MT PORTER
NORTHERN TERRITORY

PUBLIC ENVIRONMENTAL REPORT SUPPLEMENT

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PREPARED FOR

ARAFURA RESOURCES

BY

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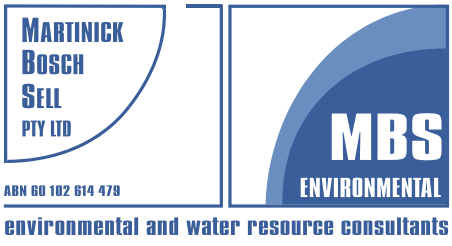

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1. INTRODUCTION

1.1 BACKGROUND

Arafura Resources NL (Arafura) proposes to develop an open cut gold mining operation at Mt Porter, approximately 180 kilometres south-east of Darwin. Ore from the operation will be transported 15 kilometres to the Union Reef Mill and toll treated. The proposed operation will run for approximately eight months, scheduled to take place during the regional dry season.

1.2 ASSESSMENT PROCESS

1.2.1 Northern Territory Process

The assessment process to gain the necessary approvals for Mt Porter Gold Project includes:

- Notice of Intent (NOI) – An NOI was submitted to the then Northern Territory Department of Primary Industries, Fisheries and Mines (DPIFM) in May 2004.
- Determination of Level of Assessment - In August 2004 it was determined by the Minister for Natural Resources, the Environment and the Arts that the level of assessment for the proposed Mt Porter Project would be a Public Environmental Report (PER).
- Public Review of Guidelines – Draft Guidelines covering issues to be addressed in the PER were released for public comment in August 2004 and final Guidelines issued in October 2004.
- Preparation of a PER– The PER was prepared between October 2004 and December 2006.
- Submission of the PER and Public Review – The PER was released for public comment for 42 days from 4 December 2006 to 15 January 2007.
- Preparation of PER Supplement – Comments received as part of the public consultation period are addressed in a Supplement (this document). The Supplement together with the PER will be submitted to the Environment Protection Agency (EPA) for review.
- Government Review and Decision – A review of the information submitted will be conducted by the EPA and recommendations forwarded to the relevant Ministers for consideration.

1.2.2 Commonwealth Process

In addition to the PER procedures of the Northern Territory Government, under the Commonwealth Government's *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*, developments require assessment if they have the potential to affect matters of national environmental significance.

A referral under the EPBC Act was submitted to the Commonwealth Department of Environment and Heritage (DEH) in relation to the Mt Porter Gold Project on 11 September 2006. A decision was made on 9 October 2006 that the proposed development constituted a Controlled Action under the following sections of the Act:

- Sections 12 and 15A (World Heritage).
- Sections 18 and 18A (Listed threatened species and communities).
- Sections 20 and 20A (Migratory species).

1.2.3 Bilateral Agreement

Controlled Actions under the *EPBC Act* are subject to final approval by the Commonwealth. On 9 October 2006, notification was received from DEH that the project would be assessed through accreditation of the NT assessment process under the terms of the Bilateral Agreement between the Commonwealth and Northern Territory Governments.

Under the Bilateral Agreement between the Commonwealth and the NT Government, the terms of assessment are considered on a case by case basis. Once assessment is completed to the satisfaction of the NT Minister for Natural Resources, the Environment and the Arts, EPA will report its findings to DEH, who will then advise of their final decision within 30 business days of submission of the EPA's recommendations. It is expected that EPA will continue to liaise with DEH through the remainder of the approval process to ensure that both agencies are satisfied that all matters are being satisfactorily addressed throughout the process.

1.2.4 PER Release and Supplement Preparation

The Mt Porter Gold Project PER was released for public comment on Monday 4 December 2006. The PER describes the proposed mining process, and assesses the likely environmental, social and economic impacts of the proposal.

The PER was prepared in accordance with the guidelines issued by the EPA.

The public notice sought comments on the PER until 15 January 2007, a period of 42 days. The required period for public comment is 28 days, however, given the timing of the PER release over the Christmas break, Arafura agreed to allow an additional 14 days for public review.

Copies of the PER were available for viewing at the:

- Department of Natural Resources, Environment and the Arts (NRETA), Darwin Plaza Building, 41 Smith Street, Darwin, NT and 2 Giles Street, Katherine, NT.
- Department of Primary Industries, Fisheries and Mines (DPIFM), Centrepoint Building, Smith Street Mall, Darwin, NT.
- Katherine Town Council and Katherine Public Library, Katherine, NT.
- Pine Creek Community Government Office and Pine Creek Public Library, Pine Creek, NT.

- Northern Territory Library, Parliament House, Cnr Bennett and Mitchell Streets, Darwin NT.
- Commonwealth Department of the Environment and Heritage Library, John Gorton Building, King Edward Tce, Parkes, ACT.

The PER document was also available to be examined for the duration of the public review period on the Northern Territory Government Website:

http://www.nt.gov.au/nreta/environmental/assessment/register/index.html.

CD ROM copies of the PER were available free of charge. Hard copies of the PER report and associated appendices were available for $20 per set.

Submissions were treated as public documents unless confidentiality was requested.

1.3 NUMBER OF SUBMISSIONS AND KEY ISSUES

A total of 11 submissions were received, all of which were received from local, Federal and Territory government agencies and bodies. The 11 public submissions were received from:

- Aboriginal Areas Protection Authority (AAPA).
- Department of Health and Community Services (DHCS) - Environmental Health Division.
- Department of Health and Community Services (DHCS) - Medical Entomology Branch.
- Northern Territory Police.
- Department of Primary Industry, Fisheries and Mines (DPIFM).
- Commonwealth Department of Environment and Heritage (DEH).
- Department of Natural Resources, Environment and the Arts (NRETA) - Conservation and Natural Resources Group.
- Department of Business, Economic and Regional Development - Economic Development Division (DBERD).
- Northern Land Council (NLC).
- Department of Natural Resources, Environment and the Arts (NRETA) – Environment Protection Authority (EPA).
- Museum and Art Gallery of the Northern Territory (MAGNT).

Two of the eleven submissions commented they had no issues of concern after review of the PER document.

The areas of primary interest and/or concern, reflected by the number of submissions and comments, were:

- Water management.

- Impacts on vegetation.
- Impacts on fauna (including aquatic fauna).
- Waste rock management.
- Cultural heritage.
- Greenhouse gas emissions and management.
- Rehabilitation.
- Environmental Management Plan.
- Socio economic impacts.
- Cumulative effects.
- Biting Insects.

A summary of the issues raised in each submission is contained in Appendix 1.

1.4 PROCESS USED TO SUMMARISE THE SUBMISSIONS

Upon receipt from the EPA, MBS Environmental numbered and recorded all submissions. Submissions were summarised and edited into a consistent format for inclusion in the Supplement (this document). Copies of the summaries were forwarded to the EPA for review to ensure that the summaries adequately represented comments made in submissions.

The summarised issues, along with the responses to them, make up the main body of text of this Supplement.

1.5 STRUCTURE AND SCOPE OF THE SUPPLEMENT

Comments were received on most of the chapters of the PER. For ease of assessment, as far as practicable the order of the subject matter presented in this Supplement follows the order of the PER.

Throughout the text, the summarised and amalgamated key issues and comments are shown in bold italics. Each is immediately followed by Arafura's response in plain text.

1.6 PROJECT CHANGES IN RESPONSE TO SUBMISSIONS

No direct comments were submitted by the community that need to be addressed in this Supplement. However, based on other comments and with the community in mind, the following cooperative measures will be adopted:

- Arafura will liaise with the Pine Creek Community Government on company matters affecting the local community and provide a register for complaints related to the Mt Porter Project.
- Arafura will liaise with the Pine Creek Police, Fire Brigade and Medical Centre on Emergency Response Plans for the Mt Porter Project and in assistance to the community.

Table 1 details additional commitments made throughout this document in response to the submissions received.

Table 1: Additional Commitments Made in Response to Submissions

Commitment Number	Commitment
S1	If project extensions into the wet season are required, Arafura will discuss this with relevant regulatory authorities and ensure appropriate management and mitigation measure are implemented.
S2	Arafura will ensure appropriate technical resources are in place to implement environmental measures described in the PER and supplement.
S3	Arafura will communicate with local fire management authorities to ensure appropriate fire management measures are implemented.
S4	At the conclusion of operations, the septic tank will be pumped out and the concrete tanks broken up and buried.
S5	On site effluent disposal systems shall comply with the setback distances for watercourses specified in Table 6 of the *Code of Practice for Small On-site Sewerage and Sullage Treatment Systems and the Disposal or Reuse of Sewerage Effluent*.
S6	Given the short duration of the project, potable water will be imported in bulk from Pine Creek and stored in a dedicated water tank.
S7	Arafura will ensure that the Northern Territory Police are consulted regularly to effectively manage issues associated with road safety and improvements.
S8	Daily commuting of the workforce (approximately 40 people) will contribute to traffic volumes. Arafura will examine the viability of using a commuter bus to reduce traffic volumes.
S9	An application to the Department of Health and Community Services will be made to construct the on site effluent disposal system.
S10	Environmentally hazardous chemicals including fuel, oil or other hydrocarbons will be stored within bunded compounds designed to Australian Standards 1940-2004.
S11	Mobile equipment, light vehicle servicing and vehicle wash down activities will take place on a hardstand surface draining into a sedimentation basin and oil-water separator. The hardstand will be constructed from either compacted clay waste on site or a constructed concrete floor.
S12	Ore transported off site will be covered.
S13	Testing of water influx rates and permeability of the clay material will be conducted and presented as part of the MMP.

Commitment Number	Commitment
S14	The cap of the PAF cell will be a minimum of three metres thick and domed to prevent any water infiltration into the capped cell. Location of the PAF cell will be surveyed and information presented to DPIFM as part of MMP documentation.
S15	If water discharge occurs from the pit, monitoring will be undertaken weekly.
S16	To provide a preferred subsurface drainage pathway for any minor quantities of water from the spring in Pit Gully, a general purpose subsoil drainage pipeline will be located in the creek bed prior to deposition of waste material.
S17	Arafura will undertake to carry out biological monitoring on Nellie Creek downstream of operations.
S18	Measures will also be implemented to prevent the introduction of additional weed species. Arafura will participate in regional weed management activities with Station owners and the local Landcare group.
S19	Monitoring of aquatic environments will be undertaken. This will be detailed in the MMP and is likely to include water quality and biological monitoring during mining as well as post mining water quality monitoring.
S20	The realignment of the access track will examine the possibility of avoiding swampy meadow and heritage site MP49.
S21	Arafura will liaise with the Pine Creek Community Government on company matters affecting the local community and provide a register for complaints related to the Mt Porter Gold Project.
S22	Employees will be made aware of potential mosquito problems that may arise during operations as part of the project induction process.
S23	Arafura will operate in compliance with *'Guidelines for preventing mosquito breeding sites associated with mining sites'.*
S24	Arafura will ensure that sediment in the basins is removed at the completion of mining and in the post-mining phase as required

2. GENERAL COMMENTS

NLC: Cumulative effects on the environment in general and the Mary River in particular from previous mining activities and from other planned developments (e.g. gold mining at Maude Creek and Iron Ore mining at Frances Creek) have not been considered during development of the PER.

The scope of the current proposal, being a short duration, single pit, campaign operation with no fixed facilities is an important factor in the response to this submission. At the conclusion of operations at Mt Porter, the four hectare footprint of the open pit and the drainage management system will be the only disturbed areas remaining.

Baseline environmental information from Frances Creek was considered as part of the Mt Porter PER. Post closure environmental monitoring at Mt Porter will be undertaken in conjunction with monitoring activities at Frances Creek for Territory Iron. Arafura Resources and Territory Iron have agreements in place to share environmental data and monitoring programs for both operations are being designed consultatively.

MEB comment that the Public Health Act should also be applicable legislation to this project.

Noted.

MEB: There is an error in the last paragraph of Section 6.6 Biting Insects in the Executive Summary. The Paragraph is incomplete.

Comment noted.

MEB: There appears to be a typing error in Paragraph 3 of Section 9.13.3 Impact Assessment. The sentence reads 'Other water storage features surveyed at Frances Creek appeared to contain significantly higher mosquito breeding sites that the open pit lakes'. The word 'that' should be replaced with the word 'than'?

Noted - 'than' is the correct word.

DPI: The start date given for the mine life leaves little scope for delays in relation to obtaining all necessary approvals or unsuitable weather conditions. It is expected that the operating phase will need to be extended, in which case the proponent would need to advise the various arms of the NGT at the time of the details of any extension and also the steps taken to ensure no environmental problems will result.

Arafura recognises the tight timeframe to obtain approvals and commence work. Arafura will continue to work closely with various Northern Territory government departments to ensure approvals are obtained in a timely manner. If project extensions into the wet season are required, Arafura will discuss this with relevant regulatory authorities and ensure appropriate management and mitigation measure are implemented **(Commitment S1).**

DPI: The PER should use consistent datum references, in some instances ground levels are referenced as metres RL and in others as metres AHD.

Noted. The Glossary (PER Section 16) contained a conversion between RL and AHD. RL was used only twice in Section 4.5.1 and in Figure 4. RL is 299.85 metres greater than AHD, the relevant elevation figures in AHD are:

- Proposed pit floor level 160 metres AHD.
- Natural ground level surrounding proposed pit 280metres AHD.

EPA: Present commitments and contingency plans against a situation where revegetation and erosion control, or acid mine drainage prevention, are found over successive wet seasons to be inadequate.

Details of post closure monitoring, routine management and contingency plans for rehabilitation will be included in the Environmental Management Plan (EMP) within the Mining Management Plan (MMP).

The PER presents commitments, plans and designs aimed at managing and mitigating possible impacts to acceptable levels.

EPA: Recommendation is made that an on-site environmental manager be appointed for the project.

Arafura will ensure appropriate technical resources are in place to implement environmental measures described in the PER and supplement **(Commitment S2).** Arafura reserve the right to determine whether there will be an on site Environmental Manager or services will be sought from external parties.

NRETA: All the monitoring requirements should be included as management strategies as well.

Monitoring requirements are implemented to provide information regarding the success of management and mitigation measures or provide additional baseline dates for comparative purposes. The structure of the EMP allows for documentation of management measures and monitoring programs.

NRETA: As per the Bushfires Act 1996, any new land holder would be required to ensure that a 4 metre firebreak is installed and maintained along all boundaries.

Noted. Arafura will communicate with local fire management authorities to ensure appropriate fire management measures are implemented (**Commitment S3**). Fire breaks are typically installed adjacent to key infrastructure or work areas rather than the project area boundary.

3. PROJECT DESCRIPTION AND MANAGEMENT

3.1 ALTERNATIVES CONSIDERED

DEH: Isn't there a viable alternative to a septic system?

A number of types of on site effluent disposal systems are commercially available. To eliminate surface disposal of wastewater that may contribute to mosquito breeding, the use of a conventional septic tank and subterranean leach drain system was chosen over an aeration system with above ground reticulation. At the conclusion of operations, the septic tank will be pumped out and the concrete tanks broken up and buried **(Commitment S4)**.

3.2 INFRASTRUCTURE

DHCS request clarification as to whether a mess will be provided on site for staff. Commercial food preparation facilities need to be registered as food business under the Food Act 2004 and should comply with the requirements of the Food Act 2004 and Food Standards.

A mess will not be provided at the Mt Porter site. Lunch room facilities will be provided for use by employees to consume food prepared off site. Section 6.2 of the PER discusses the alternative considered for workforce accommodation. The option of an on site camp (which normally includes accommodation quarters, mess facilities, laundry facilities and amenities) was not chosen.

DHCS comment that the potable water supply must comply with NH&MRC Australian Drinking Water Guidelines 1996. Bore setbacks to onsite wastewater disposal shall be in accordance with the Code of Practice for Small On-site Sewerage and Sullage Treatment Systems and the Disposal or Reuse of Sewerage Effluent.

Noted. The water supply for non potable uses on site, including ablutions and equipment wash down will be sourced from local groundwater. On site effluent disposal systems shall comply with the setback distances for watercourses specified in Table 6 of the *Code of Practice for Small On-site Sewerage and Sullage Treatment Systems and the Disposal or Reuse of Sewerage Effluent* **(Commitment S5).**

Given the short duration of the project, potable water will be imported in bulk from Pine Creek and stored in a dedicated water tank **(Commitment S6)**. Bottled water may also be brought to site for consumption by employees. Water monitoring will be conducted to ensure potable water distributed from the bulk tank meets NH&MRC Drinking Water Guidelines.

3.3 TRANSPORT

Northern Territory Police comment that although warning signs and other road improvements are to be employed, it will be necessary to ensure road safety issues are

appropriately managed. I therefore request that the mine operators establish a close working relationship with Pine Creek Police and Superintendent James O'Brien.

Comment noted. Arafura will ensure that the Northern Territory Police are consulted regularly to effectively manage issues associated with road safety and improvements **(Commitment S7)**.

DPI comment that Section 9.11 of the report relates to transport infrastructure and impacts, however does not identify expected traffic volumes. While the report indicates that road maintenance will be carried out to DPI standards, additional work, particularly to Mt Wells Road, beyond maintenance may be required. This will need to be addressed through the Mine Management Plan, in liaison with the Department of Planning and Infrastructure.

Comment noted. Ore will be stockpiled at the ROM for transport to the Union Reef Mill. The rate that ore is transported will depend up the available storage space at the Mill and the rate that the Mill can process the ore. At this point of project development there are no defined volumes of traffic movement.

Daily commuting of the workforce (approximately 40 people) will contribute to traffic volumes. Arafura will examine the viability of using a commuter bus to reduce traffic volumes **(Commitment S8).**

These issues will be further addressed in the Mining Management Plan.

3.4 RESOURCE AND PROCESSING

The EPA comments that it is unclear whether a resource would be sterilised if tailings and/or waste rock were returned to the pit. They request a description of whether the gold resource is distinctly defined and will be fully extracted or is also present in waste rock and pit walls/floor in percentages below currently recoverable thresholds.

There is remaining gold resource in the pit walls and floor beyond the current pit geometry. The pit optimisation used to define the current ore body was based on specified cut off ore grade and gold price. During the feasibility study conducted by Arafura, it was identified that the pit optimisation did not completely encompass all identified gold. The remaining resource was considered uneconomic based on the optimised design. Further drilling is being undertaken to identify whether additional economic resources are present. If this is the case, the pit design will be altered to include mining of additional material. Mining companies undertake pit optimisation processes regularly, particularly in economic climates such as are currently being experienced where high metal prices result in increasing economic resources. Backfilling of pits would sterilise economic resources and is typically not undertaken until known economic resources have been exhausted.

The EPA also request that analyses of other recoverable mineral resources that will be typically present within the waste rock be presented.

Arafura is unsure of the intent or purpose of this question. Material defined as 'waste' in the current proposal is below the economical cut off grade for gold. As owners of the Mineral

Lease, Arafura will review assays from drilling programs and determine a course of action should they identify a potentially economic resource of gold, or any other mineral.

EPA: Provide a general outline of Toll or other processing technologies to be used at Union Reef in the processing of Mt Porter gold ore.

A general description of processing of Mt Porter ore was provided in Section 4.6 of the PER. To reiterate, ore will be transported 15 kilometres to the Union Reef Mill where it will be treated using conventional CIL technology.

This facility has appropriate environmental and mining approvals from regulatory authorities. Mt Porter ore has no special characteristics which would require modifications to standard CIL processing methods.

3.5 PROJECT DESIGN

The EPA request a three-dimensional representation, to scale, of the project prior to, during, and post mining operations. Height contours and landscape features should be indicated.

Arafura is unsure of the intent or purpose of this request. The PER contains figures that include landscape features and contours. Arafura considers that this is sufficient in demonstrating the site layout and infrastructure.

Detailed designs of components including sedimentation basins, diversion drains and landforms will be provided as part of specific management plans in the MMP.

3.6 DOMESTIC WASTE MANAGEMENT

DEH comment that putrescible wastes are known to attract feral animals and should be removed from the site.

Because there will be no accommodation camp or mess facilities, the quantity of putrescible waste is anticipated to be small. Section 9.8 of the PER explains the proposed method of inert and putrescible solid waste disposal is to an on site landfill located in the waste landform. Approximately one million cubic metres of waste rock is anticipated to be excavated from the open pit. Burial of solid waste in the waste landform can be undertaken under many metres of cover material and pose negligible risk of attracting animals or of subsequent exposure by animals digging.

Removing waste material off site would generally be to another landfill site, most probably at Pine Creek, thus, burial in a landfill will be the ultimate disposal destination for this waste. It is considered that it can be buried more deeply at the project site. On site burial also minimises the risk of rubbish blowing from transport vehicles on the way to the Pine Creek landfill.

However, should regulatory agencies require that on site waste disposal not be undertaken, all waste will be placed in bulk containers ("skip bins" or similar) and removed from site. This procedure will be formalised with regulatory agencies and included in the Environmental Management Plan within the MMP.

DHCS comment that effluent disposal systems must comply with the requirements of the Code of Practice for Small On-site Sewerage and Sullage Treatment Systems and the Disposal or Reuse of Sewerage Effluent.

Noted. An application to the Department of Health and Community Services will be made to construct the on site effluent disposal system (**Commitment S9)**.

3.7 HAZARDOUS MATERIALS

DPI comment that the commitments given in this section are not considered to be sufficiently detailed to provide adequate safeguards: for example, reference is made to mobile equipment and light vehicle servicing activities being done on impervious surfaces, but does not detail how this is to be achieved i.e. bituminous surfaces, bunding etc.

Environmentally hazardous chemicals including fuel, oil or other hydrocarbons will be stored within bunded compounds designed to Australian Standards 1940-2004 (**Commitment S10**). Designs will include either self bunded storage tanks or low permeability (10^{-9} metres per second) compound(s) that will contain no less than 110% of the volume of the largest storage vessel or inter-connected system, and at least 25% of the total volume of products stored in the compound (where the total amount being stored exceeds 250 litres).

Mobile equipment, light vehicle servicing and vehicle wash down activities will take place on a hardstand surface draining into a sedimentation basin and oil-water separator. The hardstand will be constructed from either compacted clay waste on site or a constructed concrete floor (**Commitment S11**).

Further details of the construction of workshops and storage facilities will be included in the MMP.

EPA: Indicate the extent that dust/fragments from mined ores and waste rock could represent environmental contaminants or human health hazards if such dust were to be dispersed around the mine-site and along road transport corridors. Indicate how dust containment from loads will occur during road transport.

Ore transported off site will be covered **(Commitment S12).**

Possible human health hazards from dust exposure is related to particulate concentration, often measured as Total Suspended Particles (TSP), however the particle size fraction recognised as being a greater respiratory tract irritant is particle sizes of less than ten micrometres (PM_{10}).

The PER contains information regarding dust suppression measures to be used to minimise dust generation from the active mining areas. The mitigation measures and short duration of the operation is expected to have a low risk of environmental contamination or human health hazards associated with particulate emissions.

Particular chemicals of concern in air quality, as identified in the NEPM (1997) document are carbon monoxide, nitrogen dioxide, lead, sulphur dioxide and photochemical oxidants (as ozone). These chemicals are primarily the result of fuel combustion (either diesel or leaded petrol). The remote nature of the operation and the quantity of fuel anticipated to be consumed is not expected to result in emissions of these chemicals in levels that pose human health hazards.

3.8 WASTE ROCK MANAGEMENT

NLC request Arafura to reassess the estimates of acid mine drainage that may reasonably be expected from the project. This will require a re-assessment of the geochemical data provided and provision of adequate information defining the porosity of the oxide material proposed as an encapsulant so that leaching characteristics can be better defined.

Arafura do not consider reassessment of the geochemical data is required. The relevant Sections of Appendix 3 in the PER provide discussion on results of initial waste characterisation conducted in 1998 on samples that under the present optimised pit design are now classed as ore. Additional samples were collected to assess the PAF capacity of material that would be classed as waste.

The estimates of AMD are based on 35 samples with a median value of 1.2 kilograms H_2SO_4 per tonne, which is definable as NAF. Overall the production of acid will be very low.

Only five samples can be described as acid forming, all samples high in fresh pyrite and definable as fresh rock. This material will be easily recognisable and can be specifically positioned for encapsulation or return to the pit after completion of mining.

Nine samples are classifiable as PAF – LC which means that minor acid production, namely less than five kilograms H_2SO_4 per tonne, may occur over a long time frame. This material will be difficult to recognise and will report as oxide waste. However, all this material will come from the section of oxide zone just above fresh rock and may represent 15 – 20% of the total oxide waste. This oxide is likely to have a low content of secondary clay minerals and be relatively porous.

The remaining 21 samples have negligible acid production capacity. Most of this comes from the upper 40% of the open pit and represents about 80 – 85% of the total oxide waste. On the estimated total of 2,400,000 tonnes of waste rock, this equates to over 1,900,000 tonnes. This shallow oxide will be relatively high in secondary clay minerals and substantially less porous than deeper oxide. It will be the best material to use as an encapsulation medium. No permeability data is available on this material.

NLC also comment that although the amount of PAF material is relatively small (estimated at 7,200 tonnes) and it is possible that any AMD will be low in quantity and have a small impact, environmental best practice requires no impact, suggesting the PAF material should be returned to the pit void for immersion by the residual pit water. Alternatively, the material could be encapsulated in a high quality, low porosity clay material to prevent rapid infusion of water to the PAF material.

Risk exists of resource sterilisation if backfilling of pits is undertaken. For this reason, the PER described a conservative strategy of constructing an out of pit waste rock dump. If on completion of resource definition work, it is determined that extension of economic gold reserves beneath the currently defined pit is unlikely, the decision regarding placement of PAF waste rock within the pit will be reviewed. Placement of this waste in the pit also needs to consider final pit hydrology to ensure contaminants can be effectively contained.

As described in the PER, transitional rock material in the pit walls and floor is potentially acid forming. Mining industry experience shows that sulphides in pit walls and floors react when in contact with water and oxygen. The rate of formation of acid reduces over time as sulphides are consumed. Dilution of acid from pit walls and the pit floor with rainfall collected in the pit annually and any groundwater ingress is considered sufficient to ensure detrimental impacts do not occur.

Section 7.5.3 of the PER states that the standing water table depth in the bore to the south of the proposed open pit is 30 to 35 metres above the design final floor level, however the hydrological report (Appendix 4) states that the complex faulting and folding has resulted in poor connectivity between aquifers. For this reason, it is difficult to reliably predict the final depth of the pit lake and the level of fluctuation between the wet and dry seasons. This creates the possibility that if all high PAF waste was returned to the open pit, there may be periods where there is insufficient water cover to prevent oxidation and acid generation. For this reason, the conservative approach of encapsulating the material in a high clay content NAF matrix was selected as the lowest risk option.

However, during operations, installation of water monitoring bores will provide further site specific data on the possible extent of the final pit lake. Based on additional data, a review of the alternative option of returning PAF waste to the open pit can be incorporated into the MMP, in consultation with regulatory agencies. Should this option prove feasible, PAF waste can be temporarily stockpiled on the top of the waste landform and returned to the pit floor at the conclusion of mining.

DPIFM comment: Section 7.4.3 indicates that 40% of the drilling samples show PAF material and 14% have medium/high levels of PAF. These figures seem at odds to the statement that "The percentage content of significantly PAF material appears small" especially when it is extrapolated out based on the mine producing 2.4 million tonnes of waste rock. These results indicate strongly that ARD could be a problem with this development.

These percentage statements do not appear in Section 7.4.3, as such statements infer that each sample has equal weighting in relation to potential for acid formation. The extrapolation made in this submission is incorrect and out of context with the data stated in terms of sample numbers and the locations of those samples as shown in Table 2 of Appendix 3. Five of 35

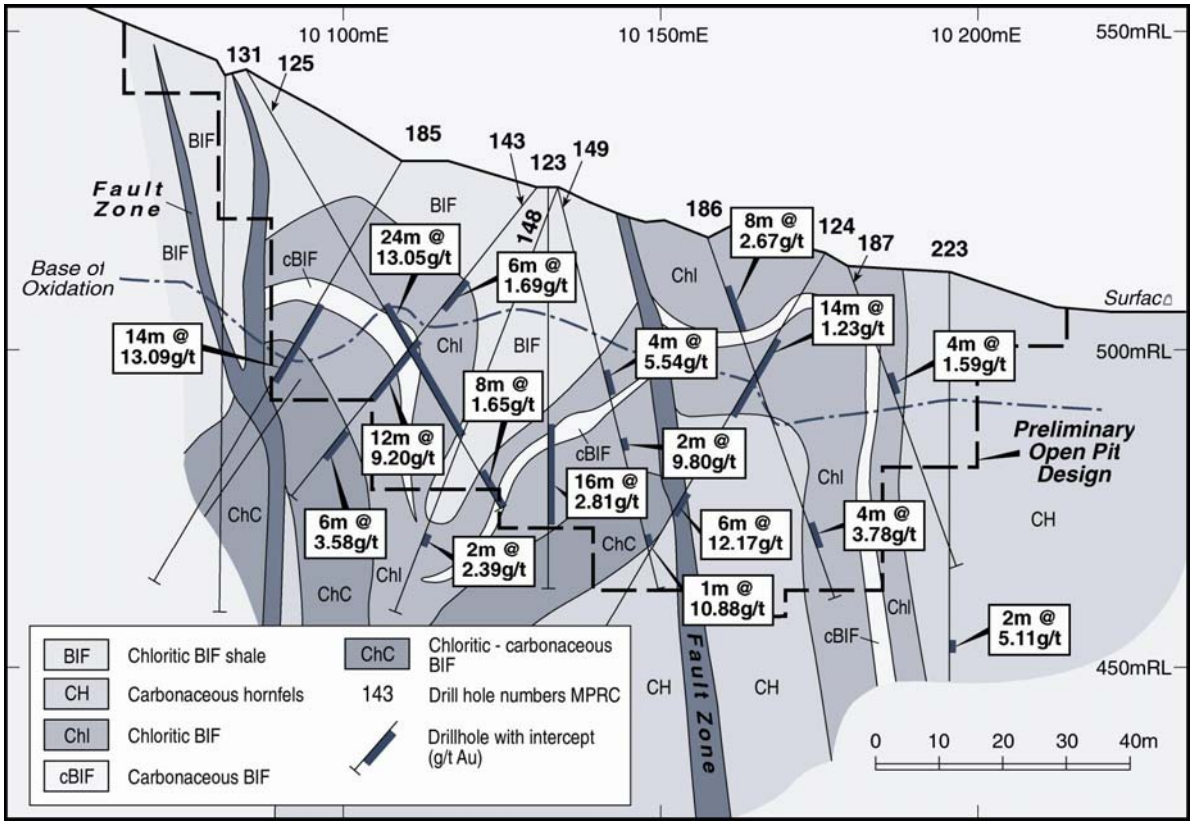
samples do have medium/high levels of PAF, but these all come from the fresh rock section of the proposed pit where the actual volume (and tonnage) of waste involved is extremely small compared with total waste. Nine of the 35 samples, all from the deeper portion of the oxide zone where the relative volume (and tonnage) is small compared with shallow and total waste, have low potential to develop acid.

Selection of samples for ARD determination is based on determining whether there is a potential to develop acid and sample numbers are not proportional to volumes of waste likely to be generated. The sample density compared with waste volumes is disproportionately large wherever there is a likelihood for samples to be PAF. On a volume to volume basis, the proportion of medium/high levels of PAF material has been estimated at less than 0.5% of the total waste. Very clearly, "the percentage content of significantly PAF material appears small."

DPIFM: Section 4.5.1, figure 4: This diagram is intended to be a cross-sectional view of the open pit but does not appear to show the open pit profile. It is hard therefore to accept the statement in section 4.7 which states that 70-75% of the waste rock in the pit is oxidised. Fig 4 shows a large proportion of ore in the primary/sulphide zone.

The diagrammatic cross section shown in the PER was intended to present as much assay and geological data as feasibly possible. Figure 1 superimposes the pit outline over this cross section. The Base of Oxidation line shown confirms the top 20-40 metres of the pit is oxidised. This represents the widest part of the open pit conical shape and comprises the bulk of the waste material. The deeper zone, in the primary sulphide zone, contains the bulk of the ore, and thus a significantly smaller proportion of waste.

Figure 1: Pit Outline



The PER stated "The … content of significantly PAF material … all contain carbonaceous siltstone-BIF with visible sulphides. Because of the high free carbon content, the Eh value within waste rock stockpile of the PAF material should be extremely low and non-oxidising, thus minimising sulphide oxidation and the potential for acid generation".

The EPA request further explanation of these statements for the general reader, as well as the expected extent of sulphide oxidation in real terms. References that support these concepts should be quoted.

The carbonaceous host rocks for both ore and waste contain substantial quantities of elemental carbon in either amorphous form or as the mineral graphite. Oxygen penetration into these rocks is minimal as the oxygen binds to the carbon. As a result, the free oxygen content in the rock (Eh) is extremely low. In the absence of free oxygen, sulphide oxidation cannot occur, so there is a very limited chance of acid generation.

Limited sulphide oxidation can still occur where the sulphides are exposed to water infiltration along cracks and joints or in porous waste storage facilities. Where the sulphide minerals are encased in non-porous host rock, oxidation rates are extremely low.

In waste landforms designed to encapsulate PAF waste in an impermeable clayey material, oxygen access to sulphides in the waste is minimised (it cannot be totally prevented), therefore oxidation rates are slow. Where the wastes have high carbon content, oxidation rates can be very much slower.

EPA: Potentially Acid Forming (PAF) material is proposed to be encapsulated within an envelope of oxide waste rock (PER s4.7, s11.3.2) stripped from the upper benches of the pit. Given the importance of excluding water and oxygen from the PAF cell (PER s.11.3.2), provide design details including water influx rates/permeability through the material encasing the PAF core. Indicate available sources of clay or low permeability material suitable and sufficient for containment of PAF material.

Water influx and permeability data have not been collected at this stage of project development. The material that is proposed for encapsulation of the PAF material has a high clay content. The most likely material will be source from weathered dolerite sills present in the upper zone of the open pit.

Permeability testing of the clay material will be conducted and included as part of the detailed landform design in the MMP **(Commitment S13).**

EPA: Predict future groundwater levels within the WRD, allowing for mounding of standing water levels under the weight of the WRD.

The existing water table level at the bore to the south of the open pit is at 190 – 195 metres. Although there appears to be limited connectivity between this bore and the valley systems where the waste landform will be located, it provides a baseline for an estimate of groundwater level once the valley is filled with mine waste. It is estimated capillary rise in the waste landform could be up to five metres above this level (in the order of 195-200 metres). The base of the PAF cell will be at least five metres above the highest predicted mounding level, at approximately 205 metres AHD.

EPA: Indicate the buried depth range of the PAF cell. Location of the PAF encapsulation cell must be recorded/registered on the land title for the site, (or by an alternative appropriate recording method) for future notification.

The cap of the PAF cell will be a minimum of three metres thick and domed to prevent any water infiltration into the capped cell. Location of the PAF cell will be surveyed and information presented to DPIFM as part of MMP documentation **(Commitment S14).**

The EPA comments that mine drainage does not have to be acidic to contain environmentally significant concentrations of dissolved metals and or salts. Present consideration of the potential for non-PAF rock placed in the waste rock dump and in various land-contouring situations to create neutral drainage of minerals and salts. Characterisation, management, monitoring and contingency plans to address any such potential should be presented.

Concentrated water leachates have been prepared from all waste types and also from existing soils and these results compared with local waters. The leachates are indicative of the total amount of contaminants that can be leached from these materials over a significant time frame.

All leachates from wastes containing free carbon have moderate contents of iron and manganese plus a weakly acidic pH. The samples with the lowest pH values also have moderate contents of dissolved (or colloidal) aluminium. Traces of bismuth, copper, arsenic and zinc are also present. The trace metal values are slightly higher that the background soil samples.

With dilution, aeration and oxidation, all of these trace metals should precipitate with residual values similar to the existing background soil samples.

None of the waste leachates appear anomalous when compared with equivalent leachates from surface soils, or from the natural spring and stream waters. The natural waters have higher pH.

The moderate content of iron and manganese in samples containing fresh carbon is probably due to a very low dissolved oxygen content and weakly acidic pH. The minor contents of base metals are likely to precipitate as they oxidise, which will happen when any leachate mixes with rainwater.

There is unlikely to be any contaminant problems related to the NAF waste material. In fact, the leachates from mine wastes contain comparable or lower contaminants than soils from the background area to the east of the minesite.

EPA: Describe seepage from the WRD and proposed monitoring and treatment/management contingencies if found to contain elevated levels of acids, minerals or salts.

The two creek lines in the valleys to be filled by mine waste are dry during the dry season. Surface water flow during the wet season will be directed around the outside edge of the waste landform. There is no evidence to suggest that significant levels of seepage will come

from the waste landform. Any seepage will report to sediment basins established in Pit Gully and East Gully downstream of the waste rock stockpile, prior to entering the natural creek line system.

A post closure monitoring schedule and maintenance program will be defined in the MMP.

The EPA Program expects that design of the Mt Porter WRD cover system will incorporate considerations outlined in TEAM NT 2004. Explain how the Mt Porter WRD design meets principles set out in TEAM NT (2004): Ch. 4. Provide detail on the construction of the waste rock dump, particularly with respect to any in situ or liner system being used to prevent leaching of contaminated water.

The waste landform design proposed in the PER (Section 9.2.2) incorporates principles set out in the TEAM NT (2004) document, to provide effective encapsulation of PAF material. These will be further developed and included in the MMP. The principles include:

- Identifying the quantity of the PAF material that will be excavated from the open pit.
- Allocating a specific location within the waste landform (an encapsulation cell) for the material, away from any natural sources of water infiltration.
- Encapsulating PAF material in a high clay content cell.
- Covering the cell with a minimum of three metres of NAF capping prior to cover with a final growth medium / topsoil layer.
- Designing the waste landform with a convex (water shedding) top, so that water does not accumulate over the encapsulation cell. The top surface will be designed with a shallow gradient (of approximately 1:200 to 1:300), to minimise velocity of storm water drainage off the top surface of the waste landform.
- Shallow scarification of the waste landform top surface to further reduce surface water velocity and aid seed germination and growth.
- Seeding native species to provide additional vegetative stabilisation of the waste landform against erosion.

The EPA comment that a commitment is made to deep rip waste rock stockpile slopes on the contour to assist water absorption and minimise erosion (PER s.9.2.2). This would be appropriate if the WRD contained an impermeable clay layer or membrane underneath a thick (~2m) topsoil layer, but this has not been proposed. Commitment 9.2.2f needs clarification in relation to any intent to discourage water from reaching the PAF cell (PER s.11.3.2).

The commitment referred to in Section 9.2.2 relates to deep ripping the waste rock stockpile slopes on the contour to assist water absorption and minimise erosion (Commitment 9.2.2f). The commitment refers to deep ripping the outside embankment slopes of the waste landform. The convex top surface of the waste landform is designed with gentle gradients to shed water to drains located on the outside edge of the waste landform where it meets natural surface levels. Only shallow scarifying of the top surface is proposed, primarily to provide seed bed preparation.

The PAF cell will be covered by a minimum of three metres of clay material and be water shedding.

3.9 GREENHOUSE GASES

The total greenhouse emissions from the project have not been estimated in the PER. This is a minimum requirement of the NT Environmental Impact Assessment Guide: Greenhouse Gas Emissions.

Table 2 presents estimated greenhouse gas emissions from the Mt Porter Gold Project.

Table 2: Predicted Emissions of Greenhouse Gases

Process/Fuel	Consumption	Emissions (Tonnes CO_2-equivalent)
Automotive Diesel Oil	880,000 tonnes	2640
Paper/cardboard waste	1.6 tonnes	4
Food (putrescibles) waste	7 tonnes	6.3
CO_2 (land clearing)	6 tonnes	6
Gross Emissions		**2656.3**
Gross Offsets		**4**
Net Emissions		**2652.3**

Measures to be undertaken to minimise greenhouse emissions are indicated only in a very general way and do not provide the EPA Program with adequate information. For example, what energy efficient technologies or equipment will be adopted? How will employees be encouraged to be energy efficient in their day-to-day activities?

Arafura is committed to minimising greenhouse emissions through the selection and design of all equipment. This may include:

- Preferentially selecting high energy efficient motors for use in equipment and ensuring ongoing maintenance of motorised equipment.
- Selection of equipment with low emission specifications.
- Use of energy efficient lighting.
- Purchasing energy efficient office equipment.

Additionally, staff will be encouraged to contribute to minimising greenhouse gases by:

- Switching off office lights.
- Switching off computers when not in use.
- Encouraging reuse of paper in the office for unofficial documents.

- Encouraging the use of the company-provided bus for transportation to work instead of using personal vehicles.
- Ensuring company vehicles are only used when required.

There appears to be confusion in the document between local air quality issues and greenhouse gas issues. 'Section 9.7.2 Greenhouse Gases' refers to Table 17 which provides air quality data, and the final paragraph of section 9.7.4 also confuses greenhouse and air quality issues. This should be rectified.

Comment noted. Table 2 of this document presents information relating to greenhouse gas emissions while Table 17 of the PER refers to air quality. Arafura understand that greenhouse emissions refer to the release of gases including carbon dioxide, methane, nitrous oxide and HCFs, into the atmosphere, contributing to an increase in global greenhouse gases that are attributed to global warming. Arafura further recognises that the Mt Porter Gold Project will produce greenhouse gas emissions and has provided more detailed management measures aimed at minimising such emissions.

In relation to the final paragraph of Section 9.7.4, Arafura would like to clarify that air quality issues relate to the local air quality while greenhouse gas emissions are a global issue of concern, quantification and management.

Air quality issues include both fugitive and point emissions resulting from the operation (as listed in Section 9.7.1 of the PER) that may cause a decline in local air quality.

The greenhouse emissions from land clearing should be presented as part of the estimation of total predicted emissions.

See Table 2.

The paragraph regarding greenhouse emissions from landfill is confusing. Does the 10.5 tonne figure refer to carbon dioxide only, or carbon dioxide equivalent including emissions of carbon dioxide, methane and other greenhouse gases? It is recommended that the proponent review the NT Environmental Impact Assessment Guide: Greenhouse Gas Emissions and provide more information regarding greenhouse issues accordingly.

The 10.5 tonnes figure is the rounded up sum of emissions (carbon dioxide equivalent) for paper/cardboard and putrescibles (see Table 2).

4. BIOPHYSICAL ENVIRONMENT

4.1 GROUNDWATER

NLC request Arafura to demonstrate the extent of connectivity between deep and shallow aquifers and surface flow areas (namely waterholes and Nellie Creek) to better determine the true amount of waste water, including potential seepage from the stockpiles, that may be entering the riparian environment.

Geological and hydrological investigations to date indicate that the project site is characterised by a complex system of folds and faults, which limit the connectivity between aquifer systems. The following points in the PER support this view:

- The large difference between groundwater levels in exploration drill holes within the open pit footprint and the bore 300 metres to the south indicate the presence of a large fault system that acts as a barrier to groundwater flow and connectivity.
- The airlift measurement of the bore produced low water yields, indicating low transmissivity within the aquifer system.
- Groundwater seeps (springs) occur at the contact between the Zamu Dolerite sills and dominant Koolpin metasediments. These sills have low porosity (but are not totally impermeable), with the surface expression of springs related to permeability in the fractures and joint sets. Observations of these springs on site during the dry season show very minimal flows, insufficient to produce stream flow for any distance down the creek bed.

These points indicate the aquifers within the project area can be described as "perched, low yielding aquifers". The information supports the view that there is limited connectivity between the systems on site and any connection is localised.

There is expected to be negligible seepage from the waste landform. The two valley systems contain dry creek beds during the dry season. The Pit Gully spring is located upstream of the final fill level of the waste landform. All surface water from Pit Gully (including the spring) and East Gully will be directed to the perimeter drainage channels around the edge of the waste landform. Removal of a large portion of Zamu Dolerite sill by the pit immediately upstream of Pit Gully means the spring/seepage is likely to cease to flow following excavation of the pit.

It is considered the studies undertaken and design of mining features provides sufficient information to determine the potential quantity of ground water from the project is low, with negligible risk to the downstream environment. During operation, monitoring bores will be installed. The monitoring schedule will be included in the Environmental Management Plan within the MMP.

DEH comment that the SKM report indicates that although porosity of the local sediments is low, there is potential for permeability. What is the likelihood of pit contaminants seeping into groundwater and surfacing in springs?

The likelihood of pit water travelling in groundwater and surfacing in springs is low. The nearest spring is in the upper reaches of Pit Gully, 50 metres away from the pit, 50 metres above the pit floor, and five metres below above the low point of the pit boundary. The spring occurs at the contact between the low permeability Zamu Dolerite sills and dominant Koolpin metasediments. As a substantial portion of Zamu dolerite sill immediately upslope of the spring will be removed by the pit, it is likely that the spring will cease to flow. Most seepage from the sediments in the area will end up in the pit rather than the spring. The observed groundwater levels in the pit were around 210 metres AHD, 10 metres below ground level and level with pit gully spring. Final water level in the pit is expected to be substantially lower due to evaporation and the low yield of the small perched aquifers, so even if the spring continues to seep, the water will not be sourced from the pit.

The only other surface seepages that could potentially be affected by the pit are in Pandanus gully. The SKM report indicates that the unnamed bore, which is in the same gully as Pandanus Gully, upstream of the seepages, is not hydraulically connected to the pit area. Water level in the bore was observed to be about 190metres AHD, 10 metres below the local ground level, but approximately equal to the ground level at the location of the seepages further down the gully so it is expected that it is linked to the seepages.

DEH This section (9.3.2) does not address mitigation or prevention of all the potential issues in 9.3.1. If groundwater quality deteriorates, what will be done about it? Can anything further be done to prevent it in the first place? Likewise for acidification due to exposure in the pit void.

A number of potential issues listed in 9.3.1 have no specific management or mitigation measures proposed as they are considered to be adequately addressed in other sections of the document. This is detailed below:

Section 9.3.1

- Concentration of salts on road areas where groundwater is used as a dust suppressant.

Section 7.5.3 provides information that the Total Dissolved Solids (TDS) of the groundwater, measured in the bore is 240 milligrams per litre, which is very fresh and within normal drinking water parameters. As such, it is not anticipated use of this water will result in salt accumulation on roads and mine areas. No specific management or mitigation measures are proposed.

Section 9.3.1

- Groundwater abstraction may reduce the volume of surface water flows due to the potential hydraulic connection between surface and ground waters.

The only surface water expression of groundwater in close proximity to the active mine areas are the seepages in the upper reaches of Pit Gully and in Pandanus Gully. Abstraction from the bore will be monitored as described in Management and Mitigation Measure dot point 1. Abstraction from the bore may affect the longevity of the shallow puddles created in the Pandanus Gully by seepage. Surface water expression in Pandanus Gully was observed to be minimal in June 2006 (early dry season). It is likely the seepages often naturally dry up before the end of the dry season. Abstraction will only change the timing of the drying up,

and only for a single dry season. The seepage in Pit Gully will most likely cease due to excavation of the Pit immediately upstream.

Section 9.3.1

- Pipeline infrastructure impacting on pastoral activities.

No specific management or mitigation measures are proposed for this item as it is not considered to pose any risk. Pipelines will generally not be buried, however pipelines will be buried where they cross access tracks or haul roads. Airlift measurement made at the one bore indicated flow rates that can be accommodated in pipelines that will not exceed 110 millimetre diameter. It is not anticipated that any pipelines on site would exceed this size. Pipes of this size are not anticipated to cause impacts on fauna, particularly as they are likely to be in place for less than 12 months.

The other potential issues and impacts listed in the PER Section 9.3.1 are addressed in Section 9.3.2. Contaminants in the pit void are unlikely to detrimentally affect the quality of groundwater in the surrounding area as both porosity and permeability of the wall rocks will be extremely low. Existing groundwater data plus the diamond drill hole logs and photographs all suggest that the only significant aquifers are within the oxide zone.

Since all of the PAF material in the completed open pit other than a small portion of the North wall, will be below the projected water level, strong acidification is possible, but unlikely. The high carbon content of the wall rocks will reduce oxygen availability to sulphides and simultaneously minimise oxidation of ferrous ions to ferric.

Should post-closure monitoring identify levels of acidification in the pit and deterioration of groundwater that is of concern, management measures will be implemented at that stage.

DPIFM comments that it has been stated that based on the observation of other open pits in the region, it is unlikely the pit lake that remains upon the completion of mining will overflow. This presumption lacks good science and a thorough investigation of groundwater recharge/ discharge associated with the proposed pit needs to be undertaken. Furthermore, there needs to be some discussion on evaporation rates and the effect of significant wet season rainfall events on the level of water in the pit lake. Recharge fluxes causing pit water to overflow will only be an issue after mining has ceased and it needs to be demonstrated that this will be monitored.

Average evaporation in the project area is region is estimated to be 2,775 millimetres per year. This is over double the average annual rainfall and over 50% greater than the 90th percentile annual rainfall of 1,812 millimetres. Given that the pit has a catchment area of only 7.8 hectares of which 3.8 is outside the pit, it is clear that rainfall will not cause long term rises in pit water level. Short term rises in pit water level will occur due to rainfall events, but even a whole years rainfall for a 90th percentile rainfall year (1,812 millimetres) would only be sufficient to cause a rise of approximately five metres in the pit water level. If the static pit water level was close to that observed during exploration drilling, about 10 metres below surface level, this would give a buffer of an additional 5 metres before the pit could overflow.

Observations of flow rates and the large variation in water level from the water bore nearby indicate, however that the groundwater in the pit is sourced from small perched aquifers which are likely to be depleted by dewatering and evaporation from the pit, resulting in a final pit water level much lower than 10 metres below ground level. While more detailed modelling including field testing results, could give a more precise estimate of the final pit water level, this overview is sufficient to show that it is extremely unlikely that surface flow out of the pit would occur. Pit water and groundwater level monitoring will be included in the post mining monitoring program described in PER Commitment 9.3.2d.

DPIFM comment that there is no commitment made to undertake a groundwater study prior to mining activities commencing. It would be beneficial to know the relationship between the final pit lake and the surrounding area for the sake of on-going monitoring.

In regard to this, Commitment 9.3.2 needs to be fleshed out to establish whether monitoring bores will be constructed to monitor the ground water quality associated with the pit, the WRD and nearby waterways (for the long-term)or will it be the monitoring of production bores.

Responses in Section 4.1 outline the proponent's view that the studies undertaken provide sufficient detail on the nature of the aquifers within the open pit. Management and mitigation measure dot point 4 establishes that post mining monitoring will occur. This will provide data on the final pit lake and surrounding water levels. It is planned that additional monitoring bores will be constructed during site operations to allow post mining monitoring to occur. This will be detailed in the Environmental Management Plan within the project MMP.

EPA: Detail plans for any groundwater monitoring bores to be used to monitor for development of groundwater contamination plumes from the pit or WRD.

As discussed in previous responses, monitoring programs will be described in the MMP.

EPA: Groundwater modelling should be undertaken to the extent that 3-dimensional mapping of aquifers intersected by the pit, or potential seepage from the waste rock stockpile, occurs.

Model groundwater aquifer transport rates into and away from the pit and waste rock stockpile, including the influence of seasonal variations.

Groundwater quality should be modelled for quantity and quality for any acidic and also neutral drainage that may occur.

Flow dynamics and expression points of affected aquifers should be predicted, with estimates of time lags before contaminated plumes would be expected to emerge as surface flows.

Predict potential downstream impacts of the mine relative to beneficial uses and users, of the aquifers.

Present modelling of progressive and long term pit water depths (AHD) and water quality, through wet and dry seasonal extremes. Depths relative to the pit rim and surrounding landscape should be included.

The groundwater investigations completed indicate that groundwater is limited to small perched aquifers of low yield. Arafura consider this is sufficient to show that impacts of the proposed development on aquifers will be manageable by the methods proposed in the PER. Monitoring during and after mining will provide more detailed data to allow refinement of management strategies where necessary. Arafura does not consider further detailed modelling to be necessary at this stage of the development.

4.2 SURFACE WATER AND WATER DISCHARGE

The NLC does not understand why the proponent consistently references its data against Stock Water quality guidelines throughout the PER. The NLC believes that using livestock values for derivation of trigger values is inconsistent with the declared beneficial uses to 'maintain the health of aquatic ecosystems' and to maintain 'public rights to take water for domestic and/or stock purposes' for the Mary River environment downstream of the project.

A range of water quality guideline values are used in the PER, not just livestock trigger values. Table 8 of the PER shows ANZECC Drinking Water Guidelines, ANZECC Aquatic Ecosystem Trigger values and ANZECC Livestock Trigger values. The inclusion of livestock water quality values (among other guideline values) is consistent with the declared beneficial uses (which include public rights to extract water for domestic/stock purposes) and the context of the land uses in the surrounding region which are largely pastoral.

The NLC recommends that Arafura specify and develop local watercourse trigger values that are based on appropriate ecotoxicological testing as well as using the ANZECC method. Development of triggers should be done in conjunction with stakeholders including Parks Australia North prior to operations commencing and must be determined in reference to the declared beneficial uses of the Mary River. Additionally, more representative background water quality data should be produced upon which these trigger values can be developed.

The proponent does not consider local trigger values and ecotoxicological testing is warranted at this point. The preferred monitoring methodology is monitoring of general water quality parameters against 'control' sites. The leachate data currently available indicates that waste landform runoff will be of similar quality to runoff from natural soils in the area. It is therefore not anticipated that runoff water quality will differ significantly from water quality at control sites. Trigger values adopted will therefore be initially based on the conservative ANZECC default trigger values. These may need to be adjusted if further monitoring indicates natural runoff in the area exceeds these trigger values. Ecotoxological testing would only be warranted if Arafura sought to discharge water significantly different to natural water quality.

DPIFM comments that detention basins are likely to fill quickly and/or have the potential to erode. How will sediment loads to these basins be managed in the medium term while vegetation is establishing and will there be a commitment to maintain these structures?

Sediment loads for sediment basins will be managed by designing shallow gradients (in the order of 1:300) to minimise velocity of water flow off the waste landform and perimeter

drainage lines, to reduce sediment leaving the waste landform. Detailed design of the top surface of the waste landform and perimeter drains are provided in Figure 2 and Figure 3.

The highest risk of sediment load is considered to be from the rock lined drop structures in front of the waste landform, where drainage from the waste landform is directed, via the detention basins, to the original creek alignment. These structures will be located in 'natural ground' not the waste landform itself, isolating the waste landform from major erosion potential.

The outer berms of the waste landform will be designed to shed water in drains on a 1:200 gradient, to the perimeter rock lined drop structures. This also minimises the risk of failure of the berms to contain water resulting in vertical scours down the face of the waste landform.

The MMP will include a post closure monitoring and maintenance schedule. This will include routine water and vegetation monitoring as well as any maintenance works required for water management infrastructure.

DPIFM comment that detention basins, while an effective means of reducing sediment will not provide remediation of acids and associated metals that the wetland filter may have provided. Shallow detention basins as described may also require on-going maintenance to ensure that the detention time of water is sufficient to allow sediments to drop out of solution. Downstream expression of mobilised salts should be considered here.

Section 9.4.2 of the PER describes that the wetland filter option was not considered appropriate as it would dry out during the dry season, thus reducing its ongoing effectiveness.

Sections 9.2 and 9.4 of the PER describe how PAF waste rock will be encapsulated in the waste landform and drainage systems constructed to minimise possible contamination from the waste landform.

Maintenance of detention basins and post closure monitoring of water and vegetation will be detailed in the Closure Plan.

DPIFM: Are monitoring results in Rainforest Gully likely to be influenced by the WRD in its vicinity? It may be beneficial to request an additional monitoring site further north to provide background readings of water quality prior to any possible contamination.

Rainforest Gully is located in the creek catchment to the east of the project site and will not be disturbed by the project. The waste landform is confined to the East Gully and Pit Gully valleys.

DPIFM: What is the hydrological relationship between the Swampy Meadow and other watercourses? Is there potential for leachates associated with the WRD to be mobilised quickly if they contaminate this swampy area?

Swampy Meadow is a vegetation unit mapped by Low Ecological. There are two areas classified as Swampy Meadow however, for the purpose of this response, the proponent will

assume the question concerns the Swampy Meadow located in East Gully. This Swampy Meadow and the East Gully will be almost entirely covered by the waste landform and any surface water flow will be redirected around the waste landform before entering sediment basins prior to release back into the natural drainage line.

Should East Gully become contaminated there is the potential of contaminants flowing into Nellie Creek. In the instance that the mechanisms in place to prevent contamination of surface waters fail, the leachates from mine wastes contain comparable or lower contaminants than soil samples from the background area to the east of the minesite.

MEB comment: The diversion drains for the waste rock stockpile should be of suitable dimensions to prevent upstream ponding for periods that will enable mosquito breeding. Silt runoff into the diversion drains should be prevented, to prevent the siltation of the drains that could lead to ponding and mosquito breeding.

The perimeter diversion drains on the waste landform will be constructed on approximately a 1:300 gradient to allow flow of water off the waste landform. The drainage system is not designed to pond water in any location other than the detention basins. The detention basins will contain water during the wet season, when the surrounding creek and swampy meadows also hold water. During the dry season, it is anticipated the detention basins will dry out.

MEB: Detention basins should be designed to completely drain within five days, to prevent the creation of mosquito breeding.

Implementation of this request has a number of practical difficulties. To achieve the outcome, the detention basins would need to be designed entirely above the current ground level, so no ponding of water could occur. This element can be achieved by using mine waste to construct the sediment basin dam walls above current natural ground levels.

To achieve complete emptying of the basin within five days after a rain event, the dam wall, or a portion of it, would need to be designed to be permeable, to allow 'slow leakage' of the contained water over a period of time. However, sediment carried in the rain event will settle in the dam, thus sealing the permeable dam water, progressively nullifying the intended outcome. For this reason, it is not considered practical to achieve drainage of the sediment basins within the time period requested.

MEB: The watercourse that pit water will be discharged to should be monitored on a weekly basis, to ensure mosquito breeding is not created by the dry season discharge. Any mosquito breeding should be controlled with an appropriate larvicide. Indicators for potential mosquito breeding would be permanent ponding and the growth of semi-aquatic reeds and grasses in the watercourse receiving the pit water discharge.

During the project, it is anticipated that all pit water will be utilised on site for dust suppression. Table 1 of the PER provides a contingency for discharge of surplus water to the creek systems if inflow to the pit exceeds site water use. This possibility is only anticipated in the latter stages of pit development (below the ground water level), so would only occur for approximately a six to eight week period. If water discharge occurs, monitoring will be undertaken weekly (**Commitment S15**).

At cessation of mining operations, dewatering of the pit, with any resultant discharge will cease.

MEB: The drainage pipe to be placed along the creek bed to drain the pit gully should be of suitable dimensions to ensure no upstream impoundment of water occurs for periods that will enable mosquito breeding.

The level of the top of the waste landform is below the location of the natural spring in the upper reaches of Pit Gully. This natural spring already impounds water. The minor flow that

leaves this natural spring at the height of the dry season rapidly infiltrates into the creek bed or evaporates, so there is no sustained flow from this source down the creek system.

In wetter times of the year, surface flow from the creek line, including the natural spring, will be diverted into the perimeter drainage line along the western edge of the waste landform. This drainage line will be designed to drain water on a gradient of approximately 1:300. No impoundment of this water is proposed.

To provide a preferred subsurface drainage pathway for any minor quantities of water from this source, a general purpose subsoil drainage pipeline will be located in the creek bed prior to deposition of waste material (**Commitment S16**). This subsoil drain will not be a potential source of mosquito breeding.

The EPA requests the following information:

- ***Explain how new watercourses will be designed to inhibit surface water infiltration through the WRD.***
- ***Provide design detail of creek diversions around the waste rock stockpile, to explain how wet season sediment transport and erosion of the newly placed waste rock and topsoil will be prevented.***
- ***Specify design parameters of sedimentation basins and drains in terms of Average Recurrence Interval (ARI) rainfall events.***
- ***Predict the consequences of rainfall events exceeding ARI design thresholds.***

The EPA comment that rock armoured spillway structures proposed on the sides of the WRD (PER s.4.7) may potentially be subjected to peripheral erosion during high rainfall events, and end up perched above or beside the actual flow channels. They request the following information:

- ***What ARI rainfall event will the drains be designed to?***
- ***Describe in concept how peripheral erosion around rock-armoured spillways will be prevented (such as using soft engineering methods).***

The new watercourse designs are shown in Figure 2 and Figure 3. Explanation of the design principles is as follows:

- The new watercourses (creek diversions) will be designed to avoid infiltration into the waste landform by constructing them into the side of the natural hillside, rather than on the top of the waste landform itself. The top of the waste landform will be designed to be water shedding on a gentle grade which will minimise surface water flow velocity and thus erosion potential (Figure 2).
- The new water course will also be designed on a gentle gradient, to similarly minimise water velocity along its length. Constructing the actual drainage channel into the natural hillside enables the drainage line to be constructed beyond the leading edge of the waste landform. Drainage off the waste landform is then directed down a rock armoured spillway, located totally onto the natural soil profile, not the waste landform (Figure 3).

Specific design parameters and cross section details of the drain and sediment basins have not yet been undertaken. It is considered this level of detail is more appropriately addressed in the MMP. General mine site drainage designs are based on an ARI of 1 in 20 year event.

Rock armouring of the mouth of the new watercourse and the spillway/drop structure will occur. Armouring using large base rock topped with smaller material will minimise erosion. The post closure monitoring and maintenance program, included as part of the MMP, will address maintenance of any breakout of the spillway.

Outflow from the spillway will enter the sediment basins located in the natural drainage lines in front of the waste landform, where sediment can settle before water flows down the natural creek channels. Figure 9 in the PER shows single basins in each creek line. The detailed design, formalised in the MMP, may opt for a two stage design consisting of primary (coarse settlement) and secondary treatment before water release to the creek system.

Figure 2: Waste Landform Upper Surface Drainage Design

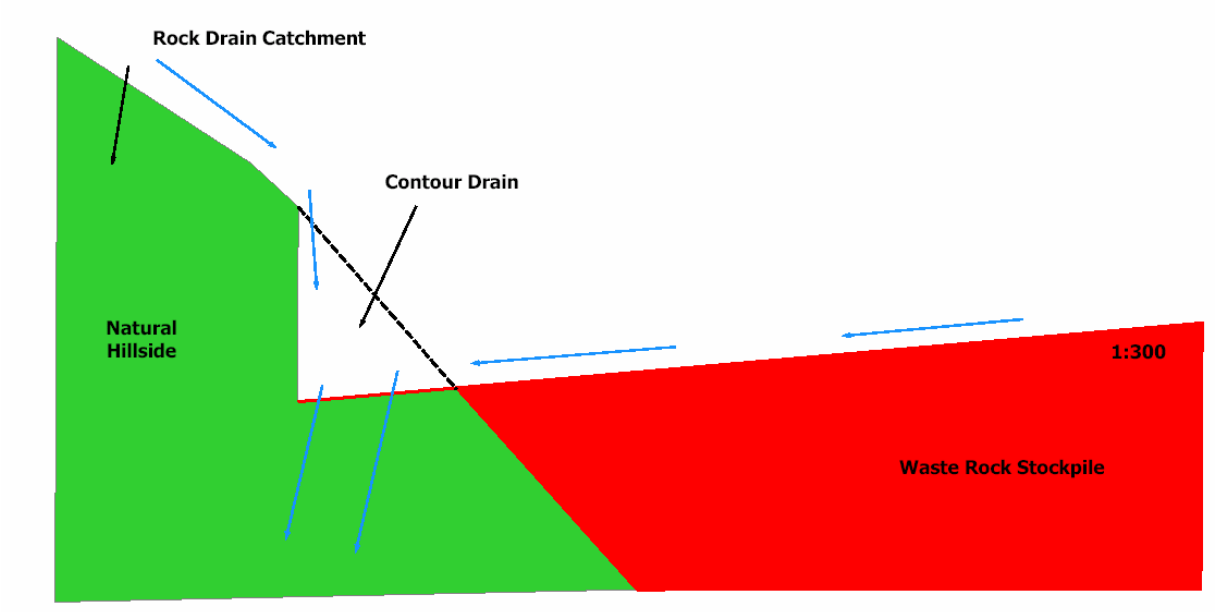
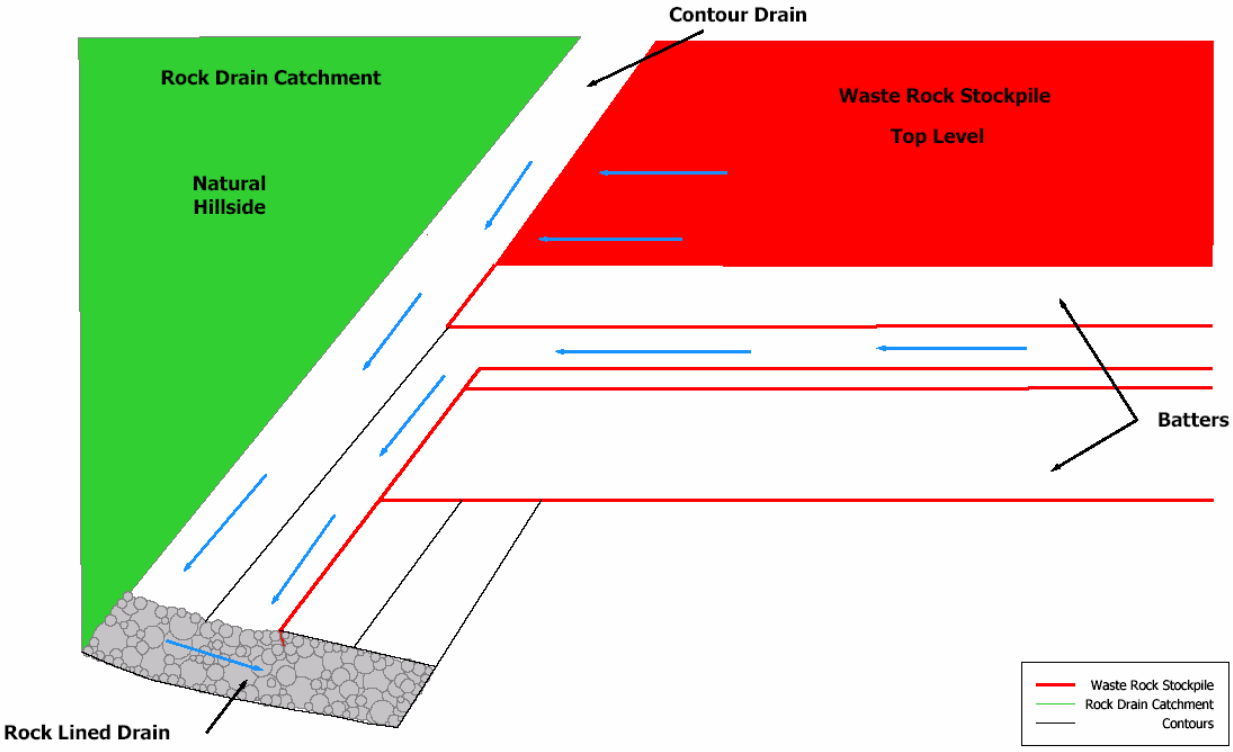


Figure 3: Waste Landform Perimeter Drain Design



The EPA request that Arafura:

- ***Undertake AUSRIVAS biological monitoring on local streams to confirm the condition assessment reported in the PER. Water quality data should be used to develop a statement of condition that could be used to set a level of species protection. 95% protection was assumed with no justification (catchment uses, existing water quality, historic water quality etc). Mary River water quality should be protected to 99% level, as this is an area of Kakadu National Park at the point where the Nellie Creek system enters the Mary River.***

Arafura will undertake to carry out biological monitoring on Nellie Creek downstream of operations **(Commitment S17)**. AUSRIVAS is the preferred method for such monitoring and will be adopted if practical. Monitoring details will be included in the EMP as part of the MMP. If AUSRIVAS proves impractical to implement for this catchment, then a suitable alternative will be implemented. AUSRIVAS protocols for the Mary River region require a semi permanent water body to allow monitoring to occur several weeks after rain ceases. The nearest suitable location is likely to be several kilometres downstream of the project location on Nellie Creek. As the proposal is located at the head of its catchments there are no suitable reference monitoring sites upstream.

The ANZECC 95% protection level is the recommended level for slightly to moderately disturbed ecosystems. The 99% protection level is applicable to high conservation/ecological value systems, effectively unmodified or highly-valued ecosystems regarded as having intact

ecological integrity. While a 99% protection level may be appropriate for the Alligator River catchments that are contained largely within Kakadu and include RAMSAR wetlands, the Mary River only skirts the edge of Kakadu and does not mix with these intact river systems. The western half of the Mary River catchment upstream of Mary River National Park consists of pastoral leases and contains several active and inactive mines. On this basis it is considered that the Mary River meets the criteria of slightly to moderately disturbed ecosystems and the 95% protection level is appropriate. The Northern Territory Government report "Water Quality Monitoring in The Mary River Catchment. Tech Report 41/2002 (Schultz et al, 2002) also uses the 95% protection criteria in its analysis of Mary River water quality.

The EPA requests a description of the required discharge regime from the activity. The water management system should be designed to be zero water discharge as a Best Practice Environmental Management measure (or at least zero discharge to an ARI of 1:10).

Discharge requirements are described in Section 4.8 of the PER. They are dependent on groundwater inflows to the pit more than rainfall, although rainfall will increase the pumping required from the pit. Mining is scheduled to occur in the dry season to minimise the influence of rainfall. All water requirements for mining will be sourced from dewatering when water is available. Should there be surplus water, there is no alternative other than to discharge. Construction of holding or evaporation dams would vastly increase the footprint and impact of the project.

The EPA request design standards for sedimentation basins – i.e. to what size particles, and to what level of treatment. Given the function of sediment ponds to accumulate sediments and progressively fill, describe how ponds will be maintained in working order in the longer term after machinery has been removed from the site.

As described previously, sediment loads for sediment basins will be managed by designing shallow gradients (in the order of 1:300) to minimise velocity of water flow off the waste landform and perimeter drainage lines, to reduce sediment leaving the waste landform.

Specific design parameters are not available at this stage of project development. The MMP will consider this aspect of design in more detail.

The MMP will include a post closure monitoring and maintenance schedule. This will include routine water and vegetation monitoring as well as any maintenance works required for water management infrastructure. Post closure monitoring and maintenance will include maintenance of sediment ponds if necessary. Machinery can be mobilised locally from the Pine Creek/Union Reef area or from Darwin if required.

The EPA comment that 1:10 dilution proposed in PER s.9.4.4 may be insufficient for some of the aquatic toxicants likely to be discharged from the site; discuss treatment systems for contaminated water.

Arafura's analysis indicates that runoff quality will not be substantially different to runoff from natural soils in the area other than sediment loads settlement and aeration of waste

landform runoff via a pond system and 1:10 dilution as described in the PER will be sufficient to meet water quality requirements without further treatment.

The EPA question what ARI does designing systems for 500mm and 100mm rain events represent? (Under PER table 15). Present ARI calculations if possible based upon up-to date data (PER s.7.1) to better incorporate recent climate changes and estimate future patterns.

The 100 millimetre and 500 millimetre rainfall events are the maximum recorded events observed in approximately 80 years of recording at Burrundie for the months of operation they apply to. It is difficult to determine ARIs to great precision for limited periods based on such limited data. Five hundred millimetres is approximately a 1 in 100 year, 72 hour rainfall event based on whole year analysis. It is expected that rainfalls exceeding 100 millimetres during the dry season are similarly rare. The data set for Burrundie is the closest available data with sufficient records for statistical analysis. Given the proposed mine life of less than one year, it is considered that adoption of these figures is conservative, and provides adequate margin for possible rainfall increase due to climate change.

Provide description of any water recycling, or irrigation programs. Provide detail on water separation systems based on quality or use within the water management system, particularly dewatering water (PER s.9.4.6).

Water use (including water recycling) was discussed in Section 4.8 of the PER. To reiterate, the following water recycling measures will be undertaken on site primarily for use in dust suppression on haulage roads, the waste landform and ROM:

- Rain falling in the pit will be directed to sumps at the base of the pit. This water will be used for dust suppression during mining. With the project duration planned for the dry season, quantities of rainwater are expected to be limited.
- Temporary earthen dams to store water for site use will be constructed either in the waste landform footprint (prior to the full extent of the landform being reached), on the top level of the waste landform (when sufficient area is constructed) or in the office and workshop area. Water will be pumped to these dams from the open pit sump.
- Contaminated water from hydrocarbon storage areas, workshops and the equipment wash bay will be directed to a sediment sump with an oil water separator for treatment prior to discharge into an evaporation pond.

Illustration should be presented of all the components of the water management system with water balance, rainfall, evaporation and annual through volumes marked.

Estimate wastewater quality and provide details on how this was estimated, including parameters used.

Section 4.8 of the PER details the estimated water balance for the site. The water balance comprises the following elements:

- Site water usage is estimated at approximately 500 kilolitres per day. This is based on a 50 tonne water cart applying 10 loads per day. Ancillary uses add a small amount to this total.

- The quantity of dewatering water extracted from the open pit is difficult to accurately predict due to the complex faulting and folding of the site geology and the poor connectivity between aquifers. The upper levels of the open pit are also expected to require less dewatering than the base of the pit, thus the daily quantity of water sourced from the open pit is expected to vary significantly over the duration of the project.
- The bore to the south of the open pit provided air lift yields of three litres per second (260 kilolitres per day), with pump yields expected to be in the order of five litres per second (430 kilolitres per day). This bore is anticipated to be required to make up the shortfall of site water needs if the open pit dewatering cannot produce the desired quantity.
- Mining during the dry season is not expected to produce significant quantities of water from rainfall.

Should pit dewatering consistently yield quantities of water significantly in excess of site requirements, a discharge licence will be sought to allow discharge of surplus water to the local creek system. Given the short duration of the entire project, it is not anticipated this scenario would occur, or if it did, would most likely be in the latter stages of mining.

EPA: Indicators of future water depth within the pit appear to vary (in PER s.7.5.3) from 190-195 AHD (30-35m above pit floor) to ~210AHD (~11m below ground level). These (underlined) values can't both be true if the pit is to be 115m deep (PER s.4.2) Clarification of these figures is needed.

Both these numbers are correct. The pit is located on a steep hillside. The ground level surrounding the pit varies from 270 metres to 215 metres AHD, so while the pit maximum depth, measured at the northwest corner is 115 metres, it is only 55 metres at the southeast corner.

The following statements in the PER are relevant to the large range of estimated depths:

1) Hydrological Report (Appendix 4), pg 6-7: comparisons of water level measurements between this unnamed bore and those within the proposed pit area show a 20 metre difference in water level over 265 metres (hydraulic gradient =0.076). This value is extremely high and indicates that the presence of a large fault system (F1 [In Figure 4 of the Appendix]) may act as a barrier to groundwater flow and connectivity between the sites.
2) Hydrological Report (Appendix 4), pg 4: Due to the complex nature of the geology and structure of the region limited connectivity between aquifer systems is believed to exist

Both these statements are repeated in the main text of the PER, in Section 7.5.3, pages 36 and 37.

This information, as well as other information such as the low flow rate from the unnamed bore and the very low flows (no water running down the creek lines) from the spring adjacent to the open pit location, indicates that the aquifers in the project area are 'perched' and low yielding.

EPA: If the depth is actually to be more in the range of 10-30m below ground level (i.e. the pit rim) and 70-100m above the pit floor, argument against returning PAF material to the pit post-mining is weakened and should be re-evaluated.

This has been addressed in Section 3.8.

EPA: Describe the extent to which, in the long term, pit water quality is likely to represent a health risk to native animals, birds and livestock.

Since all of the PAF material in the completed open pit other than a small portion of the North wall, will be below the projected water level, strong acidification is possible, but unlikely. The high carbon content of the wall rocks will reduce oxygen availability to sulphides and simultaneously minimise oxidation of ferrous ions to ferric. Due to minimal convective overturn, the pit water is likely to stratify with fresher water near the surface and progressively more contaminated water at depth.

As birds and livestock coming in contact with the pit water are likely to be accessing the upper levels of the water, contaminants and acidification are not anticipated to be of detrimental levels.

EPA: Describe any proposed mitigation measures against long term degradation of pit water quality.

There are no proposed mitigation measures in place against long term degradation of pit water quality. As described above, it is not anticipated that the pit water will be subject to degradation that will be an environmental concern. Monitoring of the pit water may be implemented as part of post-closure monitoring. Should a serious problem be identified with the quality of the pit water at this stage, corrective actions will be considered to minimise any negative impacts associated with decline in pit water quality.

NRETA: Under section 9, Licensing Requirements, the document states that, the use, storage, discharge and management of water within the mining tenements is covered by the conditions of the Mining Management Plan under the NT Mining Management Act 2001 and is administered by the Department of Primary Industries, Fisheries and Mines.

Monitoring sites and applied water quality standards should be subject to approval by the Department of Natural Resources, Environment and the Arts. The targets are not really targets as they talk about implementing strategies before operation but don't say anything about strategies over the life of the Mine. An example is "All weeds under control by year X of operation".

Arafura is unsure of the purpose of the submission. The first paragraph is a statement from the PER. Arafura intends to fulfil this requirement. The second paragraph includes the wording "should be subject to approval…", which implies there is currently no legislative basis for this to occur. The proponent reiterates its intention to comply with legislative requirements with water management on site, under the appropriate legislation and administrative body.

NRETA The major deficiency in the PER is the lack of consideration of Acid Mine Drainage and its potential impact on the aquatic ecosystems both on site and downstream in the Ferguson and Daly Rivers. Since the waste dump is on top of two minor watercourses, the chances of this contamination occurring must be high, yet there is no mention of the problem.

The proponent disagrees with this statement. Significant consideration of Acid Mine Drainage has been undertaken and is reported in PER Section 4.7, 9.2 and Appendix 3.

The assessment indicates a low risk waste landform. It is considered the proposal will present negligible risk of downstream contamination.

4.3 SOIL AND LANDFORMS

NRETA: The "land unit information" outlined in 6.2 makes little reference to soil types and therefore cannot be assessed on how each of these units should be managed to prevent erosion and sediment loss. The range of soil types in the area need to be identified consistently in order for the proponent to develop an erosion risk plan and subsequently implement erosion and sediment control measures.

The land unit information outlined in Section 6.2 of the PER describes the existing landforms on a regional scale. The comment on assessment of the existing soil types for erosion and sediment loss is considered of limited relevance to the project. The extent of earthworks associated with a mining operation dramatically alters the pre mining landform and soil profiles. Erosion and sediment control measures are more appropriately developed for the post mining landform and soil types rather than those that existed on the site pre mining. The following points are provided:

- The open pit will be internally draining. The pre mining soil types will have no relevance to the open pit.
- The waste landform is constructed from mixed materials. The final surface profile will contain topsoil sourced from the open pit location.
- The ROM and office area will contain some mine waste as fill, but will have topsoil removed and respread from the same area.

The PER contains details of water management and erosion control measures for the project. Any further details required on these aspects can be included in the site's EMP and MMP.

4.4 VEGETATION AND FLORA

DEH comments that Section 7.7.1 describes the flora of the area as relatively homogenous and states that the dominant community is Eucalyptus tintinans associated with Corymbia dichromphloia and E. miniata, over tall Sorghum grassland understorey. Is it the case that none of this vegetation type will be cleared or impacted in any way?

Section 9.5 of the PER addresses the impact of the Mt Porter Gold Project on vegetation and flora in the area. Areas to be cleared are presented in Table 16 of the report with each land unit representing an area characterised by its vegetation and landform. This table has been modified for the purpose of this document to show the corresponding dominant vegetation for each land unit (See Table 3).

Some of this vegetation (*Eucalyptus tintinans, Corymbia dichromphloia, E. miniata, and tall Sorghum*) will be cleared as the species are generally spread throughout each identified land unit.

However, as the vegetation of the area is relatively homogenous, the impact, from a conservation standpoint is insignificant. Arafura is, however, committed to restoring vegetation on cleared surfaces and landforms so as to encourage a return to pre-mining conditions.

DEH: Is figure 6.1 in Appendix 7 out of date now? It indicates that about half of the riparian rainforest and the riparian swampy meadow will be impacted. This does not tally with Table 16.

Figure 6.1 in Appendix 7 is outdated. The figure was representative of an earlier mine design. The infrastructure layout was altered to avoid rainforest areas as a direct result of information collected during site baseline studies. This has been updated and is presented as Figure 4 in Section 4.6 of this report.

NRETA: The Weed Management Plan must clearly state the methods to be used to prevent the introduction of noxious declared weeds and the methods used to control existing and new weed infestations. To prevent a breach of the NT Weed Management Act 2001, the applicant is required to comply with all management measures designed to achieve the objectives of the Weed Management Plan. The weed management plan should be subject to the approval of NRETA.

Any weed management program should recognise the potential of weeds to spread from the mine site downstream and into the broader catchment (potentially into the McKinlay section of Mary River National Park). A commitment to some cooperative weeds management with the Station owners should be considered.

Weed management will be addressed in the EMP which forms part of the MMP. Mining activities can not commence until the MMP is approved. Arafura is aware of the requirements of the *Weed Management Act* and will implement measures to manage introduced weeds that were identified in the Low Ecological site survey. Introduced species recorded during the survey included exotic weeds and introduced species not presently considered to be pests. Measures will also be implemented to prevent the introduction of additional weed species. Arafura will participate in regional weed management activities with Station owners and the local Landcare group (**Commitment S18**).

NRETA: The PER relies on Wilson et al. (1990) (the 1: 1 million vegetation map) to describe the vegetation, even though it is acknowledged that there is a more detailed

vegetation study conducted in the area in 1993. Why was this detailed study not given more attention in the PER? The overall conclusions may have been the same, but, given that the Gouldian Finch is one of the species of concern, a detailed consideration of the extent of its preferred breeding tree (Eucalyptus tintinanns) would have been useful.

The PER relies on site specific flora studies conducted by Low Ecological Services in April 2005. Previous regional and local vegetation studies were provided to Low Ecological Services prior to the site visit. This information was used as well as information collected during the site visit to map vegetation units within potential disturbance areas.

Gouldian Finch surveys were conducted by Low Ecological Services. This group has visited the Mt Porter and nearby Frances Creek area on a number of occasions to conduct flora and fauna surveys. This has allowed them to become familiar with the area and focus survey activities on habitat with the greatest potential to support Gouldian Finches. These surveys were also focused on areas likely to be disturbed by mining activities. No evidence of the Gouldian Finch at Mt Porter was found

4.5 AQUATIC FLORA, FAUNA AND HABITAT

MAGNT: The PER all but ignores aquatic fauna, which run the risk of being impacted by tailings/chemical seepage or by pollution by chemicals in worst-case scenario of flood and disaster. While the neighbouring creeks are largely ephemeral, the PER states there are refuge holes plus a spring, and the issue of potential contamination needs to be addressed. Appendix 6 also refers to a permanent spring, which could be important refuge habitat, but this was not characterised nor sampled. It is suggested that an assessment of aquatic fauna is undertaken.

There will be no tailings produced on site and seepage from the waste landform is expected to be negligible. All seepage from the waste landform will be directed to detention basins (as has been discussed in previous sections). There is a high probability that the spring in Pit Gully (actually a very small seepage, that does not result in flow in the downstream water course in the dry season) may dry out when excavation of the pit commences. Issues relating to aquatic fauna are addressed below.

Appendix 6 (water quality monitoring data) does not refer to a permanent spring. No permanent springs will be affected by the project. The seepages in rainforest gully result in small semi-permanent pools of water in the stream bed, but these will not be impacted by the project.

NLC comment that downstream aquatic ecological conditions and the potential impact of the proposed mine on aquatic flora and fauna have not been considered in the PER. They recommend that potential issues and impacts of the project on aquatic flora and fauna be addressed as required by the EPA guidelines for the EIS.

Issues and Impacts

Deterioration in surface water quantity and quality may have negative impacts on aquatic flora and fauna downstream from operation. The following issues and impacts of the project on aquatic flora, fauna and habitat have been identified:

- Diversion of surface water flows during mining and rehabilitation resulting in increased sediment loads to downstream aquatic environments.
- Contamination of surface water as a result of release of pollutants (eg sediment and hydrocarbons) associated with earthmoving, excavation and other mining activities.
- Potential for acidification of downstream aquatic environments due to exposure of sulphide waste rock material to rainfall.
- Temporary reduction in surface water volume to ephemeral creeks as a result of diverting runoff from operational areas and catching surface water in dams to provide water for the operations.

Management Measures

These issues may have detrimental effects on aquatic flora and fauna downstream from operations. However, Arafura will implement the following measures to ensure that the downstream aquatic ecosystems are protected. These issues have already been addressed in relation to surface water management and are relevant to the protection of aquatic flora and fauna:

- To protect aquatic flora and fauna from the impacts of increased sediment loads, detention basins will be installed to minimise the flow of sediments in runoff into east gully and pit gully.
- Hydrocarbons will be stored in bunded areas to minimise contamination of aquatic environments from spills.
- Diversion drains will be constructed around the waste landform to ensure natural surface flows are redirected back to the natural drainage path, ensuring downstream aquatic environments do not suffer from decreased flows.
- PAF material will be encapsulated in a clay envelope to prevent release of acidified materials into the environment, including into surface waters that may impact flora and fauna.
- Disturbance of creek lines will only occur in the areas detailed in the PER. Rehabilitation of these areas will consider aquatic plants that are present if deemed to be significant to the ecosystem.
- Rainforest riparian habitat will not be disturbed by operations.
- Monitoring of aquatic environments will be undertaken. This will be detailed in the MMP and is likely to include water quality and biological monitoring during mining as well as post mining water quality monitoring.

(**Commitment S19**)

Impact Assessment

The aquatic environment within the Mineral Lease boundaries of the Mt Porter project includes creeks, drainage areas and a freshwater seepage. At the time of the Low Ecological survey there was low to no freestanding water, however during the wet season, watercourses in the area flow steadily. Water remaining in the dry season in a few pools acts as refuge for freshwater fish, reptiles, amphibians and macro-invertebrates.

No aquatic plant species identified during the survey were listed as being endangered, threatened or endemic within the Mt Porter project area according to *TPWC Act* (2000) and *EPBC Act* (1999, amended 2004) lists. The species recorded during the survey and their associated vegetation communities are common in the region with the exception of a few species within the restricted rainforest riparian habitat. The rainforest riparian habitat will not be impacted by mining operations as it is located in the creek catchment to the east of the project site, upstream of infrastructure that occurs in the same catchment.

Few aquatic fauna species were recorded at the time of the survey. No species of conservation significance were recorded.

Given the measures in place to protect surface waters in the Mt Porter project area, it is likely that impacts on aquatic flora and fauna will be minimal and relatively confined to the diversion of the pit gully and east gully which are potential habitats for water-loving plants amphibians and macro-invertebrates.

EPA: Indicate the extent, diversity and conservation status of existing riparian flora beside ephemeral creeks in East Gully and Pit Gully.

There is no riparian zone in the Pit Gully however, a riparian zone was identified in the East Gully, labelled as the Riparian Swampy Meadow in Appendix 7 of the PER. This riparian zone was also described in Appendix 7 of the PER.

With the the exception of the remnant rainforest, other riparian zones present within the lease (including the Swampy Meadow in the East Gully) are relatively consistent, and only show major differences in species abundance rather than type of species. Tall grasses covered the Swampy Meadow with trees and shrubs being very widely scattered. The dominant grass was *Scleria sphacelata* that covered the majority of the meadow. Other grasses such as *Sorghum plumosum* and *Themeda triandra* were under 10% of the total vegetation composition. *Melaleuca* sp and a few *Pandanus spirilis* were the only two tree species present in the meadow. *Passiflora foetida* intertwined between the tall grasses and trees.

The vegetation survey at Mt Porter did not identify any plant species of conservation significance. All plants and associated vegetation communities are common in the region and all species identified in the Swampy Meadow of East Gully were also present in other land units.

4.6 FAUNA AND HABITATS

NLC echoes the proponent's concern that continued mining in this area will ultimately result in cumulative destruction of such habitats (Short-eyed Rock Wallaby) and loss of this animal to the locale. The proponent if truly concerned, should commit to minimising habitat destruction and to developing or protecting alternative suitable habitats within their lease.

Section 7.8.2.3 of the PER states "Short-eared Rock Wallaby (*Petrogale brachyotis*) were observed. On a national scale, *P. brachyotis* is not considered to be of conservation significance. However, *P. brachyotis* is of some concern as its distribution appears to be

contracting northward. Numerous rocky ridges in the local area and also granite hills on the southern extent of the Mineral Lease are likely to act as refuge areas for Rock Wallabies in the area."

The open pit and waste landform are located on the flank of Mt Porter. The rocky ridges and granite hills referred to in the PER will not be disturbed by the project. Deep burial of rubbish in the waste landform will provide no additional attraction for dingoes to the area.

DEH comment it would be appropriate to conduct wet season bird surveys pre and post mining.

Arafura feels that adequate fauna surveying has been conducted and no additional surveys will be undertaken.

DEH The monitoring program (Gouldian Finch) should include all listed species that are known to or may potentially occur in the area.

The proponent does not feel that this is a feasible request given the following considerations:

- The project has a short duration which makes it difficult to establish a monitoring program for 87 identified species and additional species that may occur in the area.
- The project area does not contain the range of habitat to support all species listed as potentially occurring.
- Although disturbances from mining will reduce localised fauna populations in the impacted parts of the Mt Porter project area, most species are common and widespread throughout their range and their status is unlikely to be affected. The short duration of the project is also likely to mean impacts on some species and areas is short term in nature.
- The fauna survey conducted by Low Ecological only identified two species classified as Near Threatened under the TPWC Act 2000. These were the Orange Horseshoe Bat and Arnhem Sheath-tailed Bat. The Partridge Pigeon was sited nearby and is considered Vulnerable under the EPBC Act.

Monitoring of species on site will involve staff awareness of species of concern (through the induction program) that if sighted will need to be reported to the relevant person on site. This will be detailed in the EMP as part of the MMP.

DPIFM: What mining activities will be undertaken at night and will an assessment be completed on the impact of these activities on significant species that are active at this time?

Mining activities to be undertaken at night include loading and placement of waste and ore on the waste landform and ROM respectively. Other support mining activities such as blasting, haulage of ore to the Union Reef mill and drilling are proposed to occur on a day shift only basis. Transport activities will thus not affect nocturnal species. Impact assessment made in the PER considered impacts assuming mining activities would occur on a 24 hour basis.

DPIFM comment that a more thorough Gouldian finch and partridge pigeon survey may be required to ensure these conservation significant species and their habitat is not detrimentally impacted upon. Will an impact assessment be carried out on possible Partridge Pigeon impacts? Feeding and roosting habitats and drinking habitats (as they require water every day and walk up to 2 km to reach water resources).

Appendix 5 Section 8.1 indicates that it is likely the spring located in Pit Gully will cease flowing once the pit is excavated. What is the importance of this spring to conservation significant fauna in the dry season? Have fauna surveys targeted this water source in the driest months of the year?

A site specific survey for the Gouldian Finch has already been undertaken in the Mt Porter project area as well as the nearby Frances Creek project area. No Gouldian Finches were observed during these targeted surveys despite the presence of several other finch species and lengthy bird searches. Due to the short duration of the project, the value of additional monitoring for this species is questionable.

It is not anticipated that the Partridge Pigeon will be adversely impacted by the Mt Porter Gold Project. The decline of Partridge Pigeon has been mainly attributed to the inter-related changes in grass composition and fire regimes. Its preferred habitat is Open Woodlands of the *Low Undulating Hills* land unit which comprises an extensive area of habitat for which only a localised area is being disturbed (See Figure 4).

Furthermore, although the spring in Pit Gully is anticipated to cease flowing once the pit is excavated, other water sources exist in the area. To the east and south of the proposed operations respectively are Rainforest Gully and Pandanus Gully which both contain small spring fed pools which persist into the dry season. Both of these pools are more probable sources of water for fauna including the Partridge Pigeon (should it occur in the area) as the Pandanus Gully is located in the preferred habitat of Open Woodlands of the *Low Undulating Hills* land unit and the Rainforest Gully is only a short distance from this land unit.

DPIFM: Pandanus Waterhole is mentioned in Appendix 3, but little mention is made of it throughout the main document. Is it a significant permanent water source for conservation significant fauna and what are the potential impacts of mining activities on this body of water?

Pandanus waterhole was not mentioned in Appendix 3 (Waste Characterisation Report), however, it was mentioned in the Flora and Fauna Report (Appendix 7). In this report, Pandanus waterhole referred to the creekline 100 meters south of trap site 3, in Pandanus Gully. The waterhole did not contain any species of conservation significance. Furthermore, the Pandanus gully is given adequate detail in the report given that it is located in a separate catchment from the main mining activities and will not be disturbed by infrastructure.

The EPA comment that the PER is unclear as to whether pipelines will be buried or whether livestock/wildlife impacts such as exclusion of animals from water sources and migration routes, will be mitigated by other means. Clarification should be presented.

Pipelines will generally not be buried, however pipelines will be buried where they cross access tracks or haul roads. Airlift measurement made at the one bore indicated flow rates that can be accommodated in pipelines that will not exceed 110 millimetre diameter. It is not

anticipated that any pipelines on site would exceed this size. Pipes of this size are not anticipated to cause impacts on fauna, particularly as they are likely to be in place for less than 12 months.

EPA: As per commitment 9.6.2g, management measures to minimise harm to fauna by road operations, should be included in the draft Fauna Management Plan (App.10.5 and Exec.Sum.s7.6).

Comment noted. Measures to minimise harm to fauna by road operations will be included as part of the final Environmental Management Plan to be submitted with the MMP.

DPIFM: Figure 5. The main access track goes through two riparian swampy meadows. Has this access track already been constructed and if not can these wetter areas be avoided to minimise impact on wetland fauna that inhabit them.

As shown in PER Figures 5 and 8, the access track from the Frances Creek Road to the site already exists. The waste landform will partially cover swampy meadow in East Gully, shown in Figure 5. No realignment of the access track through this location is proposed.

Realignment of the access track past heritage site MP49 is proposed. This site is to the west of the second swampy meadow shown in Figure 5. The exact route of the realignment has not yet been identified, however the route will also examine the possibility of avoiding swampy meadow at this location (**Commitment S20**).

DEH requested a map be provided showing the land units and the project infrastructure and indicate where the potential habitat may be for listed species. If for example a species has a particular microhabitat preference, it needs to be clear whether that habitat will be impacted by mining activity. Please tie table 16 in with this comment and add a column to the table that lists potential species impacted for each land unit.

Table 3 provides a list of land units and corresponding vegetation and fauna that will potentially be impacted by operations. Figure 4 shows these land units with the proposed infrastructure layout. Cross-referencing with Table 3 provides adequate information of vegetation and fauna impacted from land clearing.

Table 3: Areas of Disturbance

Infrastructure	Area (hectares)	Affected Land Units	Dominant Vegetation	Fauna Species Sited in Land Unit
Open Pit	3.98	70% Low Hills	*Eucalyptus tectifica, E. dichromophloia, E. tinitinans, Brachychiton megaphyllus, Themeda triandra, Sorghum plumosum, Glycine* sp. and *Ludwigia* sp.	Cane toad, Western Brown Snake, Spiny-tailed Gecko, Bynoe's Gecko, Burton's snake-lizard, Short-beaked Echidna, Fawn Anetechinus, Red-cheeked Dunnart, Northern Brown Bandicoot, Sugar Glyder, Northern Mastiff-bat, Common Sheathtail bat, Western Chestnut mouse, pale field rat and horse.
		30% Ridge Crests	*Eucalyptus tintinans, Corymbia Dichromophloia, Erythrophleum chlorostachys, Grevillea decurrens, Gardenia megasperma, Petalostigma quadriloculare, Acacia aulacocarpa, Tephrosia polyzyga. Eriachne sp., Panicum sp., Cymbopogon bombycinus, Themeda triandra, Scleria sphacelata, Eulalia, mackinlayi, Sorghum plumosum, and Chrysopogon fallax.*	Cane toad, Gilbert's Waterdragon, Earless Dragon, King Brown Snake, Bynoe's Gecko, Two-spined Rainbow Skink, Robust Ctenotus, Ridge-Tailed Monitor, Short-beaked Echidna, Northern Brown Bandicoot, Short-eared Rock Wallaby, Northern Mastiff-bat, Goulds Wattled Bat, Common Bentwing Bat, Beccari's Mastiff-bat, *Mormopterus loriae, Myotus macropus , Nyctophilus sp., Nyctophilus walkeri, Pipistrellus adamsi,* Orange Horseshoe Bat, Little Broadnosed Bat, Common Sheathtail Bat, *Saccolaimus flaviventris, Taphozous kapalgensis*, Western Chestnut Mouse, Pale Field Rat, Dingo.
Waste rock stockpile	11.82	90% Low Hills	*Eucalyptus tectifica, E. dichromophloia, E. tinitinans, Brachychiton megaphyllus, Themeda triandra, Sorghum plumosum, Glycine* sp. and *Ludwigia* sp	See above
		10% Swampy Meadow	*Scleria sphacelata, Melaleuca sp, Pandanus spirilis.*	Robust Ctenotus, Ridge-Tailed Monitor, Western Chestnut Mouse, Pale Field Rat.
ROM pad	2.36	100% Low Undulating Plains	*Eucalyptus tectifica, E. tintinans, Corymbia dichromophloia, C. latifolia, Sorghum plumosum, Themeda australis/triandra*	Gilbert's Waterdragon.
Offices, workshop and stores	5.78	100% Low Undulating Plains	*Eucalyptus tectifica, E. tintinans, Corymbia dichromophloia, C. latifolia, Sorghum plumosum, Themeda australis/triandra*	See above
Total	**23.94**			