Development of Industrial Land on the Burrup Peninsula for Future Gas Development

Woodside Energy Ltd

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 1228
September 2006

Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
17 February	**Level of Assessment set (following any appeals upheld)**	
18 April	**Proponent Document Released for Public Comment**	**8 weeks**
16 May	**Public Comment Period Closed**	**4 weeks**
24 August	**Final Proponent response to the issues raised**	**12 weeks**
4 September	**EPA report to the Minister for the Environment**	**2 weeks**

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Summary and recommendations

This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for the Environment on the proposal by Woodside Energy Ltd to develop Industrial Land on the Burrup Peninsula.

Section 44 of the *Environmental Protection Act 1986* (EP Act) requires the EPA to report to the Minister for the Environment on the outcome of its assessment of a proposal. The report must set out:

- the key environmental factors identified in the course of the assessment; and
- the EPA's recommendations as to whether or not the proposal may be implemented, and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may include in the report any other advice and recommendations as it sees fit.

The EPA is also required to have regard for the principles set out in section 4A of the *Environmental Protection Act 1986.*

Key environmental factors and principles

The EPA decided that the following key environmental factors relevant to the proposal required detailed evaluation in the report:

(a) Vegetation;

(b) Fauna; and

(c) Indigenous Heritage.

There were a number of other factors which were relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

The following principles were considered by the EPA in relation to the proposal:

(a) the precautionary principle;

(b) principle of intergenerational equity; and

(c) the principle of the conservation of biological diversity and ecological integrity.

Conclusion

The EPA has considered the proposal by Woodside Energy Ltd to develop Industrial Land on the Burrup Peninsula for Future Gas Development.

The EPA undertook this assessment with regard to the management framework established for the Burrup Peninsula. In practical terms, preservation and promotion of cultural heritage values and the natural environmental values can be readily achieved in the proposed conservation area on the Burrup Peninsula. The EPA's objective is to ensure that conservation objectives are met in the context of the wider

Burrup Peninsula and environmental impacts caused by the proposal are minimised and managed as far as is reasonably practicable. The EPA considers that the disturbance footprint has been selected and optimised to avoid the most environmentally sensitive sections of Site A and impacts have been minimised to the extent practicable.

The EPA notes that the proposal would result in the permanent loss of native vegetation, fauna habitat and some indigenous heritage sites. However, having particular regard to the management framework for the Burrup Peninsula, it is the EPA's opinion that it is unlikely that the EPA's objectives would be compromised provided there is satisfactory implementation by the proponent of their commitments and the recommended conditions set out in Appendix 4 and summarised in Section 4.

Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposal being assessed is for the Development of Industrial Land on the Burrup Peninsula;
2. That the Minister considers the report on the key environmental factors and principles as set out in Section 3;
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarised in Section 4; and
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Conditions

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Woodside Energy Ltd to develop Industrial Land on the Burrup Peninsula is approved for implementation. These conditions are presented in Appendix 4.

Contents

1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment on the key environmental factors and principles for the proposal by Woodside Energy Ltd to develop Industrial Land (designated Industrial Lease Area A) on the Burrup Peninsula for Future Gas Development.

Woodside Energy Ltd has also proposed the Pluto Liquefied Natural Gas (LNG) Development for the north-west of Western Australia. The terrestrial components of the Pluto LNG project are proposed to be located on industrial land near to the existing Woodside Joint Venture operations on the Burrup Peninsula (Figure 1).

As part of the Pluto development, LNG and condensate storage tanks are required and the construction of these tanks represents a critical time path for Woodside. As such, Woodside are seeking a separate approval for the Development of Industrial Land in order to allow limited site preparation activities to occur ahead of approvals for the overall Pluto LNG Development. The location is shown as Site A in Figure 1.

The Level of Assessment (LOA) for the Development of Industrial Land on the Burrup Peninsula was set at Public Environmental Review (PER) with a four-week public review period. Appeals were received on the LOA and these were dismissed by the Minister for the Environment on 17 February 2006.

This proposal is also being assessed by the federal Department of Environment and Heritage under the *Environmental Protection and Biodiversity Conservation Act 1999.*

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses the key environmental factors and principles for the proposal. The Conditions and Commitments to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 presents the EPA's conclusions and Section 6, the EPA's Recommendations.

Appendix 5 contains a summary of submissions and the proponent's response to submissions and is included as a matter of information only and does not form part of the EPA's report and recommendations. Issues arising from this process, and which have been taken into account by the EPA, appear in the report itself.

2. The proposal

This proposal is for the Development of Industrial Land on the Burrup Peninsula. The proposed site is designated Industrial Lease Area A (Site A). Approval would allow Woodside Energy Ltd to undertake limited site preparation activities for the future installation of infrastructure, such as LNG and condensate storage tanks, which would be needed should the proposed Pluto LNG Development be allowed to proceed. Consideration of the current proposal does not imply any particular outcome for the assessment of the Pluto LNG Development.

Figure 1: Outline of the proposed disturbance footprint on Site A.

The Pluto LNG Development is still under separate assessment and the EPA is yet to report on it. The proposed site preparation activities at Site A include:

- pegging and fencing;
- construction of an access road;
- vegetation clearing;
- cut-and-fill activities;
- drilling and blasting;
- stockpiling;
- crushing; and
- construction of site drainage.

Site A is located on the west coast of the Burrup and is 61 hectares in size. The proposed site preparation activities would disturb 25 to 30% of the site. Woodside has chosen the northern end of Site A for the disturbance footprint in order to avoid significant vegetation and cultural heritage sites to the south.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 3 of the PER (Woodside, 2006).

Table 1: Summary of key proposal characteristics

Element	Description
Access road:	Construction of an unsealed road along northern boundary of Site A.
Clearing of native vegetation:	up to 20 hectares.
Cut-and-fill activities:	up to 1 million cubic metres.
Stockpiling (temporary):	up to 1 million cubic metres.
Crushing and screening:	mobile plant.

Since release of the PER, the indicative plant layout has also been revised several times to further minimise the impacts. These include:

- a change to avoid an indigenous stone quarry site in the north–west corner of the original footprint; and
- a change to avoid rocky hills with numerous petroglyphs in the south-east corner of the original footprint.

The potential impacts of the proposal initially predicted by the proponent in the PER document (Woodside, 2006) and their proposed management are summarised in Table 6.1 of the proponent's document.

2.1 Management Framework for the Burrup Peninsula

The Burrup and Maitland Industrial Estates Agreement (BIMIEA), between the Western Australian Government and the Traditional Custodians, was settled in 2003.

The BIMIEA sought to balance large-scale industrial development with conservation and is designed to deliver long-term economic and social benefits to the local indigenous community. The agreement allocates 62% of the Burrup Peninsula for conservation and recreation.

As part of the broader BIMIEA, a Management Agreement was negotiated between the State Government, the Approved Body Corporate (Indigenous party), and the Executive Director of the Department of Environment and Conservation (DEC) for the non-industrial lands of the Burrup Peninsula. This agreement allows for joint management by the Traditional Custodians and the DEC, of the non-industrial lands and also requires a Management Plan.

The Draft Management Plan for the proposed Burrup Peninsula Conservation Reserve was recently released for public comment (DEC, 2006). The comment period closes on 11 September 2006. The draft plan advocates a balance between the protection of the internationally important heritage values of the Burrup Peninsula and the economic and social benefits the Burrup industries bring to the people of Western Australia.

Objectives of the draft plan include the preservation and promotion of the cultural heritage values of the land and the natural environmental values of the land, (including indigenous flora and fauna).

It is with regard to the above management framework that the EPA undertook this assessment. In practical terms, preservation and promotion of cultural heritage values and the natural environmental values can be readily achieved in the proposed conservation area on the Burrup Peninsula. The EPA's objective is to ensure that conservation objectives are met in the context of the wider Burrup Peninsula and environmental impacts caused by the proposal are minimised and managed as far as is reasonably practicable.

It should also be noted that it is only those environmental impacts resulting from site preparation activities that are being considered. Any additional impacts from infrastructure and services to be constructed on Site A in the future will be assessed separately as part of the overall Pluto LNG Development.

3. Key environmental factors and principles

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

The identification process for the key factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors are relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

It is the EPA's opinion that the following key environmental factors for the proposal require detailed evaluation in this report:

(a) Vegetation;

(b) Fauna; and

(c) Indigenous Heritage.

The above key factors were identified from the EPA's consideration and review of all environmental factors generated from the PER document and the submissions received, in conjunction with the proposal characteristics.

Details on the key environmental factors and their assessment are contained in Sections 3.1 - 3.3. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

The following principles were considered by the EPA in relation to the proposal:

(a) the precautionary principle;

(b) the principle of intergenerational equity; and

(c) the principle of the conservation of biological diversity and ecological integrity.

3.1 Vegetation

Description

Industrial lease Site A is located on the west coast of the Burrup Peninsula and is 61 hectares in size and the proposed site preparation activities would disturb approximately 25 to 30% of the site. The proponent has chosen the northern end of Site A for the disturbance footprint in order to avoid vegetation and indigenous heritage sites concentrated in the south.

The site preparation activities would result in the loss of 15 to 20 hectares of native vegetation. Thirty-three vegetation associations were identified on Site A, of which fourteen occur within the disturbance area. A number of vegetation associations considered to be of high conservation value occur within the proposed disturbance area.

Submissions

Submitters noted that the Burrup contains many unique vegetation association and some suggested the impacts were unacceptable. The DEC noted that impacts needed to be minimised as far as practicable.

Assessment

The EPA's environmental objective for this factor is to ensure that impacts on the abundance, species diversity, geographic distribution and productivity of vegetation

communities are avoided as far as practicable, and the unavoidable impacts are minimised.

The EPA notes that the northern part of Site A has been chosen for the disturbance footprint which avoids significant vegetation and flora species on the south of the site.

The percentage loss of vegetation associations of conservation significance is shown in Table 2.

Table 2: Vegetation Associations of conservation significance on Site A.

Vegetation Association (Trudgeon 2002)	Area to be cleared (ha) on Site A	% removal from Site A	% removal from the Burrup
AcTe	0.12	12.2	4
BaTcTe	0.19	48.7	10.6
CwTe	0.51	16.4	3.7
DsTsTe	0.0033	6.6	0.3
GpImTe	0	0	0
IcImTe	0.039	97.5	19.5
SgTeTa	0.15	100	7.1
Sv	0	0	0
TeAb	0.33	10.5	10.5
TeCa	4.1	66.5	11.4
TeRm	0	0	0
TsAcTe	0	0	0

The EPA notes that the loss of 19.5% of IcImTe is of concern but notes that it is present elsewhere and accepts that the environmental objectives for the proposed Burrup Peninsula Conservation Reserve cannot realistically be fully achieved where industry is located within the designated Burrup Industrial Estate.

The EPA is satisfied that the disturbance footprint has been selected and optimised to avoid the most environmentally sensitive areas, particularly given the indigenous heritage values on Site A.

The EPA notes that the proponent has committed to preparing a Vegetation and Flora Management Plan (VFMP) and that the proponent has also proposed conservation zones to protect the areas of Site A not required for the proposal. The EPA considers these measures are adequate to minimise the avoidable impacts on vegetation.

Summary

Having particular regard to the:

(a) management framework for the Burrup Peninsula;

(b) Vegetation and Flora Management Plan; and

(c) proposed conservation zones,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor.

3.2 Fauna

Description

The site preparation activities would result in the destruction of fauna habitat and have the potential to impact on short range endemic species. Survey work undertaken for the PER found specimens of a snail (camaenid genus *Rhagada*), which did not appear to belong to a *Rhagada* species currently recorded.

Submissions

Some submitters thought the clearing and loss of fauna habitat was unacceptable. The DEC noted that the distribution and conservation status of the *Rhagada* snail species needed to be resolved.

Assessment

The EPA's environmental objective for this factor is to ensure that impacts on the abundance, species diversity and geographic distribution of the native fauna is avoided as far as is practicable and the unavoidable impacts are minimised.

In May 2006, the proponent undertook additional survey work, which found more specimens of the snail species, both on Site A and on other areas of the Burrup Peninsula. Genetic analysis found that although there are some genetic differences, specimens from Site A and elsewhere belong to the same species (*Rhagada* sp"12") and as such, the conservation status is unlikely to be affected by this proposal.

The proponent has committed to preparing a Fauna Management Plan (FMP) and the EPA considers this would be adequate to minimise the unavoidable impact on fauna.

Summary

Having particular regard to the:

(a) management framework for the Burrup Peninsula; and

(b) Fauna Management Plan,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor.

3.3 Indigenous Heritage

Description

124 heritage sites were located during the ethnographic and archaeological heritage surveys over Site A. These heritage sites reflect how Indigenous people utilised the landscape at Site A and are comprised of artefact scatters, isolated stone pit features and/or rocky outcrops with isolated (single) or multiple (up to 1000) petroglyphs. The majority of these sites are tightly clustered on the eastern and south-western margins of Site A and are associated with rocky hills, valleys and watercourses. The disturbance footprint proposed in the PER contains 43 heritage sites.

The impact on heritage sites has been the subject of extensive consultation with Traditional Custodians, anthropologists and archaeologists.

During the archaeological heritage survey of Site A, 1240 rock art panels were identified of which it is estimated that around 38 (approximately 3%) lie within the disturbance footprint. All or most of the rock art panels within the disturbance footprint are proposed to be retrieved and relocated.

Submissions
The majority of submitters were concerned about the loss of rock art and thought that the industrial development on the Burrup was unacceptable.

Assessment
The EPA's environmental objective for this factor is to ensure that conservation objectives are met in the context of the wider Burrup Peninsula and impacts of the proposal on heritage sites are avoided wherever practicable and unavoidable impacts are managed appropriately in consultation with the Traditional Custodians.

The EPA notes that the proponent has undertaken extensive consultation with the Traditional Custodians and has configured the proposal based on input from these consultations. The EPA notes the Department of Indigenous Affairs advice that the proponent's identification of impacts, risks, mitigation and control measures was appropriate.

Following publication of the PER, the proponent has revised the disturbance footprint to avoid the rocky hills on the south-east corner of the original footprint and a "stone tool quarry" site near Holden Point. There are now 35 heritage sites located within the revised disturbance footprint.

The EPA recognises that the significance of heritage sites varies and accepts that the disturbance footprint has been selected and refined to minimise the loss of the most significant sites. In particular, the EPA notes that approximately 90% of the rock art contained within Site A falls outside the revised disturbance footprint.

Where heritage material cannot be avoided, the EPA supports the salvage, relocation and interpretation of heritage material that is displaced by industry, consistent with the requirements of the *Aboriginal Heritage Act 1972*. In particular, the EPA notes the plans for a visitor and interpretation centre in the Draft Management Plan for the Proposed Burrup Peninsula Conservation Reserve (DEC, 2006). Where material cannot be conserved in context on-site, the visitor centre would be a far more appropriate reservoir for heritage material than the basic storage that has occurred with displaced material on the Burrup in the past.

The EPA notes the proponents obligations under the *Aboriginal Heritage Act 1972* and understands that the proponent has submitted Section 18 applications to allow them to disturb sites and salvage artefacts from within the proposed disturbance area.

The proponent has also committed to preparing a Cultural Heritage Management Plan (CHMP). The EPA notes the importance of liaison with the Traditional Custodians, and has recommended that a CHMP be required by the environmental conditions.

The EPA notes that approximately 90% of the rock art contained within Site A has been avoided and considers the requirement for a CHMP is adequate to ensure that the unavoidable impacts on heritage are managed appropriately.

Summary
Having particular regard to the:

(a) management framework for the Burrup Peninsula;

(b) recommended condition for a Cultural Heritage Management Plan; and

(c) provisions of Section 18 of the *Aboriginal Heritage Act 1972*,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor.

3.4 Environmental principles

In preparing this report and recommendations, the EPA has had regard for the object and principles contained in s4A of the *Environmental Protection Act (1986).* Appendix 3 contains a summary of the EPA's consideration of the principles.

4. Conditions and Commitments

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal and, following discussion with the proponent, the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are written in a form which makes them readily enforceable, but they do provide a clear statement of the action to be taken as part of the proponent's responsibility for, and commitment to, continuous improvement in environmental performance.

4.1 Recommended conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Woodside Energy Ltd to develop Industrial Land on the Burrup Peninsula, is approved for implementation.

For this proposal, the environmental impact (loss) is managed firstly by avoiding the most environmentally sensitive areas. The disturbance footprint has now been defined and the primary way to prevent further impact is to ensure that site preparation is restricted to the proposed disturbance area. As such, the disturbance footprint is accurately described in Schedule 1 of the recommended conditions.

The proponent has made commitments to prepare and implement various management plans and is currently developing these in consultation with relevant agencies. The majority of these plans do not require auditing by the DEC and as such, only the standard environmental conditions and a requirement for a Cultural Heritage Management Plan are recommended.

It should be noted that other regulatory mechanisms relevant to the proposal are:

- *Aboriginal Heritage Act 1972* – A Section 18 approval would be required to disturb heritage sites; and
- *Environmental Protection Act 1986* – a Part V Licence would be required for the crushing and screening operations.

5. Conclusions

The EPA has considered the proposal by Woodside Energy Ltd to develop Industrial Land on the Burrup Peninsula for Future Gas Development.

The EPA undertook this assessment with regard to the management framework established for the Burrup Peninsula. In practical terms, preservation and promotion of cultural heritage values and the natural environmental values can be readily achieved in the proposed conservation area on the Burrup Peninsula. The EPA's objective is to ensure that conservation objectives are met in the context of the wider Burrup Peninsula and environmental impacts caused by the proposal are minimised and managed as far as is reasonably practicable. The EPA considers that the disturbance footprint has been selected and optimised to avoid the most environmentally sensitive sections of Site A and impacts have been minimised to the extent practicable.

The EPA notes that the proposal would result in the permanent loss of native vegetation, fauna habitat and some indigenous heritage sites. However, having particular regard to the management framework for the Burrup Peninsula, it is the EPA's opinion that it is unlikely that the EPA's objectives would be compromised provided there is satisfactory implementation by the proponent of their commitments and the recommended conditions set out in Appendix 4 and summarised in Section 4.

6. Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposal being assessed is for the Development of Industrial Land on the Burrup Peninsula;
2. That the Minister considers the report on the key environmental factors and principles as set out in Section 3;
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarised in Section 4; and
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Appendix 1

List of submitters

Organisations:

Department of Conservation and Land Management
Shire of Roebourne
Centre for Research on the Origins of Art and Religion
Dortch and Cuthbert Heritage Research
International Federation of Rock Art Organisations
Pilbara Protection Committee
Snakewood films

Individuals:

G Andrews
M Dyson
F Morris
M Owen
I Pagram
M Rowland
P Sims
D Varney
D Vaughan
R Ward
J Wilson

Appendix 2

References

DEC (2006) *Proposed Burrup Peninsula Conservation Reserve - Draft Management Plan 2006-2016*, Department of Environment and Conservation, Government of Western Australia, July 2006.

Woodside (2006) *Pluto LNG Development – Development of Industrial Land on the Burrup Peninsula for Future Gas Development*. Woodside Energy Ltd, April 2006.

Appendix 3

Summary of identification of key environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
BIOPHYSICAL			
Vegetation	The proposal would result in the clearing of 15 to 20 hectares of native vegetation.	**Government agencies:** The DEC requested additional information on the proportion of vegetation communities that fell within the disturbance footprint, and the location of priority and poorly known species. The DEC advised that the studies indicate that there is unlikely to be any 'unacceptable' impacts on regional biodiversity. The DEC also recognised that the environmental objectives for the proposed Burrup Peninsula Conservation Reserve were not achievable within the designated Industrial Areas. The Shire of Roebourne recommended that the clearing be offset using on-site and off-site revegetation, weed control and fencing. **Public:** A submitter suggested the Trudgeon report on flora commissioned by the State Government in 2003 should be referred to. A submitter was concerned about the loss of vegetation associations of high conservation significance.	**Considered to be a relevant environmental factor.**
Fauna	The proposal would result in loss of habitat and has the potential to impact on short range endemics.	**Government agencies:** The DEC noted that further short range endemic surveys should be undertaken, and the distribution and conservation status of the snail species should be resolved prior to ground disturbing activities. **Public:** Submitters were concerned about the loss of fauna habitat and the endemic snail species.	**Considered to be a relevant environmental factor.**
POLLUTION			
Air Emissions	Although this proposal does not generate significant air emissions, the Pluto LNG development would emit various air pollutants.	**Government agencies:** No comments received. **Public:** Submitters were concerned that acidic air emissions from the Pluto LNG	This matter relates to the Pluto LNG proposal and is not being considered in this assessment. **Factor does not require further**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		could cause rock art to deteriorate and may also impact on coral and other sensitive receptors.	**EPA evaluation, it will be looked at as part of the proposed Pluto LNG Development.**
Groundwater Quality	Although this proposal does not pose a threat to groundwater, the Pluto LNG development would use materials that have the potential to pollute groundwater.	**Government agencies:** No comments received. **Public:** A submitter was concerned that the Pluto LNG proposal could result in impacts on groundwater which would destroy subterranean fauna.	This matter relates to the Pluto LNG proposal and is not being considered in this assessment. **Factor does not require further EPA evaluation, it will be looked at as part of the proposed Pluto LNG Development.**
SOCIAL SURROUNDINGS			
Indigenous Heritage	The proposal would necessitate the disturbance of Indigenous Heritage sites within the disturbance footprint. The Burrup Peninsula is internationally recognised for its array of ancient rock art (petroglyphs).	**Government agencies:** The Department of Indigenous Affairs advised that the proponent's identification of impacts, risks, mitigation and control measures was appropriate. **Public:** Many submitters were of the view that further industrial development on the Burrup was unacceptable due to the impact on the rock art. There were also concerns that the National/World Heritage listing process should be completed.	**Considered to be a relevant environmental factor.**
Industrial Risk	Although this proposal does not generate risk, the Pluto LNG Development would.	**Government Agencies:** No comments received. **Public:** A submitter was concerned that the LNG inventory could explode with catastrophic consequences for the region.	The EPA does not assess industrial risk. This matter also relates to the Pluto LNG proposal and is not being considered in this assessment. **Factor does not require further EPA evaluation, however, information on risk would be included as part of the proposed Pluto LNG Development documentation.**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
Other	This proposal is part of the Pluto LNG proposal which is being assessed separately resulting in a staged assessment	**Government Agencies:** The DEC noted that the staged assessment approach caused difficulties in providing comprehensive advice/comment on the environmental impacts. **Public:** Submitters were concerned that the full Pluto LNG Development should be assessed as a whole.	The EPA recognises that this staged assessment approach has resulted in agencies and submitters experiencing some difficulties in providing comprehensive advice/comment, but notes that further opportunity for comment will be afforded during the public review period for the Pluto LNG Development.

PRINCIPLES		
Principle	**Relevant Yes/No**	**If yes, Consideration**
1. The precautionary principle *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.* *In application of this precautionary principle, decisions should be guided by –* *(a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* *(b) an assessment of the risk-weighted consequences of various options.*		
	Yes	Management measures need to be in place to ensure any unexpected heritage material that is uncovered during ground disturbing activities is dealt with appropriately.
2. The principle of intergenerational equity *The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.*		
	Yes	Proposal has the potential to impact on future generations access to all the indigenous heritage and flora on the Burrup, however this is balanced by 62% of the Burrup being allocated for conservation and recreation. Heritage material to be disturbed would be catalogued and salvaged for future study. The appropriate development of tourism should enable greater numbers of people to experience the rock art and flora in a controlled manner which prevent destruction. Indigenous Heritage is a relevant environmental factor discussed in this report.

3. The principle of the conservation of biological diversity and ecological integrity *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*		
	Yes	Proposal has the potential to impact the biological diversity of flora and fauna on the Burrup, however this is balanced by 62% of the Burrup Peninsula being allocated for conservation and recreation. Vegetation and Fauna are relevant environmental factors discussed in this report.
4. Principles relating to improved valuation, pricing and incentive mechanisms *(1) Environmental factors should be included in the valuation of assets and services.* *(2) The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.* *(3) The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.* *(4) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximize benefits and/or minimize costs to develop their own solution and responses to environmental problems.*		
	No	
5. The principle of waste minimisation *All reasonable and practicable measures should be taken to minimize the generation of waste and its discharge into the environment.*		
	No	

Appendix 4

Recommended Environmental Conditions

Statement No.

RECOMMENDED ENVIRONMENTAL CONDITIONS

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF THE ENVIRONMENTAL PROTECTION ACT 1986)

DEVELOPMENT OF INDUSTRIAL LAND FOR FUTURE GAS DEVELOPMENT, BURRUP PENINSULA
SHIRE OF ROEBOURNE

Proposal: This proposal is for the development of industrial land on the Burrup Peninsula. The site is designated as industrial lease Area A. The proponent may undertake limited site preparation activities for the future installation of infrastructure such as liquefied natural gas and condensate storage tanks, as documented in schedule 1 of this statement.

Proponent: Woodside Energy Ltd

Proponent Address: GPO Box D188, PERTH WA 6840

Assessment Number: 1608

Report of the Environmental Protection Authority: Bulletin 1228

The proposal referred to in the above report of the Environmental Protection Authority may be implemented. The implementation of that proposal is subject to the following conditions and procedures:

1 Proposal Description

1-1 The proponent shall implement the proposal as documented and described in schedule 1 of this statement subject to the conditions and procedures of this statement.

2 Proponent Nomination and Contact Details

2-1 The proponent for the time being nominated by the Minister for the Environment under section 38(6) or (7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal until such time as the Minister for the Environment has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person as the proponent for the proposal.

Published on

2-2 If the proponent wishes to relinquish the nomination, the proponent shall apply for the transfer of proponent under section 38(6a) and provide the name and address of the person who will assume responsibility for the proposal, together with a letter from that person which states that the proposal will be carried out in accordance with the conditions and procedures of this statement, and documentation on the capability of that person to implement the proposal and fulfil the conditions and procedures.

2-3 The nominated proponent shall notify the Department of Environment and Conservation of any change of the name and address of the proponent within 30 days of such change.

3 Time Limit of Approval to Commence

3-1 The proponent shall provide evidence to the Department of Environment and Conservation that the proposal has been substantially commenced within five years from the date of this statement or the approval granted in this statement shall lapse and be void.

3-2 The proponent shall make an application for any extension of approval for the substantial commencement of the proposal to the Minister for the Environment prior to five years from the date of this statement, which shall demonstrate that:

1. the environmental factors of the proposal reported in Bulletin 1228 have not changed significantly;
2. new, significant, environmental factors have not arisen; and
3. all relevant decision-making authorities and stakeholders have been consulted.

4 Compliance Reporting

4-1 The proponent shall submit compliance reports in accordance with an audit program developed in consultation with the Department of Environment and Conservation and with compliance monitoring guidelines, and shall:

1. describe, or update, the state of implementation of the proposal;
2. provide verifiable evidence of compliance with the conditions, procedures and commitments;
3. review the effectiveness of corrective and preventative actions contained in the environmental management plans and programs;
4. provide verifiable evidence of the fulfilment of requirements specified in the environmental management plans and programs;
5. identify all confirmed non-conformities and non-compliances and describe the related corrective and preventative actions taken; and
6. identify potential non-conformities and non-compliances and provide evidence of how these are being considered for corrective action.

5 Indigenous Heritage

5-1 Prior to ground disturbing activities, the proponent shall prepare in liaison with the Department of Indigenous Affairs and submit to the Department of Environment and Conservation, a Cultural Heritage Management Plan.

This plan shall address:

1. the inclusion of cultural heritage awareness training in the workforce induction;
2. the signposting and fencing of nearby heritage sites to prevent unauthorised access;
3. the monitoring of ground disturbing activities by an anthropologist/archaeologist and representatives of the Traditional Custodians; and

4. the retrieval and relocation of heritage material that lies within the disturbance footprint in consultation with the Traditional Custodians.

5-2 The proponent shall implement the Cultural Heritage Management Plan required by 5-1.

5-3 The proponent shall make the Cultural Heritage Management Plan required by 5-1 publicly available in a manner approved by the Department of Environment and Conservation.

Notes

1. Where a condition states "on advice of the Environmental Protection Authority", the Environmental Protection Authority will provide that advice to the Department of Environment and Conservation for the preparation of written notice to the proponent.

2. The Environmental Protection Authority may seek advice from other agencies or organisations, as required, in order to provide its advice to the Department of Environment and Conservation.

3. The Minister for the Environment will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environment and Conservation over the fulfilment of the requirements of the conditions.

4. The proponent is required to apply for a Works Approval and Licence for this project under the provisions of Part V of the *Environmental Protection Act 1986*.

Schedule 1

The Proposal (Assessment No. 1608)

This proposal is for the development of industrial land on the Burrup Peninsula. The site is designated Industrial Lease Area A. The proponent may undertake limited site preparation activities for the future installation of infrastructure such as liquefied natural gas and condensate storage tanks.

The site preparation activities include:

- pegging and fencing;
- construction of an access road;
- vegetation clearing;
- cut-and-fill activities;
- drilling and blasting;
- stockpiling;
- crushing; and
- construction of site drainage.

The main characteristics of the proposal are summarised in Table 1 below.

Table 1 - Key Proposal Characteristics

Element	Description
Access road:	Construction of unsealed road along northern boundary of the site.
Clearing of native vegetation:	up to 20 hectares.
Cut-and-fill activities:	up to 1 million cubic metres.
Stockpiling (temporary):	up to 1 million cubic metres.
Crushing and screening:	mobile plant.

Figure (attached)

Figure 1 - Site location and disturbance footprint, Burrup Peninsula

Figure 1: Site location and disturbance footprint, Burrup Peninsula

Site A. EPA Site Preparation Area. 230806

	Datum: GDA94		**Datum: GDA94 MGA50**	
Point	**Longitude**	**Latitude**	**Easting**	**Northing**
1	116°45'26.23"E	20°36'17.65"S	474709.1E	7721558.9N
2	116°45'26.14"E	20°36'17.83"S	474706.5E	7721553.5N
3	116°45'32.11"E	20°36'18.34"S	474879.5E	7721538.0N
4	116°45'32.14"E	20°36'18.54"S	474880.4E	7721532.0N
5	116°45'30.80"E	20°36'20.21"S	474841.6E	7721480.4N
6	116°45'30.73"E	20°36'20.02"S	474839.4E	7721486.3N
7	116°45'40.03"E	20°36'22.62"S	475108.7E	7721406.8N
8	116°45'53.83"E	20°36'29.71"S	475508.6E	7721189.5N
9	116°45'49.42"E	20°36'35.21"S	475381.2E	7721020.1N
10	116°45'48.16"E	20°36'36.15"S	475344.8E	7720991.2N
11	116°45'39.50"E	20°36'38.56"S	475094.1E	7720916.8N
12	116°45'32.49"E	20°36'34.86"S	474891.3E	7721030.4N

Appendix 5

Summary of Submissions and
Proponent's Response to Submissions

PLUTO LNG DEVELOPMENT
RESPONSE TO PUBLIC SUBMISSIONS – SITE A PREPARATION ACTIVITIES

Document Details			
Phase:	Select Phase		
WEL Document No:	XA6300RH0001	**Rev:**	0
DRIMS #:	2553057	**Total # of Pages:**	30

Approval			
Prepared By:	Soolim Carney	**Signed:**	**Date:** 24/8/06
Supervised By:	Steve Banks	**Signed:**	**Date:** 24.8.06
Approved By:	Steve Banks	**Signed:**	**Date:** 24.8.06
Custodian:	Soolim Carney	**Signed:**	**Date:** 24/8/06.

Concurrence (if applicable)			
Concurrence By:	Niegel Grazia (Corp. Affairs)	**Signed:** pp	**Date:** 24/08/06

Revision History				
Revision	**Description**	**Date**	**Prepared By**	**Approved By**
A	Issue to EPA for Review	21.06.06	SC	SB
B	Issue to EPA	21.08.06	SC	SB
0	Issue to EPA as FINAL	24.08.06	SC	SB

Release Statement (Check one box only)

- ☐ **Unclassified** (Shared without Restrictions)
- ☒ **Restricted** (Freely Shared within Woodside and Associated Companies)
- ☐ **Confidential** (Shared With Selected Personnel)
- ☐ **Most Confidential** (Strict Need-to-Know Basis)

Review Status (Check one box only)

- ☐ **Review Period 1 Year**
- ☐ **Review Period 3 Years**
- ☒ **Review Not Required**

Prepared (Check one box only)

- ☒ **By WEL**
- ☐ **For WEL Under** PO/Contract No:

Document Distribution			
Copy No.	**Name**	**Hard Copy**	**Electronic Copy**
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01	Steve Banks	☐	☒
02	Niegel Grazia	☐	☒
03	Soolim Carney	☐	☒
04	Hannah Fitzhardinge	☐	☒
05	Ben Garwood	☐	☒
06	Petrina Raitt	☐	☒
07	Peter Farrell	☐	☒
08	Harald Lyche	☐	☒

Revision History Details			
Rev:	A	**Description:**	Issued for EPA Review
Rev:	B	**Description:**	Issued to EPA
Rev:	0	**Description:**	Issue to EPA as FINAL

No.	Submission
1	Dortch and Cuthbert Heritage Research (Joe Dortch)
2	Gloria Andrews
3	Pilbara Protection Committee (J Renault)
4	Ray Ward
5	Snakewood Films (Frank Rijavec)
6	Centre for Research on the Origins of Art and Religion (James Harrod)
7	International Federation of Rock Art Organisations (Robert Bednarik)
8	Fiona Morris
9	Michael Rowland
10	Michael Dyson
11	Daniel Varney
12	Margaret Owen
13	Irene Pagram (Member Museums Australia)
14	John Wilson
15	Peter Sims
16	Dept. of Conservation and Land Management
17	EPA Service Unit
18	Shire of Roebourne
19	Dindy B Vaughan

Environmental Approvals Process

1.1 [The PER] does not discuss future or 'downstream' impacts on Aboriginal heritage or the environment.

1.2 Consideration of the impacts of site preparation should extend to the LNG plant emissions and potential for explosions that may affect a far wider area than the plant itself (Site A).

7.3 …it is necessary that, as part of this application, the EPA is given access to the full environmental impact information of the entire project: total emissions, total quantities of hazardous, flammable and explosive substances, and various other matters of this nature which the EPA requires to formulate an informed response.

8.7 EPA should be given access to the full environmental impact of the entire project.

16.1 The proponent should provide an overview of the additional project infrastructure required for the Pluto LNG Development within the PER, including pipelines, the LNG plant and marine loading facilities, and discuss the associated environmental impacts to Site A.

The scope of the current PER is limited to site preparation activities at Site A which are required for subsequent construction of LNG storage facilities at this site.

Construction and operation of the Pluto LNG Development as a whole is being assessed under the state *Environmental Protection Act 1986* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* via a separate environmental approval process. The Draft PER for the broader Pluto LNG Development proposal will be published in 2007 and further opportunity for comment will be afforded during the public review period.

1.4 Existence of a prepared site and the investment involved may count favorably for the proponent in environmental assessment of any future LNG plant.

8.6 Approval of this 'site preparation activities' application would inevitably open the way to a large LNG liquefying and processing plant. What is the point of 'site preparation' if there isn't going to be site construction? Woodside is in fact setting the stage for approval of the entire project.

11.2 Woodside shows that it considers the application to be a 'fait accompli' and could even be relying on a pre-judgment.

Site A, also known as Industrial Lease Area A, lies within the Burrup Industrial Estate which has been designated for industrial development. Five industrial areas, covering a total area of 1820 ha, have been identified by the state government for future industry use within the Burrup Industrial Estate with each area having defined development values and management objectives. As such, several petroleum and marine related industries are already located in the vicinity of Site A.

Construction and operation of the Pluto LNG Development as a whole is being assessed under the state *Environmental Protection Act 1986* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* via a separate environmental approval process. The Draft PER for the broader Pluto LNG Development proposal will be published in 2007 and further opportunity for comment will be afforded during the public review period.

Alternative Development Sites

3.1 To the south of Karratha there is an industrial estate, the Maitland, which would be a much better location for a new LNG plant as far as protection of the surrounding environment including rock art, flora and fauna is concerned. Woodside has considered Maitland but rejected it in favour of the Burrup for, basically, cost reasons.

4.1 New plants should be put on the Maitland Estate.

9.2 …the recently completed Draft Shire of Roebourne Coastal Management Strategy clearly outline[s] the requirements for development of strategic industry…Strategic Industrial Areas (SIA) have been defined and planned for, one of which is the Maitland estate adjacent to the Dampier Salt. Why has this site not been allocated if the development is to be established in the Karratha area?

As discussed in Chapter 3.3.1 of the PER, location of the Pluto LNG Development at the Maitland Estate with deepwater access via West Intercourse Island was considered during site selection studies.

While potentially suitable for other processing industries, the risks of development at Maitland Estate of any large-scale, export-oriented LNG development are immense. A 14 km cryogenic

(refrigerated) LNG export pipeline would be required - something not done before on this scale in the LNG industry. Close proximity of the LNG plant, storage and export facilities is critical for an LNG Development from both a technical feasibility and cost perspective.

No port facilities exist today at Maitland Estate and accessing deep water would require a 10 km causeway and bridge system over the ecologically-sensitive Maitland River delta and mangrove area, which would involve both construction challenges and potentially significant environmental impacts.

Furthermore, storage and export facilities similar to those currently proposed for Site A within the Burrup Industrial Estate would, if the LNG plant was located at Maitland Estate, need to be located on West Intercourse Island, which is known for its concentration of significant heritage sites.

6.1 Filings of the Australian Rock Art Research Association suggest that far more appropriate development sites are available, areas already zoned for petrochemical plants, such as Onslow.

7.5 Woodside has a perfectly suitable alternative site just south of Onslow, next to the BHP Billiton site for another large petrochemical project of the same type. There are no significant environmental considerations with the Onslow sites, and construction costs are about 20% lower there.

8.4 Other suitable sites should be considered…Woodside could very arguably locate near the BHP Billiton site, south of Onslow where it would be cheaper and where there are no significant environmental issues.

9.1 We urge you to advise the proponent to await the outcomes of the various current assessments nominations and studies or to alternatively take up the alternative site at Onslow.

11.1 I consider that any such extra facility should be sited at Onslow, and not on the environmentally ultra-sensitive Murujuga and its world heritage sites, plus already overcrowded and concentrated processing plants on Burrup Peninsula.

13.1 I respectfully request that your organization…consider advising Woodside to take up the alternative site at Onslow, in view of the extreme international significance of the Dampier monument.

Woodside has done significant work assessing the Burrup Industrial Estate and Onslow site options. Following a comprehensive assessment that included technical, environmental, social and cultural heritage factors, several reasons emerged to support the selection of the Burrup Industrial Estate. These included:

- Cost – development at Onslow would be significantly more expensive than the Burrup Industrial Estate (up to A$500 million).

- Schedule – better understanding of the Burrup Peninsula, plus certainty regarding Native Title, led to increased schedule confidence on the Burrup Peninsula over Onslow.

- Deep water access – a significant portion of the aforementioned cost differential relates to the lack of deep water access at Onslow. A high level of uncertainty exists in relation to the dredging of a channel at Onslow and ongoing requirements for maintenance dredging. These matters pose significant cost and schedule risks. By comparison, a there have been a number of dredging programs undertaken in Mermaid Sound, providing greater certainty for the Burrup Industrial Estate option.

- Infrastructure – the Burrup Peninsula option is within the Burrup Industrial Estate in close proximity to significant existing industrial infrastructure and within reasonable proximity to social and community infrastructure of a scale that can reasonably support the Pluto LNG Development workforce and related community needs. There is no comparable infrastructure in Onslow.

- Vicinity of offshore infrastructure to stranded gas – Woodside's vision for the Pluto LNG Development is that it becomes an aggregator for undeveloped gas in the region. Pipeline routes from the field to the Burrup Peninsula are closer to available undeveloped gas than routes to Onslow.

- Government support – the state government understands the advantages associated with the Burrup Peninsula and supports development within the Burrup Industrial Estate, consistent with the Burrup Land Use Plan and Management Strategy (Burrup Peninsula Management Advisory Board 1996) and the Burrup and Maitland Estate Agreement between the Government and local Indigenous groups.

Air Emissions

3.2 We feel that consideration should be given to injecting the gases presently burned in the flare towers into the ground as is proposed for the Gorgon Project on Barrow Island.

The scope of the PER is limited to site preparation activities within a 15-20 hectare area at Site A. Construction and operation of the Pluto LNG Development as a whole is currently being assessed under the state *Environmental Protection Act 1986* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* via a separate environmental approval process. An assessment of greenhouse gas emissions and proposed management strategies will be addressed as part of the PER for the Pluto LNG Development as a whole.

7.4 The proposed Pluto plant…can reasonably be predicted to raise the combined levels of NOx, from the three petrochemical plants (NW Shelf, Burrup Fertilisers and Pluto) to around 30,000 tonnes per year.

7.9, 8.8
There are many concerns not addressed in the Woodside PER…The increasing emissions of carcinogens, especially benzene, close to Karratha, Dampier and Roebourne.

7.16, 9.5
What will be the total emissions from all three petrochemical plants at Dampier, of carcinogenic and other harmful emissions?

15.5 The following are some concerns that need to be addressed in the Public Environmental Review…increased emissions of carcinogens, especially benzene, close to nearby populations.

The scope of the PER is limited to site preparation activities within a 15-20 hectare area at Site A. Construction and operation of the Pluto LNG Development as a whole is currently being assessed under the state *Environmental Protection Act 1986* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* via a separate environmental approval process. Cumulative air emissions modeling and assessment against relevant air quality guidelines is being undertaken as part of the PER for the Pluto LNG Development as a whole.

- **Figure 1: Site Preparation Activities Footprint**

Rock Art

1.3 There is considerable controversy over the argument that existing LNG plant emissions have limited impact on the rock art of other parts of the Peninsula, with several studies suggesting that impacts on the art are high

4.2 What are these [air] emissions doing to the rock art on the Burrup?

7.7 There are many concerns not addressed in the Woodside PER…The increased atmospheric acidification of the environment, and its effects on the rock art and the coral reefs.

7.15, 9.4

What will be the total combined acidic atmospheric emissions at Dampier after completion, and what will be their effects on rock art, coral reefs and other environmental entities?

15.3 The following are some concerns that need to be addressed in the Public Environmental Review…effect on the rock art with increased atmospheric acidification of the air shed

7.8 There are many concerns not addressed in the Woodside PER…The fact that there is currently a study by the CSIRO into the deterioration of the rock art from existing atmospheric emissions, which is not expected to be completed for three more years.

15.4 The following are some concerns that need to be addressed in the Public Environmental Review…the results of the current study by CSIRO into the deterioration of rock art

The scope of the PER is limited to site preparation activities within a 15-20 hectare area at Site A. The main source of atmospheric emissions during site preparation is likely to arise from vehicle and mobile equipment exhausts. However, these emissions will be minimal given the relatively small number of vehicles on site, as described in **Section 3.1.1** of the PER.

Construction and operation of the Pluto LNG Development as a whole is currently being assessed under the state *Environmental Protection Act 1986* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* via a separate environmental approval process. The potential impact of atmospheric emissions associated with LNG production will be addressed through this subsequent approval process.

Woodside is not aware of any scientific evidence that proves that emissions accelerate the deterioration of rock art on the Burrup Peninsula.

Woodside supports work by various bodies to determine whether emissions are having an impact on rock art. The Western Australian Government has appointed the Burrup Rock Art Monitoring Management Committee as an independent body which, in 2004, commissioned the CSIRO to conduct scientific modelling and research to verify if there is potential for industrial emissions to affect rock art. Woodside is participating in this study as operator of the North West Shelf Venture by funding research of A$250 000 a year.

Air monitoring results from this study, and Woodside's studies at the North West Shelf Venture, have found that air emissions on the Burrup Peninsula are well below national and international environmental and health standards.

CSIRO is also studying artificial fumigation of rock surfaces as well as colour changes and microbiological aspects of petroglyphs.

Woodside plans to use low-NOx technology for the Pluto LNG plant and to ensure emissions are within acceptable limits.

7.2 A perusal of [the] preliminary site layout (figure 3-1) makes it clear to anyone familiar with the locality that there will be massive destruction of rock art sites. Moreover the submission fails to make any mention of the hundreds of stone arrangements in the same area.

8.5 Woodside's claims of minimal physical destruction [to rock art] are grossly misleading…why is it planning to make s.18 applications under WA Aboriginal Heritage Act 1972 for destroying all sites in the way of its development?

8.6 What will happen to megalithic stone arrangements which cannot be moved?

8.9 Moving boulders which have rock art takes them out of their cultural context.

12.1 Any stone petroglyphs and scatters of the antiquity of these on the Burrup Peninsula are important and the proposal should not proceed.

Woodside's approach to the management of Aboriginal heritage has been developed to ensure the requirements of the Aboriginal Heritage Act and the Environmental Protection Act are met in relation to identification, assessment and management of significant sites.

The approach is based on a policy of minimal disturbance, which is implemented via a step-wise approach, as follows:

- Probability of occurrence of Aboriginal heritage sites is used as a constraint in site selection decision-making.
- Conduct thorough archaeological and anthropological heritage surveys and consultations with relevant Indigenous groups to develop a detailed understanding of the heritage landscape.
- Use the results of surveys and consultations to develop design footprints that avoid disturbance to Aboriginal heritage sites as far as practicable.
- Where disturbance to sites is unavoidable, seek permission under Section 18 of the Western Australia *Aboriginal Heritage Act 1972* to retrieve, relocate and where this is not possible, disturb Aboriginal heritage material.
- Develop detailed heritage management plans in consultation and collaboration with Aboriginal people and the state government.

Consistent with this approach, comprehensive heritage surveys have been completed over Site A and an application to disturb some sites at this location has been lodged under Section 18 of the Western Australia *Aboriginal Heritage Act 1972*.

Where relocation is required, approval will be sought to move sites to prescribed conservation areas, in consultation with relevant Indigenous groups. Woodside's preferred practice is to avoid disturbing heritage sites: as many sites as possible will be left in-situ but disturbance to some sites is unavoidable.

The potential impact of the Pluto LNG Development on the Aboriginal heritage landscape, particularly at Site A, has been discussed in detail with the Ngaluma, Injibandi, Yaburarra, Mardudhunera and Wong-Goo-Tt-Oo people.

During the archaeological survey of Site A a total of 80 archaeological sites were recorded including 47 previously unrecorded sites and 33 previously recorded sites. The survey found that these sites include a total of 1240 rock art panels.

The majority of sites are distributed along the eastern and south-western margins of Site A associated with rocky hills, intervening valleys and watercourses, and will not be impacted by the Development.

Proposed site preparation activities at Site A will occur over 15 to 20 hectares in the northern portion of the site where heritage sites occur in lower densities and are mostly of lower significance (as identified by local Indigenous groups) than in other areas of Site A **(Figure 1)**.

It is estimated that more than 90% of the rock art contained within Site A falls outside of the site preparation footprint. Of the remainder most can be relocated or left in situ. One site of high significance falls within the disturbance area and forms part of the site disturbance application under Section 18 of the *Aboriginal Heritage Act 1972*. Recent design changes indicate that this site will not be disturbed.

Woodside has identified conservation areas within Site A, which contain sites of particular significance, in consultation with relevant Indigenous groups and archaeological and anthropological experts.

As a result of studies and discussions, Woodside has also amended the proposed infrastructure footprint and implemented design modifications to ensure proposed site preparation activities do not impact on these conservation areas.

A Cultural Heritage Management Plan (CHMP) will be prepared and implemented for Site A, which will include but not be limited to the following:

- Disturbance to sites will be minimised as far as possible. Where disturbance to sites cannot be avoided, archaeological material will be relocated to designated conservation areas.
- Any proposed disturbance to cultural heritage sites is subject to an application under Section 18 of the *Aboriginal Heritage Act 1972*.
- Aboriginal sites near work areas will be managed to prevent avoidable impact.
- A cultural heritage induction will be included within site access inductions.
- Initial site preparation works will be monitored by Aboriginal representatives.
- Any archaeological discoveries during site preparation work will be reported to the regulatory authority in accordance with reporting and mitigation measures identified in the CHMP, state government policy and the expectations of the Indigenous groups.
- Aboriginal representatives will be involved in all stages of mitigative relocation.
- Access to conservation areas by Indigenous groups will be maintained, subject to operational and occupational health, and safety constraints.

7.23 If the destruction of Australia's largest monument, the world's largest art gallery, were to be continued through the EPA allowing itself to be prompted to make a hasty decision, the significant degradation of the Dampier Precinct would be continued to the point where the rock art's integrity would be irreparably compromised. To be more specific, all of the rock art would be destroyed, some by the direct physical impact on sites, the rest by greatly increased acidification of atmospheric fallout.

The Burrup Land Use Plan and Management Strategy (Burrup Peninsula Management Advisory Board 1996) sets aside approximately 60% of the Burrup Peninsula for conservation purposes. The Pluto LNG Development sites are primarily located within the Burrup Industrial Estate which is zoned for industrial use. Woodside is confident that it can operate on the Burrup Peninsula without having a significant impact on cultural heritage.

Proposed site preparation activities at Site A will occur over 15 to 20 hectares in the northern portion of the site where heritage sites occur in lower densities and are mostly of lower significance (as identified by local Indigenous groups) than in other areas of Site A.

It is estimated that more than 90% of the rock art contained within Site A falls outside of the site preparation footprint. Of the remainder most can be relocated or left in situ. One site of high significance falls within the disturbance area and forms part of the site disturbance application under Section 18 of the *Aboriginal Heritage Act 1972*. Recent design changes indicate that this site will not be disturbed.

Woodside has identified conservation areas within Site A, which contain sites of particular significance, in consultation with relevant Indigenous groups and archaeological and anthropological experts.

As a result of studies and discussions, Woodside has also amended the proposed infrastructure footprint and implemented design modifications to ensure proposed site preparation activities do not impact on these conservation areas.

The main source of atmospheric emissions during site preparation is likely to arise from vehicle and mobile equipment exhausts. However, these emissions will be minimal given the relatively small number of vehicles on site, as described in **Section 3.1.1** of the PER.

Construction and operation of the Pluto LNG Development as a whole is currently being assessed under the state *Environmental Protection Act 1986* and the Commonwealth

Environment Protection and Biodiversity Conservation Act 1999 via a separate environmental approval process. The potential impact of atmospheric emissions associated with LNG production will be addressed through this subsequent approval process.

National/World Heritage Listing

7.10 *There are many concerns that are not addressed in the Woodside PER…The incomplete assessment of the nomination of Dampier to the National Heritage by the Federal government.*

15.6 *The following are some concerns that need to be addressed in the Public Environmental Review…assessment of the Dampier area for National Heritage listing*

7.17, 9.6
How will Woodside accommodate any pending recommendations from the current assessments by various parties? For instance would they pay for relocating the plant if required to do so?

7.11 *There are many concerns that are not addressed in the Woodside PER…The request by UNESCO to submit the Dampier monument to its World Heritage List.*

15.7 *The following are some concerns that need to be addressed in the Public Environmental Review…the request by UNESCO to submit the Dampier monument to its World Heritage list; and the implication of any new guidelines applicable for the protection of rock art.*

7.12 *There are many concerns that are not addressed in the Woodside PER…The pending release of new UNESCO guidelines to all Member States for the protection of rock art, to be available in late 2006.*

7.19, 9.8
Is Woodside aware that UNESCO will issue new guidelines for the protection of world rock art in 2006, and has the company informed itself of its future obligations in that respect?

7.18, 9.7
Would Woodside accept any up-front costs that may accrue in the future due to the need to comply with heritage requirements as a result of National and/or World Heritage listing?

8.1 *This application attempts to degrade the site before full protection is in place.*

Woodside is seeking approvals for the Pluto LNG Development under relevant legislation. It is not possible to seek approvals or to comply with guidelines or regulatory measures that do not presently apply.

Should Woodside require any further approvals for the development, these will be sought.

Groundwater

4.3 *If more processing plants are built on the Burrup, it would be a disaster for the underground water and all the blind fish which live in the water. Those fish have been there longer than the rock art and this water should be protected at all costs.*

The scope of the PER is limited to site preparation activities within a 15-20 hectare area at Site A. Construction and operation of the Pluto LNG Development as a whole is currently being assessed under the state *Environmental Protection Act 1986* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* via a separate environmental approval process. The Draft PER for the broader Pluto LNG Development proposal will be published later this year.

Woodside is committed to ensuring that the Pluto LNG Development does not result in unacceptable groundwater impacts on the Burrup Peninsula. As such, an assessment of potential groundwater impacts, including potential for impacts to subterranean fauna, will be presented in the PER which covers the construction and operation of the Pluto LNG Development as a whole. This PER will also outline proposed groundwater monitoring and impact mitigation measures.

Stakeholder Consultation

7.1 Woodside has made no attempt to consult the stakeholders representing the cultural dimensions of this priceless heritage

7.13, 15.1
The completely inadequate level of consultation with many stakeholders, particularly those concerned with the protection of the cultural monument and the Indigenous Custodians of the sites.

7.20, 9.9
Will Woodside consult those stakeholders it has so far completely ignored in the planning process?

8.2 Many key stakeholders were not consulted…

Woodside views public involvement in environmental assessment as critical and more than a statutory requirement. During the preparation of the PER, Woodside consulted a broad range of stakeholders with the aim of:

- Briefing stakeholders on the development concept and fostering an understanding of Woodside's objectives and timeline for the Development.
- Presenting stakeholders with the key environmental factors associated with the Development and potential impacts and proposed environmental management strategies.
- Gaining feedback from stakeholders on the environmental, social and heritage aspects of the proposed Development.
- Providing Woodside with the opportunity to demonstrate commitment to achieving a high level of environmental performance through its environmental management approaches for the development.

In regards to consultation on the issue of cultural heritage, Woodside has undertaken considerable consultation with Indigenous groups and archaeological and anthropological experts. This has included:

- Establishment of heritage survey protocols in consultation with relevant Indigenous groups.
- Extensive heritage surveys with Indigenous groups, and consultant anthropologists and archaeologists.
- Agreement of basis for application for Section 18 clearance under WA Aboriginal Heritage Act to operate in areas containing Aboriginal heritage.
- Ongoing monitoring of rock art management.
- Ongoing Indigenous access to rock art within the Pluto LNG Development area.

- Detailed submissions, discussions and site visits with relevant authorities and the Aboriginal Cultural Materials Committee.

8.3 This application deserves to be advertised nationally…

The four week public comment period for the PER was advertised in the *Pilbara News*, *The West Australian* and nationally in *The Australian*, as per EPA requirements.

Safety

7.6 There are many concerns not addressed in the Woodside PER…The massive build-up of explosive, volatile, toxic and hazardous substances in a single location, and the threat this will pose to the public and the economy of WA.

7.14, 9.3
What will be the total combined quantities of explosive, volatile, toxic and hazardous substances at the existing Woodside plant, the Pluto plant, the Burrup Fertilisers plant and at Dampier Port, should the Pluto project be sited at Dampier.

15.2 The following are some concerns that need to be addressed in the Public Environmental Review…build-up of explosive, volatile, toxic and hazardous substances in a single location.

11.3 The layout of the processing facilities at Burrup is such there are no buffer zones or bunkers, just concentration of facilities.

The scope of the PER is limited to site preparation activities within a 15-20 hectare area at Site A. Construction and operation of the Pluto LNG Development as a whole is currently being assessed under the state *Environmental Protection Act 1986* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* via a separate environmental approval process. The above safety risk issues will be assessed through this subsequent approval process.

A safety risk analysis is being undertaken to demonstrate that risk to the public from the LNG Plant will be acceptably low in accordance with the WA EPA Guidance Statement No. 2 for risk assessment and management of offsite risks from hazardous industrial plants. Cumulative risks from neighboring facilities are being considered as part of the risk analysis.

Vegetation

10.1 I seriously request that this report [the Trudgen report (2003)] be found and re-presented alongside M Bednarick's submission.

The results of Trudgen's (2002) vegetation survey of the Burrup Peninsula were included in the assessment of potential vegetation and flora impacts presented in the PER. The aim of Trudgen's (2002) report, as referenced in the PER, was to document the vegetation and flora of the Burrup Peninsula, Dolphin Island, Angel Island and Gidley Island, and to compare the flora species composition of the vegetation to other areas within the Pilbara.

As Trudgen's area of study for the 2002 report covered a large area and resulted in a large volume of data, the full report has not been replicated in the PER. However, results relevant to

Site A have been presented in **Section 4.2.2** of the PER. The Trudgen (2002) report is publicly available.

10.2 There are many plants which can only be found on the Burrup i.e. nowhere else in the world. Similarly endemic snails were only recently found.

It is recognised that many of the flora species on the Burrup Peninsula are endemic to the Pilbara region, and some are endemic to the Burrup Peninsula itself. However, none of the flora species recorded in Site A occur solely within Site A: all have been recorded elsewhere on the Burrup Peninsula and most species are represented in the Burrup Peninsula Conservation Zone.

It is acknowledged that recent surveys of the Pilbara region, including the Burrup Peninsula, have identified the potential presence of short-range endemic land snail species. A survey of land snails was undertaken at Site A and nearby areas in October 2005 by the WA Museum. Most of the snail species identified within Site A are not endemic to the Burrup Peninsula, but have been recorded in other areas of Western Australia and one species (*Stenopylis coarctata*) also occurs on the islands of the Central Indo-West Pacific region (Slack-Smith 2005). One unnamed snail species (*Rhagada* species) was found during the survey. Genetic work was carried out to identify this species; it is believed to be *Rhagada* sp 12 which occurs across the Burrup Peninsula and may also have been collected on islands of the Dampier Archipelago and Millstream-Chichester National Park (Biota 2002; P. Runham [Biota] 2006, pers. comm., 24 May).

An additional survey for land and aquatic snails was undertaken by Biota Environmental Sciences at Site A and other areas on the Burrup Peninsula in May 2006 during cooler, moister conditions (Biota 2006a). Results indicate that snails from the genera *Quistrachia* and *Rhagada* were recorded within Site A and snails from the genera *Quistrachia*, *Rhagada* and *Isidorella* were recorded in other locations on the Burrup Peninsula outside of Site A (Biota 2006b; 2006c). The species *Quistrachia legendrei* not only occurs on the Burrup Peninsula but has been recorded on several islands in the Dampier Archipelago. A single species of planorbid freshwater snail resembling *Isidorella newcombi* was found at Site B. This species is also widespread and is not considered to be of conservation significance. Genetic investigations were undertaken to identify the *Rhagada* species and results suggest that the specimens are all the same species despite some genetic variations.

12.2 The loss of vegetation associations through clearing 15-20 hectares of land and the loss of habitat for creatures which have evolved to live in this environment, but have not evolved to survive loss of habitat or being bulldozed, is unacceptable.

The Burrup Peninsula covers over 8700 ha, of which approximately 60% (5400 ha) is allocated to conservation, heritage and recreation and 16% (1395 ha) is allocated to industry. Site A encompasses 61 ha within the industrial zone, of which 15 to 20 ha will be cleared of vegetation. The area proposed for the Pluto LNG Development represents 0.2% of the total Burrup Peninsula.

Section 4.2.2 of the PER provides a description of the existing environment in terms of vegetation and flora found within Site A. **Section 5.6** of the PER outlines the potential impacts associated with clearing and the approximate area of each vegetation association that will be cleared. Most of the significant vegetation associations within Site A are concentrated in the southern half of Site A. The disturbance footprint for the site preparation has been situated in the north-eastern area of Site A to avoid and minimise impact on significant vegetation associations, however due to the area required for site preparation some areas of significant vegetation will be affected. It is difficult to alter the footprint further due to cultural heritage constraints in other areas of the site.

Section 5.6 and **Appendix B** of the PER outline measures to minimise impacts on vegetation including a Framework Vegetation and Flora Management Plan.

17.1 Vegetation survey reports are in agreement that the Burrup contains many unique plant community types not found on the mainland and not well reserved outside the industrial areas. In particular, rockpile vegetation is considered to be of high conservation value (Trudgen 2002).

It is acknowledged that the Burrup Peninsula contains unique vegetation communities and that rockpile vegetation is considered to be of high conservation value. Most rockpile areas within Site A have been avoided by the disturbance footprint.

Section 5.6 of the PER outlines the potential impacts associated with clearing and the approximate area of each vegetation association that will be cleared. All of the vegetation associations identified within Site A by Trudgen (2002) that will be affected during site preparation activities are represented elsewhere on the Burrup Peninsula; generally less than 5% regional extent of any vegetation association will be affected.

17.1 It is difficult to judge the impacts to vegetation within sites without knowledge of the proportion to be cleared in each area (clearing footprint not shown on vegetation map). Is there any scope to preserve areas of the 8 vegetation types that are not well reserved elsewhere?

17.2 Vegetation maps in Trudgen 2002 show some patches of vegetation are unusual associations that occur in few locations. These occupy a relatively small part of the site and should be avoided.

16.6 It is noted that a number of significant flora and vegetation communities, as found in surveys by Trudgen (2002) and Astron (2005), occur within Site A. The vegetation associated with rockpiles is significant and considered to be an ecosystem that is declining and vulnerable in 'A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002' (May and McKenzie, 2003). As such it is recommended that the location of significant flora species and vegetation communities be identified on a GIS system and that the site layout for the project is designed to minimise impacts.

Section 5.6 of the PER outlines the approximate area to be cleared of each vegetation association identified by Trudgen (2002). Information available at the time of writing considered that vegetation associations IcImTe, TsAcTe, BaTcTe, Ac'Te, CwTe, DsTsTe, SgTeTa and GpImTe were of conservation significance within Site A (**Section 4.2.3** of the PER). This was based on advice provided by Astron Environmental (2005), which used a methodology whereby vegetation associations with ten or less occurrences on the Burrup Peninsula (as mapped by Trudgen 2002) were considered significant.

Further work and informal consultation with CALM and M. Trudgen has since been undertaken; it is now considered that vegetation associations with ten or less occurrences on the Burrup Peninsula and/or less then 30% extent in the Burrup Peninsula Conservation Zone should be considered as being significant. When taking into account this revised criteria, four additional vegetation associations within Site A should be considered as being significant; Sv, TeAb, TeCa and TeRm. As outlined in **Section 5.6** of the PER, vegetation association TeAb and TeCa occur within the proposed disturbance area.

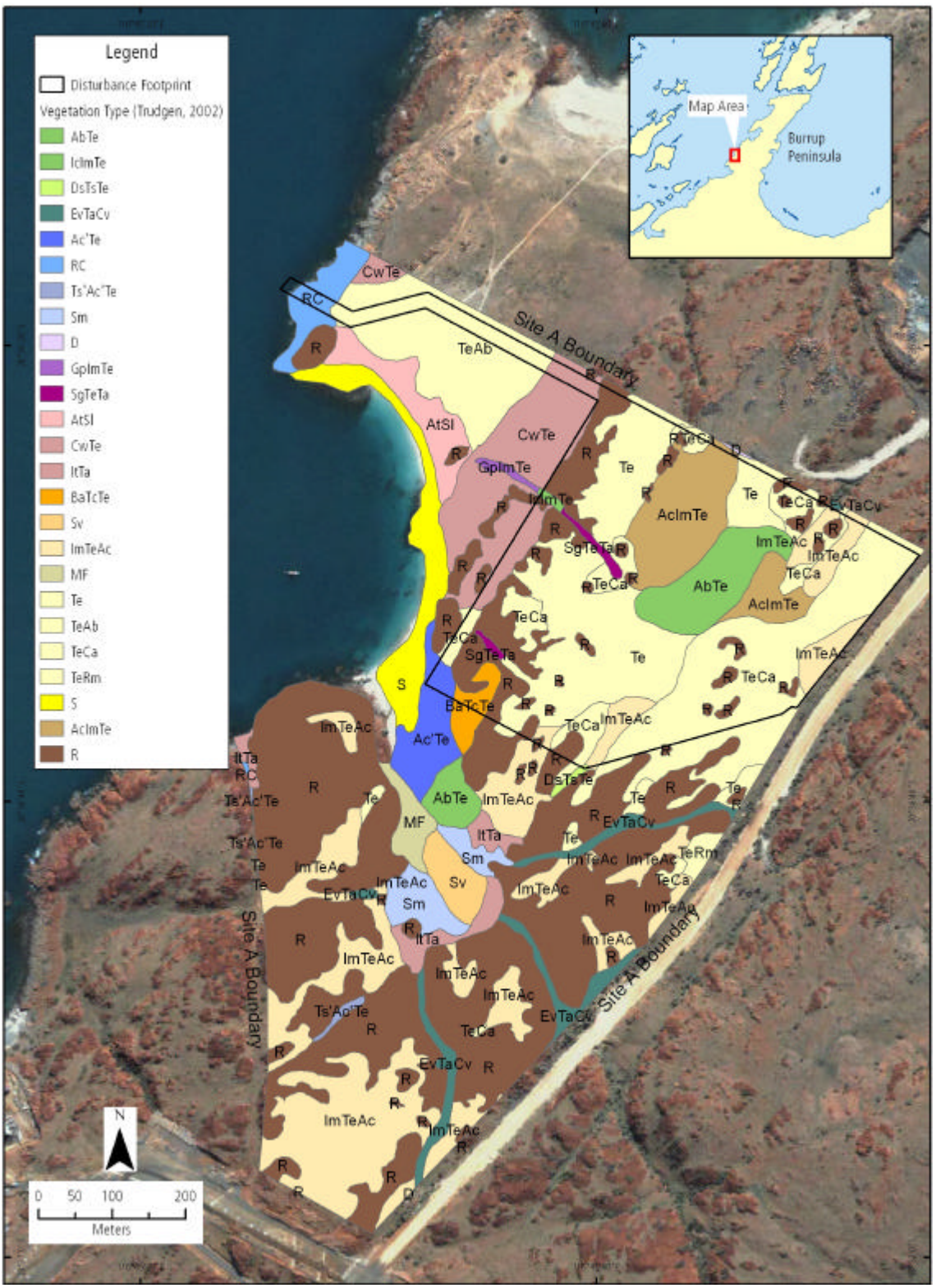
The disturbance area has also been refined due to ongoing project design. As such, a summary of the revised list of significant vegetation types in Site A and the proposed disturbance is provided in **Table 1**. Please refer to **Figure 2** and **Figure 3**, which present the current disturbance footprint and vegetation associations within Site A.

- **Table 1: Location of Species of Conservation Value**

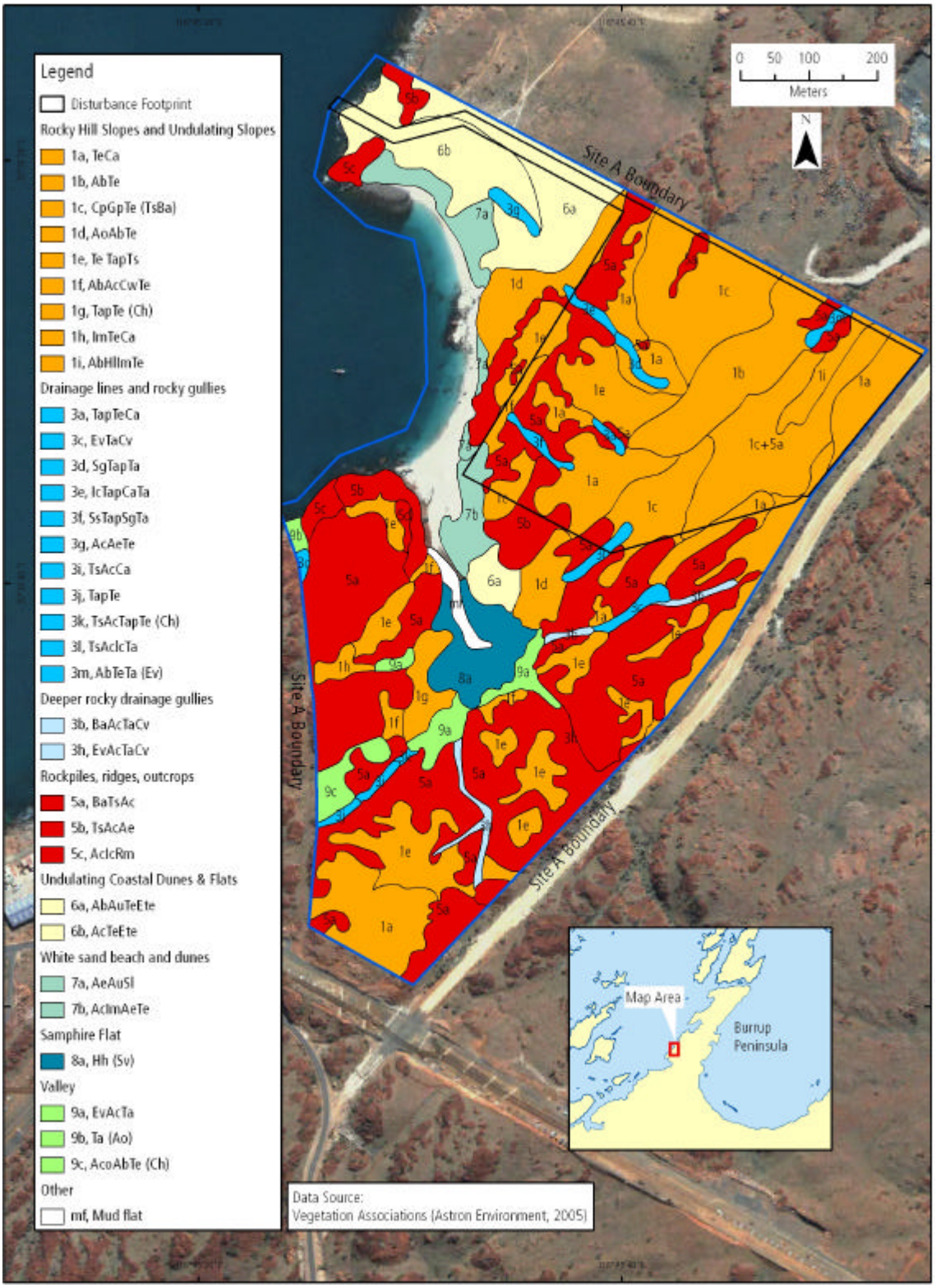
Vegetation Association (Trudgen 2002)	Number of Occurrences on the Burrup Peninsula	Total Area on Burrup Peninsula (ha)	Representation in the Burrup Peninsula Conservation Zone	Coverage within Site A (ha)	Required Area to be cleared (ha)	% Removal within Site A	% Removal within Burrup Peninsula
Ac'Te	5	3.02	16.3%	0.98	0.12	12.2	4.0
BaTcTe	4	1.8	78.2%	0.39	0.19	48.7	10.6
CwTe,	7	13.9	0%	3.11	0.51	16.4	3.7
DsTsTe	7	1.08	94.4%	0.05	0.0033	6.6	0.3
GpImTe[#]	19	14.2	64%	0.09	0	0.0	0.0
IcImTe	2	0.2	0%	0.04	0.039	97.5	19.5
SgTeTa[#]	12	2.1	52.4%	0.15	0.15	100.0	7.1
Sv	7	1.08	40.3%	0.56	0	0.0	0.0
TeAb	33	3.14	16.5%	3.13	0.33	10.5	10.5
TeCa	97	36.1	4.3%	6.17	4.1	66.5	11.4
TeRm	37	51.7	20.0%	0.18	0	0.0	0.0
TsAcTe	3	0.4	0%	0.08	0	0.0	0.0

Note: [#] Exceed the criteria of 10 or less occurrences and/or 30% or less representation within the Conservation Zone, however classified as being significant by Astron (2005).

Most of the significant vegetation associations within Site A are concentrated in the southern half of Site A. The disturbance footprint for the site preparation has been situated in the north-eastern area of Site A to avoid and minimise impact on significant vegetation associations, however due to the area required for site preparation some areas of significant vegetation will be affected. It is difficult to alter the footprint further due to cultural heritage constraints in other areas of the site.



- **Figure 2: Site A Vegetation Associations According to Trudgen (2002) and the Proposed Disturbance Footprint**



- **Figure 3: Site A Vegetation Associations According to Astron Environmental (2005) and the Proposed Disturbance Footprint**

17.3 Vegetation condition?

The vegetation at Site A is considered to be in good condition generally, with minor evidence of grazing and no evidence of fire within the site (Astron Environmental 2005). Rocky ridges, outcrops, gullies, hill slopes, valleys and the saline flat are considered to be in very good to excellent condition. These areas comprise of 80 to 100% native flora composition, have generally intact vegetation structure, weed cover/abundance was less than 5% and there was either no or minimal signs of disturbance. The beach dunes and undulating coastal dunes and flats are in poor condition with 20 to 50% native flora composition, modified vegetation structure, weed cover of 20 to 60% and high disturbance (Astron Environmental 2005).

17.4 Cumulative impacts of proposed developments (A + E + B)?

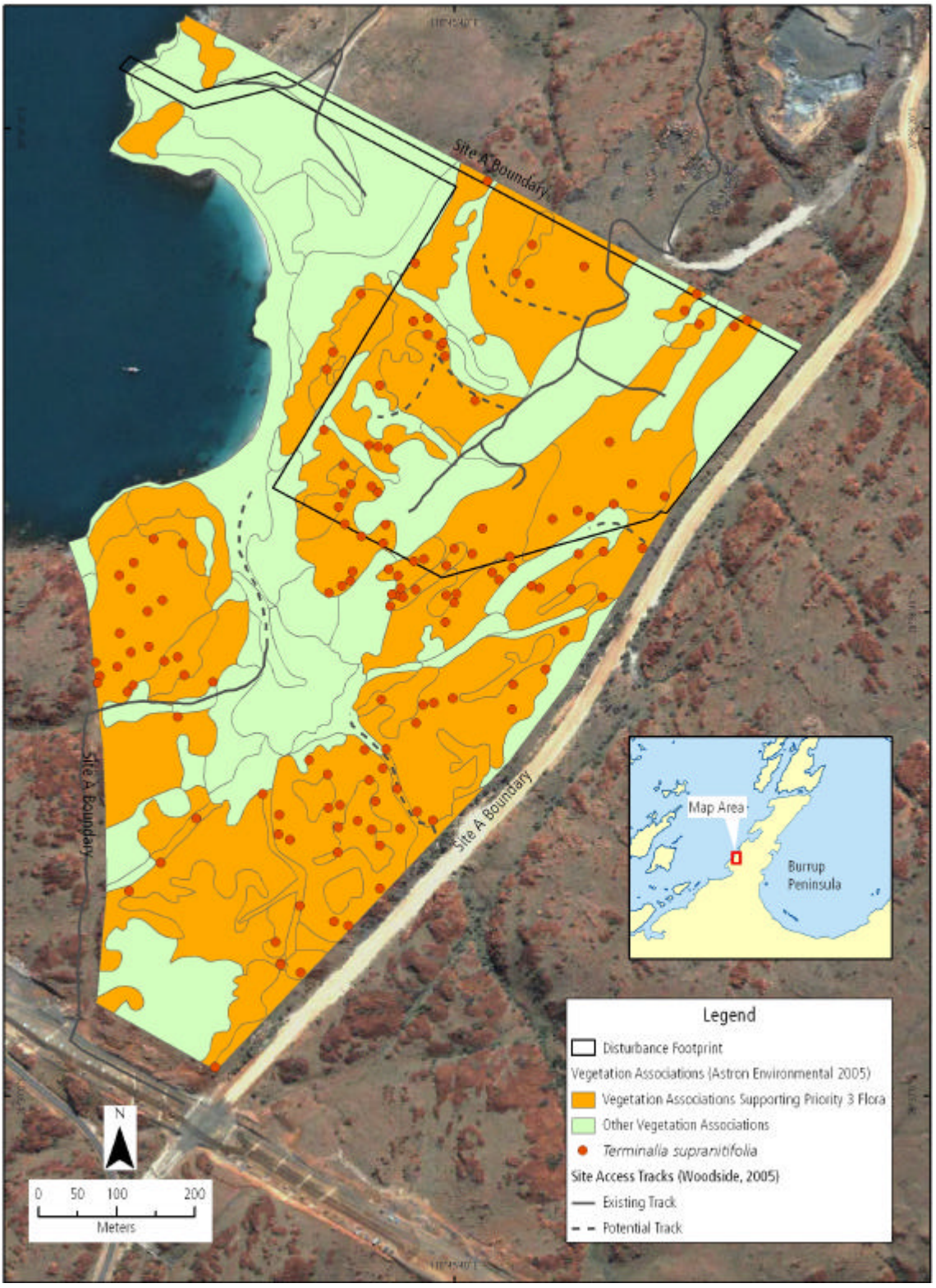
The cumulative impacts of the proposed development sites will be documented in the Pluto LNG Development PER which is in the process of being developed.

17.7 Information about impacts of the proposed developments on the priority species Terminalia supranitifolia *and 11 poorly known species should be provided. The location of individuals of important plant species should also be marked on Figures provided. Will it be possible to avoid significant individuals of priority species?*

The Priority 3 species *Terminalia supranitifolia* was recorded in 12 of the 33 vegetation associations mapped by Astron Environmental (2005). *Terminalia supranitifolia* was generally found at a density of less than 5% coverage within Site A, with the exception of vegetation associations TsAcCa, TsAcTapTe(Ch) and TsAcIcTa where it had a cover of 5 to 20% (Astron Environmental 2005). Associations TsAcCa and TsAcTapTe(Ch) are outside the disturbance area, however a small area of TsAcIcTa lies within the disturbance area (refer to **Figure 3**, question 17.2). Other vegetation associations that contain *Terminalia supranitifolia* also occur within the disturbance footprint. Vegetation associations that contain *Terminalia supranitifolia* are presented in **Figure 4.**

Further to the vegetation survey undertaken at Site A (Astron Environmental 2005), a targeted Priority flora survey was undertaken by ENV (2006a) to comprehensively map the locations of *Terminalia supranitifolia* within the site. The data collected was combined with additional information from Astron Environmental (unpublished data 2006) and in total *T. supranitifolia* was recorded at 120 sites within Site A. Most of the locations are outside of the proposed disturbance area. In general, *T. supranitifolia* is more common on rocky hill slopes and rockpiles with large numbers occurring in the southern half of Site A. The locations of *T. supranitifolia* plants are shown in in **Figure 4.** Impacts to individual plants within the disturbance footprint cannot be avoided; however *T. supranitifolia* is widespread on the Burrup Peninsula and is represented within the Burrup Peninsula Conservation Area.

The 11 species of conservation value were not mapped, however **Table 2** outlines the vegetation associations that support these species within Site A and indicates which of these vegetation associations lie within the disturbance area. Impacts to individual plants within the disturbance footprint cannot be avoided, however all of these species are represented outside of the disturbance footprint (except *Paspalidium tabulatum*) and most of these species are also represented within the Burrup Peninsula Conservation Area.



- **Figure 4: Location of *Terminalia Supranitifolia* within Site A**

- **Table 2: Location of Species of Conservation Value**

Species	Vegetation Associations Within Site A	Vegetation Associations within Disturbance Area	Occurs within Burrup Peninsula Conservation Zone
Corchorus walcotti	AbTe, CpGpTe(TsBa), AoAbTe, AbAcCwTe, TapTe(Ch), AbHllmTe, TapTeCa, TapTe Found on rocky hill slopes, shallow drainage lines, and on the coastal flats. It would account for 2% cover within these habitats.	AbTe, CpGpTe(TsBa), AbHllmTe, TapTeCa	Yes
Euphorbia sp. VL1488-09)	EvAcTaCv 3 plants only	Does not occur within disturbance footprint	Unknown
Euphorbia tannensis supsp. *eremophila* (Burrup form)	AoAbTe, AbAcCwTe, AcAeTe, AbAuTeEte, AcTeEte, AeAuSl 5-10% cover within sandy coastal flats. Less than 2% cover in other areas.	AbAuTeEte, AcTeEte	Yes
Paspalidium tabulatum	AoAbTe, SsTapSgTa, EvAcTaCv, TsAcCa, TsAcAe Common on rockpiles and along rocky gullies. It would account for 2% cover within these habitats.	SsTapSgTa	Yes
Rhynchosia sp. Burrup (82-1C)	TeCa, AbTe, CpGpTe(TsBa), BaAcTaCv, SgTapTa, IcTapCaTa, SsTapSgTa, EvAcTaCv, TsAcCa, TsAcTapTe(Ch), TsAcIcTa, BaTsAc, AcIcRm Found along rocky gullies, some shallower drainage lines associated with rocks and some rockpiles. (estimated 30 plants within these habitats)	TeCa, AbTe, CpGpTe(TsBa), BaAcTaCv, IcTapCaTa, BaTsAc	Yes
Sida aff. *cardiophylla*	CpGpTe(TsBa) 2 plants only	CpGpTe(TsBa) (also occurs outside the disturbance footprint)	Unknown
Themeda sp. *Burrup* (84)	EvAcTaCv One population only (approximately 30 plants)	Does not occur within disturbance footprint	Yes
Triodia angusta	BaAcTaCv, EvTaCv, SgTapTa, IcTapCaTa, SsTapSgTa, EvAcTaCv, TsAcIcTa, AbTeTa(Ev), EvAcTa Common along all the drainage lines (it would account for 60% of drainage line cover, where it occurs).	SgTapTa, IcTapCaTa, AbTeTa(Ev)	Yes
Triodia epactia (Burrup form)	TeCa, CpGpTe(TsBa), AoAbTe, TeTapTs, AbAcCwTe, TapTe(Ch), ImTeCa, AbHlmTe, TapTeCa,	TeCa, CpGpTe(TsBa), TeTapTs, AbHlmTe, TapTeCa, AbTeTa(Ev), TsAcAe, AbAuTeEte,	Yes

Species	Vegetation Associations Within Site A	Vegetation Associations within Disturbance Area	Occurs within Burrup Peninsula Conservation Zone
	AcAeTe, EvAcTaCv, TsAcCa, TapTe, TsAcTapTe(Ch), TsAcIcTa, AbTeTa(Ev), TsAcAe, AcIcRm, AbAuTeEte, AcTeEte, AeAuSl, AcImAeTe Dominates the cover for the entire site (approximately 65% cover on the site).	AcTeEte	
Triodia wiseana (Burrup form)	CpGpTe(TsBa) Occasional on hill slopes (accounts for about 10% of the entire site)	CpGpTe(TsBa) (also occurs outside the disturbance footprint)	Yes
Triumfetta appendiculate (Burrup form)	TeCa, AoAbTe, TeTapTs, AbHlmTe, TapTeCa, SgTapTa, IcTapCaTa, TsAcCa, TapTe, TsAcTapTe(Ch), AbTeTa(Ev) Found around the base of rockpiles and in drainage lines. It was recorded as dense in TapTeCa.	TeCa, TeTapTs, TapTeCa, SgTapTa, IcTapCaTa, AbTeTa(Ev)	Yes

Hydrology

16.5 On page 13 of the PER, it is stated that the initial soil encountered during cut and fill activities will be stockpiled for future use. Clarification and discussion is sought on whether 'future use' includes progressive rehabilitation.

Stockpiled topsoil will be reused on site, either for rehabilitation if the soil is suitable (for example, if it is weed free) or for general reuse such as fill if the soil is not suitable for rehabilitation. Management measures will be incorporated into the Rehabilitation Management Plan (**Appendix B** of the PER).

16.9 Additional information is requested on the degree to which surface drainage will be impacted as a result of site preparation activities at Site A, the expected downstream impacts on vegetation communities, and how these impacts will be managed (page 59).

There are a number of minor drainage lines within Site A, the majority of which occur in the southern half of the site and drain south-west or north-west into a saline flat.

Surface water in the northern portion of the site, within the disturbance footprint, generally flows to the north-west towards undulating coastal dunes and beach. Drainage lines within the disturbance footprint will need to be levelled (filled) during site preparation works; this may result in a decrease of drainage mainly towards coastal dunes. Some of the drainage lines leading to the saline flat will be partially affected (**Figure 2**) which may decrease flow into this area. However, downstream impacts on the samphire flat are expected to be minor as the majority of the drainage lines feeding into this area will be avoided.

It is recognised that some downstream impacts on vegetation due to drainage line disturbance may occur. The location of the disturbance footprint minimises impacts on drainage lines as much as possible. The Earthworks Management Plan and the Vegetation and Flora Management Plan will be developed in consultation with relevant authorities to ensure that appropriate management measures are developed and implemented for affected vegetation communities.

Fauna

16.2 Additional surveys for short range endemic taxa, including aquatic taxa, should be undertaken for Site A and surrounding areas during wet conditions prior to ground disturbing activities.

17.7 Short range endemic invertebrate species should be considered and CALM and the WA Museum should be consulted to determine if selected invertebrate groups need to be surveyed.

17.8 Comprehensive list of vertebrate species known from the Burrup are provided but no detailed comment on their likelihood of occurrence in the habitats present in the project area is given. There is no indication that Short Range Endemics were targeted or advice sought on which groups needed to be assessed. The Desktop Fauna Report (Page 6) refers to some background information on land snails only.

A survey of land snails was undertaken by the WA Museum at Site A (**Section 4.2.6** of the PER) and nearby areas in October 2005.

Additional surveys for both terrestrial and aquatic taxa were carried out by Biota Environmental Sciences in May 2006 during cooler weather and while sufficient moisture remained on the ground. The survey included three areas; Site A, Site B and Site E. This enabled comparisons of snail species found within the disturbance areas of Site A and other areas of the Burrup Peninsula. Site B is adjacent to Site A while Site E is found on the eastern side of the Burrup Peninsula, near Hearson's Cove.

Table 3 summarises the snail survey results and demonstrates that the snails found within Site A were also found elsewhere on the Burrup Peninsula. No aquatic snails were found at Site A, despite there being a number of small standing pools of water within the site during the survey (Biota 2006a).

- **Table 3: Land and Aquatic Snail Survey Results (Biota 2006)**

Site	Land Snails Recorded				Aquatic Snails Recorded
	Live *Rhagada* snails	Dead *Rhagada*	Live *Quistrachia* snails	Dead *Quistrachia*	Live *Isidorella* snails
A	47	394	0	52	0
B	49	61	17	19	96
E	35	288	0	2	0

Most for the Rhagada specimens found resembled *Rhagada* sp "12" (banded) which has been recorded elsewhere on the Burrup Peninsula. *Rhagada* sp "12" (banded) was relatively abundant in the three sites. A morphological variation was recorded at one location within Site A, this is likely to be a pale, unbanded form of *Rhagada* sp "12" that has adapted locally to the light coloured coastal sands where it was recorded (Biota 2006b).

The *Quistrachia legendrei* specimens found have been recorded elsewhere on the Burrup Peninsula, and on several islands in the Dampier Archipelago. It is not considered to be of conservation significance (Biota 2006b).

A single species of planorbid freshwater snail resembling *Isidorella newcombi* was found at Site B. This species is widespread and is not considered to be of conservation significance. No evidence of other aquatic snail species was found (Biota 2006c).

16.3 The taxonomy, distribution and conservation status of the unnamed Rhagada *species collected from Site A needs to be resolved prior to land disturbing activities. The proponent is encouraged to undertake genetic analyses of specimens collected.*

Morphological appearance of the *Rhagada* species found within Site A in 2005 and 2006 suggested two possible taxa; *Rhagada* sp "12" (banded) and *Rhagada* sp "Holden Point" (unbanded specimens resembling *Rhagada convicta*). Genetic analysis was undertaken by Biota Environmental Sciences in conjunction with Professor Mike Johnson (University of Western Australia) to provide further information on the taxonomic status of these specimens and to resolve the broader distribution of the snails on the Burrup Peninsula.

Genetic analysis of *Rhagada* sp "12" (banded) found that, although the specimens collected in Site A look the same and resemble the other specimens collect on the Burrup Peninsula, there were genetic differences between specimens. This was also found to be the case for *Rhagada* sp "12" in other areas of the Burrup Peninsula (Sites B and E). The most likely explanation for the genetic differences is that the *Rhagada* sp "12" has evolved over a history of isolation, divergence and re-invasions on the Burrup Peninsula. It is likely that, as sea levels fluctuated over time, populations became isolated on areas of high elevation and could not exchange genetic material with other population, This was followed by periods of lower sea levels (such as the current environment) where populations have slowly re-colonised low-lying areas.

Analysis of *Rhagada* sp "Holden Point" (unbanded) was also undertaken. Results indicate that, although it resembles *Rhagada convicta*, *Rhagada* sp "Holden Point" (unbanded) is genetically best grouped with *Rhagada* sp "12". Therefore it is likely that *Rhagada* sp "Holden Point" (unbanded) is a pale form of *Rhagada* sp "12" that has adapted locally to the light coloured coastal sands where it was recorded.

16.4 Given the potential conservation significance of the Rhagada *species, strategies for avoiding, minimizing, mitigating and monitoring impacts need to be developed as a component of the project and implemented prior to ground disturbing activities (unless surveys prove that this is unnecessary).*

Many of the survey sites within Site A where the *Rhagada* species was collected are outside the proposed disturbance area. The *Rhagada* species was also collected within the DPA-owned site immediately south of Site A, and has since been collected at other locations on the Burrup Peninsula (see response to question **16.2**). Management measures to ensure that clearing and vehicle movement does not occur outside the proposed disturbance area are outlined in the framework Vegetation and Flora Management Plan in Appendix B of the PER; these measures will ensure that sites outside the disturbance area containing the *Rhagada* species will not be disturbed.

17.9 There is no consolidation of results with earlier surveys of the area, and surveys of other sites on the Burrup Peninsula. Please provide and compare with other sites on the Burrup.

Tables 1 to 3 of the Desktop Fauna Report (Worley Astron 2005) consolidate the results of a number of surveys undertaken throughout the Burrup Peninsula between 1994 and 2005. The data presented are the species recorded/observed or predicted on the Burrup Peninsula.

17.10 Habitat maps showing where threatened or priority fauna are located relative to proposed disturbance on the site are not provided. Please provide.

Please refer to **Figure 5** (this document) for a habitat map for Site A based on topography, landforms and vegetation.

Threatened and priority fauna that have the potential to occur within Site A are outlined in **Section 4.2.6** of the PER and in Worley Astron (2005).

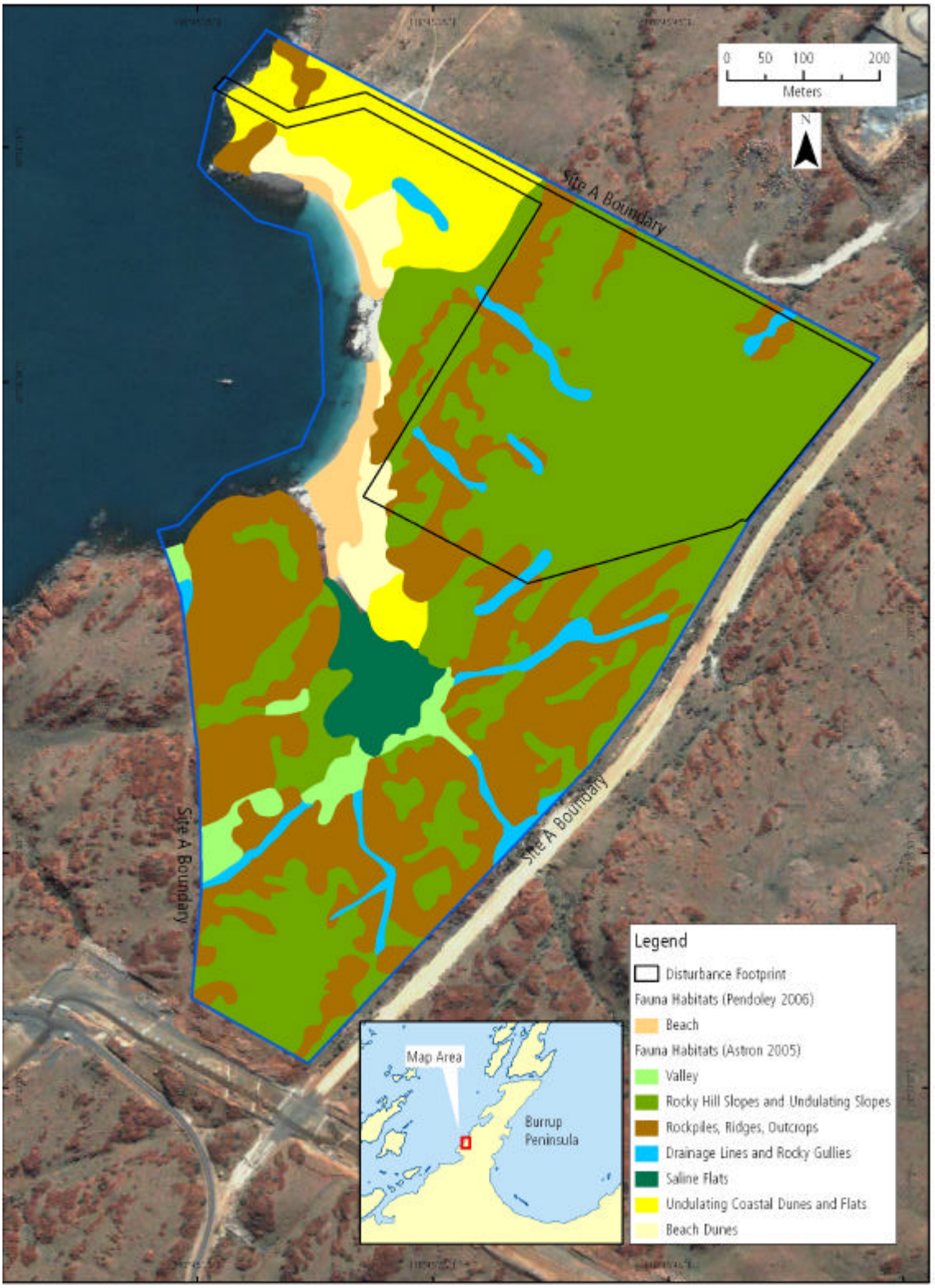
The Pilbara olive python (*Liasis olivacea baroni*) occupies large home ranges and is associated with waterholes, temporary rockpools, deep rock fissures and rockpiles (Worley Astron 2005). The Pilbara olive python is expected to utilise the majority of Site A, including rocky hill slopes and undulating slopes, drainage lines and gullies, valleys, rockpiles and outcrops. Rockpiles in particular are considered an important habitat for the Pilbara olive python as they provide shelter.

The beach at Holden Point may be used by green turtles (*Chelonia mydas*) and flatback turtles (*Natator depressus*) as nesting habitat. Evidence of low level flatback turtle and possibly green turtle nesting was recorded in the southern half of the beach in January 2006 (Pendoley 2006). The beach area of Site A is recognised as breeding habitat for turtles and is considered an important habitat within Site A.

The peregrine falcon (*Falco peregrinus*) is a highly mobile and predominantly aerial threatened species that inhabits a variety of environments. Within Site A, it is possible that this species uses habitat for hunting; however, it is a wide-ranging predator and would not be specifically dependant on habitats to be disturbed by the proposed site preparation activities. The peregrine falcon uses cliffs or woodlands for nesting (Garnett and Crowley 2000), therefore it is unlikely that breeding occurs in Site A due to lack of suitable habitat.

The grey falcon (*Falco hypoleucos*) usually occupies shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found near wetlands or in coastal open woodlands. Nests are usually made in the old nests of other birds in tall eucalypts that grow near water. While the grey falcon is associated with drainage lines and watercourses, it also hunts in tussock grassland and open woodland (Garnett and Crowley 2000). It is possible that the grey falcon uses the habitats within Site A for hunting.

The Australian bustard (*Ardeotis australis*) is a ground-dwelling bird that occupies open habitats where canopy cover is less then 10% such as tussock grasslands, hummock grasslands, low shrublands and grassy woodlands (Pizzey 1991). The species is highly nomadic and appears to move in response to variables such as rainfall, available food and recently burnt country. It is possible that the Australian bustard will utilise habitats within Site A.



- **Figure 5: Fauna Habitats Within Site A**

The bush stone-curlew (*Burhinus grallarius*) is known to occupy a variety of habitats throughout Australia including open forest, open woodlands, grassy woodlands and scrub. In southern Australia the species is associated with habitats that provide litter and fallen timber; however, in northern Australia, bush stone-curlews also inhabit areas where the ground cover is more open (DEH 2000). It is possible that the bush stone-curlew utilises open shrublands and woodlands within Site A such as those found within rocky hills slopes and undulating slopes, drainage lines and gullies, valleys, rockpiles and outcrops. Being a mobile species, it is also possible that the bush stone curlew moves through other habitats in Site A including undulating coastal dunes and saline flats.

The eastern curlew (*Numenius madagascariensis*) is a migrant shorebird that breeds in eastern Russia and has been recorded as a non-breeding visitor to numerous Asian and Pacific countries. In Australia, the largest numbers of eastern curlew occur on the coastal mudflats of eastern and north-western Australia (Watkins 1993). It is expected that the eastern curlew utilises the beach habitat and saline flat habitat within Site A as feeding habitat during the non-breeding season (approximately August to April).

The little north-western mastiff bat (*Mormopterus loriae cobourgensis*) a Priority 1 species, has been recorded on the Burrup Peninsula (Worley Astron 2005). This species is generally associated with mangroves. As presented in **Figure 5**, there are no mangrove stands within Site A.

The ghost bat (*Macroderma gigas*) is predicted to occur on the Burrup Peninsula, and therefore within Site A (Worley Astron 2005). The rugged topography of the Burrup Peninsula and the likely occurrence of caves and underground water, means that roost caves may exist. However, there are no known caves within Site A, so ghost bat use of the habitats within Site A is expected to entail foraging only.

The western pebble mound mouse (*Pseudomys chapmani*) is considered locally extinct (Worley Astron 2005); therefore it is unlikely to occur within Site A.

The water rat relies on permanent water (fresh, brackish or marine) and therefore occurs in mainly coastal areas, near inland surface water or in wetland habitats. The status of the water rat (*Hydromys chrysogaster*) is unclear as it has not been recorded recently and may have declined locally (Worley Astron 2005), therefore it is considered unlikely that the water rat occurs in Site A despite the presence of saline flat and beach habitat.

Three skink species, *Lerista planiventralis maryani*, *Lerista quadrivincula* and *Notoscincus butleri*, have been recorded in the Pilbara region and are considered to have the potential to occur within the Burrup Peninsula and Site A. *Lerista planiventralis maryani* and *Lerista quadrivincula* forage in litter and detritus in hummock grassland, open heath, open scrub and tall shrubland. *Notoscincus butleri* is known from a small locality around Karratha, as well as other areas in the Pilbara, and has been located in a diverse array of habitats common on the island and the mainland (ENV 2006). Due to a lack of information on these species, it is difficult to ascertain whether habitat within Site A is suitable therefore it is assumed that these species have the potential to occur on site.

17.11 Threatened or Priority surveys not provided. Fauna Management Plan proposes to "identify and peg significant habitats in the vicinity of the site preparation within Site A" …. "to ensure that sensitive fauna habitats are avoided". These should have been identified as part of the PER. It is further proposed "Monitoring of habitat disturbance in and adjacent to the working areas will be undertaken for the duration of the works". How is this monitoring going to be conducted when there are no data available for the site?

A desktop fauna assessment was undertaken for Site A; this is consistent with the advice provided by the Department of Environment and Conservation (DEC).

Rockpiles and the beach are considered important habitats within Site A, as rockpiles provide habitat for the Pilbara olive python and the beach is used for low intensity nesting by flatback turtles and possibly green turtles. The disturbance footprint avoids these habitats as much as possible. Rockpiles and beach areas in the vicinity of the disturbance footprint will be pegged and their importance as fauna habitat will be communicated to personnel working on site.

It is proposed that monitoring of habitats will involve visual inspection for signs of habitat disturbance or vegetation clearing outside of the disturbance footprint. The Fauna Management Plan will be developed in consultation with DEC: procedures for monitoring habitat disturbance will be refined during this process.

17.13 The PER makes unsubstantiated unreferenced comments which tend to downplay the significance of the Burrup for fauna, e.g. "Terrestrial fauna habitats on the Burrup are well represented throughout the Pilbara region (Page 33), "most vertebrate species are widespread throughout the Pilbara region" (Page 33. What about those that are not widespread?), "There is a limited range of habitats available to fauna on the Burrup Peninsula compared with the remainder of the region" (Page 39). This downplays the significance of the habitats present. This is in direct contrast with the statement in the Desktop Fauna Report that states on Page 4 "The diversity of terrestrial species on the Burrup Peninsula is comparatively high considering its relatively small area compared with the Pilbara as a whole. This high diversity can be partly explained by the multitude different macro-habitats found on the Burrup Peninsula, but also by the number of microhabitats which provide food and shelter within each broad scale habitat type"

The various statements referred to are not considered to be in direct contrast with one another, but relate to different subjects as outlined below.

"Terrestrial fauna habitats on the Burrup are well represented throughout the Pilbara region (Page 33)". The broad fauna habitats of the Burrup Peninsula, such as rocky slopes, undulating slopes, drainage gullies, valleys, mangroves, beaches, saline flats and rocky coastlines are based on landforms and vegetation and are found elsewhere in the Pilbara region of Western Australia. For example, according to May and McKenzie (2002), the Pilbara 4 (Roebourne synopsis) includes upland *Triodia* hummock grasslands, ephemeral drainage lines, samphire and mangroves. According to Van Vreeswyk et al (2004), the Burrup Peninsula includes hills, ridges, domes and upper slopes that support hummock grassland, lower slopes, stony plains, Gilgai plains, upper drainage lines, drainage floors and channels with hummock grasslands, shrublands or woodlands and drainage foci, which are found within the Granitic Land System (402 000ha) and Rocklea Land System (2 299 300ha) of the Pilbara region. It is therefore considered that broad-scale habitats found on the Burrup Peninsula are also found elsewhere.

"Most vertebrate species are widespread throughout the Pilbara region" (Page 33. What about those that are not widespread?)". The desktop fauna report and the fauna assessment of the PER have focused on Site A and the Burrup Peninsula. Those vertebrate species not found within the development area but are elsewhere within the Burrup Peninsula or Pilbara region are not discussed as they are not relevant to the proposal.

"There is a limited range of habitats available to fauna on the Burrup Peninsula compared with the remainder of the region" (Page 39). This downplays the significance of the habitats present." This statement needs to be read within the context of the rest of this section. The full statement in the PER reads '*There is a limited range of habitats available to fauna on the Burrup Peninsula compared with the remainder of the region, with no extensive open water, woodland or riparian habitat'.* This statement does not attempt to outline the significance of habitats, but refers to the fact that the Burrup Peninsula supports some but not all broad-scale habitats that are found in the Pilbara region. For example, the Pilbara region also supports permanent water features such as the Millstream wetlands and deeply incised gorges of the Hamersley Range that contain extensive permanent spring-fed streams and pools (Kendrick 2001). Similar habitats

are not found on the Burrup Peninsula due to the lack of permanent water features. Mulga habitat is also found in the Pilbara, but not on the Burrup Peninsula.

"The diversity of terrestrial species on the Burrup Peninsula is comparatively high considering its relatively small area compared with the Pilbara as a whole. This high diversity can be partly explained by the multitude of different macro-habitats found on the Burrup Peninsula, but also by the number of microhabitats which provide food and shelter within each broad scale habitat type." This statement relates to the number of species supported by the Burrup Peninsula (at least 304 vertebrate species in approximately 11 846 ha) which is considered high diversity for the relatively small area. A possible contributing factor to the high species diversity is the number of broad-scale habitats (macrohabitats) and the various local-scale habitats within those (microhabitats) on the Burrup Peninsula, as stated on page 4 of the desktop fauna report.

16.8 Table 6-1 (page 80) should be updated to state that weeds that are introduced or spread as a result of site preparation activities will be eradicated.

This commitment is included in Table 1-3 Framework Weed Management Plan, page 104 of the PER.

17.6 How will major weeds present on Site A be managed?

A vegetation and flora survey undertaken within Site A recorded kapok (*Aerva javanica*), buffel grass (*Cenchrus ciliaris*) and milk thistle (*Sonchus oleraceus*); the full survey results are presented in Astron Environmental (2005). Most of the weeds occur on the coastal dunes in the north of the site, although some weeds were recorded in gullies and rockpiles.

The Weed Management Plan in Appendix B of the PER outlines management strategies including the identification of weed infestations prior to the commencement of site preparation, establishment of plant and vehicle hygiene to minimise the introduction or spread of weeds on site and the restriction of access within the site to minimise construction vehicle or personnel movements.

Regular visual inspections for weeds will be carried out, and a control programme will be implemented if observations reveal that weeds have spread or been introduced as a result of site preparation activities. Weed control will be undertaken using methods such as chemical control and manual removal. The methods used will depend on the time of year, the weed species and the location of the weeds.

16.7 It is noted on pages 79–84 that advice will be sought from CALM in relation to the development of environmental management plans. CALM would be pleased to provide advice to guide the development of these plans. As preliminary advice the proponent should ensure that management plans contain key performance indicators that are quantifiable, relate directly to objectives/targets, and are supported by a rigorous monitoring system.

This comment is acknowledged.

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