atlas data. The NSW Wildlife Atlas does not include all known records in the local area of *P. aristata*.

Further, Figure 3 shows that there are a large number of *P. aristata* records. What the figure does not show is the age of the records or if each record represents an individual

plant or a population of individuals. It is therefore not possible to estimate the total regional population of the species from this data. However, it is known by the author that a significant number of records are not represented in the south-western portion of Figure 3 along the Appin road, both in Dharawal Nature Reserve and in the vicinity of the West Cliff Colliery (surveyed during the Species Impact Statement for the West Cliff Coal Wash Emplacement).

There are however several important observations that should be noted that trend toward an extremely large regional population of this species.

Firstly the population estimates discussed in this report indicate that populations of the species regularly exceed tens of thousands of plants at any one location and that these populations are common.

Secondly the majority of the records of the species plotted on Figure 3 are located on Fire Roads or other road networks. It is most probable that these records do not indicate a bias towards the species preferring disturbed easements as its ideal habitat although in the case of other threatened plant species (e.g. *Persoonia hirsuta* and *Acacia bynoeana* pers. obs.) this may be so. It is more likely that, as indicated by the distribution of known records, that the species is incidentally recorded along these easements as it is readily identifiable by the catchment and reserve managers frequenting these roads and tracks.

Thirdly, it should be noted that in Table 2 the observation and trend regarding the species distribution is that while *P. aristata* is regularly recorded along fire roads and disturbance easements, the largest and most dense populations occur in upland swamps which are not typically bisected by fire roads and tracks. That is to say the majority of the records outlined in Figure 3 are from locations where the species is least dense (at road/easement boundaries) and not in the habitats where it is most dense (upland swamps).

While it is not possible to quantify the regional population size of this species it is clear that the regional population is likely to be very large indeed, a population which is almost entirely reserved within the National Parks Estate, Defence Lands or the Metropolitan Water Catchments as noted by DEWHA (2008).

Reserve Status and Threat Profile

Further to the discussion of the regional population of *P. aristata* outlined above, one final note on the distribution of *P. aristata* as a species should be noted for the sake of balance. It is noted that the Final Determination of the Scientific Committee to list the species as Vulnerable on the TSC Act states that two major sources were used in deciding to list the species at the introduction of the *Threatened Species Conservation Act* in 1995. They are the pre-existing status of the species as Rare or Threatened Australian Plants (ROTAP) species and the NPWS review of plants across NSW using standardised risk assessment criteria.

A review of the ROTAP status of the plant (Briggs and Leigh 1995) indicates that the species is listed as a Rare or Threatened Australian Plant on the basis of its restricted distribution (less than 100km). This reasoning is supported by DEWHA (2008) which broadly confines the distribution of the species to the Woronora Plateau. Nowhere in the published literature is it suggested that the listing of the species as Vulnerable on the TSC Act is related to its rarity.

This distinction is important as it speaks to the threat profile which may concern discussions such as the current assessment. That is to say that a species which is rare but widely distributed has a different threat profile to a species which is locally abundant but has a restricted distribution as in the case of *P. aristata*.

Threat profiles that should concern large but localised populations are those stochastic events which have the potential to impact the entire population such as the outbreak of disease, inappropriate fire activity or other direct disturbance to the entire population.

The proposal to develop Borehole AI19 and its associated access track does not carry with it such a threat profile. The current project will result in the removal of a small number of individuals of *P. aristata* in a large local population which exists within an extremely large regional population. The proposal will not lead to any activity which will place an inordinate threat on either the local or regional population of the species.

How many plants will be Impacted by the Proposal?

The impact of the proposal on the local population of *P. aristata* is likely to be minimal, given the extensive population in the immediate vicinity of the proposed disturbance and the fact that this species is known to colonise disturbed areas, as shown by the large numbers of the species recorded along the previously cleared fire trail in the Niche Environment and Heritage (2010) survey and assessment.

The maximum number of individuals of *P. aristata* that will or are likely to be impacted by the proposal has not altered from previous assessments. Approximately 100 individuals of *Pultenaea aristata* are likely to be impacted, or 0.5 per cent of the local population. Table 3 outlines the strategies that will be utilised to avoid and mitigate impacts to the local population of *P. aristata*.

3 IMPACT ASSESSMENT

Direct Impacts of the proposal include:

- ❑ Unavoidable removal of 0.66 ha of native vegetation.
- ❑ Removal of approximately 100 individuals of *P. aristata*

Indirect impacts of the proposal will largely be mitigated by the on-site Environmental Management Plan (EMP), but may include:

- ❑ The spread of weeds and disease;
- ❑ Erosion and sedimentation from soil disturbance; and
- ❑ Increased human activity.

Indirect impacts from vegetation disturbance can also include edge effects which extend into the retained vegetation from the ‘new’ edge of the vegetation which is left after clearing has occurred. Typically edge effects may extend up to 50 m from the edge of the vegetation into the remnant vegetation.

It is acknowledged that the predominant disturbance activities associated with the proposed development will be related to the re-opening of the existing fire road. That being the case, the edge effects associated with the fire road’s existence are already in place although in some areas these edge effects are mitigated by the natural revegetation of the fire road. The proposal is not considered likely to increase the edge effects associated with the fire road above that which previously existed when the fire road was open and actively used.

3.1 Assessment under Part 3A of the EP&A Act

Part 3A Key Thresholds

The Guidelines for threatened species assessment under Part 3A of the EP&A Act state that development applications must contain a justification based upon the listed key thresholds (DEC & DPI 2005):

- Whether or not the proposal, including actions to avoid or mitigate impacts or compensate to prevent unavoidable impacts, will maintain or improve biodiversity values.
- Whether or not the proposal is likely to reduce the long-term viability of a local population of a threatened species, population or ecological community.
- Whether or not the proposal is likely to accelerate the extinction of a threatened species, population or ecological community or place it at risk of extinction.
- Whether or not the proposal will affect critical habitat.

These key thresholds are addressed in Table 3. A revised assessment of significance is supplied in Appendix A.

Table 3. Assessment of Key Thresholds under Part 3A of the EP& A Act.

Threatened Biota	Maintain or improve biodiversity values.	Reduction in the long-term viability of a local population of the species, population or ecological community.	Accelerate extinction of the species, population or ecological community	Will critical habitat be affected?
Threatened Flora				
<i>Pultenaea aristata</i>	<p>Likely to reduce the total population of at least 20,000 plants, in the immediate vicinity of the proposal by no more than 100 plants (no more than 0.5 per cent of the local population).</p> <p>Loss is considered negligible in the context of the likely population size within 5 km of the site and the broader regional population within the Woronora Plateau.</p> <p>An ecologist will be present on site during clearing such that as many individuals as possible are avoided and to minimise impact to no more than 100 individuals along the access track.</p> <p>All plants within the Borehole site itself will be avoided and exclusion zones implemented to keep plant and equipment out of sensitive areas.</p> <p>Track construction will minimise impact on the natural soil profile and by retaining a slashed native stubble to facilitate more rapid post-disturbance regeneration. Vehicle movements will be minimised to and from the site.</p>	<p>Unlikely to reduce long term viability of the local population as a very small proportion of the population may be impacted and the proposed activity will not lead to indirect impacts such pollinator interference such that the lifecycle of the remaining population will be impacted.</p>	<p>Unlikely. The proposal has the potential to impact up to 0.5 percent of the local population of the species. The regional population is however likely to be extremely large and will not be impacted by the proposal.</p>	<p>No</p>

4 AMELIORATION MEASURES

4.1 Avoid and Mitigate

Actions that have been taken to avoid and mitigate impacts include:

1. Utilisation of existing tracks; and
2. Implementation of an Environmental Management Plan for the project.

The following measures will be implemented to further reduce potential impacts to native vegetation, fauna habitats and animals species:

1. Soils will not be stockpiled on the side of the existing fire road during re-development as this will increase the potential for the placement of soil on threatened plants which would otherwise be avoided by the road development works.
2. Best practice sediment and erosion control will be employed at the borehole site and also along sections of the access track which have erosion potential.
3. Any superfluous drill water will be removed from the Catchment area and disposed of at an appropriate site. Dirty water will not be discharged into vegetation adjacent to the borehole site.
4. Seed bearing material will be harvested from disturbed vegetation for use in the management and rehabilitation of vegetation on the disturbed development footprint.
5. At the site of the proposed borehole AI19, all trees which have the potential to contain hollows and any small sandstone outcrops will be avoided and if necessary fenced off using flagging tape and wooden stakes to ensure clearing contractors avoid these values.
6. All vehicles, including drill rigs and clearing equipment, should be subject to full wash down procedures before entering the Catchment lands. Vehicle movements to and from the borehole site will be minimised.
7. Rehabilitation of the access road and the borehole sites will be undertaken immediately upon decommissioning. Track construction will minimise impact on the natural soil profile and by retaining a slashed native stubble to facilitate more rapid post-disturbance regeneration.
8. An ecologist will be present on site during clearing to instruct work crews so that as many individuals of *Pultenaea aristata* as possible are avoided and to minimise impact to no more than 100 individuals along the access track. The maximum number of *P. aristata* that will be impacted by the proposal is 100 plants.
9. All *Pultenaea aristata* individuals within the Borehole site itself will be avoided and exclusion zones implemented to keep plant and equipment out of sensitive areas.

5 CONCLUSION

The proposal will result in the removal of no more than 100 individuals of *P.aristata*.

Impact assessments and assessment of significance undertaken for *Pultenaea aristata* conclude that the impact of the proposal on the species is unlikely to lead to a significant impact on the local population of the species.

Amelioration measures have been formulated such that the proposal will avoid, minimise and mitigate impacts on biodiversity.

REFERENCES

Biosis Research (2007) *Dendrobium Area 3 Species Impact Statement*. Report for BHP Illawarra Coal.

Biosis Research (2007) *West Cliff Colliery Stage 3 Coal Wash Emplacement Species Impact Statement*. Biosis Research, Sydney

DECCW (2005) NSW Department of Environment, Climate Change and Water - Threatened Species Profile - Spikey Bush-pea

DEWHA (2008) Approved Conservation Advice for *Pultenaea aristata*. Approved by the Minister / Delegate of the Minister on: 26/03/2008.

FloraSearch (2009) *Illawarra Coal Bulli Seam Operations Project Terrestrial Flora Assessment*. Prepared by Colin C. Bower PhD. July 2009.

FIGURES

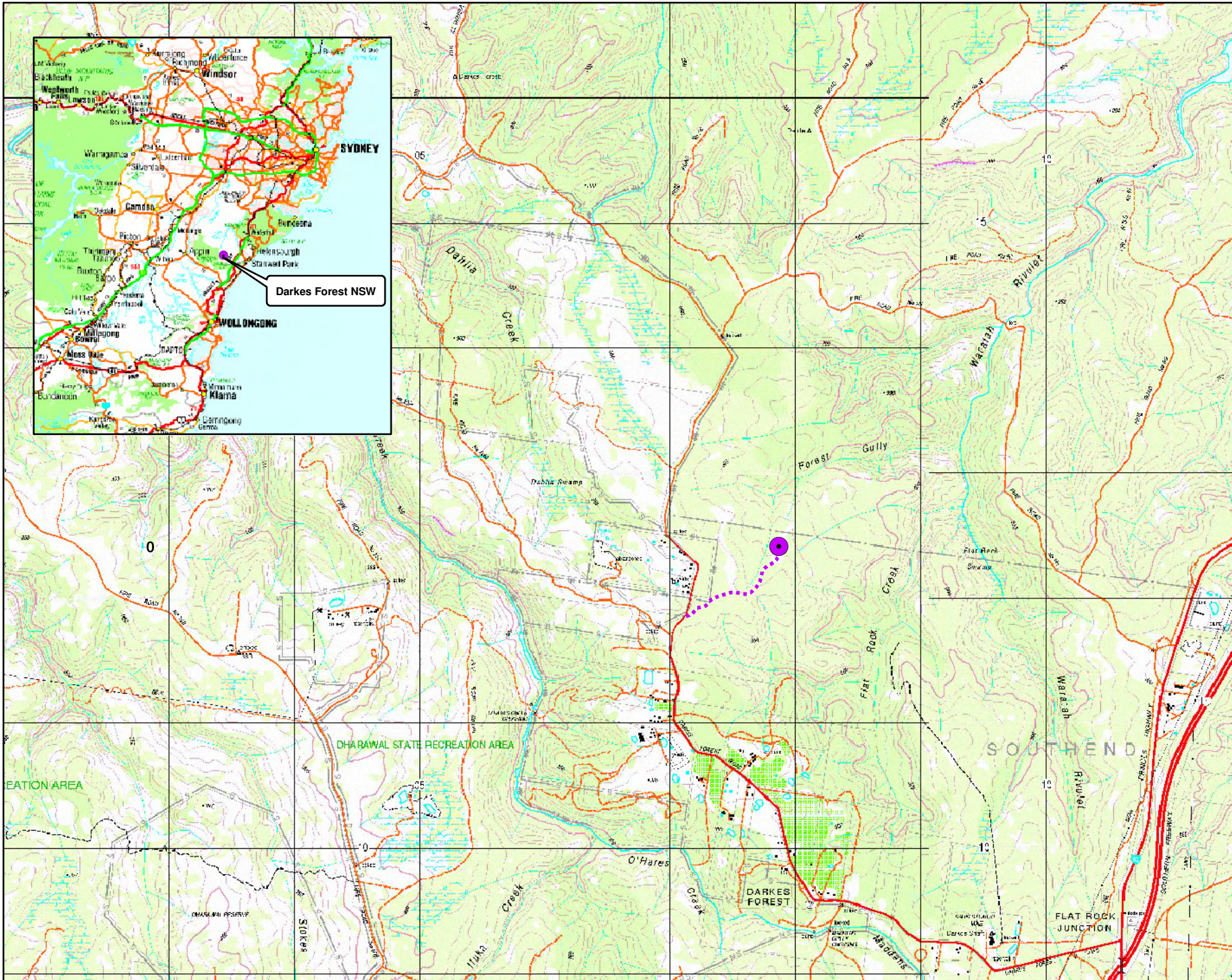


Figure 1.
Location
 31 August 2010

Proposed work
 ● Borehole AI19
 - - - Access Track



Kilometers
 0 0.25 0.5 1



Figure 2: Local *P. aristata* populations

**1035 Borehole AI19
Response to Submissions**

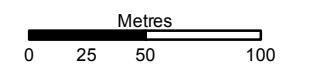
Drawn by: RJ

Project Mgr: MR

Date: 18/04/2011

Legend

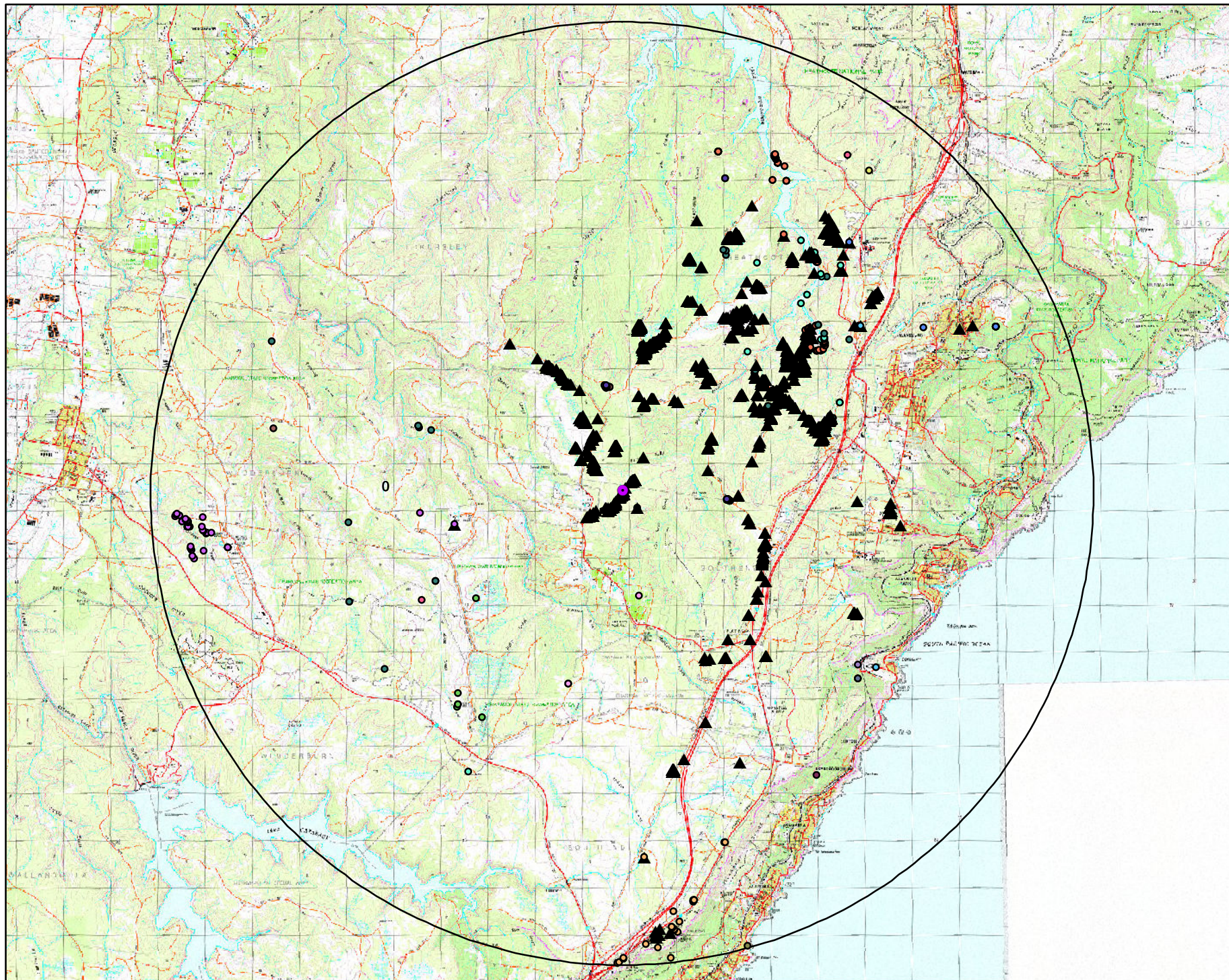
- *P. aristata* (30 Aug 2010)
- ◆ *P. aristata* (NPWS Atlas)
- *P. aristata* (13 April 2011)
- Plot (10m x 10m)
- ⋯ Access Track
- P. aristata* population areas



Horizontal Datum
MGA Zone 56

Figure 3
Pultenaea aristata
 within 10 km of the
 AI19 Borehole Site

19 April 2011

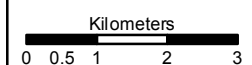


Threatened Flora
Scientific name

- *Acacia baueri* subsp. *aspera*
- *Acacia bynoeana*
- *Astrotricha crassifolia*
- *Callistemon linearifolius*
- *Callitris endlicheri*
- *Chorizema parviflorum*
- *Daphnandra* sp. *C. Illawarra*
- *Epacris purpurascens* var. *purpurascens*
- *Genoplesium baueri*
- *Grevillea parviflora*
- *Haloragis exalata* subsp. *exalata* var. *exalata*
- *Leucopogon exolasius*
- *Melaleuca deanei*
- *Persoonia hirsuta*
- *Pomaderris adnata*
- *Prostanthera marifolia*
- ▲ *Pultenaea aristata*
- *Syzygium paniculatum*

Proposed work

- Borehole AI19
- Access Track



APPENDICES

Appendix A: Assessment of Impacts on Threatened Species and Ecological Communities Under Part 3A of the EP&A Act

Threatened Flora

Pultenaea aristata

Pultenaea aristata is a small erect shrub, usually less than 40 cm tall, with leaves 8 to 22 mm long and 1 to 2 mm wide. The leaves are linear with a distinctive long bristle tapering to a sharp point. Flowers of the Prickly Bush-pea appear in yellow to light orange terminal heads between September and October.

Figure 2 shows:

- The distribution of *P. aristata* within the study area as recorded by Niche during field surveys in August 2010 and April 2011;
- The location of previously recorded individuals of this species along the access track to the north-east of the proposed borehole site (Atlas of NSW Wildlife);
- A conservative estimate of the extent of the local population of *P. aristata*; and
- The location of seven 10m x 10m plots used to count *P. aristata* and thereby estimate the local population.

While there is little or no information regarding the pollination and dispersal biology of this species, given the number of plants in the locality and their likely distribution in close proximity to the access track and borehole site, it is likely that the plants to the northeast of the borehole site are part of the much larger population in the locality.

This species is known to occur in localised, but nonetheless, large populations on the Woronora Plateau with some populations estimated to be in the thousands and possibly tens of thousands (Matthew Richardson pers. obs.).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

The proposal will result in the direct removal of no more than 100 individuals of this species.

Within the study area the species was found to be a common shrub species along the access track and at the borehole site as well as in the vegetation surrounding these areas. It was estimated that at least 20,200 individual plants occur within the study area with no more than 0.5 per cent subject to disturbance by the proposal. These figures are considered to be conservative and it is likely that both the extent and size of the local population is much greater than has been calculated here. The great majority of the population will not be impacted by the proposal either directly or indirectly.

How is the Proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposal will result in the removal of 0.66 ha of vegetation which is considered to be either known or potential habitat for *Pultenaea aristata*.

In the context of the locality this area of vegetation is negligible given the relatively undisturbed nature of the Woronora Catchment which, as shown in Figure 3, is known habitat for this threatened species.

It should be noted that the proposed access track and borehole site will be fully rehabilitated at the completion of all works. That being the case, and given that the current localised distribution of this species occurs on and directly beside the existing abandoned and regenerating Fire road it is anticipated that the species would re-colonise the access track and borehole site once the project is completed. This conclusion is based on the estimate that only a very small proportion of plants in the local population will be impacted by the proposal and will act as a source population for the regenerating area.

Therefore, the proposed development will have a relatively short term impact on a small area of known and potential habitat for *Pultenaea aristata*.

Does the Proposal affect any threatened species or populations that are at the limit of its known distribution?

Pultenaea aristata is restricted to the Woronora Plateau, a small area between Helensburgh, south of Sydney, and Mt Keira above Wollongong.

The study area occurs within this known distribution and Figure 3 indicates that within 10 km of the borehole site at least, the local population is surrounded by records for the species in all directions. It should be noted that large populations of the species occurring within the O'Hare's Creek Catchment to the south west of the borehole site (Matthew Richardson pers. obs.) are not indicated on Figure 3, indicating that the Atlas of NSW Wildlife does not include all known records in the local area.

How is the proposal likely to affect current disturbance regimes?

The proposal will lead to the re-opening of a previously disturbed area in the form of an abandoned fire road. Development of the borehole site will also lead to a small area of disturbance in a previously undisturbed site.

How is the Proposal likely to affect habitat connectivity?

The proposal will result in a disturbance footprint that will include a 5 m wide clearing running for approximately 1 km to the borehole site, which itself will result in a clearing of approximately 40 x 40 m.

Habitat connectivity in this area will be temporarily interrupted (i.e. for the life of the project) in a relatively minor way. That is to say that a 5 m wide clearing may limit the movements of some animal species such as small rodents, although a clearing of this nature is not likely to inhibit the movement of most fauna.

In relation to *Pultenaea aristata* habitat connectivity has the potential to be important for pollinator movement. The pollinators of this species are not known but smaller fauna or insects are the likely vectors. It is not known if a 5 m wide clearing would inhibit pollinator movements for this species. It is considered unlikely however that the creation of a very small clearing would result in a situation that would fragment an existing population such that the population was no longer able to exchange genetic material through pollination or disperse seed adequately.

Four main considerations should be noted:

1. there are sections of the regenerating fire road which are already devoid of vegetation and therefore will already act to inhibit pollinator movement in the area, if indeed any pollinators would be affected by these small widths of track devoid of vegetation.
2. the population of *Pultenaea aristata* within the study area exists despite previous disturbances which are almost identical to the disturbances proposed for the development of Borehole AI19.
3. the population of *Pultenaea aristata* within the study area is likely to have been present before (and after) the fire road was created. That is to say, the population displays no indication that the previous disturbance has inhibited its current existence in any manner, indeed a large number of individuals of this species were recorded within the abandoned fire road footprint itself.
4. the proposed development footprint will exist within a largely undisturbed landscape to the north, east and south (i.e. within a largely contiguous expanse of vegetation associated with the Woronora Catchment). This vegetation provides known and potential habitat for *P. aristata* which is extensive in the locality and, to a greater extent, the region and which will not be affected more broadly by the proposal.

How is the Proposal likely to affect critical habitat?

No critical habitat as listed on the TSC Act will be affected by the proposal.