FINAL REPORT

Department of Defence

Mobile User Objective System (MUOS), Western Australia

Initial Environmental Review

August 2006

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Initial Environmental Review

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Reference: 0052594

For and on behalf of Environmental Resources Management Australia

Approved by: Ruth Kelly

Signed: 

Position: Senior Consultant
Date: 31 August 2006

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1 INTRODUCTION

1.1 OVERVIEW

Environmental Resources Management Australia Pty Ltd (ERM) has been commissioned by the Department of Defence (Defence) to provide an Initial Environmental Review (IER) for the construction of the Mobile User Objective System (MUOS) in Western Australia (WA).

MUOS, a United States (US) owned satellite communications system has four primary uplink ground sites worldwide. A more detailed description of the project is provided in *Section 2.1*. Defence is currently assessing two potential locations for the MUOS project and both Geraldton and Garden Island (HMAS Stirling), have been identified in WA as potential sites:

- Geraldton is the regional hub of the entire mid-west of WA and is located approximately 450km north of Perth, perched near coastline to the west and rolling hills and breakaway ranges to the east. The Chapman and Greenough Rivers frame the heart of Geraldton to the north and south (*Figure 1.1)*.

- Garden Island is located 45km south of Perth and covers approximately 1200ha of land and is surrounded by 2500ha of naval waters *(Figure 1.2)*. A causeway joins the Island to the mainland at Cape Peron, where a small area on commonwealth land is used for access control.

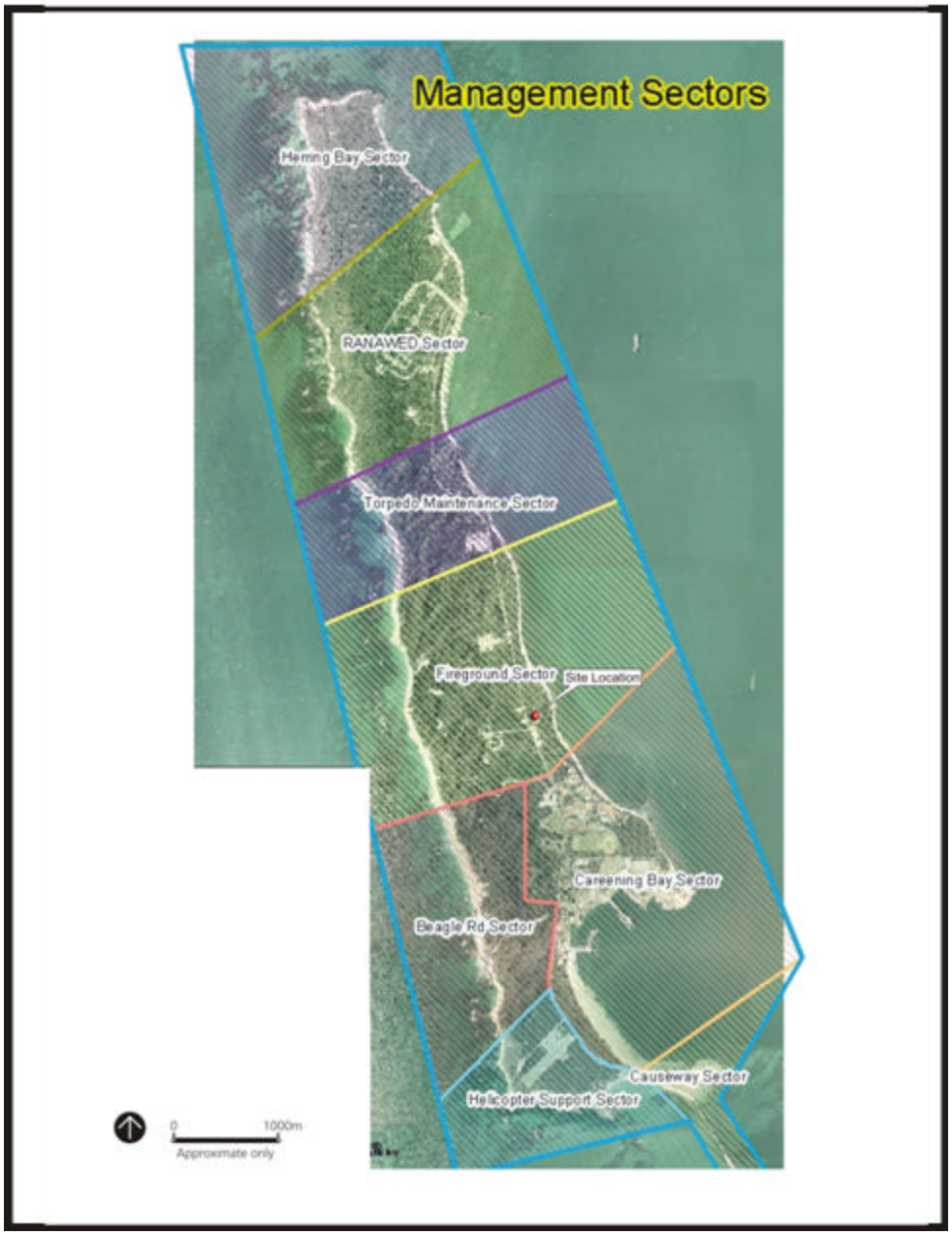
  Garden Island refers to the whole of the Island and its Defence component is known as HMAS Stirling and/or Fleet Base West. Approximately 30% of the land is used for defence purposes while the remaining 70% is covered in bushland and managed for conservation purposes. In order to manage these areas the Island is organised into a series of sectors for management purposes *(Figure 1.3)*. Members of the general public have access (via private boat only) to those areas not zoned for naval development.

This IER assists in the selection of a preferred site as well as facilitating Defence's decision making with respect to environmental, heritage and amenity aspects resulting from the project.

Figure 1.1 Geraldton Site Location

Figure 1.2 Garden Island Site Location

Figure 1.3 Garden Island - Management Sectors



1.2 *PURPOSE OF REPORT*

This document is an initial review of environmental issues identified through the review of information and analysis of any gaps. The IER will inform Defence on the background of environmental conditions for each site, the risk and potentially significant impacts resulting from the proposal and the means by which the impacts could initially be mitigated.

This IER considers the environmental and heritage issues at both Garden Island and Geraldton to assist Defence in the siting, construction and operation of the project.

The environmental risks of both sites have been quantified and prioritised in order to assist Defence select a preferred site. This will assist in choosing the most appropriate location and planning ahead for any environmental issues which may need to be managed throughout the development process.

1.3 *METHODOLOGY*

ERM adopted a core approach and undertook the following to ensure that the heritage, environmental and social aspects were considered:

- review of existing reports;
- desktop review including searches;
- site inspection of Garden Island; and
- consultation with Defence staff.

1.4 *STRUCTURE OF THIS REPORT*

The report is structured with the following chapters:

- Introduction;
- Project Description;
- Legislative Framework;
- Geraldton Site Environmental Factors;

- Garden Island Site Environmental Factors;
- Risk Assessment;
- Management; and
- Conclusions.

The environmental issues covered in the 'Environmental Factors' chapter includes:

- natural heritage (flora and fauna);
- Aboriginal heritage;
- historical (cultural) heritage;
- hazardous waste;
- contaminated sites;
- noise and air pollution;
- sediment and erosion control;
- access and ingress issues;
- changes to current site capacity;
- remediation;
- visual amenity and public perception;
- environmental sustainable development (ESD) considerations; and
- water and energy resources.

Each of these environmental issues are discussed in terms of their:

- background;
- potential impacts;
- gaps; and
- references.

2 PROJECT DESCRIPTION

2.1 PROJECT DESCRIPTION

The communications station will consist of three 18.4m Ka-band earth terminals (ET), the radio access facility (RAF), power distribution units (PDUs), and transformers.

Each ET requires a single ancillary structure with a footprint or roughly 50m x 10m. The three ETs will be supported by one RAF shelter to house the antenna PDU and ET drive transformer required by the antenna. Generally one ET will point east provide a link to a Pacific Ocean Satellite, the second will point west to link to an Indian Ocean satellite and the third is a back up.

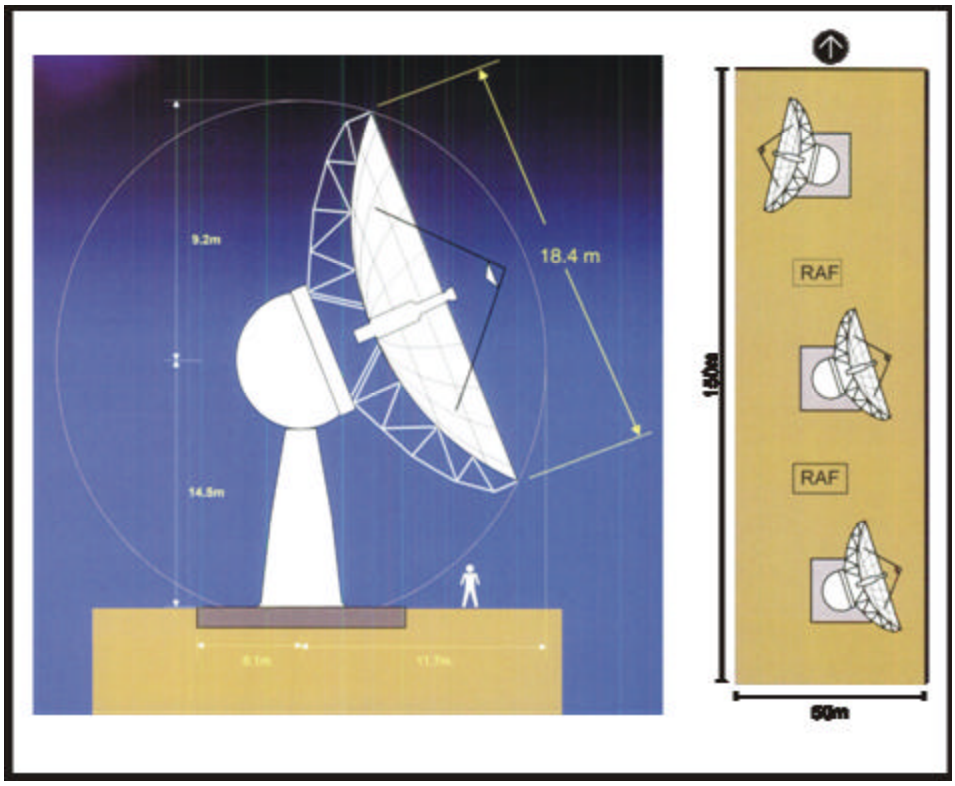
The entire site will cover an area of 150m x 50m and will be surrounded with a suitable fence to enhance physical security for the ETs and the ancillary structure.

The facility will include:

- three 18.4m diameter antennas (23.7m tall from the ground to the highest point of the dish) *(Figure 2.1*);
- a small building;
- power upgrades to support 785kw of power;
- backup generator and fuel storage; and
- fibre connections and a security monitoring system.

The antennas will be of a pedestal design *(Figure 2.1)* and associated facilities will be assimilated into the landscape.

Figure 2.1 Diagram of proposed Earth Terminal and facility compound



2.2 NEED FOR THE PROPOSAL

The MUOS will be a US government owned satellite communications system that will support a worldwide, multi service population of mobile and fixed-site terminal users.

The MUOS will ultimately replace the Follow-On (UFO) system while providing continued interoperability with the legacy terminals. It has four primary uplink ground sites worldwide supporting operations. One site is to be located in Australia, which will support communications to two of four MUOS satellites and connection to other MUOS ground stations.

The placement of a MUOS ground site in Australia has been approved in principle by the Australian government. To support this US government requirement, the Australian government has supported previous site visits and detailed surveys.

2.3 *ALTERNATIVES CONSIDERED*

Items of consideration that were part of the process of MUOS site selection include:

- availability of 24hr security;
- accessibility, convenient access to roads, water, power and Telecom services; and
- redundancy in terms of communications (the MUOS project has a requirement for two independent links back to the US).

Geraldton and Garden Island were chosen as potential sites for the MUOS after consideration of a range of technical requirements as well as those concerned with logistic and other support needs.

2.3.1 *Geraldton Site Overview*

The site being considered for the facility is situated inside the ADSCS. ADSCS is approximately 25km east of Geraldton in the Kojarena Range, north of the Geraldton-Mullewa Road (*Figure 1.1*).

The Kojarena Range reveals undulating country and the site is located within a valley with a small creek running through and shielding hills on three sides. The proposed site is located on the western side of the creekline which is used for pastoral grazing and is substantially cleared.

The ADSCS covers 455ha, including some 30ha used by Defence for a secure compound and an access road (*Figure 2.2)*. The ADSCS site was acquired compulsorily vide Commonwealth Government Gazette (S330 of 2 December 1987) and was chosen as it is within reasonable commuting distance from Geraldton. In addition there are convenient access to roads, water, power and terrestrial communication services.

An 'Environmental Options Assessment' was undertaken in June 1987 by Kinhill Engineers Pty Ltd to examine various locations for the potential ADSCS site. The assessment provided the environmental information used by Defence in the overall selection process of the preferred operational location. The key environmental issues bought forward during the assessment included but were not limited to the flora and fauna, Aboriginal heritage, historical heritage and topography.

Seven potential sites were initially identified within a 20km to 40km distance of Geraldton, which all has surrounding hills to provide some shielding from external radio interference and were inland by at least 10km so the station would not suffer the corrosive effects of salt spray carried inland by winds. Of the seven sites, five showed greater potential and were examined in closer detail.

Two sites were then short-listed for the ADSCS before a final choice was made. Factors governing the final site selection included but were not limited to flora and fauna, Aboriginal heritage and space.

The proposed MUOS site lies north of the existing ADSCS secure buildings *(Figure 2.2)* within the buffer of the compound.

Figure 2.2 ***Geraldton ADSCS and proposed MUOS site location.***

2.3.2 Garden Island Site Overview

HMAS Stirling is the largest operational naval base utilised by Defence and is located on Garden Island. Garden Island lies between the Indian Ocean to the west and Cockburn Sound to the east and can only be accessed via a 4.2km causeway.

The site survey collected information on Garden Island and two potential sites that were located next to one another were identified as the most suitable locations for the installation of the antenna field *(Figure 2.3)*. Both of these sites were previously used for telecommunications in the past. Site selection was made on the northern site, which is situated at a slightly higher elevation.

The site is located on the eastern side of the Island just north of Careening Bay Operations area, within a designated 'development area'. This development area forms part of the 30% of the Island that may be developed for roads and/or naval establishments. The site faces Cockburn Sound and lies approximately 15m Australian height datum (AHD), with gently undulating hills to the west.

The proposed site is located within the Fireground sector (*Figure 1.3)*, which is considered to have high defence capability values, high cultural and natural heritage values and medium environmental values (Garden Island, Heritage Assessment and Statement of Significance, ERM 2005).

Figure 2.3 Garden Island proposed construction location

3 LEGISLATIVE FRAMEWORK

3.1 INTRODUCTION

There are a series of legislative requirements and policy frameworks that guide this project. Outlined below is a summary description of the guiding provisions and how they apply to this project including:

- Commonwealth legislation;
- Defence policy and management frameworks; and
- State legislation and planning instruments.

3.1.1 Commonwealth Legislation

Both Geraldton and Garden Island sites are Defence (Commonwealth) owned facilities, the guiding legislation in terms of the environment is the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In summary the key sections of the EPBC Act that are applicable to this project include:

- Part 3, Division 1: Requirements relating to matter of national environmental significance;
- Section 26: Requirement for approval of activities involving Commonwealth land;
- Section 28: Requirement for approval for activities undertaken by a Commonwealth agency; and
- Section 341ZC: Minimising adverse impacts on heritage values.

3.1.2 Defence Policy and Management Frameworks

The following is a list of the relevant Defence policy and management frameworks that relate to this project:

- Environmental Policy and Vision and Heritage Strategy and Vision;
- Environmental Management Planning;
- Defence Instructions;

- ADSCS Geraldton Environmental Management Plan;
- HMAS Stirling, Garden Island Environmental Management System;
- Garden Island Heritage Assessment and Statement of Significance; and
- Garden Island Strategic Heritage Plan.

3.1.3 State Legislation and Planning Instruments

The General Defence Instructions for Environmental and Heritage Management in Defence provides for Defence personnel to comply with:

- State;
- Territory;
- Local government environmental legislation; and
- Local government environmental requirements.

This compliance is considered to the extent that these do not conflict with Commonwealth legislative obligations. Legislation for the protection of the heritage of Garden Island is the EPBC Act. The Commonwealth heritage list (CHL) is protected by this Act. As a Commonwealth body, Defence is primarily guided by the EPBC Act at both sites in terms of avoidance of significant impacts on the environment.

Key state and local frameworks that relate to this project include:

- State Environmental (Cockburn Sound) Policy (2005);
- Contaminated Site Management Series: Assessment Levels for Soil, Sediment and Water. (DEC November 2003);
- *Environmental Protection Act 1986*; and
- *Aboriginal Heritage Act 1972.*

The following evaluation and risk assessment has been undertaken in consideration of the requirements of these Acts and instruments.

4 GERALDTON SITE ENVIRONMENTAL FACTORS

4.1 TOPOGRAPHY

4.1.1 Background

The Kojarena Range consists of a landform where the ancient plateau surface has been eroded, revealing the undulating country typical of the Northampton Block.

4.1.2 Potential Impacts

Ground disturbance during construction of the site for the MUOS facility will change the topography of the area, however this is not a major impact as the footprint of the facility is not considered big. Any potential effects as a result of ground disturbance will be managed through the Construction Environmental Management Plan (CEMP).

4.1.3 Gaps

No gaps were identified for this component.

4.1.4 References

- ADSCS Geraldton Environmental Management Plan (EMP).
- Site Selection for Geraldton Satellite Communications Station: Preliminary Environmental Assessment (Kinhill Engineers Pty Ltd, June 1987).

4.2 GEOLOGY AND SOILS

4.2.1 Background

Residuals of the overlaying Jurassic strata remain as isolated flat topped hills or mesas. Remnants of the original sand plain are evident on the mesa summits and granite outcrops are evident in some parts of the site.

Geotechnical surveys have revealed underlying granite within the compound area, however, its depth and nature varies considerably. Some gravel has been extracted from laterite on private property near the eastern boundary of Defence-owned land.

Soils on the site are mainly sandy loams. There is no significant soil erosion on the site, and where there is, it is comparatively stable.

4.2.2 Potential Impacts

During construction of the MUOS facility the geology and soil may be impacted causing erosion and sedimentation as a result of ground disturbing works. This will be address as part of the CEMP.

4.2.3 Gaps

No gaps were identified for this component.

4.2.4 References

- ADCSC Geraldton EMP.
- Site Selection for Geraldton Satellite Communications Station: Preliminary Environmental Assessment (Kinhill Engineers Pty Ltd, June 1987).

4.3 HYDROLOGY AND HYDROGEOLOGY

4.3.1 Background

Some springs exist on the site which lies within the Gascoyne Groundwater Area. Scabby Station Gully Creek is fed by a spring (on a neighbouring property) and normally flows for 11 months of the year. There is some underground water throughout the general area which contains some dissolved salt.

A Water Authority Western Australia water pipeline runs south of the Mullewa Road and connects Geraldton to Wicherina Springs and continues on to Mullewa.

4.3.2 Potential Impacts

- Impacts on the hydrology and hydrogeology of the area will be negligible as the proposed MUOS facility is located to the west of the creek and is not expected to interfere with any surface water or groundwater resources. However, the construction of the facility may cause runoff to occur into the creek.

- During the construction of the facility it would be environmentally best practice to include measures to prevent any runoff into the creek that may occur.

4.3.3 Gaps

No gaps were identified for this component.

4.3.4 References

- ADSCS Geraldton EMP.

- Site Selection for Geraldton Satellite Communications Station: Preliminary Environmental Assessment (Kinhill Engineers Pty Ltd, June 1987).

4.4 LISTED VEGETATION COMMUNITIES AND THREATENED SPECIES (STATE AND COMMONWEALTH LEVEL)

4.4.1 Background

The flora and fauna conservation value of the site has been substantially degraded through clearing and pastoral use, consequently development of the facility would have negligible impact upon native flora and fauna.

Register searches

- An online search of the Department of the Environmental and Heritage (DEH) website for matter of national environmental significance (NES) was undertaken for the site including a 500m buffer (*Annex A*).

- No matters of NES were identified at the site.

Previous Investigations

- A very limited amount of biological survey work has been conducted in the Geraldton area. Kinhill Engineers Pty Ltd undertook a flora and fauna survey of the ADSCS. No rare or restricted plants or rare species of animals were found within the area which is located immediately south of the proposed footprint of the MUOS facility.

- The survey conducted by Kinhill Pty Ltd recorded a total of 14 species of birds at the ADSCS site. All of the mammals and birds observed during the survey are relatively common in a regional context and it was found that the faunal conservation value of the ADSCS site was very low.

- The survey found that the stream dissecting the site contains a prolific growth of saltine grass. This is an exotic species and its occurrence is probably attributable to the spread of seeds from the lawn surrounding the farmhouse located upstream.

4.4.2 Potential Impacts

The proposed site for the MUOS facility is located north-west of the existing ADSCS secure compound, within the 500m buffer zone which is currently used for pastoral use. There does not appear to be any significant areas of native vegetation where the footprint of the MUOS facility is proposed.

4.4.3 Gaps

No gaps were identified for this component.

4.4.4 References

- ADSCS Geraldton EMP.

- Site Selection for Geraldton Satellite Communications Station: Preliminary Environmental Assessment (Kinhill Engineers Pty Ltd, June 1987).

4.5 ABORIGINAL HERITAGE

4.5.1 Background

Current Listings

There are no current listings for the proposed MUOS site.

Register searches

The Aboriginal Heritage Inquiry System was searched and scattered artefacts have been identified at Scabby Station Gully Creek, which is located to the east of the proposed site.

Previous Investigations

- Archaeological and ethnographic assessment was undertaken for the ADSCS which is located next to the proposed MUOS site. Kinhill Engineers Pty Ltd undertook a comprehensive ethnographic and archaeological survey for the ADSCS. The purpose of the surveys was to identify, investigate and recommend possible remains to preserve any Aboriginal sites of significance within the sites that would be affected by the proposed development.

- The area surveyed for archaeological sites encompassed the site and the proposed access corridor to the site was surveyed for a width of at least 100m either side of the centre line. The adjacent ridge near the proposed access corridor of the site was also examined. The survey confirmed that small artefact scatters existed at the ADSCS site, however the isolated finds are not registered as sites, but consistent with Museum policy, are recorded as single artefact places.

- The ethnographic survey conducted at the ADSCS concluded that the site did not contain any sites of religious or historical significance. The nearest site of ethnographic significance was identified in the vicinity of the Chapman River, some distance to the north-west of the proposed MUOS site.

- The Kinhill Pty Ltd archaeological assessment involved discussion with the local Aboriginal spokesman in the Geraldton region and it was identified that the occasional artefact scatters that were noted during the field survey do not support the likelihood that the area would include significant Aboriginal sites.

4.5.2 Potential Impacts

- There are no significant archaeological sites that would constrain the location of the MUOS at the site. The artefacts noted in the area were of a general type and indicative of brief visits to the area by Aboriginals for seasonal activities such as foraging or travel.

- Although the archaeological sites identified through the survey for the ADSCS do not represent major sources of Aboriginal heritage, they contribute to the understanding of the pattern of life for 'pre and post-colonisation' Aboriginals. Further investigations may be required of the site to inspect for Aboriginal sites.

4.5.3 Gaps

- Additional survey work may be required following selection to ensure that the design and construction of the facility provides adequate preservation of any possible Aboriginal heritage sites of interest if the sites are required to be avoided.

- A full survey of the site should be conducted prior to any construction to ensure the identification and adequate protection of any possible Aboriginal sites.

- An application for permission from the Register of the Department of Aboriginal Sites (Western Australian Museum) to disturb the archaeological sites should precede any development.

4.5.4 References

- ADSCS Geraldton EMP.
- Site Selection for Geraldton Satellite Communications Station: Preliminary Environmental Assessment (Kinhill Engineers Pty Ltd, June 1987).
- Site Selection for Geraldton Satellite Communications Station: Archaeological and Ethnographic Assessment. (Kinhill Engineers Pty Ltd June 1987).

4.6 HISTORICAL HERITAGE

4.6.1 Background

Previous investigation conducted on the ADSCS confirmed that there are no buildings of historical interest within the area including the proposed MUOS site. Therefore historical and heritage amenity of the region does not require further consideration.

4.6.2 Potential Impacts

No potential impacts were identified for this component.

4.6.3 Gaps

No gaps were identified for this component.

4.6.4 References

- ADSCS Geraldton EMP.
- Site Selection for Geraldton Satellite Communications Station: Preliminary Environmental Assessment (Kinhill Engineers Pty Ltd, June 1987).
- Site Selection for Geraldton Satellite Communications Station: Archaeological and Ethnographic Assessment (Kinhill Engineers Pty Ltd June 1987).

4.7 NATURAL HERITAGE

4.7.1 Background

There are no natural heritage listings for the proposed MUOS site.

4.7.2 Potential Impacts

No potential impacts were identified for this component.

4.7.3 Gaps

No gaps were identified for this component.

4.7.4 References

- ADSCS Geraldton EMP.
- Site Selection for Geraldton Satellite Communications Station: Preliminary Environmental Assessment (Kinhill Engineers Pty Ltd, June 1987).
- Site Selection for Geraldton Satellite Communications Station: Archaeological and Ethnographic Assessment (Kinhill Engineers Pty Ltd, June 1987).

4.8 HAZARDOUS WASTE AND MATERIALS SUCH AS ASBESTOS

4.8.1 Background

The site has previously been used for pastoral grazing and has no history of hazardous material ever existing at the site. To construct the MUOS facility no hazardous waste or material such as asbestos are proposed to be used.

The construction phase will involve materials required for infrastructure including water supply and disposal, electricity and/or gas. Associated waste streams will include, but not limited to metal waste, pipe off-cuts and concrete.

4.8.2 Potential Impacts

Based on the data reviewed to date there appears to be no potential impacts.

4.8.3 Gaps

It appears that there has not been any dumping in the past due to the historical landuse of the site however this may need to be confirmed.

4.8.4 References

- ADSCS Geraldton EMP.
- Site Selection for Geraldton Satellite Communications Station: Preliminary Environmental Assessment (Kinhill Engineers Pty Ltd, June 1987).

4.9 CONTAMINATED SITES SUCH AS HYDROCARBONS AND ORGANIC CHLORINES

4.9.1 Background

Historically the site has been used for pastoral use and it does not appear, based on this history that there are any contaminated issues.

4.9.2 Potential Impacts

Based on the data reviewed to date there appears to be no potential impacts.

4.9.3 Gaps

It appears that there are no contaminated issues with the site however this may need to be confirmed.

4.9.4 References

- ADSCS Geraldton EMP.
- Site Selection for Geraldton Satellite Communications Station: Preliminary Environmental Assessment (Kinhill Engineers Pty Ltd, June 1987).

4.10 NOISE POLLUTION AND AIR POLLUTION E.G. DUST

4.10.1 Background

The ADSCS is located within a quiet rural zone and noise attenuation from emergency power generators and all mechanical plants were attenuated to maintain acceptable noise levels for working conditions at the station and to maintain the noise area category at the site boundary under normal atmospheric conditions.

Previous investigations

A study was undertake by Bernard Ardagh Building Science Consultants to determine, by site measurement, the attenuation of sound over distance and to ascertain whether precautions are required to prevent noise being an annoyance to neighbouring properties.

The noise area category was estimated to be R1 to Australian Standard 1055.2–1984.

4.10.2 Potential Impacts

The only potential noise and air pollution impact will be produced during the construction phase. Air pollution such as dust will be generated by earth moving, vehicle movements and wind erosion from stockpiles and exposed areas. Dust will be managed by the contractor.

4.10.3 Gaps

There are no gaps for this component.

4.10.4 References

- ADSCS Geraldton EMP.
- Acoustic Study, Satellite Communication Station, Geraldton WA. (Bernard Ardagh Building Consultants, March 1998).

4.11 SEDIMENT AND EROSION CONTROL

4.11.1 Background

The site proposed for the MUOS facility does not consist of much vegetation and the soils are not prone to erosion, however, is located immediately north of the ADSCS where site disturbance was experienced during the construction and design of the station. Effective measures for the control of erosion and instability of soils was incorporated.

Disturbed surfaces were given a topsoil cover and vegetation was re-established as soon as construction was completed. Disturbed areas were grassed and/or landscaped to minimise soil erosion and control of construction activities were put in place to minimise disturbance to Scabby Station Gully Creek banks and rehabilitation of creek banks.

4.11.2 Potential Impacts

Erosion is not a major concern for the MUOS site, however during the construction of the facility mitigation measures may need to be put in place similar to those used in the construction of the ADSCS to minimise and avoid any runoff into Scabby Station Gully Creek.

4.11.3 Gaps

No gaps were identified for this component.

4.11.4 References

ADSCS Geraldton EMP.

4.12 ACCESS AND EGRESS ISSUES

4.12.1 Background

The MUOS site can be accessed via Geraldton Mount Magnet Road and Kojarena Road north for the movement of material for construction and via the existing access roads that have been developed for the ADSCS.

Trucks accessing the ADSCS for the construction of the MUOS facility will not have problems. The station is a secure site and has been designed for movement of trucks. The carpark and roads within the compound have been designed in a loop so that trucks do not need to reverse.

4.12.2 Potential Impacts

In order for construction vehicles and personnel to gain access into the secure area the procedure that is already in place will need to be followed.

4.12.3 Gaps

There are no gaps for this component.

4.12.4 References

- ADSCS Geraldton EMP.
- Personal communications with Defence personnel.

4.13 INCREASED OPERATIONAL CHANGES TO CURRENT SITE CAPACITY

4.13.1 Background

The MUOS facility is proposed to be located outside the existing ADSCS area and will therefore not affect the current site capacity.

4.13.2 Potential Impacts

There are no potential impacts for this component, however this is not an environmental issue but a Defence operational capacity issue. Once constructed the MUOS facility would potentially impact on space pressures rather than operational pressures.

4.13.3 Gaps

No gaps were identified for this component.

4.13.4 References

ADSCS Geraldton EMP.

4.14 REMEDIATION OF SITE

4.14.1 Background

Historical use of the site appears to have only been used for the purpose of pastoral grazing, therefore it appears that the site does not require any remediation.

4.14.2 Potential Impacts

Based on the data reviewed to date there appears to be no potential impacts.

4.14.3 Gaps

Based on the data reviewed to date there appears to be no evidence that the site requires remediation.

4.14.4 References

ADSCS Geraldton EMP.

4.15 VISUAL AMENITY AND PUBLIC PERCEPTION

4.15.1 Background

The proposed MUOS site is located approximately 25km out of town and is situated within a ridge, surrounded by three gently undulating slopes. The site has ridges to the east and west, with the ridge to the west being slightly higher.

Public perception of the proposed facility is potentially negligible as the only angle that the ETs will be visible from the north, which is used for farming by local farmers. Farmers within the area are aware that the land is currently used for the purpose of satellite communications.

This ADSCS management plan covered a range of social issues arising from the establishment and operation of the ADSCS and included liaison with the local community, public information on the station, public access to the station, housing and employment of local people.

Throughout the development of the ADSCS there was been considerable contact between Commonwealth officials (Defence, Australian Construction Services and Australian Property Group personnel) and State Government Authorities, Local Government Authorities and representatives of the wider community, including the media. These relations were generally amicable and positive and provided a good basis for future relations between ADSCS staff and the local community.

Defence undertook an interactive public information program in the Geraldton area to dispel any public fears associated with the ADSCS, this program was effective.

4.15.2 Potential Impacts

- The site is not visible from the main road as the site is in a gully and visual aesthetics will not be an issue.
- The perception from the public in regards to whether or not the MUOS system will provide any benefit to the Australian Defence communications systems may have a social impact.

4.15.3 Gaps

There appears to be no visual amenity issues associated with the site however confirmation as to the benefit for Australian Defence communications needs to be established. This has not been based on a site inspection or on any detailed social analysis or community consultation.

4.15.4 References

ADSCS Geraldton EMP.

4.16 ESD CONSIDERATIONS AND PROVISION OF ADEQUATE WATER AND ENERGY RESOURCES

4.16.1 Background

Proposed operations at the facility will not demand water supply. The only use of water will be required through the construction phase.

The MUOS facility would require approximately 785kw of electrical power (488kw for the three ETs and 297kw for the RAF), with a backup generator to support approximately 800kw of power. Primary power requirements (785kw) are already available from the base power house at the ADSCS.

4.16.2 Potential Impacts

No potential impacts have been identified for this component. It should be noted that while it is prudent to use best practice to incorporate ESD considerations, Defence is restricted by operational needs which are driving the facility itself.

4.16.3 Gaps

Defence should consider any ESD approaches being adopted to ensure that any water and energy resources used will be done in a sustainable manner. These could be incorporated into the design of the facility and could potentially included building materials and energy efficiencies, without comprising operation needs.

4.16.4 References

- Communications Satellite Program Office: MUOS PowerPoint presentation (March 2006).
- ADSCS Geraldton EMP.

5 GARDEN ISLAND SITE ENVIRONMENTAL FACTORS

5.1 TOPOGRAPHY

5.1.1 Background

Geologically the Island is a ridge of Pleistocene limestone covered by Holocene calcareous sand dunes. The distribution and elevation of the limestone determines the gross topography of the Island.

On the western side are steep dunes and limestone cliffs exposed to high energy ocean and wind conditions. On the east are lower relief (gently undulating) benches associated with low energy conditions (Brooker 1992, referenced in URS 2001).

The centre of the Island is dominated in the south by a series of large dunes ranging in height from 25m to 55m and in the north by a gently undulating landscape.

Figure 5.1 Garden Island - Looking north-east (from the western boundary) toward the northern cleared area

5.1.2 Potential Impacts

- As the topography of the site varies the area will need to be raised in order for the ETs to be on one level. This will involve the introduction of additional soil to the island and the potential for weed and disease (eg. dieback).

- Introduction to soil topography for site would require control measures, including stockpile management, dust management and transport.

5.1.3 Gaps

- Investigations into the amount of soil required to level the area will need to be determined and possible sources of soil from which soil can be collected, to ensure that the soil is free from weeds and disease.
- Control measures will need to be taken to ensure that any problems regarding importing of soil be addressed and tackled. Information detailing the source of the soil, how much is required and verification that it is free from weeds and disease should be provided.

5.1.4 References

- HMAS Stirling / Garden Island EMS Development Project, Environmental Review Report (ERM, October 2005 for Department of Defence).
- Personal communications with Regional Environmental Officer (REO) during site visit of Garden Island.

5.2 GEOLOGY AND SOILS

5.2.1 Background

Garden Island is part of a limestone ridge, formed during Pleistocene times, which comprises the Murray Reefs, Penguin Island, Cape Peron, Camac Island and Rottnest Island. The Island occurs within the Quindalup Dunes Formation and is predominately composed of Tamala Limestone, which comprises calcareous Safety Bay Sand overlying aeolianite (McArthur & Bartle, 1981, referenced in URS 2001).

The parabolic sand dunes that dominate the western side of the Island are among the best preserved dunes of the Quindalup soil unit. Limestone outcrops and intertidal rock platforms occur on the western and southern coastlines.

All soils on Garden Island are classified as Undifferentiated Calcareous Sands (Uc 1.11), and generally comprise dark grey to grey brown surface sands overlying pale coloured sands at depth.

5.2.2 Potential Impacts

During construction of the MUOS facility the geology and soil maybe impacted causing erosion and sedimentation as a result of ground disturbing works. This will be addressed as part of the CEMP.

5.2.3 Gaps

No gaps have been identified for this component.

5.2.4 References

- HMAS Stirling / Garden Island EMS Development Project, Environmental Review Report (ERM, October 2005 for Department of Defence).
- Personal communications with REO during site visit of Garden Island.

5.3 HYDROLOGY AND HYDROGEOLOGY

5.3.1 Background

There is no natural fresh surface water on the Island. Any surface runoff generated during rainfall events is extremely localised, due to the presence of the highly porous carbonate sands described above.

Garden Island's superficial aquifer is saline with a narrow top layer of freshwater which varies seasonally with rainfall. Since rainfall rapidly infiltrates down through the sand and limestone of the Island, the groundwater is little more than an extension of the adjacent marine water bodies, with fluctuations in the level and lateral movements determined by competing pressures from the Indian Ocean and Cockburn Sound.

Studies undertaken by Commonwealth Scientific and Industrial Research Organisation (CSIRO) have indicated that the Island's superficial aquifer is highly vulnerable to pollution, in particular the mid-eastern section which is categorised by low elevations and considerable development.

5.3.2 Potential Impacts

No potential impacts have been identified for this component however it is best practise to include runoff controls as part of the construction phase.

5.3.3 Gaps

No gaps have been identified for this component.

5.3.4 References

HMAS Stirling / Garden Island EMS Development Project, Environmental Review Report (ERM, October 2005 for Department of Defence).

5.4 LISTED VEGETATION COMMUNITIES AND THREATENED SPECIES (STATE AND COMMONWEALTH LEVEL)

5.4.1 Background

General Vegetation

- There are 16 vegetation communities on the Island as a whole, most of which comprise varying combinations of the following dominant species: *Callitris preissi, Melaleuca lanceolata, Melaleuca hueglii and Acacia rostellifera, Myporum adscendens, Pittosprorum phyliraeoides and Acacia cochlearis.*

- A small area of vegetation at the site has already been cleared for the purpose of telecommunication antennas, which are no longer in use.

Threatened Ecological Communities

- *Callitris preissi* is located throughout the vegetation present within the proposed footprint of the facility.

- *Callitris preissii* communities of the swan coastal plain are restricted to a small area from Perth to Garden Island and as such are included on the WA Department of Conservation and Land Management's (CALM), Threatened Ecological Communities (TEC) database as 'vulnerable'.

Threatened Species (Flora and Fauna)

An online search was undertaken on the DEH website for matter of NES at the site including a 500m buffer *(Annex A).*

Thirteen threatened species and 15 migratory species were identified through the search and are detailed in brief below:

- a total of 13 threatened species listed under the EPBC Act have been previously recorded within the locality proposed for the antenna facility. The island is important for the role it plays in the conservation of restricted vegetation communities that are undergoing conservation pressures elsewhere in their natural range;

- the fauna diversity of the island is quite low. Birds are more diverse but many that have been recorded on the island in the past occur only as vagrants or occasional visitors. A total of 15 migratory bird species listed under the EPBC Act have been previously recorded within the locality of the proposed area. Despite its low diversity the fauna of the island is of conservation significance as many of the species on the island have suffered range reductions elsewhere; and

- the island is considered a stronghold for the Tammar Wallaby, Carpet Python, Linked Skink and Brush Bronzewing.

5.4.2 Potential Impacts

- Direct impact to the natural heritage by the construction of the facility will contribute to potential loss of natural heritage as an area of *Callitris preissi* and other native vegetation significant to the ecological value of the Island will need to be cleared for the construction of the facility. As the Callitris community has declined elsewhere within its natural range Garden Island supports the most intact example of the community and supports an excellent representation of coastal heath which is floristically distinct from mainland coastal and limestone heaths.

- Indirect impacts will occur to surrounding habitats from development of the infrastructure. The movement of vehicles, personnel, construction machinery and equipment within the Island and the mainland has the potential to transport and spread weeds and weed seeds. Appropriate construction management will minimise the potential for this effect.

- Faunal communities have the potential to use the area that is proposed to be occupied by the MUOS, however, the area is unlikely to represent a significant proportion of the habitat available to the entire population of these animals inhabiting the Island. Similarly the area to be affected by the proposal is unlikely to represent a significant proportion of the foraging habitat available. It should be noted in the context of the above comment, however, with respect to the incremental loss of significant vegetation species.

- Construction traffic may impact on the faunal communities during vehicle transit. There is a high incidence of collisions between Tammars and vehicles on the Island (up to 400 a year). Tammars often access the road verge through holes in fences rather than from unfenced scrub.

5.4.3 Gaps

Control measures will need to be included to in order to mitigate and manage the potential impacts noted above.

5.4.4 References

HMAS Stirling / Garden Island EMS Development Project, Environmental Review Report (ERM, October 2005 for Department of Defence).

5.5 ABORIGINAL HERITAGE

5.5.1 Background

There is limited heritage significance in this aspect where values are confined to one readily recognisable issue (the mythology and stories relating to the Island) and there is limited archaeological potential.

Current Site Listings

- Garden Island itself is registered as a mythical site in the WA State Department of Indigenous Affairs sites register.

Register searches

- The Aboriginal Heritage Inquiry System was searched for the existence of Aboriginal sites within the proposed site area and mythological artefacts were identified.

Previous Investigations

- Investigations have been undertaken by Martinck 1994 and Yates 1996, in relation to the indigenous relationship with Garden Island. Both the reports detail a mythical relationship with Garden Island.

- The Yates report was undertaken to record the results of an archaeological monitoring program for site specific development work on Garden Island in 1996. The report identified potential areas of indigenous and historical sites using a predictive model of archaeological site location. The three areas of indigenous archaeological potential are not located near the site proposed for the antenna facility.

- In addition to the mythological relationships, physical evidence of indigenous presence has also been identified on Garden Island. Three isolated flake finds have been identified, however these are located towards the south and south-west of the Island near the Tamala limestone cliffs, not near the proposed MUOS site.

- Archaeological surveys have identified further areas of potential indigenous sites within the Island, however no additional artefacts have been uncovered and these are not located near the proposed site.

Aboriginal Consultation

- Consultation with relevant indigenous groups was undertaken by Yates 1996. Through this consultative process (Yates 1996), no specific area of Aboriginal significance was identified through letter consultation or during a site inspection with a representative of the Aboriginal community. It is acknowledged however that the island would have been used by indigenous peoples for hunting, fishing and camping.

5.5.2 Potential Impacts

- Although no Aboriginal sites were observed during the field survey this does not mean Aboriginal sites could not be present in buried soils / deposits. However, the likelihood of such a site being disturbed by the proposed development is very low.
- It is envisaged that the development will not pose an adverse impact on Aboriginal values as the site shows low potential for yielding archaeological significance as the site has already been disturbed for telecommunications.
- It can be concluded that no mitigation measure with regards to physical Aboriginal heritage are required, however the CEMP should include measures to manage any discoveries during construction.

5.5.3 Gaps

No data gaps are identified for this component as there appears to be no Aboriginal values located within the footprint of the antenna field.

5.5.4 References

- Garden Island Heritage Assessment and Statement of Significance (ERM, June 2005 for Department of Defence).
- Garden Island Strategic Heritage Plan (Input to Master Plan) (ERM June 2005 for Department of Defence).
- HMAS Stirling / Garden Island EMS Development Project, Environmental Review Report (ERM, October 2005 for Department of Defence).

5.6 HISTORICAL HERITAGE

5.6.1 Background

Historic sites take up a relatively small proportion of the Island and are scattered along its entire length. Majority of the sites of heritage are located in the dunes along the west and north of the Island.

In terms of historical heritage it is difficult to assess the Island as one heritage item. Historical events or periods on the island are in many cases not related in terms of proximity, more does the relationship of one set of events that created the heritage item(s) pertaining to it have a bearing on items from other periods.

There is no historical heritage located near of within the footprint of the proposed facility.

Current listings

- Garden Island has listings on the CHL and the Register of the National Estate (RNE). These citations cover historic and natural heritage values.

Location	Commonwealth Heritage List	Register of the National Estate
Garden Island	Natural	Natural
Cliff Point Historic Site	Historic	Historic
Garden Island – Entrance	Historic	Historic

Research searches

- An online search of the RNE was undertaken which confirms that Garden Island has both CHL and RNE listings.

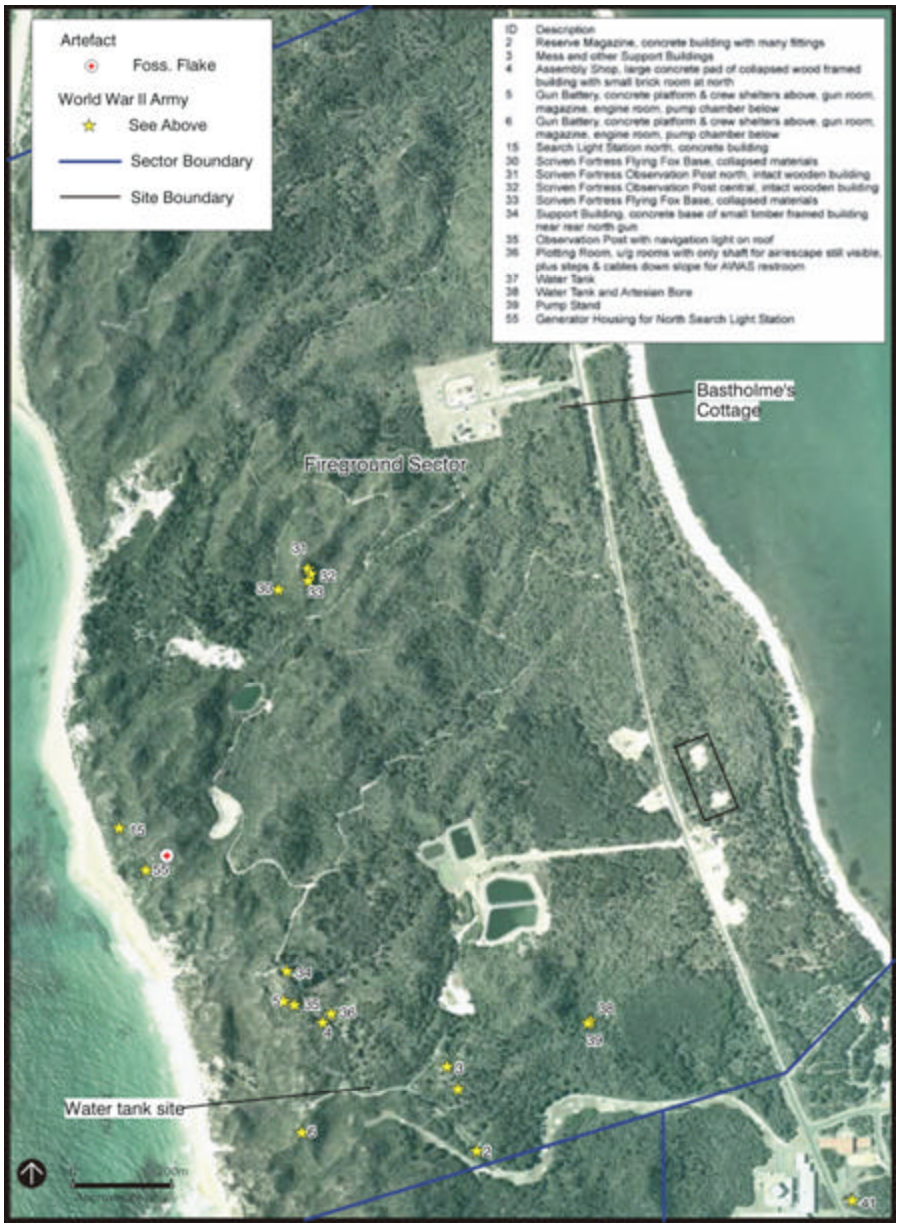
Previous investigations

- In 1966-1967 the Federal Government undertook a feasibility of Garden Island to establish a naval support facility, construction of a base was endorsed in 1969.

- Previous investigations have confirmed that there are no individual buildings surviving from the Stirling period (1970–present). These appear to have been all destroyed in a fire. The only structure remaining from this period is a well.

- No heritage features are located near the proposed site *(Figure 5.2).*

Figure 5.2 Heritage features for Fireground Sector



5.6.2 Potential Impacts

Construction of the MUOS facility will not be sympathetic with the significance of Garden Island and would represent a risk to heritage value of the whole Island. With the location of the facility not being compatible with the heritage values of the area eg. style and character, the visual amenity of the Island will be impacted.

5.6.3 Gaps

There appears to be no historical heritage values located within the footprint of the antenna field, however the heritage values of the whole Island needs to be considered in more detail.

5.6.4 References

- Garden Island Strategic Heritage Plan (Input to Master Plan) (ERM June 2005 for Department of Defence).
- Garden Island Heritage Assessment and Statement of Significance (ERM, June 2005 for Department of Defence).
- WG Martinick Associates, Cultural Heritage Conservation Plan for Garden Island, WA.
- HMAS Stirling/Garden Island EMS Development Project, Environmental Review Report (ERM, October 2005 for Department of Defence).

5.7 NATURAL HERITAGE

5.7.1 Background

Current Site listings

- As mentioned above *(Section 5.6.1)* Garden Island has listings on the CHL and the RNE. Some of these citations cover the natural heritage (for which the entire island is listed).
- The Island has been listed for supporting a range of flora and fauna regarded as significant at the Commonwealth, State and Regional level. It is also recognised for its aesthetic values and its values to scientific research.

Figure 5.3 Location of Callitris Preissii over the proposed MUOS site

Previous investigations

- ERM prepared an EMS report for Garden Island, which focused on the natural heritage aspects and incorporated all previous investigations undertaken in the area.

- The fauna of Garden Island has been relatively well studied with comprehensive fauna surveys conducted in 1991 (Brooker et al 1992) and 1996-1997 (Wykes and Pearson 1998).

- Several postgraduate research studies have been conducted on the Tammar Wallaby on the Island (Walker 2002 and Chambers 2004) and the Little Penguin (Cannell 2004). Pearson is conducting a long term study on the Carpet Python population of the Island.

Field Inspection

- A site inspection was undertaken at Garden Island on 2 August 2006 where aspects of topography, flora, fauna and amenity of the area were considered.

- The natural heritage of Garden Island can be considered highly significant overall as the Island supports populations of species that are restricted, rare, or declining on the mainland. It also supports breeding populations of migratory bird species protected by international treaties and the EPBC Act. For many of the species, Garden Island is now considered one of the strong holds of their existence because elsewhere in their range they are subject to predation pressure, impacts of disease and loss of habitat.

5.7.2 Potential Impacts

- Direct impact to the natural heritage by the construction of the facility will contribute to potential loss of natural heritage as an area of *Callitris preissi* and other native vegetation significant to the ecological value of the Island will need to be cleared for the construction of the facility. As the Callitris community has declined elsewhere within its natural range Garden Island supports the most intact example of the community and supports an excellent representation of coastal heath which is floristically distinct from mainland coastal and limestone heaths.

- Garden Island supports the only known population in the Perth region of *Amyema melaleucae* (a Mistletoe), *Lepidium puberulum* (a Peppercress) and *Myosotis australis.* Garden Island has the best remaining stands of *Pittosporum phylliraeoides var phylliraeoides* (Cheesewood) and some of the oldest known individuals of *Callitris preisii* (Rottnest Island pine).

- Indirect impacts will occur to surrounding habitats from development of the infrastructure. The movement of vehicles, personnel and construction machinery and equipment within the Island and the mainland has the potential to transport and spread weeds and weed seeds. Appropriate construction management will minimise the potential for this effect.

- Breeding and nesting of migratory birds such as the Osprey will need to be maintained to avoid and/or minimise this occurring on the operational structures (ETs).

- The topography of the area changes throughout the site, therefore in order for the land to be level the site area will need to import soil. This soil will need to be screened to ensure that no weeds are introduced into the area.

- During construction there is the potential for weeds to spread and soil is moved. The erosion and sediment runoff may wash down into surrounding areas of vegetation.

- Given the relatively small size of area to be impacted (approximately 0.75ha) relative to the surrounding vegetation (approximately 840ha) it is considered unlikely that the proposed development of the MUOS would substantially diminish the natural heritage of the island. However, this should be considered in the broader Defence context with respect to the incremental loss of the significant species which over time could be significant.

- Faunal communities have the potential to use the area that is proposed to be occupied by the MUOS, however, the area is unlikely to represent a significant proportion of the habitat available to the entire population of these animals inhabiting the Island. Similarly the area to be affected by the proposal is unlikely to represent a significant proportion of the foraging habitat available. It should be noted in the context of the above comment however with respect to the incremental loss of significant vegetation species.

5.7.3 Gaps

- Populations of *Amyema melaleucae* (a Mistletoe), *Lepidium puberulum* (a Peppercress) and *Myosotis australis* need taxonomic confirmation. CALM is currently undertaking a survey of the Island to more clearly define areas of TECs on the Island in order for the areas of high significance to be protected.

- Further mapping of the extent of vegetation clearance may need to be undertaken to ascertain proportion of *Callitris preissi* that would be cleared this would help define the level of significance.

- Further impact assessment specifically in relation to the natural heritage (including flora and faunal attributes) may need to be undertaken to support a CEMP.

5.7.4 References

- Garden Island Heritage Assessment and Statement of Significance (ERM, June 2005 for Department of Defence).

- HMAS Stirling/Garden Island EMS Development Project, Environmental Review Report (ERM, October 2005 for Department of Defence).

5.8 HAZARDOUS WASTE AND MATERIALS SUCH AS ASBESTOS

5.8.1 Background

Historically the site has only ever been used for telecommunications. There is no history of hazardous material ever existing at the site, however copper earth mats used previously for the telecommunication antennas still remain in the ground, along with small open shed like structures which were used to protect the antenna equipment. These however do not pose a direct risk to the environment or human health.

To construct the MUOS facility no hazardous waste or material such as asbestos will be used. The construction phase will involve materials required for infrastructure including water supply and disposal, electricity and/or gas. Associated waste streams will include, but not limited to metal waste, pipe off cuts and concrete.

5.8.2 Potential Impacts

No potential impacts have been identified for this component.

5.8.3 Gaps

No gaps have been identified for this component.

5.8.4 References

- HMAS Stirling / Garden Island EMS Development Project, Environmental Review Report (ERM, October 2005 for Department of Defence).
- Contaminated Sites Management Series: Assessment Levels for Soil, Sediment and Water. (DEC November 2003).
- Personal communications with REO during site visit of Garden Island.

5.9 CONTAMINATED SITES

5.9.1 Background

The site does not appear to be contaminated and does not contain any hydrocarbons or organic chlorines. The site was previously used for telecommunications and the only remnants of the use are the copper earth mats, which still remain in the ground and a few sheets of corrugated iron. The mats do not pose a direct risk to the environment and / or human health and are not considered a contamination.

5.9.2 Potential Impacts

There are no potential impacts associated with the copper earth mats in the ground, however Defence may need to consider removing these mats before construction of the proposed MUOS facility.

5.9.3 Gaps

Alternatives to removing the copper earth mats may need to be considered.

5.9.4 References

- HMAS Stirling / Garden Island EMS Development Project, Environmental Review Report (ERM, October 2005 for Department of Defence).
- Contaminated Sites Management Series: Assessment Levels for Soil, Sediment and Water. (DEC November 2003).
- Personal communications with REO during site visit of Garden Island.

5.10 NOISE POLLUTION AND AIR POLLUTION

5.10.1 Background

The site is currently not being used and all telecommunication infrastructure that once existed has been dismantled and is no longer operational.

5.10.2 Potential Impacts

The main potential for noise and air pollution will be from construction activities such as dust, which will be generated by earth moving, vehicle movements and wind erosion from stockpiles and exposed areas. Dust will be managed by the contractor.

5.10.3 Gaps

No gaps have been identified for this component.

5.10.4 References

HMAS Stirling/Garden Island EMS Development Project, Environmental Review Report (ERM, October 2005 for Department of Defence).

5.11 SEDIMENT AND EROSION CONTROL

5.11.1 Background

The soils at Garden Island are known to be highly erodible and require rehabilitation to restore stability. Any increase in site runoff would lead to an increase in erosion as the runoff transports the soil from the site. It is thus important that the volume of runoff is controlled to prevent further erosion.

5.11.2 Potential Impacts

- As the soils are susceptible to erosion this may lead to scarring of the landscape, requiring significant rehabilitation to restore stability. An increase in runoff has the potential to lead to an increase in erosion and hence an increase in sediment loads down to lower elevations.

- These potential impacts are linked directly the construction phase and appropriate measures to mitigate these issues should be addressed in the CEMP.

5.11.3 Gaps

No gaps have been identified for this component.

5.11.4 References

HMAS Stirling / Garden Island EMS Development Project, Environmental Review Report (ERM, October 2005 for Department of Defence).

5.12 ACCESS AND EGRESS ISSUES

5.12.1 Background

The site is situated next to the main arterial road which runs from the causeway to the northern end of the island. Access roads to the ETs will be developed as a roadway is required to each of the antennas and equipment shelters.

The road will allow for the passage of construction and semi-trailer tractors, however this may experience some difficultly when trying to unload and egress.

5.12.2 Potential Impacts

There is a high incidence of collisions between Tammars and vehicles on the Island (up to 400 a year). Although the size of population does not seem to be impacted by the high number of road deaths it has been found through previous investigations (Chambers 2004), that most road deaths (80%) occurred on the main arterial road of the Island (Dampier Road) and around the Navy buildings. Tammars often access the road verge through holes in fences rather than from unfenced scrub.

5.12.3 Gaps

Traffic management measures will need to be established for the construction phase, to minimise Tammar deaths.

5.12.4 References

- HMAS Stirling/Garden Island EMS Development Project, Environmental Review Report (ERM, October 2005 for Department of Defence).
- Tammar Honours Thesis, University of Western Australia (Chambers B, 2004).

5.13 INCREASED OPERATIONAL CHANGES TO CURRENT SITE CAPACITY

5.13.1 Background

The MUOS facility is proposed to be located within a designated 'development area' and will not effect the current capacity of the site. The footprint of the facility falls well within the designated area and over land that was previously used for a similar use.

5.13.2 Potential Impacts

An increase to site capacity will directly impact the natural heritage and will contribute to potential loss of natural heritage as an area of *Callitris preissi* and other native vegetation significant to the ecological value of the Island will need to be cleared for the construction of the facility. As the Callitris community has declined elsewhere within its natural range Garden Island supports the most intact example of the community and supports an excellent representation of coastal heath which is floristically distinct from mainland coastal and limestone heaths.

5.13.3 Gaps

No gaps have been identified for this component.

5.13.4 References

HMAS Stirling/Garden Island EMS Development Project, Environmental Review Report (ERM, October 2005 for Department of Defence).

5.14 REMEDIATION OF SITE

5.14.1 Background

Although the site contains the remains of previous telecommunication use, the copper earth mats that remain in the ground are not considered a direct risk to the environment and/or human health. The site does not require remediation as it does not appear to be contaminated.

5.14.2 Potential Impacts

Defence needs to determine if the earth mats should be removed, prior to any proposed construction.

5.14.3 Gaps

There are no gaps for this component.

5.14.4 References

- HMAS Stirling/Garden Island EMS Development Project, Environmental Review Report (ERM, October 2005 for Department of Defence).
- Contaminated Sites Management Series: Assessment Levels for Soil, Sediment and Water. (DEC November 2003).

5.15 VISUAL AMENITY AND PUBLIC PERCEPTION

5.15.1 Background

Cockburn Sound, which is located some 20km south of the Perth-Fremantle area, is the most intensively used marine embayment in WA. Its sheltered waters, diverse marine life, aesthetic attractiveness make Cockburn Sound a highly valued community asset for a wide range of recreational, tourist and commercial uses. The overall visual character of Garden Island is highly valued by the community for its aesthetic attributes and low skyline.

In conjunction with the natural contours at the site's highest point and the proposed height and diameter of the ETs, the visual impact of the facility may be seen from various points from the mainland and across Garden Island *(Figure 5.4)*.

5.15.2 Potential Impacts

- Public amenity may be a concern as the MUOS facility, namely the ETs are likely to be visible on the horizon due to higher elevation.
- The development of the facilities at Garden Island will result in change to the external façade of the island and the visual impact to external viewers will be permanent.
- Due to the close proximity to the ocean and winds the operational structures will be affected by salt spray.
- The perception from the public in regards to whether or not the MUOS system will provide any benefit to the Australian Defence communications systems may have a negative impact on the community and needs to be clarified.

Figure 5.4 Looking west from Woodman Point to Garden Island

5.15.3 Gaps

- A more detailed visual assessment will need to be undertaken to identify the level of aesthetic value that will be lost in Cockburn Sound from surrounding areas as this has the potential to be a significant impact.

- Establish possible management actions that can be undertaken to prevent further reduction of, and if possible, improve the aesthetic value.

- Consultation with the community should be undertaken to assess the implications the proposal has on the visual amenity.

5.15.4 References

- State Environmental (Cockburn Sound) Policy 2005 (Government of Western Australia).

- Environmental Quality Criteria Reference Document for Cockburn Sound (2003-2004) - A Supporting Document to the State Environmental (Cockburn Sound) Policy 2005, (Environmental Protection Authority January 2005).

5.16 ESD CONSIDERATIONS AND PROVISION OF ADEQUATE WATER AND ENERGY RESOURCES

5.16.1 Background

Proposed operations for the MUOS will not demand water supply other than the use of water required during the construction phase.

The MUOS facility would require approximately 785kw of electrical power (488kw for the three ETs and 297kw for the RAF), with a back up generator to support approximately 800kw of power.

5.16.2 Potential Impacts

No potential impacts have been identified for this component.

5.16.3 Gaps

Defence should consider any ESD approaches being adopted to ensure that any water and energy resources used will be done in a sustainable manner. These could be incorporated into the design of the facility and could potentially include building materials and energy efficiencies, without comprising operational needs.

5.16.4 References

Site Requirement Package for MUOS Groundsites HMAS Stirling, Garden Island, WA (Perth), (General Dynamics Decisions Systems, December 2005).

6 RISK ASSESSMENT

6.1 INTRODUCTION

This chapter provides a risk assessment of the impacts identified in this IER. This risk assessment has been undertaken utilising a modified version of the Defence environmental risk tool (ERT), and is intended to provide an analysis of the extent of impacts, and to justify the level of mitigation required to be outlined in the IER.

Risk assessment been undertaken to enable Defence to make appropriate decisions either with respect to further study and potential referral, or internal sign-off through environmental clearance certificates (ECC).

6.1.1 Defence Risk Management Framework

The ERT has been developed to facilitate the IER and enable collation and analysis of risk assessment results. It focuses in on those aspects which are considered to be critical issues identified for each site, including:

- natural heritage (flora and fauna);
- Aboriginal heritage;
- historical (cultural) heritage;
- hazardous waste;
- contaminated sites;
- noise and air pollution;
- sediment and erosion control;
- access and ingress issues;
- changes to current site capacity;
- remediation;
- visual amenity and public perception;
- ESD considerations; and
- water and energy resources.

As part of the environmental review of the Garden Island and Geraldton sites the ERT has been utilised to help prioritise potential environmental impacts identified.

6.1.2 Methodology

The risk assessment follows the core steps as outlined below:

a) list of aspects, sub-aspects, impacts and sub-impacts;

b) seven dimensions of consequence for every risk;

c) a likelihood rating for each risk; and

d) risk level and score calculated using the Defence standard risk matrix.

The full results of the risk assessment are provided in *Annex B* with a summary provided of the key issues provided below.

6.1.3 Results

The aspects and impacts have been grouped in the summary table to provide an indication of the level of risk for each site.

Table 1 Geraldton

Activity	Aspect	Impact	Risk Band
Construction	Flora – Terrestrial	Loss of flora	Low
Construction	Fauna – Habitat	Loss of habitat	Low
Construction	Disturbance – Community	Loss of visual amenity	Low
Construction	Heritage - Aboriginal	Loss of Aboriginal heritage	Low

Table 2 Garden Island

Activity	Aspect	Impact	Risk Band
Construction	Flora – Terrestrial	Loss of flora	Medium
Construction	Fauna – Habitat	Loss of habitat	Low
Construction	Disturbance – Community	Loss of visual amenity	High
Maintenance	Fauna Terrestrial	Nesting of birds on operational structure	Medium
Construction	Run-off sediment	Degradation of land	Medium

7 MANAGEMENT

7.1 MANAGEMENT REGIMES

The management regime has been developed to assist Defence in the following:

- ensure that the development of the MUOS facility is carried out in such a way to minimise any impacts on the environment;
- ensure that Defence delivers the system in a good manner, minimising harm to the environment, heritage and social impacts;
- promotes confidence in the way in which Defence will go about the construction of the MUOS; and
- ensures efficient coordination of mitigation responses during each phase of the project.

Outlined below is a table summarising the required outcomes for project. The outcomes and potential impacts for mitigation are grouped into four categories - Construction, Demolition, Maintenance and Site Operations. If you are undertaking an activity within those categories, this table is intended to provide guidance to plan your action appropriately.

The table also outlines:

- Mitigation Measures (to achieve the Outcome);
- the Performance Measure, by which the successful outcome may be measured;
- the Project Phase in which the mitigation should be undertaken;
- the Primary Responsibility (ie. the person(s) who has carriage of the mitigation and its successful implementation);
- the Secondary Responsibility (ie. the person(s) who also have responsibility for implementation);

- the Corrective Action Loop: to be undertaken if there is no alternative or if the mitigation cannot be undertaken (eg. if strategic planning activities cannot avoid impacts to heritage items, or if total sediment control cannot reasonably be implemented). The Corrective Action Loop provides an indication of whose advice should be sought in the event that these occurrences arise; and

- possible Corrective Action / Alternative: This provides an indication of what alternatives might be achieved through consultation with the relevant parties to avoid potential impacts. To take the examples noted above, impacts to heritage items might be avoided via seeking advice from Department Heritage Biodiversity Division (DHBC) followed by investigating alternative design management. Similarly, by seeking advice via the REO, alternate engineering controls could be sought for the appropriate capture of sediments.

Table 3 Framework Management Guidance

GERALDTON							
Aspect	**Impact**	**Outcome Requirement**	**Mitigation**	**Performance measure**	**Primary responsibility**	**Secondary responsibility**	**Action loop if no alternative to action**
Planning	Degradation to heritage	No net impacts to heritage values	Change footprint of facility	Retention of attributes in which heritage values lie	MUOS Project Team	DEIM	Further investigation to % removed
Construction	Production of dust	No impact to air pollution	Monitor and manage construction to minimise sir pollution	Lack of dust production throughout construction phase	Contractor	MUOS Project Team	Cease work and seek advice
Operations	Visual amenity	No impact to the visual amenity of the site	Paint ETs a colour that is more pleasing to the landscape	No concerns raised by community	MUOS Project Team	DEIM	Seek advice and plan alternative options
GARDEN ISLAND							
Aspect	**Impact**	**Outcome Requirement**	**Mitigation**	**Performance measure**	**Primary responsibility**	**Secondary response**	**Action loop if no alternative to action**
Planning	Degradation to heritage	No net impacts to heritage values	Change footprint of facility	Retention of attributes in which heritage values lie	MUOS Project Team	DEIM	Further investigation to % of heritage removed
Construction	Production of dust	No	Monitor and manage construction to minimise sir pollution	Lack of dust production throughout construction phase	Contractor	MUOS Project Team	Cease work and seek advice from MUOS project team
Operations	Visual amenity	No impact to the visual amenity of the site	Paint ETs a colour that is more pleasing to the landscape	No concerns raised by community	MUOS Project Team	DEIM	Plan alternative options

8 CONCLUSIONS

Both locations provide sufficient space for the ETs and equipment shelter, however more environmental constraints will be encountered at Garden Island based on the following:

- vegetation clearing;
- natural heritage; and
- social impacts through visual amenity.

The proposed Geraldton site is out of town where there is less potential for there to be community concerns with respect to the three proposed towers. In addition the site at Geraldton would have a negligible impact on flora, fauna, Aboriginal heritage and/or historical heritage.

8.1 SUMMARY OF GAPS AND RECOMMENDATIONS

Outline below is a summary of the gaps and recommendations identified through this IER.

8.1.1 Geraldton

1. During construction of the facility it would be environmentally best practice to include measures to prevent any runoff into the creek that may occur.
2. Although no significant environmental factors constrain the location of the facility of Geraldton additional survey work would be required following final site selection to ensure that the design and construction of the facility provide adequate preservation of any possible Aboriginal heritage sites of interest.
3. It appears that there have been no illegal dumping in the past and that there are no contaminated issues with the site, however this may need to be confirmed.
4. Dust will be generated by earth moving, vehicle movements and wind erosion from stockpiles and exposed areas and will need to be managed by the contractor within the CEMP.

5. Erosion is not of concern for this MUOS site, however during the construction of the facility mitigation measure would need to be put in place to minimise and avoid any runoff into Scabby Station Gull Creek.

6. Confirmation should be provided as to the benefit that the MUOS facility will offer for Australian Defence communications.

7. Defence should consider any ESD approaches being adopted to ensure that any water and energy resources used will be done in a sustainable manner.

8.1.2 Garden Island

1. Investigations into the amount of soil required to level the area will need to be determined and possible sources from which soil can be collected, to ensure that the soil is free from weeds and disease.

2. Control measures will need to be developed to ensure that any issues associated with the importing of soil is addressed. Information detailing the source of the soil, how much is required and verifying that it is free from weeds and disease should be provided.

3. During construction of the facility it would be environmentally best practice to include measures to prevent any runoff from the site.

4. Construction measures will need to be established for the protection of fauna on the Island during construction vehicle transit.

5. Further mapping of the extent of vegetation clearance may need to be undertaken to ascertain the proportion of *Callitris preissii* that would be cleared this would help define the level of significance.

6. Further impact assessment specifically in relation to the natural heritage (including flora and faunal attributes) may need to be undertaken to support a CEMP. In addition to this mitigation measures will need to be developed to manage the impacts.

7. Although no significant environmental factors constrain the location of the facility at Geraldton additional survey work would be required following final site selection to ensure that the design and construction of the facility provide adequate preservation of any possible Aboriginal heritage sites of interest.

8. Additional survey work may be required following selection to ensure that the design and construction of the facility provides adequate preservation of any possible Aboriginal heritage sites of interest if the sites are required to be avoided.

9. It appears that there are no contaminated issues with the site, however this may need to be confirmed.

10. Dust will be generated by earth moving, vehicle movements and wind erosion from stockpiles and exposed areas and will need to be managed by the contractor within the CEMP.

11. Traffic management measures will need to be established for the construction phase to minimise any Tammar deaths.

12. Defence need to determine if the copper earth mats present at the site are to be removed.

13. Confirmation should be provided as the benefit that the MUOS facility will offer for Australian Defence communications.

14. A more detailed visual assessment will need to be undertaken to identify the level of aesthetic value that will be lost in Cockburn Sound from surrounding areas. Management actions will also need to be established that can be undertaken to prevent further reduction of, and if possible, improve the aesthetic value.

15. Consultation with the community should be undertaken to access the implications the proposal has on the visual amenity.

16. Defence should consider any ESD approaches being adopted to ensure that any water and energy resources used will be done in a sustainable manner.

Annex A

Register Searches

Australian Government
Department of the Environment and Heritage

Protected Matters Search Tool

11 August 2006 10:58

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

You may wish to print this report for reference before moving to other pages or websites.

The Australian Natural Resources Atlas at http://www.environment.gov.au/atlas may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.deh.gov.au/epbc/assessmentsapprovals/index.html

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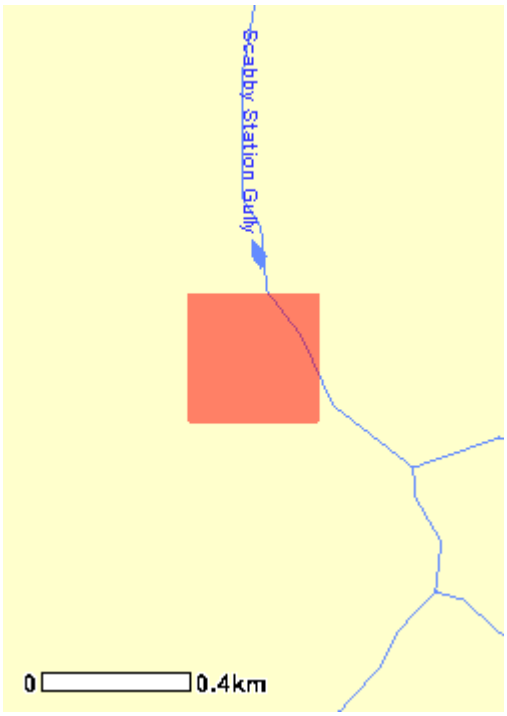

Search Type: Area

Buffer: 0.5 km

Coordinates: -28.690225,114.837045, -28.693837,114.837045, -28.693837,114.840723, -28.69022,114.840723

Report Contents:

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.deh.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	1
Migratory Species:	1

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.deh.gov.au/heritage/index.html.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.deh.gov.au/epbc/permits/index.html.

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Places on the RNE:	None
Listed Marine Species:	5
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Other Commonwealth Reserves:	None
Regional Forest Agreements:	None

Matters of National Environmental Significance

Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
Calyptorhynchus latirostris * Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo	Endangered	Species or species habitat likely to occur within area
Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Dataset Information]	Status	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift	Listed - overfly marine area	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Listed - overfly marine area	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Listed - overfly marine area	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
Commonwealth Lands [Dataset Information]		

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report. This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the *Environment Protection and Biodiversity Conservation Act 1999*. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under "type of presence". For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the migratory and marine provisions of the Act have been mapped. The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Australian Government
Department of the Environment and Heritage

Protected Matters Search Tool

11 August 2006 10:41

EPBC Act Protected Matters Report

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The Australian Natural Resources Atlas at http://www.environment.gov.au/atlas may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.deh.gov.au/epbc/assessmentsapprovals/index.html

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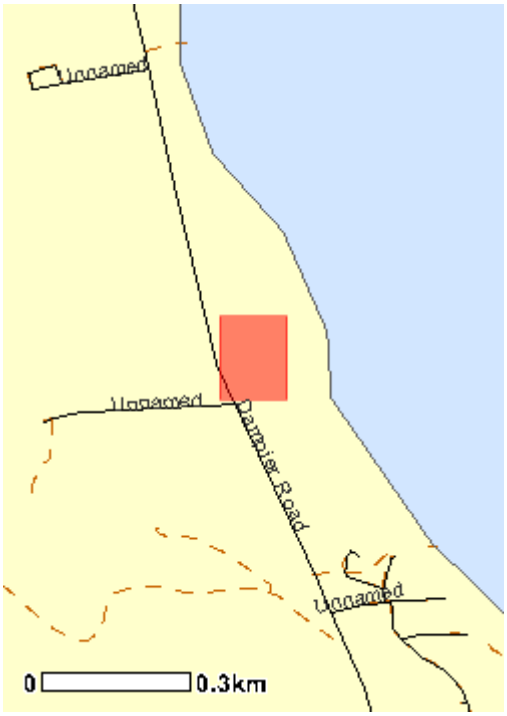

Search Type: Area

Buffer: 0.5 km

Coordinates: -32.2099759,115.6832587, -32.2119430,115.6832587, -32.2119430,115.6848697, -32.209975,115.6848697

Report Contents:

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.deh.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	3
Commonwealth Marine Areas:	Relevant
Threatened Ecological Communities:	None
Threatened Species:	13
Migratory Species:	15

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.deh.gov.au/heritage/index.html.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.deh.gov.au/epbc/permits/index.html.

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Places on the RNE:	1
Listed Marine Species:	33
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Other Commonwealth Reserves:	None
Regional Forest Agreements:	None

Matters of National Environmental Significance

Wetlands of International Significance [Dataset Information] (Ramsar Sites)	
BECHER POINT WETLANDS	Within same catchment as Ramsar site
FORRESTDALE & THOMSONS LAKES	Within same catchment as Ramsar site
PEEL-YALGORUP SYSTEM	Within same catchment as Ramsar site

Commonwealth Marine Areas [Dataset Information]

Approval may be required for a proposed activity that is likely to have a significant impact on the environment in a Commonwealth Marine Area, when the action is outside the Commonwealth Marine Area, or the environment anywhere when the action is taken within the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Within 3 Nautical Mile Limit

Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
Calyptorhynchus baudinii * Baudin's Black-Cockatoo, Long-billed Black-Cockatoo	Vulnerable	Species or species habitat likely to occur within area
Diomedea gibsoni * Gibson's Albatross	Vulnerable	Species or species habitat may occur within area
Macronectes giganteus * Southern Giant-Petrel	Endangered	Species or species habitat may occur within area
Macronectes halli * Northern Giant-Petrel	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta * Shy Albatross	Vulnerable	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus * Blue Whale	Endangered	Species or species habitat may occur within area
Eubalaena australis * Southern Right Whale	Endangered	Species or species habitat known to occur within area
Megaptera novaeangliae * Humpback Whale	Vulnerable	Congregation or aggregation known to occur within area
Neophoca cinerea * Australian Sea-lion	Vulnerable	Species or species habitat may occur within area
Setonix brachyurus * Quokka	Vulnerable	Species or species habitat may occur within area

Sharks		
*Carcharias taurus (west coast population)** Grey Nurse Shark (west coast population)	Vulnerable	Species or species habitat may occur within area
Carcharodon carcharias * Great White Shark	Vulnerable	Species or species habitat may occur within area
Rhincodon typus * Whale Shark	Vulnerable	Species or species habitat may occur within area
Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
Migratory Wetland Species		
Birds		
Calidris alba Sanderling	Migratory	Species or species habitat likely to occur within area
Migratory Marine Birds		
Diomedea gibsoni Gibson's Albatross	Migratory	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel	Migratory	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel	Migratory	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross	Migratory	Species or species habitat may occur within area
Migratory Marine Species		
Mammals		
Balaenoptera edeni Bryde's Whale	Migratory	Species or species habitat may occur within area
Balaenoptera musculus * Blue Whale	Migratory	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale	Migratory	Species or species habitat may occur within area
Eubalaena australis * Southern Right Whale	Migratory	Species or species habitat known to occur within area
Lagenorhynchus obscurus Dusky Dolphin	Migratory	Species or species habitat may occur within area
Megaptera novaeangliae *	Migratory	Congregation or aggregation

Humpback Whale		known to occur within area
Orcinus orca Killer Whale, Orca	Migratory	Species or species habitat may occur within area
Sharks		
Carcharodon carcharias Great White Shark	Migratory	Species or species habitat may occur within area
Rhincodon typus Whale Shark	Migratory	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Dataset Information]	Status	Type of Presence
Birds		
Calidris alba Sanderling	Listed	Species or species habitat likely to occur within area
Diomedea gibsoni Gibson's Albatross	Listed	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
Larus novaehollandiae Silver Gull	Listed	Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel	Listed	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel	Listed	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross	Listed	Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri New Zealand Fur-seal	Listed	Species or species habitat may occur within area
Neophoca cinerea Australian Sea-lion	Listed	Species or species habitat may occur within area
Ray-finned fishes		
Acentronura australe Southern Pygmy Pipehorse	Listed	Species or species habitat may occur within area
Campichthys galei Gale's Pipefish	Listed	Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish	Listed	Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse	Listed	Species or species habitat may occur within area

Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse	Listed	Species or species habitat may occur within area
Hippocampus subelongatus West Australian Seahorse	Listed	Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish	Listed	Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish	Listed	Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish	Listed	Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish	Listed	Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish	Listed	Species or species habitat may occur within area
Mitotichthys meraculus Western Crested Pipefish	Listed	Species or species habitat may occur within area
Nannocampus subosseus Bony-headed Pipefish	Listed	Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon	Listed	Species or species habitat may occur within area
Phyllopteryx taeniolatus Weedy Seadragon, Common Seadragon	Listed	Species or species habitat may occur within area
Pugnaso curtirostris Pug-nosed Pipefish	Listed	Species or species habitat may occur within area
Solegnathus lettiensis Indonesian Pipefish, Gunther's Pipehorse	Listed	Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish	Listed	Species or species habitat may occur within area
Stigmatopora nigra Wide-bodied Pipefish, Black Pipefish	Listed	Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish	Listed	Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish	Listed	Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish	Listed	Species or species habitat may occur within area
Vanacampus poecilolaemus Australian Long-snout Pipefish, Long-snouted Pipefish	Listed	Species or species habitat may occur within area

Reptiles

Disteira kingii Spectacled Seasnake	Listed	Species or species habitat may occur within area
Whales and Other Cetaceans [Dataset Information]	Status	Type of Presence
Balaenoptera acutorostrata Minke Whale	Cetacean	Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale	Cetacean	Species or species habitat may occur within area
Balaenoptera musculus * Blue Whale	Cetacean	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale	Cetacean	Species or species habitat may occur within area
Delphinus delphis Common Dolphin	Cetacean	Species or species habitat may occur within area
Eubalaena australis * Southern Right Whale	Cetacean	Species or species habitat known to occur within area
Grampus griseus Risso's Dolphin, Grampus	Cetacean	Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin	Cetacean	Species or species habitat may occur within area
Megaptera novaeangliae * Humpback Whale	Cetacean	Congregation or aggregation known to occur within area
Orcinus orca Killer Whale, Orca	Cetacean	Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin	Cetacean	Species or species habitat may occur within area
Tursiops aduncus Spotted Bottlenose Dolphin	Cetacean	Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin	Cetacean	Species or species habitat may occur within area
Commonwealth Lands [Dataset Information]		

Places on the RNE [Dataset Information]
Note that not all Indigenous sites may be listed.

Natural

Garden Island WA

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

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Only selected species covered by the migratory and marine provisions of the Act have been mapped.

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
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- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Annex B

Risk Assessment

Risk Ref	Unit	Activity & Sub Activity	Location	Aspect and Second Level Aspect	Additional Aspect Description	Impact & Sub Impact	Impact Description	Capability	Justification	Likelihood - cap	Risk Level	Financial Efficiency	Justification	Likelihood - FE	Risk Level	Environment and Heritage	Justification	Likelihood - E&H	Risk Level	Occupational Health & Safety	Justification	Likelihood - OHS	Risk Level	Compliance	Justification	Likelihood - compl	Risk Level	Reputation	Justification	Likelihood - Rep	Risk Level	Personnel	Justification	Likelihood - pers	Risk Level	Risk Band	Risk Priority
	CSI	Construction / Development - Infrastructure	Geraldton	Interaction with Flora and Fauna - Flora - Terrestrial		Loss of Flora & Fauna - Flora - Terrestrial	loss of vegetation	21	The impacts are minimal and will not affect Defence in fulfilling its obligations	9	Low	21	Risk dimension no really relevant to this proposal	9	Low	21	no significant flora to clear	9	Low	21	Risk dimension not really relevant to this proposal	9	Low	21	No major loss for each impact therefore compliance not an issues.	9	Low	21	Community should not be concerned as no significant impacts	9	Low	21	Personnel are use to the area being used as a satellite communication station and do not see any issues with the construction of the facility	9	Low	Low	210
	CSI	Construction / Development - Infrastructure	Geraldton	Interaction with Flora and Fauna - Habitat - Terrestrial		Loss of Habitat - Terrestrial	Loss of habitat for fauna once area cleared for facility	21		9	Low	21		9	Low	21	use of area as a habitat would be negligible	9	Low	21		9	Low	21		9	Low	21		9	Low	21		9	Low	Low	210
	CSI	Construction / Development - Infrastructure	Geraldton	Disturbance - Community	Social impact on aesthetics	Loss of Amenity - Visual	Construction of ETs will impact on visual amenity	21		9	Low	21		9	Low	21	Site located in gully, visual impact no significant	9	Low	21		9	Low	21		9	Low	21		9	Low	21		9	Low	Low	210
	CSI	Construction / Development - Infrastructure	Geraldton	Interaction with Heritage - Indigenous Heritage Item - deterioration		Loss of Heritage - Indigenous	Loss of heritage values	21		9	Low	21		9	Low	21	no Aboriginal significance present	9	Low	21		9	Low	21		9	Low	21		9	Low	21		9	Low	Low	210

Risk Ref	Unit	Activity & Sub Activity	Location	Aspect and Second Level Aspect	Comment	Impact & Sub Impact	Impact Description	Capability	Justification	Likelihood - cap	Risk Level	Financial Efficiency	Justification	Likelihood - FE	Risk Level	Environment and Heritage	Justification	Likelihood - E&H	Risk Level	Occupational Health & Safety	Justification	Likelihood - OHS	Risk Level	Compliance	Justification	Likelihood - compl	Risk Level	Reputation	Justification	Likelihood - Rep	Risk Level	Personnel	Justification	Likelihood - pers	Risk Level	Risk Band	Risk Priority
	CSI	Construction / Development - Infrastructure	Garden Island	Interaction with Flora and Fauna - Flora - Terrestrial		Loss of Flora & Fauna - Flora - Terrestrial	Loss of Callitris Preissi and other threatened species	21	Loss of flora will not affect Defence in fulfilling its obligations	9	Low	21	Not relevant	9	Low	11	Removal of less than 10% of the population of a species protected under EPBC Act	3	Medium	21	No relevant	9	Low	16	vegetation is protected under the EPBC Act. There is a possibility of a breach	5	Medium	16	Flora is of importance to community. May get complaints from public	5	Medium	16	May affect a small number of staff but he effect will be minimal	7	Low	Medium	169
	CSI	Construction / Development - Infrastructure	Garden Island	Interaction with Flora and Fauna - Habitat - Terrestrial		Loss of Habitat - Terrestrial	Potential developments at the site have the potential to encroach on terrestrial habitats.	21	Loss of fauna habitat will not affect Defence in fulfilling its obligations	9	Low	21	Not relevant	9	Low	21	Damage to heritage values that is immediately contained on site and will recover fully in less than 6 months	5	Low	21	No relevant	9	Low	21	Technical breach but no damages and no monetary penalty	3	Low	21	Fauna not as significantly impacted. Low profile may only receive trivial substantiated complaints from community	5	Low	21	Little impact on personnel as the impact will be minimal	7	Low	Low	194
	CSI	Construction / Development - Infrastructure	Garden Island	Disturbance - Community		Loss of Amenity - Visual	Construction of ETs will impact on visual amenity	16	Community concern with visual amenity may cause delays in construction	9	Low	21	Not relevant	9	Low	6	Extensive damage or disturbance to any matter protected under EPBC Act the will likely recover in more than 2 years	3	High	21	No relevant	9	Low	21	Technical breach but no damages and no monetary penalty	3	Low	11	Visual amenity may raise community concerns and complaints. Public demonstrations and/or ministerial may be a consequence	3	Medium	16	May affect a small number of staff but the effect will be minimal	7	Low	High	155
	CSI	Maintenance - No Sub Activity	Garden Island	Interaction with Flora and Fauna - Fauna - Terrestrial	Breeding and nesting of birds	Resource Depletion - Not Specified	Deterioration of satellites by birds nesting on dishes and through effect of salt spray	16	Misuse of ETs by fauna such as Osprey and the effect of salt spray may cause readiness levels to fall	9	Low	21	Not relevant	9	Low	16	Any damage or disturbance to any matter protected under the EPBC Act that will recover within 6 months	5	Medium	21	An injury or ailment that does not require medical treatment by a physician or a qualified first aid person.	9	Low	21	Technical breach but no damages and no monetary penalty	3	Low	21	Low profile issue	7	Low	21	Little impact on personnel	7	Low	Medium	186
	CSI	Construction / Development - Infrastructure	Garden Island	Runoff - Sediment	erosion during construction phase	Degradation of Land Soil Erosion	Runoff during site construction could lead to soil erosion. The impact will be controlled through implementing erosion and sediment control measures	16	Soil erosion may cause delays in construction of facility	9	Low	21	Not relevant	9	Low	16	Garden island soils are known to be highly erodible and require rehabilitation to restore stability	3	Medium	21	No relevant	9	Low	21	Will follow correct procedures to minimise this impact	7	Low	21	Low profile issue	7	Low	21	Little impact on personnel	7	Low	Medium	188