Pisolite Hills Project

Wenlock Basin Wild Rivers Submission

Cape Alumina Limited

May 2009

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1. Executive Summary

The proposed declaration of the Wenlock River Basin as a Wild River Area (the Proposal) by the Minister for Natural Resources & Water on 10 December, 2008 will, if it proceeds without amendments, result in the loss of substantial economic and social benefits to Queensland and the Australian economy including the loss of hundreds of direct jobs. That loss will be most severely felt in the Aboriginal communities of Cape York, particularly Mapoon.

The High Preservation Area (HPA) set out in the Proposal is arbitrary and cannot be justified on scientifically based environmental grounds. On the one hand it excludes some important environmental features, whilst, on the other hand, it unnecessarily sterilises excessively large and valuable mineral resources without any demonstrable environmental benefit. The adverse impact of proceeding with the Proposal in its current form clearly demonstrates the dangers in the inappropriate use of arbitrary buffer zones in an area where a large body of scientific environmental data is available.

Minor amendments to the Proposal, as outlined in this submission, will have no significant environmental impact and will avoid these negative outcomes.

This submission proposes that the HPA in the Proposal be modified to reflect the results of detailed analysis of the environmental features in the vicinity of Pisolite Hills, and with reference to published literature on the protection of wetlands and water courses from mining and development activities.

The modified HPA proposed by Cape Alumina is consistent with both the *Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland – Exploration and Mining in Watercourses (DME 1995),* and the *Guideline for the Determination of Wetland Buffer Requirements (Department for Planning and Infrastructure, State of Western Australia 2005).*

Bauxite deposits at Pisolite Hills have substantial economic and strategic value and can be developed without material adverse impact on the environmentally valuable areas associated with the Wenlock River.

Deficiencies in the Proposal and a workable solution

The extent of the proposed HPA identified in the Proposal have no scientific justification and will result in the unnecessary sterilisation of substantial and valuable bauxite resources without any benefit in terms of preservation of areas of high environmental value associated with the Wenlock River. Cape Alumina contends that the establishment of HPA's by reference to scientific data and publications will preserve the areas of high environmental value and allow the appropriate development of the bauxite resources to proceed in a manner that does not threaten those areas.

In the case of the Wenlock River tributaries, the HPA in the Proposal comprise 500m wide buffer zones around 50m wide buffer zones which extend either side of the tributaries. In the vicinity of Pisolite Hills, these tributaries are so small that in most cases, their associated riparian zones comprise only one or two individual canopy trees and average between 5 and 15m in total width. In other words, the HPA contained in the Proposal is typically around 112 times the width of the features they are intended to protect. There is no logic to having a buffer around a buffer and the width of the proposed HPA contained in the Proposal far exceeds the recommended widths for buffers set out in the published literature and the precedents established with other Wild River declarations.

Should the Wenlock River Basin be declared as a Wild River Area, without alteration to the proposed HPA, it is estimated that $1 billion worth of bauxite will be lost from the proposed Pisolite Hills project and bauxite resources with a similar value lost from the adjacent Alcan Mining Lease, without any improved protection to the environment or the environmental features identified in the Proposal.

Furthermore, such a declaration will jeopardise the viability of the Pisolite Hills project and put at risk billions of dollars in export earnings, hundreds of millions of dollars in state royalties and federal taxes, and hundreds of jobs including many from the nearby Aboriginal communities.

This loss will be the result of the excessively large HPA, or buffer zones, which extend up to 550 m either side of certain environmental features in the vicinity of Pisolite Hills as set out in the Proposal. There is no scientific basis for such a large buffer zone around these features.

We strongly recommend that the HPA for the entire area referred to as the "Coolibah Springs Complex" in the Proposal be abandoned in favour of the scientifically based HPA buffers outlined in this submission.

Cape Alumina has prepared a map showing the appropriate extent and distribution of the HPA in the Pisolite Hills area and is willing to work with the Government to prepare similar appropriate buffers for the adjoining area on the Alcan mining lease. This can be done very quickly on the basis of available data sets.

The scientific justification for the amended HPA proposed by Cape Alumina

The buffer zones proposed in this submission as the amended HPA are presented against the key criteria of hydrologic connectivity, riparian function, wildlife corridor and water quality. On the basis of all four criteria it is demonstrated that the amended HPA will provide a high level of protection to the Coolibah Springs Complex. The amended HPA will provide a minimum buffer of approximately 25x the width of tributaries and appropriate environmental protection around the mapped springs.

Whilst Cape Alumina agrees that the springs and tributaries warrant environmental protection, we reject the claim that they provide important flows to the Wenlock River as stated in the Overview Report. Contrary to that statement, we present results of detailed hydrological studies which demonstrate that the catchment area of the four largest springs in the vicinity of Pisolite Hills represent 0.0015% of the catchment area of the Wenlock River Basin. The total combined flow data from these catchments represents 1.06% of the long-term average wet season discharge and 0.24% of the average dry season discharge of the Wenlock River Basin (Geoaxiom, 2009). We conclude that the Coolibah Springs Complex in the vicinity of Pisolite Hills does not contribute significant wet or dry season base flows to the Wenlock River.

The bauxite layer at Pisolite Hills is not the source of ground water flows to springs, tributaries or the Wenlock River. The bauxite does not act as a sponge or a water filter critical to the health of the springs or the river. The stratigraphic profile of the bauxite bearing plateau, as determined by extensive exploration and hydrological drilling conducted by Cape Alumina, clearly shows that the bauxite forms a blanket-like deposit at the surface which extends down to an average depth of 3.5m and overlies an ironstone layer. The ironstone layer overlies a clay horizon which, in turn, overlies a thick sand-gravel aquifer. The bauxite is dry throughout the dry season and most of the wet season, whereas the underlying sand-gravel aquifer holds water throughout much of the year and provides groundwater flows to the springs in the vicinity of Pisolite Hills.

The bauxite horizon is not critical for recharge of the sand-gravel aquifer; disturbance of the bauxite profile during mining will have no direct impact on the hydrological connectivity between the source reservoir and the springs; and mining or removal of the bauxite can occur without impacting the springs (Australasian Groundwater & Environmental Consultants, 2009).

The hydrologic connectivity between the groundwater reservoir, the springs and the Wenlock River will be fully protected under the amended HPA proposed in this submission. The much larger HPA as set out in the Proposal will provide no additional environmental protection to this hydrologic connectivity.

The amended HPA recommended in this submission will provide environmental buffers of no less than 25 times the width of the actual tributaries and associated riparian zones, and will more than adequately preserve these features including the riparian function of the tributaries, as well as the springs and associated waterways.

The HPA buffers proposed in this submission and based on published literature and detailed scientific studies, will preserve the existing riparian zone and maintain both the wildlife corridor values of the area as well as minimizing any impacts on water quality.

Broader concerns about the Proposal

Cape Alumina is also concerned that other aspects of the Pisolite Hills project, including mine related infrastructure planned to transect the HPA, may be restricted by the proposed declaration and we seek assurance from the Minister that both the objectives of the *Wild Rivers Act 2005* (the Act) and the integrity of the Pisolite Hills project can be properly assimilated in the public interest. In this regard we are prepared to work with the Minister to identify any legislative amendments that may be required to achieve this goal. In this context we propose that the definition of "Specified Works" in the Act be amended to include "*pumping of water from a river or water body where required for approved mining activities*".

Furthermore, for clarity and consistency we recommend that the *Mineral Resources Act 1989* (MRA) provisions relating to wild rivers be amended to specifically allow the conduct of "Specified Works" as defined in the Act notwithstanding that other 'mining lease activities' may not be permitted to be undertaken. Also, some clarity should be given to the expression 'mining lease activities' in s.383 and s.384 of the MRA to ensure that holders of mining leases are aware of the proper scope of the limitations on conducting activities pursuant to a mining lease in a wild rivers area.

It is estimated that the average and median annual flow of the Wenlock River at the confluence of Ling Creek is 3.1 and 2.9 million Ml/year, respectively (Geoaxiom, 2009). Our preliminary studies indicate that the total water requirements of the Pisolite Hills project are likely to be between 4,000 and 8,000 Ml per year, which will represent less than 0.3% of the annual flow of the Wenlock River. We request confirmation from the Minister that no restrictions will be imposed under the proposed declaration on the ability of Cape Alumina to draw water from the Wenlock River as may be required for the Pisolite Hills project.

2. Introduction

The Act provides a framework for the protection of river systems in Queensland that are considered pristine, that is, rivers that are considered to have most of their natural values intact. The process for declaring a Wild River includes an initial proposal by the Minister of Natural Resources and Water (now administered by the new Department of Environment and Resource Management), a public submission and consultation period, and subsequent consideration of community feedback prior to a decision being made on the declaration. Since the inception of the Act, nine river systems have been proposed and subsequently declared as being Wild Rivers. These declarations include:

- Fraser Wild River Declaration;

- Gregory Wild River Declaration;
- Hinchinbrook Wild River Declaration;
- Morning Inlet Wild River Declaration;
- Settlement Wild River Declaration;
- Staaten Wild River Declaration;
- Archer River Basin;
- Lockart River Basin; and
- Stewart River Basin.

On December 10th, 2008, the Minister proposed the Wenlock River Basin as an area to be considered for declaration under the Act (Figure 1). Public submissions were invited on the declaration proposal, and close on 29th May 2009.

This document has been prepared as a submission, with supporting information, on the Wenlock Basin declaration proposal.

2.1 Wenlock Wild River Proposal

The Wenlock River, along with thirteen of its major tributaries and three special features, form the Wenlock Basin Wild River proposal. The Wenlock River is located in the northern part of Cape York and flowing to the west coast. The proposed Wenlock Basin Wild River area spans approximately 743,500 ha.

Under the Wenlock Wild River Proposal planned management of activities within the proposal area are to be regulated by four designated areas, including:

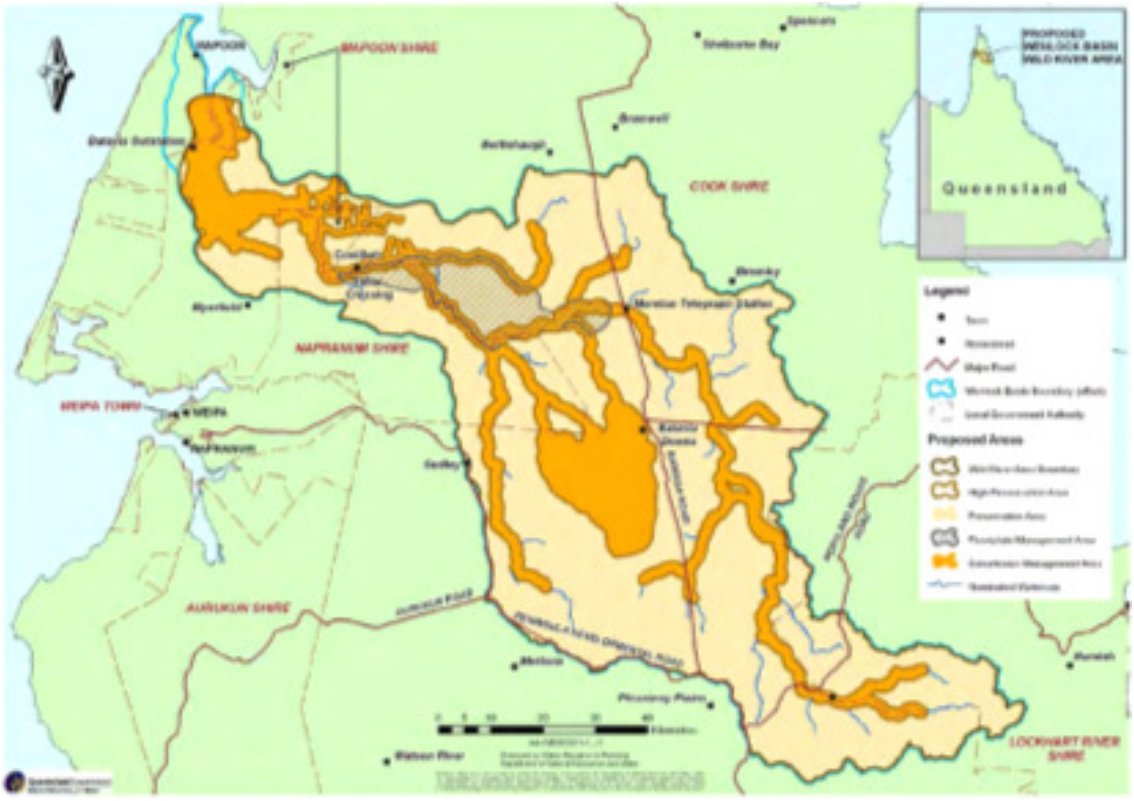
- High preservation areas;
- Preservation areas;
- Floodplain management areas; and
- Sub-artesian management areas.

To assist in the public consultation process, the then Department of Natural Resources and Water (DNRW) released a number of documents to describe the proposed conditions to be imposed on the Wenlock Basin as part of its declaration as a Wild River. These documents (as follows) were reviewed in preparation of this submission:

- Wenlock Basin Wild River Declaration Proposal – December 2008
- Wenlock Basin Proposed Wild River Area Overview Report – December 2008
- Wild Rivers Guide, Mining and Exploration – October 2007

The Special Feature referred to as the Coolibah Springs Complex occurs in the lower catchment to the north of the Wenlock River. It is stated in the Wenlock Basin Proposed Wild River Area Overview Report (pg 17) that special features are to be included in the designated High Preservation Areas.

The proposal outlined plans to effectively prohibit high impact activities, such as surface mining, in planned High Preservation Areas. High Preservation Areas mostly consist of buffer regions, ranging up to 1000 m either side of a designated water body. It is this proposed buffer that makes up the High Preservation Area around tributaries in the vicinity of and including Ling Creek and Sandfly Creek (referred to as the “Coolibah Springs Complex”) that is of concern to Cape Alumina and the planned Pisolite Hills Project.



Source: Wenlock Basin Wild River Declaration Proposal, Schedule 2 (DNRW 2008)

Figure 1: Proposed Wenlock Wild River Declaration Proposal.

3. Background to submission

3.1 Company making the submission – Cape Alumina Limited

Brisbane-based Cape Alumina Limited was formed in February, 2004, and on 29 January, 2009 it raised $15 million from investors and became the only resource company to list on the Australian Securities Exchange since the global financial crises commenced in September, 2008. Cape Alumina's key objectives are to secure areas of bauxite mineralisation and establish a bauxite export business. Options for participation in an integrated bauxite-alumina supply chain will be assessed after the establishment of the bauxite export business. The primary regional focus of the company is the western region of Cape York in the world-class Weipa Bauxite Province.

3.2 The Pisolite Hills Project

The proposed Pisolite Hills Project is Cape Alumina's flagship development and is situated approximately 50 km northeast of Weipa in Northern Queensland, as shown in Figure 2. The Project site, consisting of a proposed mining and processing area, is located approximately 34 km from a proposed stockpile and barge loading facility at Port Musgrave. The Project is expected to mine approximately 8 - 12 million tonnes of run of mine ore per year and export about 7 million tonnes per year (dry basis) of bauxite. The Project has an expected mine life of approximately 10-15 years. Production is targeted to commence in 2013.

Table 1 Pisolite Hills Mining and Exploration Tenement schedule.

Tenement	Project Name	Status	Area	Registered Holder	Date Commenced	Date Expires	EA Number & Type
EPM 14547	Pisolite Hills	Granted	14,856 ha	Cape Alumina Ltd	20/04/2006	19/04/2011	MIM500241704
EPM 15278	Pisolite Hills North	Granted	16,404 ha	Cape Alumina Ltd	30/09/2007	29/09/2012	MIC200376105
EPM 15984	Port Musgrave	Granted	1,238 ha	Cape Alumina Ltd	24/02/2009	23/02/2014	MIC200481406
MLA 20572	Pisolite Hills 1	Application	12311.3994 ha	Cape Alumina Ltd	Lodged date 1/11/2007		MIN100644307
MLA 20573	Pisolite Hills 2	Application	3207.8898 ha	Cape Alumina Ltd	Lodged date 1/11/2007		MIN100644307
MLA 20574	Pisolite Hills 3	Application	3885.5034 ha	Cape Alumina Ltd	Lodged date1/11/2007		MIN100644307
MLA 20612	Port Musgrave	Application	1050.2893 ha	Cape Alumina Ltd	Lodged date 20/11/2008		

The Project is situated on granted Exploration Permits (Minerals) EPM14547, EPM15278 and EPM15984 and Mining Lease applications MLA20572, 20573, 20574 and 20612, all held 100% by Cape Alumina under the *Mineral Resources Act 1989* (Table 1).

Since establishment in 2004, Cape Alumina has undertaken a comprehensive exploration program to characterise the bauxite resources. The JORC-code compliant bauxite resource at Pisolite Hills currently stands at 101 million tonnes (76 million tonnes Indicated + 25 million tonnes inferred) of *in situ* bauxite that, after wet beneficiation will yield 68.8 million tonnes (52.7 million tonnes indicated plus 16.1 million tonnes inferred) of dry product bauxite at an average grade of 53.5% Al_2O_3 (inc. 41.6% Trihyrdate available alumina at 150°C), 12.2% SiO_2 (inc. 7.4% reactive SiO_2). A significant resource upgrade is expected to be confirmed by June 2009.

The Pisolite Hills bauxite is typical of the bauxite that occurs between the Wenlock and Ducie Rivers. It is unique in Cape York in its low bohemite content which generally averages 3-6% compared with 10-20% for the areas around Weipa and Aurukun. The low bohemite nature of Pisolite Hills bauxite makes the area of high strategic value as it is suitable for processing in low temperature or Trihydrate refineries such as those that have been recently built in China. Low temperature refineries operate at 100-150°C compared with 250-280°C for high temperature refineries such as QAL and Yarwun in Gladstone. The low operating temperature of Trihydrate refineries means they typically have lower energy costs and lower associated CO_2 emissions than high temperature refineries.

Figure 2: Location map of the Pisolite Hills project, western Cape York.

The Pisolite Hills bauxite deposits and those adjoining bauxite deposits on the Rio Tinto Alcan mining leases situated between the Wenlock and Ducie Rivers are therefore important, strategic resources.

Cape Alumina prepared a scoping level feasibility study into the development of a bauxite mining and export operation at Pisolite Hills in 2007. Positive findings led to a decision to apply for Mining Leases (MLs) over the proposed project area later that year. Environmental studies were commenced in July, 2007 for the preparation of an Environmental Impact Statement (EIS) and a Preliminary Feasibility Study was completed in July 2008.

In August 2008, with assistance from the National Native Title Tribunal, Cape Alumina commenced formal negotiations for an Indigenous Land Use Agreement (ILUA) with the Mapoon DOGIT Trustees, six Traditional Land Owner groups and the Cape York Land Council. Those negotiations are now at an advanced stage with authorisation expected to take place in 2009.

Cape Alumina plans to complete the Pisolite Hills EIS and a Bankable Feasibility Study (BFS) in 2010.

To date, the company's monetary investment in the Pisolite Hills project is approximately $12 million and a further $12 million has been committed for expenditure by June 2010.

3.3 Reason for submission

Cape Alumina Limited agrees that the Wenlock River catchment contains some areas of natural environmental values that are worthy of protection. However, any decision to sterilise valuable strategic mineral resources must be based on a proper scientific assessment of the environment with due regard to the social and economic impacts. Our submission, based on completed flora, fauna and aquatic ecology studies over almost two years, and preliminary results of surface and ground water hydrology studies conducted as part of the EIS, provides the scientific basis for such an assessment.

Details relating to the proposed locations and extents of High Preservation Areas (HPA) cannot be justified on scientifically based environmental grounds and the disproportionate impact that the proposed HPA will have on the Pisolite Hills project warrants serious reconsideration of the extent of the HPA in the vicinity of Pisolite Hills and the adjacent bauxite areas on the Alcan Mining Lease ML7031.

It is understood from the *Department of Natural Resources and Water (DNRW) guideline Wild Rivers Guide – Mining and Exploration* that surface mining activities are not permitted in a High Preservation Area. As indicated in Schedules 1 and 2 of the Wenlock Basin Wild River Declaration Proposal and in GIS layers provided by DNRW, the proposed High Preservation Areas of the Proposal will greatly restrict the activities proposed for the Pisolite Hills Project (Figure 3) and will have a significant detrimental impact on the project feasibility.

The effect of the Proposal as it currently stands will be to sterilise at least 15% of ML20572 and at least 58% of ML20573 which will result in the sterilisation of at least 28% of the JORC-code compliant Indicated Resource at Pisolite Hills. The estimated value of the bauxite which will be sterilised under the Proposal on the Cape Alumina Mining Leases alone is estimated to be approximately $1 billion. Should the loss of this portion of the resource result in the project becoming unviable, the estimated lost revenue will approximate $3-$4 billion. In addition, hundreds of full time jobs will be lost.

Our assessment of the proposed HPA is that they are arbitrary, without justification and that there is no precedent for such a vast setback from a waterway or special feature.

Given that the area of interest is of strategic importance, has substantial economic value, and for which there is a vast body of scientific environmental data available supporting the proposition that a significant portion of the HPA is of no value in the preservation of environmental values associated with the Wenlock River Basin, we are of the very strong opinion that arbitrary boundaries are inappropriate in this particular area, and that a case by case approach should be taken in respect of establishing High Preservation Areas associated with the “Special Features” in the vicinity of Pisolite Hills and adjoining parts of the Alcan Mining Lease.

Moreover, some environmental features in the vicinity of Pisolite Hills that we believe warrant protection are notably excluded by the proposed arbitrary buffers. For instance the evergreen spring shown in the lower middle section of Figure 3 to be outside the proposed arbitrary HPA, but covered by our recommended case by case HPA in Figure 7. We believe this highlights the inappropriateness of arbitrary HPA’s, or buffer zones, in an area for which there is a large body of scientific data available.

We hold the view that a proper assessment of the special features and consequent determination of appropriate buffers on purely environmental grounds will establish High Preservation Areas that will provide a high level of environmental protection of the Special Features and preserve the

environmental values of the area, whilst not unnecessarily sterilising the State's strategic and valuable mineral resources.

Furthermore, we wish to register our concern about the term "Preservation Area" which is used in the Wild Rivers legislation and may be perceived to be inconsistent with our development plans for Pisolite Hills. We are aware that the Cape York Land Council also has serious reservations about this terminology. We suggest that rather than "Preservation Area" the term "Catchment Area" or "Management Area" be used.

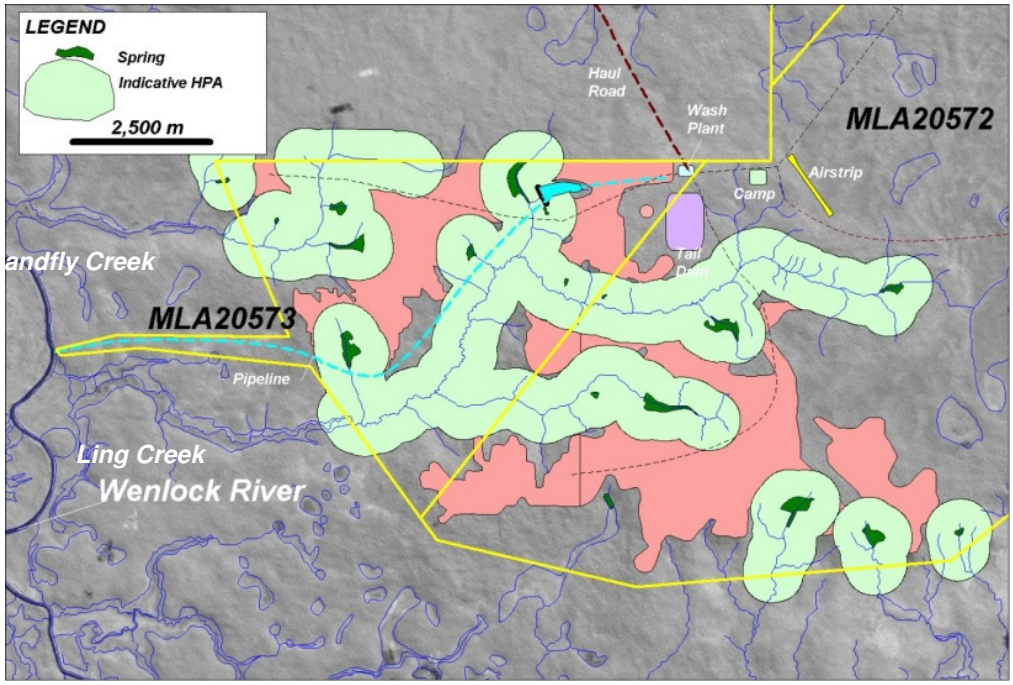


Figure 3: Impact of the proposed HPA on the Pisolite Hills project. Pink area shows the JORC Code-compliant bauxite resource.

4. High Preservation Areas – Coolibah springs complex

4.1 Arbitrary High Preservation Areas

The proposed High Preservation Area detailed in the Overview Report that affects the Pisolite Hills Project surrounds the Special Feature referred to as the "Coolibah Springs Complex".

Simplistic information is provided in the Overview Report, referencing only one short unpublished memo which appears to be based on a field inspection of only 3 days duration (Wannan 2007). The source material does not indicate any details of the methodologies employed or the qualifications of the persons undertaking the field inspection. It does not appear to support the generalised claims in the Overview Report that the springs "*provide important flows into the Wenlock River*" as no hydrological data is presented nor discussed. Hydrological data collected and analysed by Cape Alumina's environmental experts demonstrates that the statement is incorrect.

4.2 Description of the Special Features in the vicinity of Pisolite Hills

The Special Features known as the Coolibah Springs Complex, proposed in Schedules 1 and 2 of the Wenlock Basin Wild River Declaration Proposal, are examples of a widespread group of "evergreen springs" which have now been mapped by independent ecologists as part of the Pisolite Hills EIS. Over 100 "evergreen springs" have been mapped and it is likely that more exist in the area north of the Ducie River where detailed mapping is yet to be carried out. In addition, many more linear springs have been mapped in the area north of Weipa.

Work undertaken as part of the Pisolite Hills EIS has determined that most evergreen springs occur as a deep green forest patch with a triangular or umbrella shape that is readily identifiable in aerial imagery. They contain a number of small streams that quickly merge into a single large stream. The drainage pattern resembles a delta. As the direction of water flow is the reverse of a normal delta, the configuration is referred to as an *inverted delta*. The resulting single thread stream is known as a 'spring run'. This general pattern is illustrated in Figure 4.

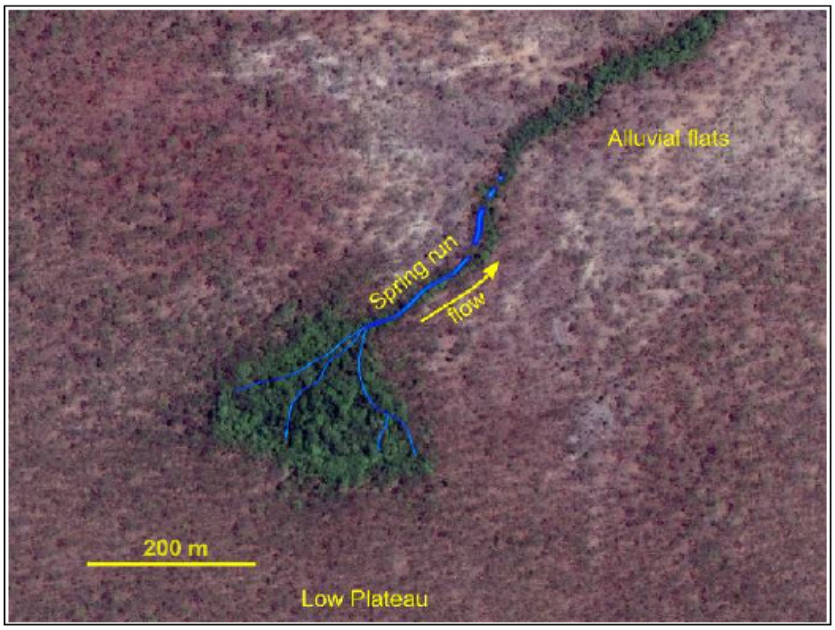


Figure 4: General Pattern of Evergreen Springs

More than one hundred evergreen springs are known to exist for the Weipa-Aurukun aluminous lateritic plateau (Bulimba Formation) which stretches along the coastal and sub-coastal areas of western Cape York Peninsula. More than 50 springs have also been located mainly around the margins of aluminous ferruginous lateritic plateaus in the central part of the Cape, and some springs may also occur in what appear to be alluvium or aeolian sand deposits in high positions in landscapes with underlying bedrock. Springs also occur on the east coast of Cape York Peninsula in areas north of Shelburne Bay. The distribution of springs on Cape York Peninsula is shown in Figure 5.

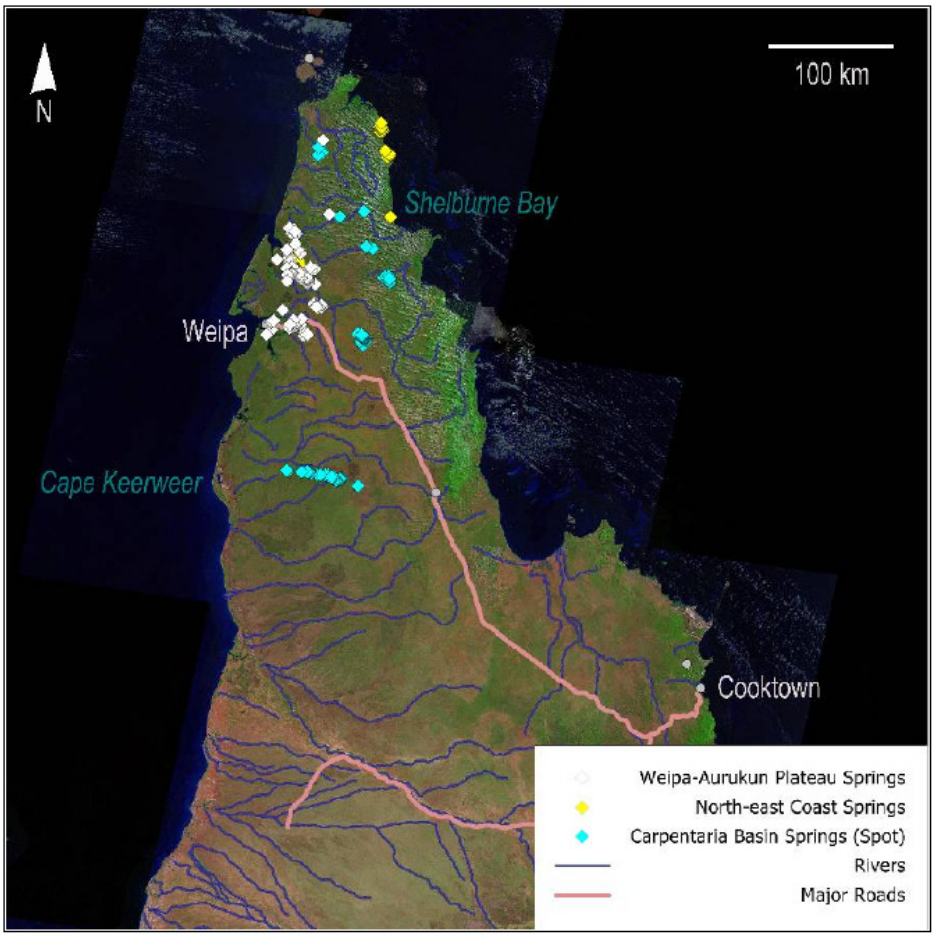


Figure 5: Distribution of Springs on Cape York Peninsula

Springs to the west and north-west of the Pisolite Hills Project are known to contain a superset of the species present in the Pisolite Hills (based on data from R. Fensham, pers comm). In wetter areas, rainforest species are frequent in and around the springs.

A cluster of evergreen springs have been mapped on the northern side of the Wenlock River. The cluster is approximately 20km long and 4km wide. Within this cluster, most of the springs have an inverted delta shape which supports a higher diversity of vegetation patterns and species. Outside of this band, most of the springs are linear springs and follow creeks.

Within the evergreen springs of the Wenlock catchment, the largest and most conspicuous species included:

- Deplanchea tetraphylla (Golden bouquet tree);
- Lophostemon suaveolens (Swamp mahogany);
- Livistona humilis (straight-leaf fan palm/dwarf fan palm);
- Dillenia alata (Red beech)
- Eucalyptus brassiana (Cape York red gum); and
- Xanthostemon crenulata (Swamp penda).

Other plants common in swampy rainforests of north Queensland (including the springs) included:

- Acacia mangium (Brown salwood); and
- Syzygium angophoroides (Swamp satinash);
- Livistona benthami (Top end weeping fan palm);
- Acmena hemilampra (Blush satinash);
- Stenochaena palustrus (Alligator fern); and
- Calophyllum sil (Alligator bark, Blush touriga).

The springs were also found to support a number of specialised species that are only found in small colonies in the wettest parts of the springs, some examples of which are shown below. All these species are found elsewhere on Cape York Peninsula. Nevertheless, they are relatively uncommon across this range and are usually limited to small colonies in very wet areas. Some species are listed in the schedules of the *Nature Conservation Act 1992*, which means that the species are formally recognized as being uncommon to the point where consideration needs to be given to their conservation. These species include their conservation status in brackets.

- Pandanus lauterbachii;
- Calophyllum bicolor (Springwood) [vulnerable];
- Schidapsis altisimum (Banana-leafed climber);
- Licuala ramsayi (Umbrella palm);
- Hydriastele wendlandiana (Water palm);
- Macaranga polyadenia (Swamp macaranga) [rare];
- Horsfieldia australiana; and
- Hanguana malayana (lily).

4.3 Errors in the definition of Special Features in the Overview Report

The High Preservation Area (HPA) setback zones associated with Ling Creek, Sandfly Creek, and the Special Features in the vicinity of Pisolite Hills are provided in the Declaration Proposal (as shown in Figure 1 and 3). Mapping of the GIS layers supplied by DNRW shows that buffers extending 500m either side of all Special Features are proposed to be designated as High Preservation Areas. However, no documentation supplied by DNRW contains an explanation or justification for the determination of the extent of these buffer zones, and there is no reference given to published literature or accepted practices for environmental buffers. It must therefore be concluded that the proposal is simply an arbitrary determination, with lines drawn on a map without the benefit or consideration of actual site-specific scientific data on the ecology or hydrology of the site.

Furthermore, it can be shown from the GIS data derived from the Overview Report, that the Special Features in the vicinity of Pisolite Hills are in fact **buffers** around the environmental features rather than the mapped outlines of the environmental features themselves. Figure 6 illustrates the errors in mapping of the Special Features in the vicinity of Pisolite Hills (Figure 6a) as shown in the overview report. Figure 6b) is a close-up of the Special Feature which is a tributary of Ling Creek. The yellow lines are 100m apart and represent a 50m buffer either side of the creek line. In Figure 6c) the actual riparian zone around the tributary is highlighted. This riparian zone has an average width of between 5 and 10 metres. In addition, the “Special Feature” as mapped in the Overview Report excludes both a tributary and an evergreen spring, but includes a wide zone of open dry Stringybark woodland unrelated to the tributary or its riparian zone.

Similarly, mapping of those springs defined as Special Features includes buffers extending up to 85m out from the wet edge of the springs. It is from the edge of these buffers that the HPA starts (Figure 6a).

The result of these proposed buffers upon buffers means that the actual HPA as proposed at Pisolite Hills are a minimum of 1120m wide. This means that the declaration proposal as it currently stands is to establish HPA over buffers extending up to 112 times the size of the actual environmental feature being protected. This is far in excess of any recommended buffers based on any scientific publication and is against the recommendations of independent ecologists.

There is no logic in the application of a buffer on a buffer and this approach will result in the unnecessary sterilisation of JORC Code-compliant ore resources at Pisolite Hills and threaten the viability of the project without any basis in environmental science.

The tributaries in the vicinity of Pisolite Hills are very narrow and Cape Alumina recommends that mapping of the Special Features be restricted to the features themselves which, in the case of the tributaries, have a total width of between 5 and 15m in the immediate vicinity of Pisolite Hills. In the case of the springs, Cape Alumina recommends those feature be mapped to the wet edge.

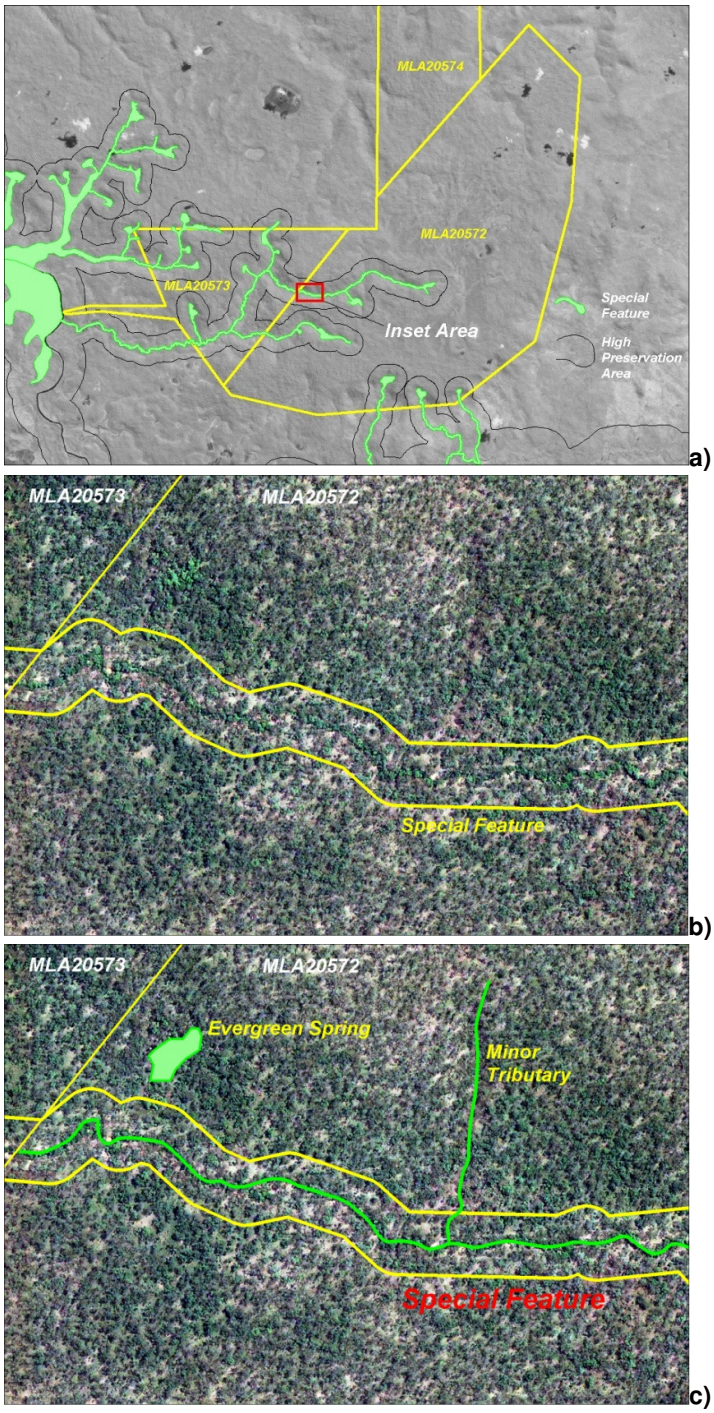


Figure 6: Mapping errors in the definition of Special Features

5. Proposed High Preservation Areas in the vicinity of Pisolite Hills – the scientific or case by case approach

5.1 Determination of appropriate environmental buffers

As part of the Pisolite Hills EIS, Cape Alumina has commissioned numerous environmental studies to collect detailed, site specific information from the project area and environs in relation to the hydrology, ecology, flora, fauna, and soil geochemistry for the purpose of describing the environmental base line and understanding the interdependence between environmental features including those referred to as Special Features, the ground water, geology and mineral deposits of the area.

We contend that the extent and width of environmental buffer zones that will be protected as HPA, should be considered on the basis of this information and with reference to published literature where appropriate.

In addition, guidelines and scientific papers have been published that relate to the determination of environmental buffer zone widths, as follows:

5.1.1 Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland – Exploration and Mining in Watercourses (DME 1995)

This guideline specifically relates to ensuring that the integrity of waterways is conserved during mining and exploration activities and is therefore most relevant to the determination of appropriate buffers in the vicinity of Pisolite Hills. The management principles discussed in the guideline involve a risk-based approach, first categorising the environmental impact of the proposed activity and the sensitivity of the watercourse. It is stated that "works in the vicinity of a watercourse should maintain an adequate separation distance from that watercourse". The more environmentally sensitive the watercourse, the larger the separation distance that should be maintained". The guideline contains suggested minimum buffer widths (Table 2).

Table 2. Suggested minimum buffer zone widths between activity areas and watercourses.

Degree of Sensitivity of Watercourse	Impact Potential of Activity	
	Very High/High	Moderate/Low
Very High/High	100m	75m
Moderate/Low	50m	25m

Source: DME (1995) pg 5

This shows that where a waterway is assessed as having a very high sensitivity and the activity assessed as being of very high impact, the suggested buffer width is only 100m.

5.1.2 Guideline for the Determination of Wetland Buffer Requirements (Essential Environmental Services 2005).

This guideline is specific to the protection of wetland areas through the development of appropriate separation distances (buffers) from development. Again, the guideline adopts a risk-based assessment process which considers the existence and attributes of the wetland area, the functionality and extent of the wetland and identifies threatening processes that may impact on the

values of the wetland. Based on these assessments, a separation distance is derived. Assuming that the wetland has a high conservation value, the recommended separation distances are up to 100m as shown in Table 3 together with proposed management strategies.

Table 3 Separation Distances and Management Strategies.

Key Threatening Processes	Recommended Separation and/or management	Separation Area Management
Alteration to the water regime	Regulation of groundwater abstraction as catchment management measure	Area to be vegetated with deep-rooted perennial vegetation Preferably native plant communities 6m firebreak minimum, inside of fence Fence to limit vehicle, stock, exotic fauna access Clear perimeter outside of fence (path, firebreak, road) Fire control to maintain habitat and species diversity Minimise track access/clearing, maximise native vegetation Management for water quality outcomes as required
Habitat modification	100m weed infestation Up to 100m for bird habitat dependent on extent of use 6-50m firebreak Fence for controlling exotic fauna access ≥100m to minimise edge effects	
Inappropriate recreational use	≥50m to improve aesthetics ≥50m for barrier Fence, paths for controlling access	
Diminished water quality	Drainage inflows eliminated or managed Where a proposal may affect wetland water quality, particularly through un-channelised flow, detailed site specific work should be undertaken to determine the specific separation measures required, including management measures	

Source: Essential Environmental Services (2005).

5.2 Recommended High Preservation Areas in the vicinity of Pisolite Hills and the Coolibah Springs Complex

Consideration of the role of environmental buffer zones in the context of the Coolibah Springs Complex should be twofold:

a) Protection of sensitive areas from direct disturbance or clearance.

The buffers proposed should be large enough to include all of the vegetation which is visibly benefiting from groundwater – both the evergreen spring and its associated riparian zone.

b) To provide a barrier between the sensitive area and proposed disturbances to absorb any potential environmental impacts.

The buffer zone vegetation should be viable in its own right. This can be defined as being wide enough that the death of one or a few canopy species is unlikely to result in a gap in the buffer.

The buffer should be wide enough that recovery after bushfire and cyclone will lead to re-establishment of normal bushland.

The buffer should include naturally occurring steep slopes and gullies that lead into springs as many environmental impacts are water-borne (such as dispersal of fungal pathogens, sedimentation, weed seeds and excess nutrients).

The buffer should be wide enough that any issues which develop at the edge of the mining activity area can be managed within the buffer without affecting the adjacent spring.

To address the functions outlined above, in keeping with the recommended buffer widths described in the published literature (Section 5.1) it is recommended that the following buffer widths are applied in the Coolibah Springs Complex:

- Small evergreen springs – 100m
- Medium evergreen springs – 150m
- Large evergreen springs – 200m

These recommended buffers meet, and in most cases exceed, the maximum recommended buffer widths in recent published literature.

HPAs following this recommendation in the vicinity of Pisolite Hills (including on the adjacent Alcan Mining Lease ML7031) will ensure that both the springs themselves, their resulting watercourses and the surrounding vegetation are fully protected as High Preservation Areas whilst allowing for reasonable and carefully managed development of valuable and strategic mineral resources in the so called “Preservation Area”.

The proposed boundaries are illustrated in Figure 7.

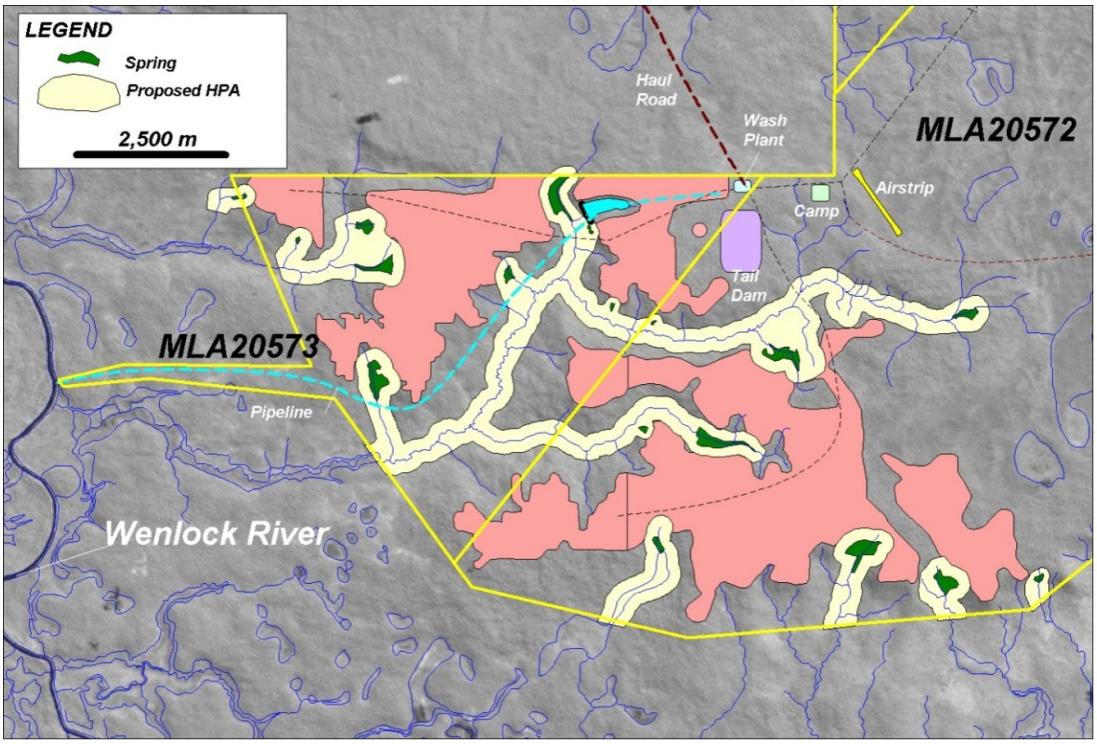


Figure 7: **Recommended HPA in the Pisolite Hills area based on a scientific appraisal of the environmental features.**

6. Key Assessment Criteria

6.1 Hydrological connectivity

The springs and tributaries that make up the "Coolibah Springs Complex" are considered "evergreen", in other words, they appear to host water throughout most, if not all of the year. A simple topographic assessment shows that they form part of the Wenlock Basin catchment area, and are therefore tributaries to the Wenlock River.

However, despite being mentioned on a number of occasions in the Overview Report, the significance of the suggested connectivity between the Coolibah Springs Complex and the Wenlock River is neither explained nor justified by any supporting data. It is stated that "*designating the springs and associated watercourses and habitat as a special feature is important for maintaining the hydrological connectivity*" (*pg 18*) but the report lacks any justification for this claim.

Cape Alumina supports the protection of the springs and their associated watercourses in recognition of their environmental value. However, it is necessary to understand the hydrological and hydro-geological mechanisms that control the springs, in order to accurately assess potential impacts and make informed decisions on appropriate buffers for their protection.

Cape Alumina has commissioned professional hydrological studies and on-going monitoring of the springs in the Pisolite Hills area. This work involved installation of 12 groundwater monitoring bores at six locations to assess and monitor groundwater flows, and five surface flumes to monitor surface water flows. Drill logs from the hydrological monitoring bores are presented in Appendix 1. This

monitoring has already provided conclusive results as discussed in the following section, and will be continued for at least a further twelve months to build a groundwater and surface water model for the area taking into account the distinct seasonal variations from the region. Nevertheless, sufficient data is now at hand to provide a confident, informed basis for any decisions on appropriate buffers zones aimed at the environmental protection of the springs and waterways.

This work has resulted in the identification of a previously unknown fresh water aquifer located beneath the lateritic bauxite profile at Pisolite Hills and thought to have a very widespread distribution north of the Wenlock River.

Landform, regolith, topographic, hydrological and geological studies indicate the plateau in the vicinity of Pisolite Hills can be divided into a hydrologic Recharge zone, a Transit zone, and a Discharge zone (Figure 8).

Transit Zone

Data derived from approximately 3000 exploration drill holes as well as the twelve hydrological monitoring bores shows that the bauxite occurs on plateaus as loose, pisolitic laterite material up to 5m thick (average thickness 2-3m). The stratigraphic profile in the vicinity of Transit Zone can be summarized, based on Australasian Groundwater and Environment Consultants Pty Ltd (2009) (see Appendix 1 for drill logs), as follows:

General Stratigraphy - Transit Zone

- Topsoil, 0-0.5m
- Bauxite, 0.5-4m
- Ferricrete, 4-6m
- Clay (kaolin), 6-8.5m
- Sand and gravel aquifer, 8.5 – 17.5m[1]

[1]*Maximum drill depth is 17.5 m and the deeper holes typically finished in the gravel aquifer.*

Discharge Zone

The Discharge Zone is formed by the intersection between the dissected land surface and the sand/gravel aquifer. As such, the bauxite, ironstone and clay horizons observed in the Transit Zone have been removed by erosion. The Discharge Zone stratigraphy is summarized as:

General Stratigraphy - Discharge Zone

- Sand and gravel aquifer, *mapped at surface, thickness not known*

Recharge Zone

The Recharge Zone is defined by very flat surface gradients, numerous sinkholes and no bauxite. Limited drilling in the Recharge zone suggests that in places this area may be devoid of the clay horizon which underlies the bauxite elsewhere. Although further drilling is required to confirm the stratigraphy of the recharge zone, it appears to be as follows:

General Stratigraphy – Recharge Zone

- Topsoil 0-0.5m
- ± Clay (kaolin) 0.5-4.0m
- Mottled bedrock/ironstone 0.5/4.0-?

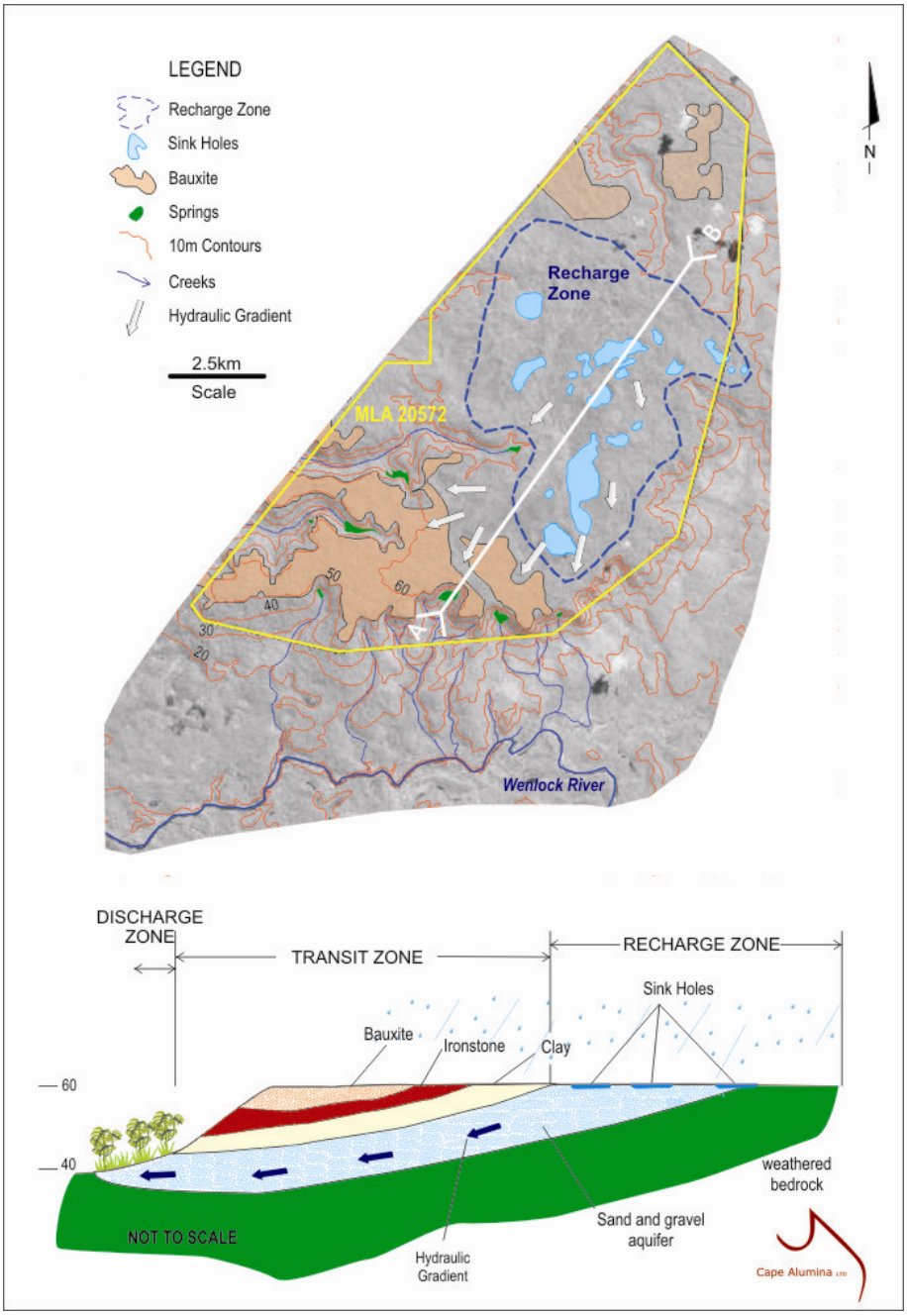


Figure 8: Simplified illustration of the Recharge, Transit and Discharge zones associated with elevated plateaus in the southern and eastern parts of the vicinity of MLA 20572.

Figure 8 is a simplified illustration of the principle physiographic, geological and hydrological features of the plateau in the vicinity of MLA20572 at Pisolite Hills.

The sink holes in the Recharge Zone are equivalent to the melon holes in the Weipa area described by Laffan (2001) who considered them to be pseudo-karst features that control the modern hydrologic conditions of the Plateau. They form localized low points that can be up to 5 m below the surrounding

plateau. Laffan (2001) noted some melon holes are permanently full of water whereas others are only seasonally inundated. The melon holes appear to be connected to the sand/gravel aquifer that underlies the Clay horizon by a network of pipes and cracks. The sink holes and underlying aquifer form an integrated reservoir that sustains groundwater flows to springs throughout the dry season.

Analysis of spring water samples at Pisolite Hills indicates that it is of very high quality with a total dissolved salt content of less than 50mg/L. It is therefore apparent that the spring source cannot be associated with any upward leakage from the deep aquifers of the Great Artesian Basin. The analyses indicate that the spring water is sourced from the sand and gravel aquifer underlying the Clay horizon.

The stratigraphy of the Transit Zone comprises two highly porous and permeable rock units (the bauxite horizon and the sand/gravel aquifer) separated by an ironstone and a clay horizon. Hydrology studies indicate that, due to the highly permeable nature of the bauxite, its limited catchment area and topography, this unit does not retain water for any significant period of time and will typically "run dry" over a period of days or weeks, or rarely over one to two months during very high rainfall. As such, the bauxite/ironstone does not support year-round water flow to the "evergreen" springs.

In contrast, the lower sand and gravel unit is known to be "water saturated" all year round and is the source of water for the "evergreen" springs throughout the dry season. It is this unit which appears to have a high degree of lateral hydrologic connectivity with the sink holes. This connectivity provides an abundant supply of water to the sand/gravel aquifer which subsequently discharges into the springs over a period of months and typically throughout the dry season.

On the question of hydrological connectivity between the springs and the Wenlock River the following observations are relevant.

Five flumes were installed on four creeks draining the main springs in the vicinity of Pisolite Hills to gauge the wet and dry season water flow from the springs into the Wenlock River. The preliminary results indicate that the four gauged catchments represent 0.0015% of the total catchment area of the Wenlock Basin below the confluence with Ling Creek. Flow data from the gauged catchments represent a total of 1.06% of the long term average wet season discharge of the Wenlock River Basin. The same catchments also comprise 0.24% of the Dry Season base flow (November Average) of the Wenlock River (Geoaxiom, 2008, 2009).

6.1.1 Conclusions on hydrologic connectivity

Investigations indicate that heavy wet season rain falling on the plateaus is discharged at the edges of the plateau from two permeable rock units separated from each other by an ironstone and a clay horizon. The upper unit comprised of bauxite and ironstone appears to remain dry throughout much of the wet season but with infiltration following heavy rainfall typically discharges over a period of days or weeks and does not provide year round flow to the "evergreen" springs.

The source of the water feeding the "evergreen" springs throughout the dry season is the deeper sand/gravel aquifer, which lies below the bauxite and subjacent kaolin horizon. The bauxite horizon is not critical for recharge of the sand/gravel aquifer which support hydrological flows to the springs. Disturbance of the bauxite profile during mining will have no direct impact on the hydrological connectivity between the source reservoir and the springs and furthermore, mining or removal of the bauxite could occur without impacting the springs (Australasian Groundwater & Environmental Consultants, 2009).

Contrary to the statement in the Overview Report, we conclude that the gauged spring catchments of the Coolibah Springs Complex in the vicinity of Pisolite Hills do not contribute a significant dry season or wet season base flow to the Wenlock River.

There is no evidence to suggest that a buffer zone such as that proposed in the Wenlock Basin Wild Rivers declaration proposal, would serve any greater purpose in protecting the hydrological connectivity between the "evergreen" springs, their source aquifer and the Wenlock River than the amended HPA recommended in Section 5.2.

6.2 Riparian function

Ling Creek and Sandfly Creek drain into the Wenlock River and make up part of the basin catchment area. They are both characterised by distinct riparian vegetation, usually composed of a narrow band of rainforest trees clinging to the vertical creek banks. The riparian zone is 20-30 m wide in the lower reaches but thins to between 5-15 m wide in the upper reaches adjacent to the Pisolite Hills bauxite areas. The riparian band is very clearly discernible from surrounding vegetation, as shown in Figure 9. Trees of up to 20m tall and almost 1m in diameter at breast height occur near larger pools, with trees of half that stature present in most places. Riparian specialists are limited to White Apples, with other rainforest or swamp trees also present like Freshwater Mangroves. Riparian vegetation along these creeks includes rainforest species like False Mango and Rose Butternut.

The riparian vegetation mostly comprises very thin continuous strips along the banks of the creeks. The understorey contains mostly seedlings and shrubby growth of tree species, which largely seals the edges of the stream against oblique sunlight. This has led to a general lack of aquatic plants in the waterway itself, and a scarcity of herbaceous plants along the silty or rocky creek banks. The most frequently observed macrophyte was *Eriocaulon setaceum*, however *Blyxa aubertii* and *Nitella sp*. were also observed. In the lower reaches of the creeks *Myriophyllum sp*. became the dominant macrophyte.

The creeks have no distinct flood plain and the ground immediately adjacent to the creeks is usually open bushland. In places susceptible to wet season inundation, a grassy strip separates the riparian and bushland vegetation. This strip is composed of fine-leaved grasses dotted with occasional aborescent species such as Dwarf Fan Palms (*Livistona muelleri*) or scattered trees (*Acacia fleckeri* and *Canarium australianum*)

Figure 9: Riparian zone at Ling Creek showing abrupt margin.

Evergreen spring headwaters comprise of emerging water from soaks on the dissected sides of the plateaus that flow into small streams and which rapidly merge into a single stream known as a "spring run".

No submerged aquatic plants are observed in spring headwaters and the riparian vegetation is dominated by trees, ferns, palms and pandanus. The transition habitat between the spring headwaters and the defined spring run consists of several small streams merging into the spring run. These areas have wide riparian strips with a subset of evergreen spring vegetation. Monocots like palms, pandanus and sedges can be frequently observed.

Species within the springs that also occur within the surrounding woodlands include Golden Bouquet Tree, Swamp Mahogany, Dwarf Fan Palm, Red Beech, Cape York Red Gum and Swamp Penda. This habitat also supports a number of orchids and mosses which are absent from the surrounding landscape.

Specialised springs species observed in the springs include Spring Pandanus, Springwood, Banana-leafed Climber, Umbrella Palm, Water Palm, and Swamp Macaranga. The Springwood (vulnerable), Swamp Macaranga (rare) and the orchid *Spathoglottis plicata* (vulnerable) are recognised under the *Natural Conservation Act 1992* and are located within the thin strip of riparian vegetation adjacent to the spring headwaters.

6.2.1 Conclusion on riparian function

The area referred to as the Coolibah Springs Complex includes evergreen vegetation patches (springs) and the resulting creeklines known as Ling Creek and Sandfly Creek, as described above. The riparian vegetation associated with these areas serves an important function in protecting the

watercourse through bank stabilisation, regulation of runoff and sedimentation and also provides habitat for native flora and fauna.

The riparian zone surrounding the tributaries is very narrow, in most cases comprising only one or two individual canopy trees. Sandfly and Ling Creeks are second and third order streams (respectively) that do not contain running water at all times throughout the year.

The Special Features as mapped in the declaration proposal are in fact 50m wide buffers extending from either side of the tributaries. The arbitrary proposal to designate High Preservation Areas extending a further 500m either side of the 50m wide buffers far exceeds the recommended widths for buffers in the published literature, and the precedents of other Wild River declarations. There is no justification given for the proposed extent, and no clear rationale for buffers of this width or any argument that would support any additional protection derived from such wide buffers.

As considerable flora, fauna, ecological and hydrological data exists on this system, it is recommended that case-specific buffer zones be determined as described in Section 5.2. The buffer zones recommended in Section 5.2 will provide environmental buffers of no less than 25 times the width of the actual tributaries and will more than adequately preserve the entire riparian zone, and therefore the riparian function of the springs and associated waterways.

6.3 Wildlife corridor

The Wenlock River is the major wildlife corridor within the Wenlock River basinextending some 180km from Port Musgrave in the west to the Great Dividing Range in the east. The Pisolite Hills project is situated between 5 and 15 km away from the Wenlock River.

The waterways that make up the Coolibah Springs Complex are comprised of a continuous natural riparian zone linking a group of small springs to the Wenlock River. This narrow band of vegetation provides habitat for native flora and fauna species, and is also likely to facilitate safe movement of species throughout their natural ranges. The narrow width of the riparian zone (5-30m) and very abrupt boundary with the surrounding open woodlands suggests that the wildlife corridor function of the tributaries is closely linked to the physical extent of the riparian zone and therefore, the recommended buffers in section 5.2 will provide ample protection of the wildlife corridor associated with the tributaries.

The Overview Report contains no justification of the arbitrary designation of a buffer in excess of 500m wide and does not provide any data to suggest that the proposed buffer was calculated to optimise corridor values, nor does it provide any evidence that the corridor values of the riparian zone would be diminished in any way by a reduction in the width of this zone.

The buffer widths, determined based on published literature and current scientific knowledge, and as proposed in Section 5.2 of this submission, will preserve the existing riparian zone and maintain the wildlife corridor values of the area.

6.4 Water quality

The water quality of the springs and their associated creeklines is naturally high, showing low concentrations of total dissolved solids (TDS). The source of the spring water is linked to a broad Recharge Zone defined by very flat topographic expression and marked by numerous sink holes which provide variable water storage. Laffan (2001) described the sink holes on the Andoom and Weipa Peninsular as melon holes. He interpreted their origin to be due to the collapse of sub-surface solution pipes in the regolith. It is thought that there is good hydrologic connectivity between the sink holes in the Recharge zone and the sand/gravel aquifer. It is noteworthy that there is complete

absence of bauxite in the Recharge Zone which is situated well away from the proposed bauxite mining area.

Sink holes in the Recharge Zone are generally situated between 3,000 and 9,000 m from the springs at Pisolite Hills and lie between 600 and 6,000 m from the proposed bauxite mining areas. None of the sink holes lie within the proposed HPA as proposed in the Overview Report and the entire Recharge zone lies outside the HPA as proposed in that report. Notwithstanding, there is no scientific basis to include the sink holes in the HPA.

The Overview Report contains no justification of the arbitrary designation of a buffer in excess of 500m wide in relation to water quality. There is no data to suggest that the water quality of the system would be compromised in any way by a reduction in the width of this zone.

The buffer width, determined based on published literature and current scientific knowledge, as proposed in Section 5.2 will preserve the existing riparian zone and thereby serve to minimise impacts on water quality. Due consideration of water quality should be made in relation to any proposed development in the vicinity of the sink holes, but this should be made on a case by case basis. As a result of extensive studies in the region, Cape Alumina recognises the function of the sink holes and therefore has no plans to undertake any development activities on or near these features. An access road is proposed to pass no less than 100 m past one of the sink holes approximately 3,000m east of the proposed airstrip. The sink holes have been subjected to over 100 years of uncontrolled cattle grazing and pig infestation with no discernable effect on the water quality of the springs. There is no evidence to indicate that the proposed access road will have any impact on the water quality of the springs.

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7. Other aspects of the Wenlock Wild River Proposal and possible impacts on the Pisolite Hills project

Figure 7 shows the proposed mine-related infrastructure in relation to the recommended HPA at Pisolite Hills. A raw water pipeline and mine haul roads are planned to cross the HPA's as recommended by Cape Alumina. These features are "*specified works*" under the Act and therefore we anticipate there will be no restriction to their proposed development pursuant to any declaration under the Act. In addition, Cape Alumina plans to draw water from the tidal zone of the Wenlock River at the western end of MLA20573.

Cape Alumina is concerned that the Act and consequential amendments to other Acts including the *Mineral Resources Act 1989* (MRA) are yet to be properly tested and may well be subject to differing interpretations. We therefore seek to work with the Government to ensure appropriate legislative amendments, including to the MRA, are made in order to provide certainty to the Pisolite Hills project in light of the proposed declaration of the Wenlock Wild River.

The following sections detail specific legislation relevant to proposed infrastructure features at Pisolite Hills. Through this submission we request confirmation from the Minister that none of the proposed infrastructure features listed here will be negatively impacted by any declaration under the Act.

7.1 Taking water from the tidal reach of Wenlock River within the proposed HPA

The Pisolite Hills mine proposal includes infrastructure for the taking of tidal water within the proposed HPA for which a water licence under the *Water Act 2000* is not required. As the proposed infrastructure lies within MLA20573, the *Integrated Planning Act 1997* (IPA) will not apply and development approval under the IPA for operational works will therefore not be required. Further, as the works will be a necessary and unavoidable part of installing or maintaining works or infrastructure required to support the mining activities for which a Mining Lease application has already been made, if the IPA did apply then an application could be made. Nevertheless, we request that the Minister amend the definition of "*specified works*" in the Act to specifically include "*pumping of water from a river or water body where required for approved mining activities*". Furthermore, for clarity and consistency we recommend that the *Mineral Resources Act 1989* be amended to include the term "Specified Works", consistent with that term as defined in the Wild Rivers Act.

The associated pipeline will also cross the proposed HPA around the Wenlock River as well as the Cape Alumina-recommended HPA at three locations. As this pipeline is classified "*specified works*" we understand there will be no restriction of the proposed development under the Act and we seek the Ministers confirmation of this.

It is estimated that the average and median annual flow of the Wenlock River at the confluence of Ling Creek is 3.1 and 2.9 million Ml/year, respectively (Geoaxiom, 2009). Our preliminary studies indicate that the total water requirements of the Pisolite Hills project are likely to be between 4,000 and 8,000 Ml per year, which will represent less than 0.3% of the annual flow of the Wenlock River. We request confirmation from the Minister that no restrictions will be imposed under the proposed declaration on the ability of Cape Alumina to draw water from the Wenlock River as may be required for the Pisolite Hills project.

7.2 Construction of a raw water dam

A raw water storage dam with a capacity greater than 500ML is proposed for the head of a gully, outside the Cape Alumina-recommended HPA, at the end of a 10 km long pipeline east north-east of the proposed raw water draw point on the Wenlock River. The final engineering plans for this structure will be determined through the BFS which will be completed in 2010. However, a dam with this capacity, if its height is also to be more than 8m, will likely be a referable dam and require failure impact assessment in accordance with the Water Supply (Safety and Reliability) Act 2008..

If the dam is subject to the dam safety provisions, then the dam will have to be failure impact assessed.

Cape Alumina will ensure the assessment is completed, and accepted by the Chief Executive of the Department of Environment and Resource Management (DERM) before construction of the dam begins.

8. Economic and Social Impact

8.1 Economic impacts

The Pisolite Hills project will, if developed, represent a $500 million investment in a greenfield mine and port in one of the world's great bauxite provinces at western Cape York. It is anticipated that the project will export 7 million tonnes of bauxite on a dry product basis over an initial life of 12-15 years. This project will generate $3 - $4 billion of export revenue from bauxite sales over the life of the

operation. Approximately 350 permanent full time jobs will be created in an area that suffers from high levels of unemployment, with many more during the two year construction phase which in turn will generate a significant number of indirect jobs in far north Queensland. Hundreds of millions of dollars will be paid in State royalties and Federal direct taxes and many millions more in personal income taxes from the permanent labour force.

Table 4. Impact on Ore Resources of Cape Alumina-recommended scientifically-based HPA.

Location	*In situ* Ore Resource	Beneficiated Ore Resource	Sterilised Ore	% Ore Resource Sterilised	Available Ore Resource	Beneficiation Recovery (%)
PH 1	58,293,024	38,274,106	**740,482**	**2%**	**37,533,624**	65.66
PH 2	25,746,182	18,837,059	**650,158**	**3%**	**18,186,901**	73.16
PH 3	8,345,245	6,023,573	**25,044**	**0%**	**5,998,529**	72.18
PH 4	4,142,087	3,015,648	**100,300**	**3%**	**2,915,347**	72.81
PH 5	2,086,967	1,346,212	-		**1,346,212**	64.51
PH 6	2,186,461	1,304,923	-		**1,304,923**	59.68
All	**100,799,966**	**68,801,521**	**1,515,985**	**2%**	**67,285,537**	**68.0**

Table 5. Impact on Ore Resources of HPA proposed in the Overview Report.

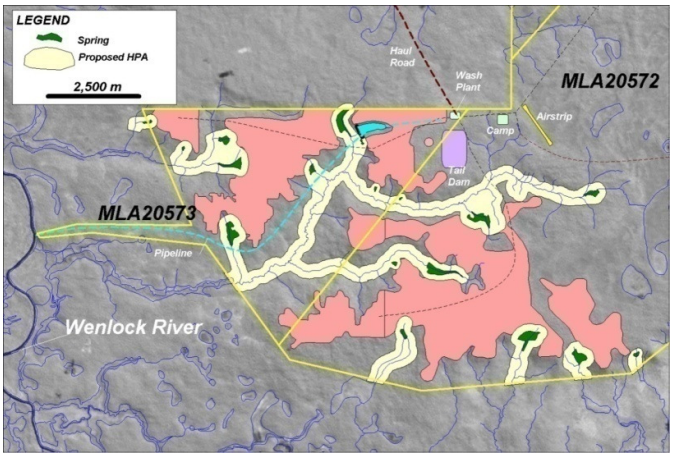
Location	*In situ* Ore Resource	Beneficiated Ore Resource	Sterilised Ore	% Ore Resource Sterilised	Available Ore Resource	Beneficiation Recovery (%)
PH 1	58,293,024	38,274,106	**8,279,354**	**22%**	**29,994,753**	65.66
PH 2	25,746,182	18,837,059	**7,681,077**	**41%**	**11,155,982**	73.16
PH 3	8,345,245	6,023,573	**1,309,348**	**22%**	**4,714,225**	72.18
PH 4	4,142,087	3,015,648	**2,019,616**	**67%**	**996,032**	72.81
PH 5	2,086,967	1,346,212	-		**1,346,212**	64.51
PH 6	2,186,461	1,304,923	-		**1,304,923**	59.68
All	**100,799,966**	**68,801,521**	**19,289,395**	**28%**	**49,512,127**	**68.0**

Figure 10 shows the distribution of ore resources and the actual mapped extents of the "Special Features" at Pisolite Hills. In Figure 10a) HPA as recommended in this submission and based on a rigorous scientific analysis are shown, whereas Figure 10b) illustrates the impact of the arbitrary HPA, as proposed in the Overview Report, on the mineral resources at Pisolite Hills.

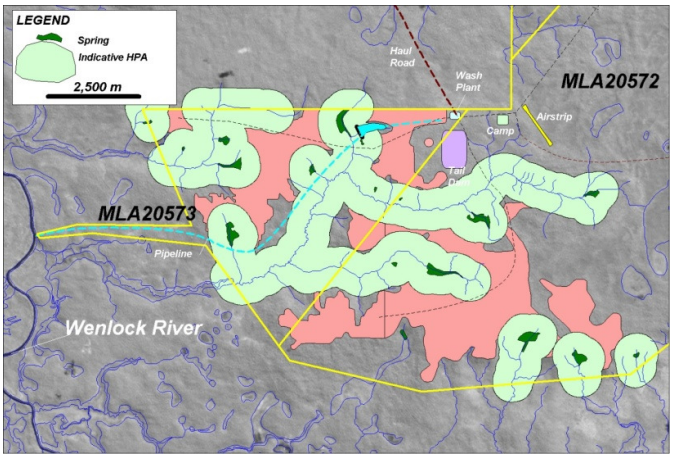
Tables 4 and 5 list the impact of the two alternative HPA zones at Pisolite Hills on the current JORC code-compliant mineral resources. These tables show that the HPA as recommended by Cape Alumina in this submission will have a small impact on the mineral resource at Pisolite Hills by sterilising 2% of the total resource. In contrast, Table 5 shows that the HPA as proposed in the Overview Report will sterilise at least 28% of the mineral resources at Pisolite Hills.

It is not clear what impact such a significant sterilisation of resources will have on the Pisolite Hills project at this stage. It is easy to calculate the lost value of the sterilised resource at approximately $1,000,000,000; however, it is likely that the project would not be viable with such a large loss of the resource base. This is due to the high capital cost of the project and the significant reduction in the life of mine that would result from the sterilisation. Furthermore, the arbitrary HPA will result in a disproportionately large sterilisation of the two highest quality ore deposits at Pisolite Hills being PH2 and PH4, where, respectively, at least 41% and at least 67% of the resources will be sterilised. It is concluded that there is a high probability that the project will not proceed should the Wenlock be

declared a Wild River with the HPA as indicated in the Overview Report. Should that occur, then the economic impact of the arbitrary HPA, as opposed to the scientifically based HPA recommended in Section 5.2 of this submission, will be the loss of a project valued at between $3 - $4 billion in export revenue, the loss of substantial royalty and taxation flows to the State and Commonwealth, the failure to create approximately 350 jobs (including many jobs for indigenous people) and a lost opportunity to train indigenous people and bring hope to one of the most economically disadvantaged populations in Australia.



a)



b)

Figure 10: Pisolite Hills area - evergreen springs, tributaries and HPA based on a) scientific assessment as proposed by Cape Alumina, and b) arbitrary HPA as proposed in the Overview Report.

8.2 Social impacts

The social impact of the Pisolite Hills project is yet to be determined but will be fully assessed through the Pisolite Hills Social Impact Assessment study to be completed later this year. However, Cape Alumina has engaged the Mapoon community, Mapoon Aboriginal Council, Old Mapoon DOGIT Trustees, six Traditional Land Owner groups for the project area including Taepadthighi Peoples, Warangku Peoples, Tjungunddji Peoples, Mpakwithi Peoples, Atambaya Peoples and Seven River Angkamuthi Peoples, and local traditional owner family groups on a routine basis since the commencement of field operations in 2005. Cape Alumina has the strong support of the local

Aboriginal community for the Pisolite Hills project and has to date executed four exploration access agreements in the region with relevant Aboriginal groups.

In August 2008, through the National Native Title Tribunal, Cape Alumina commenced formal negotiations for the Pisolite Hills Indigenous Land Use Agreement (PHILUA) with the Old Mapoon DOGIT Trustees, representatives of the seven Traditional Owner groups, and the Cape York Land Council. It is anticipated that the PHILUA will be executed later this year and will establish the relationship between Cape Alumina and the Aboriginal parties particularly in the areas of environmental management, cultural heritage management, employment and training, business development, and community benefits and compensation. This agreement will represent the first bauxite mining ILUA negotiated in Cape York under current legislation prior to grant of a mining lease and as such will represent a benchmark agreement.

It is anticipated that the social benefits from the Pisolite Hills project, if developed, will include improved education and training for the indigenous youth of the area, significant employment opportunities, which importantly will provide opportunities closer to home for the people of Mapoon, and the possibility of more suitable fly in – fly out rosters for Aboriginal communities in western Cape York including Napranum and the Northern Peninsular region.

The broader community of Weipa is set to benefit dramatically from the development of Pisolite Hills which will represent an investment of up to $500 million in the region. Weipa businesses and the people they employ have already benefited substantially from Cape Alumina's activities over the last 5 years with several million dollars invested directly into the region and a further $12 million committed to be spent by mid 2010.

The HPA in the vicinity of Pisolite Hills as proposed in the Overview Report will have major impact on the future development of the Pisolite Hills project. At best the project will be significantly reduced in size and scope which will reduce the social benefits commensurately. The worst case scenario is that the very large degree of sterilisation of ore resources that would result from the proposed arbitrary HPA may render the project unviable. In this scenario the social impact of the declaration would be that none of the social benefits of the project will be realised.

9. Recommendations

We request the Minister give due and proper consideration to the following recommendations of this submission.

1) That the mapping of the Special Features referred to as the "Coolibah Springs Complex" be corrected so as to include only the actual features being the full extent of the riparian zone around the tributaries and the wet edge of the springs;

2) That the HPA in the Proposal associated with the "Coolibah Springs Complex" in the vicinity of Pisolite Hills be abandoned in favour of the amended HPA outlined in Section 5.2 of this submission;

3) That the HPA on the adjoining Alcan mining lease ML7031 be amended so as to be consistent with the amendments recommended in this submission;

4) That appropriate amendments be made to the Act and the MRA so as to ensure clarity and consistency in respect of any potential impacts on the Pisolite Hills project to ensure that both

the objectives of the Act and the integrity of the Pisolite Hills project can be properly assimilated in the public interest.

10. References

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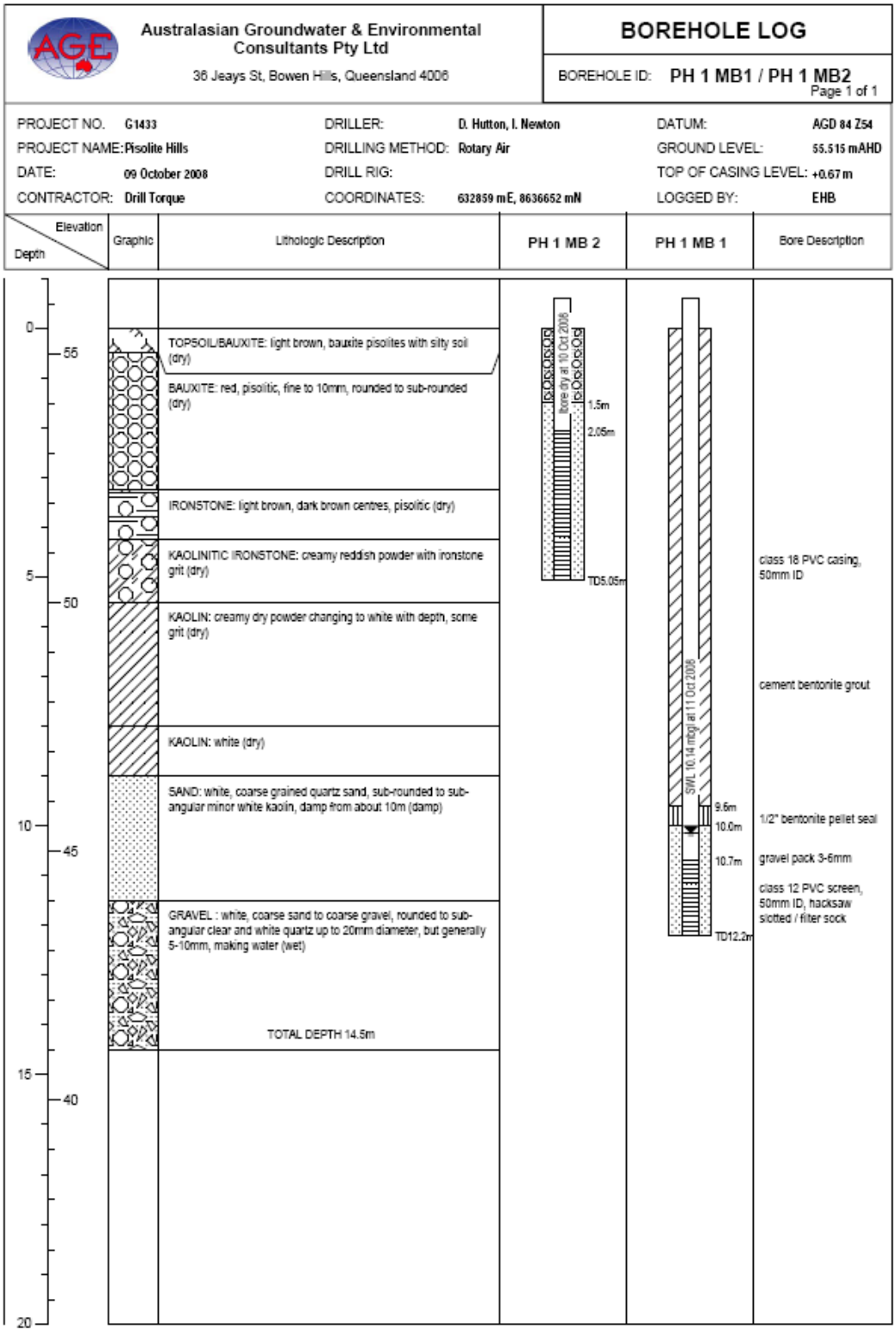
Appendix 1. Hydrology drill logs



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BOREHOLE LOG

BOREHOLE ID: **PH 1 MB1 / PH 1 MB2** Page 1 of 1

PROJECT NO.	G1433	DRILLER:	D. Hutton, I. Newton	DATUM:	AGD 84 Z54
PROJECT NAME:	Pisolite Hills	DRILLING METHOD:	Rotary Air	GROUND LEVEL:	55.515 mAHD
DATE:	09 October 2008	DRILL RIG:		TOP OF CASING LEVEL:	+0.67 m
CONTRACTOR:	Drill Torque	COORDINATES:	632859 mE, 8636652 mN	LOGGED BY:	EHB

Elevation / Depth	Graphic	Lithologic Description	PH 1 MB 2	PH 1 MB 1	Bore Description
0 – 55		TOPSOIL/BAUXITE: light brown, bauxite pisolites with silty soil (dry)			
		BAUXITE: red, pisolitic, fine to 10mm, rounded to sub-rounded (dry)	bore dry at 10 Oct 2008	SWL 10.14 mbgl at 11 Oct 2008	
		IRONSTONE: light brown, dark brown centres, pisolitic (dry)	1.5m		
5 – 50		KAOLINITIC IRONSTONE: creamy reddish powder with ironstone grit (dry)	2.05m		class 16 PVC casing, 50mm ID
		KAOLIN: creamy dry powder changing to white with depth, some grit (dry)	TD5.05m		cement bentonite grout
		KAOLIN: white (dry)		9.6m	
		SAND: white, coarse grained quartz sand, sub-rounded to sub-angular minor white kaolin, damp from about 10m (damp)		10.0m	1/2" bentonite pellet seal
10 – 45				10.7m	gravel pack 3-6mm
		GRAVEL : white, coarse sand to coarse gravel, rounded to sub-angular clear and white quartz up to 20mm diameter, but generally 5-10mm, making water (wet)			class 12 PVC screen, 50mm ID, hacksaw slotted / filter sock
		TOTAL DEPTH 14.5m		TD12.2m	
15 – 40					
20					

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BOREHOLE LOG

BOREHOLE ID: **PH 2 MB1 / PH 2 MB2**
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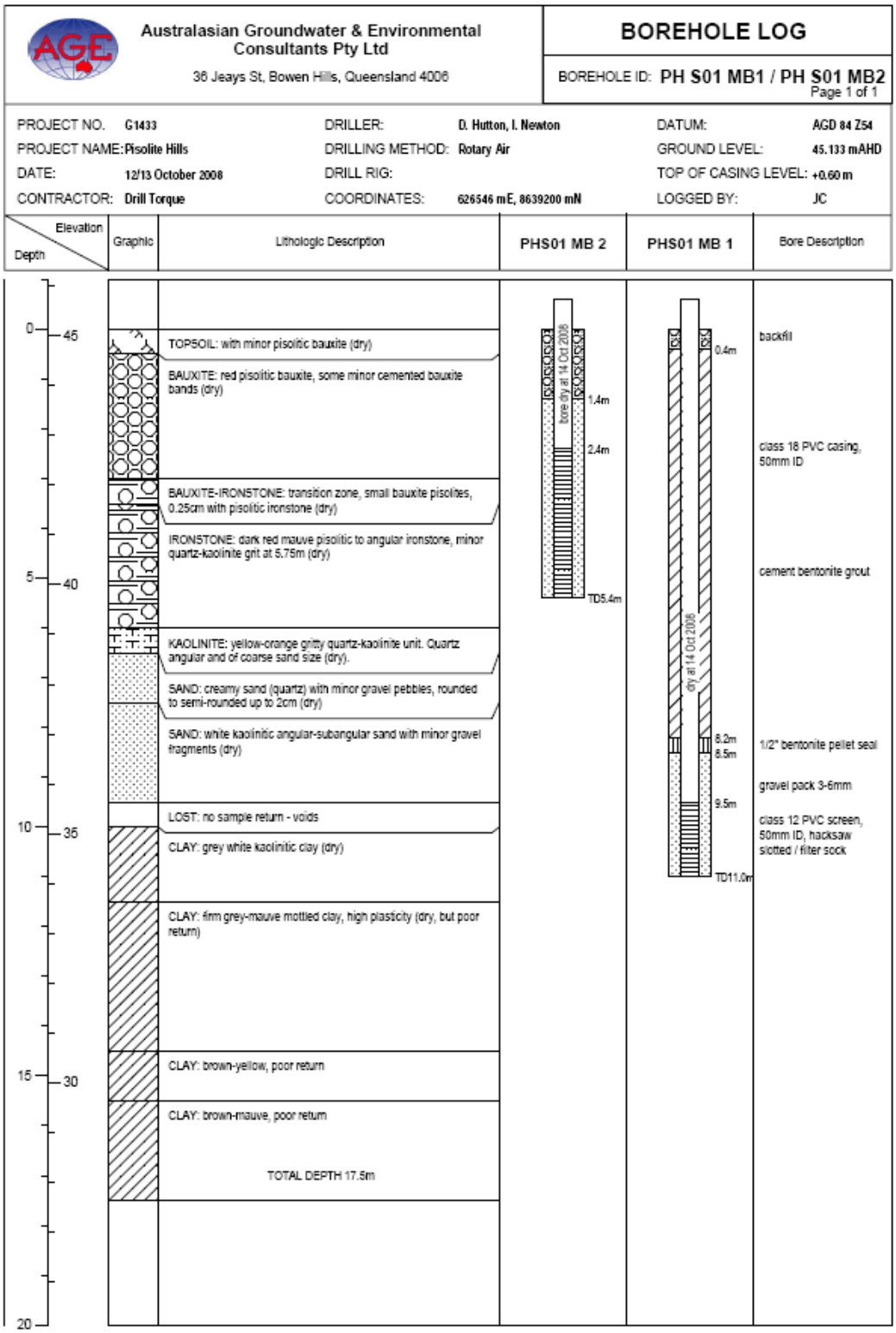
PROJECT NO.	G1433	DRILLER:	D. Hutton, I. Newton	DATUM:	AGD 84 Z54
PROJECT NAME:	Pisolite Hills	DRILLING METHOD:	Rotary Air	GROUND LEVEL:	49.424 mAHD
DATE:	11 October 2008	DRILL RIG:		TOP OF CASING LEVEL:	+0.64 m
CONTRACTOR:	Drill Torque	COORDINATES:	627154 mE, 8640405 mN	LOGGED BY:	EHB

Elevation / Depth	Graphic	Lithologic Description	PH 2 MB 2	PH 2 MB 1	Bore Description
50 / 0		TOPSOIL/BAUXITE: light brown, bauxite pisolites with silty soil (dry)	bore dry at 11 Oct 2008	SWL 12.0 mbgl at 11 Oct 2008	class 18 PVC casing, 50mm ID
		BAUXITE: red, pisolitic, fine to 10mm sub-rounded to rounded (dry)	2.5m, 2.98m		
45 / 5		IRONSTONE: light brown, pisolitic (dry)			
		CLAYEY SAND: light, creamy, reddish brown kaolin, and fine to medium quartz sand (dry)	TD5.98m		
		KAOLIN: white (dry)			
		SANDY CLAY: light brown (damp)			cement bentonite grout
40 / 10		SAND: light brown, coarse sub-rounded to sub-angular quartz (damp)			
		GRAVEL: white, changing to light reddish, medium quartz gravel, sub-rounded to sub-angular. Intersected water table at about 12m depth (wet).		12.1m, 12.3m	1/2" bentonite pellet seal
				13.43m	gravel pack 3-6mm
35 / 15					class 12 PVC screen, 50mm ID, hacksaw slotted / filter sock
		CLAYEY GRAVEL: light creamy red, quartz gravel with kaolin (wet)		TD14.83	
		TOTAL DEPTH 17.5m			
30 / 20					



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BOREHOLE LOG

BOREHOLE ID: **PH S01 MB1 / PH S01 MB2**
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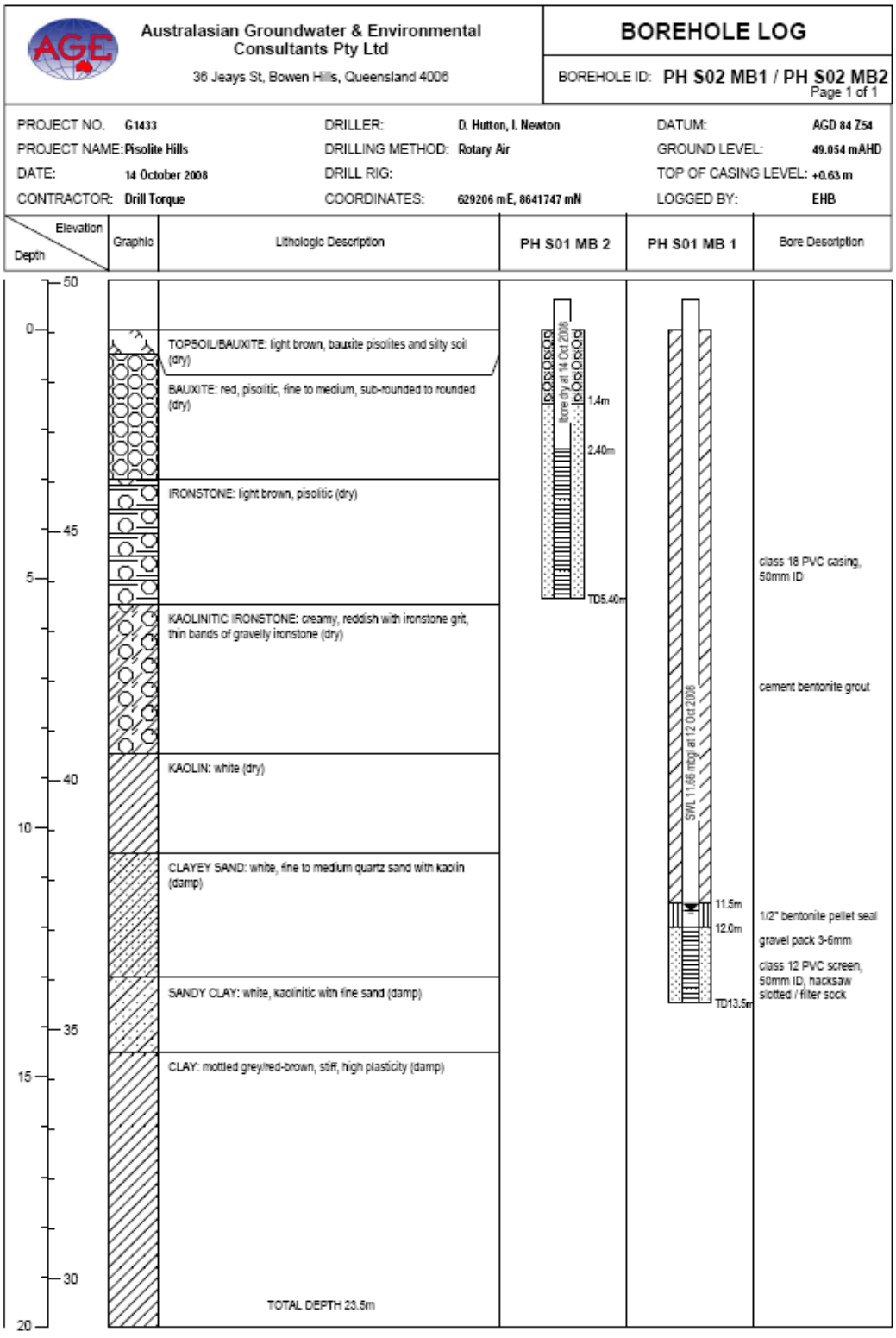
PROJECT NO.	G1433	DRILLER:	D. Hutton, I. Newton	DATUM:	AGD 84 Z54
PROJECT NAME:	Pisolite Hills	DRILLING METHOD:	Rotary Air	GROUND LEVEL:	45.133 mAHD
DATE:	12/13 October 2008	DRILL RIG:		TOP OF CASING LEVEL:	+0.60 m
CONTRACTOR:	Drill Torque	COORDINATES:	626546 mE, 8639200 mN	LOGGED BY:	JC

Elevation / Depth	Graphic	Lithologic Description	PHS01 MB 2	PHS01 MB 1	Bore Description
0 – 45		TOPSOIL: with minor pisolitic bauxite (dry)			backfill
		BAUXITE: red pisolitic bauxite, some minor cemented bauxite bands (dry)	bore dry at 14 Oct 2008; 1.4m; 2.4m	dry at 14 Oct 2008; 0.4m	class 18 PVC casing, 50mm ID
		BAUXITE-IRONSTONE: transition zone, small bauxite pisolites, 0.25cm with pisolitic ironstone (dry)			
		IRONSTONE: dark red mauve pisolitic to angular ironstone, minor quartz-kaolinite grit at 5.75m (dry)			cement bentonite grout
5 – 40		KAOLINITE: yellow-orange gritty quartz-kaolinite unit. Quartz angular and of coarse sand size (dry).	TD5.4m		
		SAND: creamy sand (quartz) with minor gravel pebbles, rounded to semi-rounded up to 2cm (dry)			
		SAND: white kaolinitic angular-subangular sand with minor gravel fragments (dry)		8.2m; 8.5m	1/2" bentonite pellet seal
		LOST: no sample return - voids		9.5m	gravel pack 3-6mm
10 – 35		CLAY: grey white kaolinitic clay (dry)			class 12 PVC screen, 50mm ID, hacksaw slotted / filter sock
		CLAY: firm grey-mauve mottled clay, high plasticity (dry, but poor return)		TD11.0m	
15 – 30		CLAY: brown-yellow, poor return			
		CLAY: brown-mauve, poor return			
		TOTAL DEPTH 17.5m			
20					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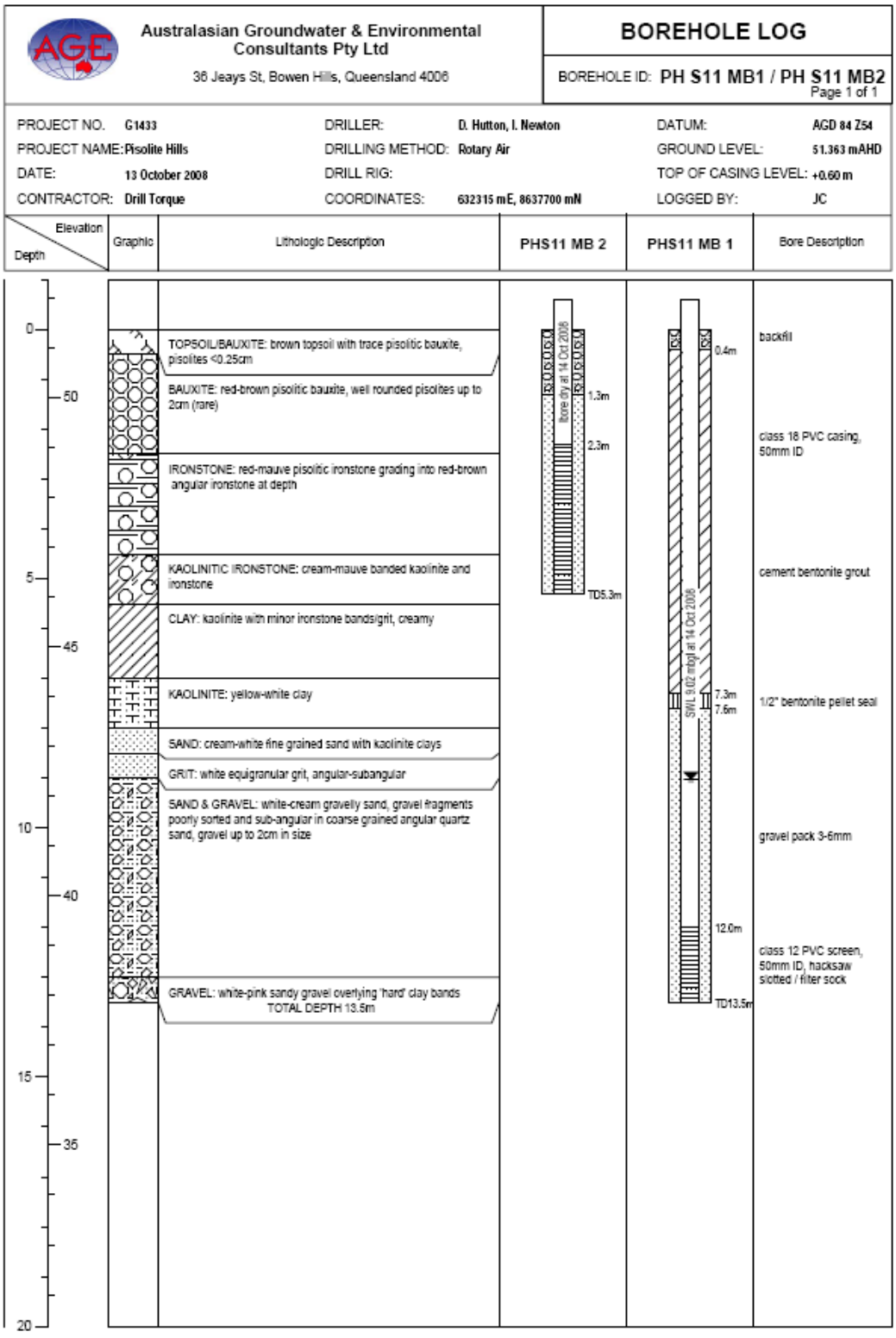
BOREHOLE LOG
BOREHOLE ID: PH S02 MB1 / PH S02 MB2
Page 1 of 1
PROJECT NO. G1433
PROJECT NAME: Pisolite Hills
DATE: 14 October 2008
CONTRACTOR: Drill Torque
DRILLER: D. Hutton, I. Newton
DRILLING METHOD: Rotary Air
DRILL RIG:
COORDINATES: 629206 mE, 8641747 mN
DATUM: AGD 84 Z54
GROUND LEVEL: 49.054 mAHD
TOP OF CASING LEVEL: +0.63 m
LOGGED BY: EHB
Elevation
Depth
Graphic
Lithologic Description
PH S01 MB 2
PH S01 MB 1
Bore Description
50
0
45
5
40
10
35
15
30
20
TOPSOIL/BAUXITE: light brown, bauxite pisolites and silty soil (dry)
BAUXITE: red, pisolitic, fine to medium, sub-rounded to rounded (dry)
IRONSTONE: light brown, pisolitic (dry)
KAOLINITIC IRONSTONE: creamy, reddish with ironstone grit, thin bands of gravelly ironstone (dry)
KAOLIN: white (dry)
CLAYEY SAND: white, fine to medium quartz sand with kaolin (damp)
SANDY CLAY: white, kaolinitic with fine sand (damp)
CLAY: mottled grey/red-brown, stiff, high plasticity (damp)
TOTAL DEPTH 23.5m
bore dry at 14 Oct 2008
1.4m
2.40m
TD5.40m
SWL 11.86 mbgl at 12 Oct 2008
11.5m
12.0m
TD13.5m
class 18 PVC casing, 50mm ID
cement bentonite grout
1/2" bentonite pellet seal
gravel pack 3-6mm
class 12 PVC screen, 50mm ID, hacksaw slotted / filter sock



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BOREHOLE LOG

BOREHOLE ID: **PH S11 MB1 / PH S11 MB2**
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PROJECT NO.	G1433	DRILLER:	D. Hutton, I. Newton	DATUM:	AGD 84 Z54
PROJECT NAME:	Pisolite Hills	DRILLING METHOD:	Rotary Air	GROUND LEVEL:	51.363 mAHD
DATE:	13 October 2008	DRILL RIG:		TOP OF CASING LEVEL:	+0.60 m
CONTRACTOR:	Drill Torque	COORDINATES:	632315 mE, 8637700 mN	LOGGED BY:	JC

Elevation / Depth	Graphic	Lithologic Description	PHS11 MB 2	PHS11 MB 1	Bore Description
0 / 50		TOPSOIL/BAUXITE: brown topsoil with trace pisolitic bauxite, pisolites <0.25cm		0.4m	backfill
		BAUXITE: red-brown pisolitic bauxite, well rounded pisolites up to 2cm (rare)	1.3m		
		IRONSTONE: red-mauve pisolitic ironstone grading into red-brown angular ironstone at depth	2.3m		class 18 PVC casing, 50mm ID
5 / 45		KAOLINITIC IRONSTONE: cream-mauve banded kaolinite and ironstone			cement bentonite grout
		CLAY: kaolinite with minor ironstone bandsgrit, creamy	TD5.3m		
		KAOLINITE: yellow-white clay		7.3m	1/2" bentonite pellet seal
		SAND: cream-white fine grained sand with kaolinite clays		7.6m	
		GRIT: white equigranular grit, angular-subangular			
10 / 40		SAND & GRAVEL: white-cream gravelly sand, gravel fragments poorly sorted and sub-angular in coarse grained angular quartz sand, gravel up to 2cm in size			gravel pack 3-6mm
				12.0m	class 12 PVC screen, 50mm ID, hacksaw slotted / filter sock
		GRAVEL: white-pink sandy gravel overlying 'hard' clay bands TOTAL DEPTH 13.5m		TD13.5m	
15 / 35					
20					

Bore dry at 14 Oct 2008

SWL 9.02 mbgl at 14 Oct 2008

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BOREHOLE LOG

BOREHOLE ID: **PHS12 MB1 / PHS12 MB2**
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PROJECT NO.	G1433	DRILLER:	D. Hutton, I. Newton	DATUM:	AGD 84 Z54
PROJECT NAME:	Pisolite Hills	DRILLING METHOD:	Rotary Air	GROUND LEVEL:	57.158 mAHD
DATE:	10 October 2008	DRILL RIG:		TOP OF CASING LEVEL:	+0.61 m
CONTRACTOR:	Drill Torque	COORDINATES:	634467 mE, 8636342 mN	LOGGED BY:	EHB

Elevation / Depth	Graphic	Lithologic Description	PHS12 MB 2	PHS12 MB 1	Bore Description
0					
		TOPSOIL/BAUXITE: light brown bauxite pisolites with silty soil (dry)			
		BAUXITE: red, pisolitic, fine to 10mm grained, sub-rounded to rounded (dry)	bore dry at 10 Oct 2008		
55			2.2m		
			3.1m		class 18 PVC casing, 50mm ID
5		IRONSTONE: light brown, dark brown centres, pisolitic (dry)			
		KAOLINITIC IRONSTONE: creamy, reddish with ironstone grit (dry)			
		KAOLIN: white (dry)	TD6.1m		
50					
		SAND & GRAVEL: creamy white quartz ranging from coarse sand to fine gravel (damp)			cement bentonite grout
		CLAYEY SAND: creamy white, fine to medium quartz sand with kaolin (damp)			
10		SAND: light creamy brown, coarse sub-rounded to sub-angular quartz sand (damp)		SWL 11.36 mbgl at 11 Oct 2008	
				11.1m	
				11.4m	1/2" bentonite pellet seal
45					gravel pack 3-6mm
		GRAVEL: light brown, fine to coarse sub-rounded to sub-angular quartz gravel (wet)		12.73m	
					class 12 PVC screen, 50mm ID, hacksaw slotted / filter sock
15				TD14.23	
		TOTAL DEPTH 17.5m			
40					
20					