



PRELIMINARY ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN

Atlas Wodgina DSO Project – Great Northern Highway Intersection Improvement Works – North AMENDMENT

October 2012

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SUMMARY

Atlas Iron Limited (Atlas) operates the Wodgina Direct Shipping Ore (DSO) Project located 100 km south of Port Hedland. Approximately 4 million tonnes per annum (Mtpa) of iron ore is transported by road train from the Wodgina mine site to Port Hedland via the Great Northern Highway (GNH). To enhance the safe merging and turning of mine site traffic on/off the GNH, Atlas proposes to undertake improvement works of the present T-junction of the Wodgina Haul Road and the GNH (the Project) consisting of:

- The construction of a dedicated slip lane and acceleration lane for all northbound traffic exiting the mine.
- The construction of a dedicated southbound turning lane into the mine.
- Local widening of the junction to accommodate the turning vehicles.
- Enhancement of the approach signage on the GNH.
- The provision of solar lighting at the junction.
- Geotechnical investigations to enable applicable design and construction methods.

This Preliminary Environmental Impact Assessment (PEIA) captures disturbance activities (2.90 ha) for the improvement works under Main Roads WA (MR) existing clearing permit CPS818/6. The design of the upgraded T-junction was approved by MR through the complex works application process on the 9th October 2012. All improvement works will be conducted within Atlas' tenement L45/211 and the MR Reserve Boundary.

Geotechnical investigations will be undertaken prior to road construction and are expected to include 4 test pits located along the length of the proposed acceleration lane. All geotechnical investigations will be carried out within the Main Roads Road Reserve, approximately 5 m from the edge of the sealed road.

The wider Project area has been the subject of several environmental surveys as part of Atlas' environmental and social impact assessments for the Wodgina DSO Project's development. Previous flora studies of the area include:

- Baseline Flora and Vegetation Assessment (Outback Ecological Services, 2009).
- Flora and Vegetation Assessment (Woodman Environmental Consulting, 2011).

In addition, Atlas requested an archaeological and ethnographic heritage survey to be undertaken within the T-junction area with the traditional owners between 30th April and 1st May 2012. Representatives of the *Kariyarra* Native Title Group participated in the assessment. No archaeological sites and no ethnographic sites were identified within the surveyed area.

Atlas Wodgina DSO Project – Great Northern Highway Intersection Improvement Works – North - AMENDMENT

1. BACKGROUND

Atlas proposes to upgrade the existing Wodgina Haul Road T-junction with the GNH, at approximate SLK 1507 m. The intersection upgrade is required to minimise hazards for traffic entering and exiting the GNH from Wodgina Haul Road. Atlas proposes to construct a dedicated slip lane and an acceleration lane for all the northbound traffic exiting the mine, and a dedicated southbound turning lane on the GNH into the mine. Atlas also proposes local widening of the junction to accommodate these turning vehicles, and appropriate signage with solar lighting at the junction. All improvement works will be conducted within Atlas' tenement L45/211 and the MR Reserve Boundary.

This PEIA relates to the disturbance works (2.90 ha) required under MR's Clearing Permit CPS818/6 for the upgrade of the T-junction. The design of the upgraded T-junction was approved by MR through the complex works application process on the 9th October 2012.

The wider Project area has been the subject of several environmental surveys as part of Atlas' environmental and social impact assessments for the Wodgina DSO Project's development. Previous flora studies of the area include:

- Baseline Flora and Vegetation Assessment (Outback Ecology Services, 2009).
- Flora and Vegetation Assessment (Woodman Environmental Consulting, 2011).

To comply with MR's Environmental Assessment and Approval process, an initial 'Low Impact Environmental Screening Checklist' was completed for the Project and submitted to MR on the 14th May, 2012. A copy of the checklist has been presented in Appendix A, which indicated that the Project would require further environmental assessment (this PEIA).

This PEIA is an amendment to the PEIA approved by MR on the 8th June 2012.

The PEIA comprised a desktop analysis of environmental aspects and impacts, a site investigation, an assessment of native vegetation clearing, stakeholder consultation and consideration of necessary environmental management.

2. DESCRIPTION OF THE PROJECT

Atlas proposes the following improvement works for the T-junction of Wodgina Haul Road and GNH:

- Geotechnical investigations to confirm design parameters.
- The construction of a dedicated slip lane and acceleration lane for all northbound traffic exiting the mine.
- The construction of a dedicated southbound turning lane into the mine.
- Local widening of the junction to accommodate the turning vehicles.
- Enhancement of the approach signage on the GNH.
- The provision of solar lighting at the junction.

In order to upgrade the intersection, clearing will be required to construct or extend the road. The clearing required for road works is summarised in Table 1.

Table 1 Area of clearing for proposed works

Item of works	Dimension (m)	Total Area (m ²)
Acceleration lane	5m wide x 1038m long plus batters, drainage and construction access	16,200
Slip lane at junction	5m wide x 539m long plus batters, drainage and construction access	10,700
Left Turn Pocket	105m long x 2m wide plus batters, drainage and construction access	2,100
	Total area	29,000 (2.9 ha)

The resulting improved intersection will enable traffic from the mine site, particularly road trains, to achieve an appropriate speed before merging with northbound traffic on the GNH. In addition, a dedicated southbound turning lane will enable GNH southbound traffic to flow continuously around traffic stopped to enter the Wodgina mine site.

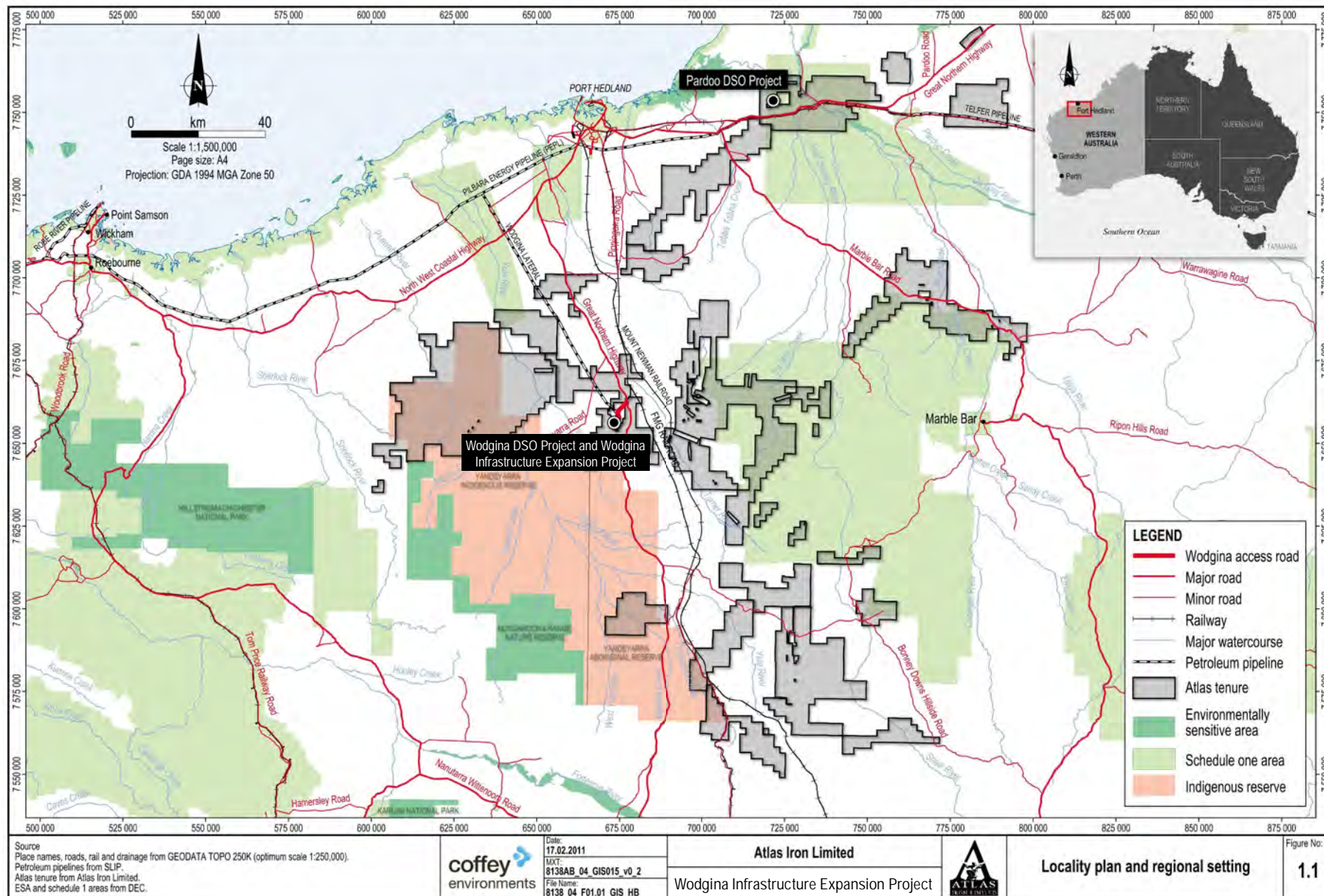
2.1 Project Location

The Project is located adjacent to GNH at approximately SLK 1507m. The regional location of the Project area is shown in Figure 1.

The layout for the proposed intersection works and test pits is included in Figure 2.

The study area is approximately 100 m either side of the roads. The intersection is located on flat open alluvial plains supporting low shrublands and spinifex grasslands. An ephemeral creek flows northeast – southwest across the northern portion of the intersection and small ephemeral drainage lines cross the study area.

All geotechnical investigations will be carried out within the Main Roads Road Reserve, approximately 5 m from the edge of the sealed road.



PARSONS
BRINCKERHOFF

Not to scale.
Original figure: Coffey, 17/02/11

Drawing No.: 2173132A-GIS-F083

Revision: A

Date: 07/12/2011

Drawn By: BS

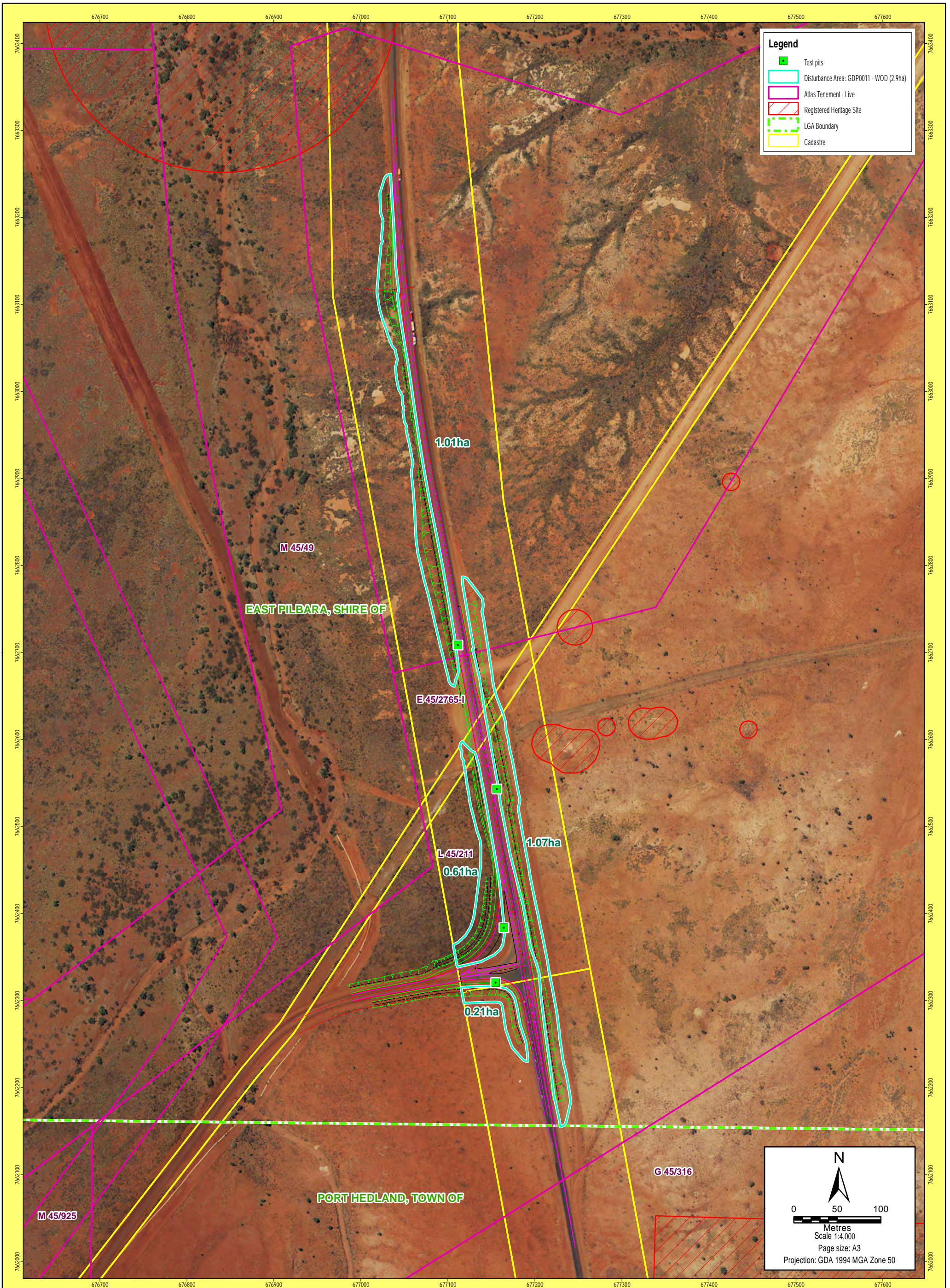
Checked by: JS/AP

Data Source: Atlas Iron Limited
Wodgina DSO Project Stage 2

Atlas Iron

Wodgina Infrastructure Expansion Project

Locality plan and regional setting
Figure 1



3. METHODOLOGY

3.1 Preliminary Desktop Study

The Project area has been surveyed previously as part of the Atlas' environmental and social impact assessments (refer Section 1). The study area for these surveys, referred to as the Atlas Study Area, is a large region stretching 150 km south from Port Hedland. As the Project is located within the Atlas Study Area, findings from the surveys are applicable to this PEIA. Specific study areas are identified in the following sections.

3.1.1 Threatened Flora, Fauna & Communities, Conservation Reserves and ESAs

A search of the WA Department of Environment and Conservation (DEC) databases was undertaken for a 100 km x 100 km area bound by the co-ordinates 20 ° 46' - 21 ° 40' S and 118 ° 10' - 119 ° 09' E (GDA94) (Woodman, 2009). The search identified one Priority 3 Community, 'Plant assemblages of the Wona Land System' within 15 km of the search area.

A flora and vegetation assessment was undertaken for the Wodgina Stockyard 2, located approximately 1.5 km south-west of the proposed Project along the Wodgina Haul Road (Woodman, 2011). Refer to Appendix B.

No Threatened Ecological Communities (TEC) or Priority Ecological Communities (PEC) have been recorded in the vicinity of the Project. Most existing vegetation types are considered to be widespread (Woodman 2011).

Conservation Significant Flora Taxa known within the vicinity of the survey area (Woodman, 2011)

Table 2 Conservation Significant Flora Taxa

Taxon	Ranking
<i>Eriachne</i> aff. <i>festucea</i>	*
<i>Euphorbia clementii</i>	P2
<i>Gymnanthera cunninghamii</i>	P3
<i>Heliotropium muticum</i>	P1
<i>Mallotus</i> sp.	*
<i>Nicotiana umbratica</i>	P2
<i>Terminalia supranitifolia</i>	P3
<i>Vigna</i> sp. rockpiles	P3

* represents a potentially undescribed taxon that may be of conservation significance

During a field inspection over the greater Wodgina study area, only one conservation significant taxon was recorded in the area, *Euphorbia clementii*, a species that is known to respond to the passage of fire. A large portion of the study area was burnt within the last 2 years (Woodman, 2011).

The vegetation in the survey area is equivalent to widespread and common Floristic Community Types in the wider area and therefore unlikely to be of conservation significance (Woodman, 2011).

A search of the Landgate's GIS shapefile 'LGATE-123' as an online mapping tool indicated that there are no Environmentally Sensitive Area's (ESA) in or surrounding the Project area.

3.1.2 Heritage

Non-indigenous heritage was examined on 22nd May 2012, utilising the Australian Heritage Places Inventory, Heritage Council of Western Australia Places Database and the Shire of East Pilbara's local heritage list. There are no registered non-Indigenous heritage sites within or surround the Project area.

3.1.3 Aboriginal Heritage

A search of the Department of Indigenous Affairs' (DIA's) database indicated that the Project site does not fall within any recorded Aboriginal Heritage sites.

An archaeological and ethnographic heritage survey the 30th April and 1st May 2010 confirmed that there are no archaeological or ethnographic Aboriginal sites found within the vicinity of works relating to the junction upgrade. Refer to Appendix C.

3.1.4 Sensitive Water Resources

A search of the Department of Water's (DoW's) database on 21st May 2011 indicated that the Project area does not contain any sensitive water resources (including Public Drinking Water Source Areas or Water Pollution Control Areas) and is not adjacent to any significant lakes, rivers, wetlands or proclaimed areas..

3.1.5 Wetlands

A search using the Department of Environment and Conservation (DEC) "Native Vegetation Map Viewer" mapping tool determined that there were no wetlands, lakes, rivers, or proclaimed areas located within the Project area.

3.1.6 Weeds

The Department of Agriculture and Food list of declared plants indicates that there are 87 species of declared plants in the East Pilbara region. Refer to Appendix D.

A flora survey conducted by Woodman (2011) concluded there are seven known introduced flora taxa in the greater study area in 2011 (Table 3).

Table 3 Summary of known introduced taxa known within the study area

Taxon	Declared Ranking	Plant	Environmental (CALM 1999)	Weeds	Rating
<i>Aerva javanica</i>	-		High		
<i>Cenchrus ciliaris</i>	-		High		
<i>Cynodon dactylon</i>	-		Moderate		
<i>Flaveria trinervia</i>	-		Not assessed		
<i>Opuntia stricta</i>	P1; P2		Not assessed		
<i>Portulaca oleracea</i>	-		Not assessed		
<i>Solanum nigrum</i>	-		Moderate		

3.1.7 Dieback

The closest Bureau of Meteorology (BoM) weather station is located at Indee (BoM Station No. 004016), and receives annual rainfall of 313.3 mm. As this is less <400 mm and is above the 26° parallel, dieback is not considered to be an issue.

3.1.8 Contaminated Sites

A search of the DEC's contaminated sites database on 21 May 2012 determined that the Project area does not contain, and is not adjacent to, any contaminated sites.

3.1.9 Acid Sulfate Soils

A search of the DEC's acid sulfate soils maps on the Shared Land Information Platform on the 21 May 2012 determined that acid sulphate soils will not be a risk to the Project.

3.1.10 Air Quality

The proposed geotechnical investigations and intersection works will result in the clearing of approximately 2.90 ha and is likely to result in a localised short term increase in the amount of airborne particulate matter. However, the overall impacts to the nearest non Project-related sensitive receptor (Yandeyarra, 27 km southwest of the Project) is likely to be negligible because of the scope of works and the distance to those receptors. Dust impacts will be managed during construction with a water cart utilised for conditioning road base materials.

3.2 Commonwealth Referral

The decision whether to refer the Project to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) was based upon whether the Project would impact Commonwealth land, or may have a significant impact upon matters of national significance, which are protected under the *Environment Protection and Biodiversity Conservation Act 1999*. These are; World Heritage properties, National Heritage places, wetlands of international importance (listed under the Ramsar convention), Commonwealth Marine Areas, migratory species protected under international agreements, nuclear actions, nationally threatened species and ecological communities.

The DSEWPaC protected matters search tool was used to determine if the Project will impact upon any matters of national significance. The preliminary impact assessment determined that the Project will not have a significant impact on Matters on National Environmental Significant or impact Commonwealth land, as discussed in Section 7 of this report.

3.3 State Referral

Due to the small scale nature for the works, the low significance of its impacts to the surrounding environment and that it is unlikely the Project will generate significant public interest; the Project does not require referral to the WA Environmental Protection Authority.

It is proposed that vegetation clearance (2.90 ha) required for the Project will be captured within MR's Clearing Permit CPS818/6.

4. EXISTING ENVIRONMENT

4.1 Description

The Project is located in the Pilbara bioregion under the Interim Biogeographic Regionalisation for Australia (IBRA) classification system, within the Chichester subregion (McKenzie, 2003). The Chichester sub-bioregion is characterised by undulating Achaean granite and basalt plains with significant areas of basalt ranges and plains of igneous granite and felsic volcanic rocks (Kendrick and McKenzie 2001).

The intersection is located on flat open alluvial plains supporting low shrublands and spinifex grasslands. Vegetation is considered to be consistent with the wider regional area. Despite recent exposure to fire, vegetation in the area is considered to be in 'Excellent' condition (Woodman, 2011).

A total of approximately 2.90 ha of vegetation is expected to be cleared as a result of the Project. The vegetation to be cleared is located in a long narrow strip alongside an existing roadside.

4.2 Site Investigation

A site visit was carried out by Atlas personnel, Mr Jon Scarth and MR representative Ms Fiona van Rijnsdoud, on 1st March 2012 to examine the general features of the area. Observations included vegetation, topography, drainage and existing disturbance. Site photos were obtained at a later date (16th May 2012) and are included in Appendix E.

5. CLEARING OF NATIVE VEGETATION

Native vegetation describes all indigenous aquatic and terrestrial vegetation (living or dead). The term does not include vegetation that was intentionally sown, planted or propagated unless it was required under a statutory condition.

Apart from activities that are exempt under the clearing regulation (Section 5 – Prescribed Clearing), typically all Main Roads clearing will be undertaken using a permit.

It is proposed that clearing of native vegetation for the Project will be undertaken using MR's Clearing Permit (CPS818/6).

5.1 Details of Vegetation Associations to be Cleared

In order to assess the significance of the vegetation proposed to be cleared for Atlas Wodgina Geotechnical Investigation the vegetation type, condition and percent of pre-European Extent remaining has been identified. Table 4 describes the location and condition of vegetation associations within the Project area while Table 5 provides further information regarding each vegetation association's representativeness.

Table 4: Vegetation Description, Condition and Percent Remaining

No.	Description	Start & End SLK	Side of Road (L- left, R - right, RBM building materials) -road	Condition (Keighery 1994)*	Pre-European Extent Remaining (%) **	Area (ha)
93	Hummock grasslands; shrub steppe; kanji over soft Spinifex	1507	Both sides	Excellent	100	2.90

Table 5: Vegetation Percept Remaining

Pre-European Extent Remaining: Vegetation Association No. 93		
Regional Context	Location	Pre-European Extent Remaining (%)
State-wide	N/A	100
Bioregional (IBRA Region)	Pilbara	100
Bioregional (IBRA Sub-Region)	Chichester (PIL1)	100
LGA	Shire of East Pilbara	100

5.2 Assessment Against Clearing Principles

In assessing whether the Project is likely to have a significant impact on the environment, the Project was assessed against the ten clearing principles (EP Act 1986 Schedule 5).

The Project is not likely to be at variance with the 10 clearing principles, as outlined below.

Table 6 Clearing Principles

(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.	
ASSESSMENT	Hummock grasslands; shrub steppe; kanji over soft Spinifex (93) is widespread in the Pilbara region and in good condition (100% of pre-European extent remaining). The native vegetation to be cleared does not comprise a high level of biological diversity. There will be a minimal amount of clearing (2.90 ha), which is a long narrow strip along an existing roadway.
METHODOLOGY & REFERENCES	Site visit (Jon Scarth, 1 March 2012), Flora and Vegetation Assessment (Outback Ecology Services, 2009) Level 2 flora assessment (Woodman, 2011)
Proposal is not likely to be at variance to this Principle.	

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	
ASSESSMENT	Given the minimal amount of clearing (2.90 ha) and the proximity to the road, the Project is unlikely to result in any habitat fragmentation or isolation. In addition, Hummock grasslands; shrub steppe; kanji over soft Spinifex is widespread in the Pilbara region.
METHODOLOGY & REFERENCES	Site visit (Jon Scarth, 1 March 2012), Level 2 flora assessment (Woodman, 2011) and Level 2 Fauna Assessment (Outback Ecology Services, 2009)
Proposal is not likely to be at variance to this Principle.	

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	
ASSESSMENT	No known Declared Rare Flora (DRF) in Project area.
METHODOLOGY & REFERENCES	Level 2 flora assessment (Woodman, 2011)
Proposal is not likely to be at variance to this Principle.	

(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.	
ASSESSMENT	There is no known EPBC Act or DEC threatened ecological community (TEC) or priority ecological community (PEC) within a 50-km radius of the Atlas Study Area.
METHODOLOGY & REFERENCES	Level 2 flora assessment (Woodman, 2011)
Proposal is not likely to be at variance to this Principle.	

(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	
ASSESSMENT	Native vegetation is widespread within the region within the region has 100% pre-European extent remaining. The Project will only clear a minimal amount of land (2.90 ha).
METHODOLOGY & REFERENCES	Car Reserve Analysis (2009)
Proposal is not likely to be at variance to this Principle.	

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	
ASSESSMENT	No Water course or wetland near Project area (See Section 3.1.5)
METHODOLOGY & REFERENCES	Search of DSEWPac Directory of Important Wetlands in Australia
Proposal is not likely to be at variance to this Principle.	

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	
ASSESSMENT	Clearing is unlikely to cause appreciable land degradation as a small amount of clearing (2.90 ha) is required to allow for road construction.
METHODOLOGY & REFERENCES	Flora and Vegetation Assessment (Outback Ecology Services, 2009)
Proposal is not likely to be at variance to this Principle.	

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	
ASSESSMENT	There are no conservation areas within a 50km radius of the Project area.
METHODOLOGY & REFERENCES	DEC database search (2011).
Proposal is not likely to be at variance to this Principle.	

(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	
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ASSESSMENT	No dewatering is expected to be required for the proposed works and no change to surface water or groundwater quality is expected. An existing twin box culvert will be extended to accommodate the acceleration lane. Test pits will be backfilled as part of the rehabilitation process if required.
METHODOLOGY & REFERENCES	Site visit (Jon Scarth, 1 March 2012)
Proposal is not likely to be at variance to this Principle.	

(j) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

ASSESSMENT	Only 2.90 ha will be cleared for the Project. The Project area is adjacent to artificial drainage structures (the GNH) and is not likely to cause, or exacerbate, the incidence or intensity of flooding. Any alternations to drainage structures during construction will be re-instated as part of the works.
METHODOLOGY & REFERENCES	Site visit (Jon Scarth, 1 March 2012)
Proposal is not likely to be at variance to this Principle.	

5.3 Summary of Management Actions

Atlas attempts to avoid clearing vegetation if possible, where clearing cannot be avoided then this clearing is kept to a minimum. The following actions are proposed to manage and minimise vegetation clearing for the Atlas Wodgina Junction upgrade and associated geotechnical works.

Environment Management methods:

- Avoiding significant vegetation
- Vegetation stockpiled separately for use in rehabilitation
- Use of liners and drip trays to minimise hydrocarbon spillage
- Use of appropriate machinery to minimise impacts
- Vehicle hygiene maintained to minimise spread of plant pathogens
- Any stockpiled vegetation from clearing works shall not be burnt.

Rehabilitation practices:

- Excavations backfilled and respread with topsoil and vegetation
- All rubbish removed from site (including any hydrocarbon spills)

The following Table 7 summarises what further assessment and management is required in accordance with MRWA State-wide vegetation Clearing Permit (CPS 818/6).

Table 7 Summary of Additional Management Actions

Impact of Clearing	Yes/No or NA	Further Action Required
1. Does the assessment indicate that the clearing may be at variance or is at variance with one or more of the principles for clearing?	No	No further action required.
4. Will the Project involve clearing for purposes considered temporary in nature under Condition 13 of CPS818?	No	Any vegetation required to be cleared for geotechnical works would be included within the area proposed for permanent intersection works.

6. ASSESSMENT OF ASPECTS AND IMPACTS

Table 8: Aspects and Impacts – Wodgina Intersection Improvement Works

Aspect	Evaluation of Potential Impacts
Vegetation – clearing	<p>Atlas proposes to clear 2.90 ha native vegetation. The vegetation is widespread in the region and is described as Hummock grasslands; shrub steppe; kanji over soft Spinifex. The native vegetation proposed to be cleared is well represented regionally as both associated possess more than 30% of its pre-European extent.</p> <p>The Woodman (2011) study indicated that the vegetation in the area was primarily considered to be in 'Excellent' condition despite the recent fire affecting the composition and structure of the vegetation.</p> <p>The majority of the 2.90 ha to be cleared is expected to be permanent. Impacts are expected to be minimal given the long narrow strip of vegetation to be cleared and the proximity to an existing roadway.</p>
Vegetation – TECs/DRF	<p>No TECs/DRF is present in the proposed works areas. No significant vegetation types or threatened flora have been recorded within the road reserve.</p> <p>The proposal is not expected to have a significant impact upon any DRF or TECs.</p> <p>No known Matters of National Environmental Significance as protected under EPBC Act (1999) will be impacted (see Section 3.1).</p>
Vegetation – weeds	<p>Flora and Vegetation Assessment (Woodman, 2011) determined that there are 7 known weeds in the Atlas Study Area. These species are likely to be widespread within the reserve and general area.</p>
Vegetation – dieback	<p>Vegetation dieback is not an issue given the Project area receives <400 mm of average annual rainfall or is located above the 26° parallel.</p>
Fauna	<p>With the proximity to the GNH, no significant impacts would be expected on native fauna generally as a result of the Project.</p>
Heritage (non-indigenous)	<p>A search of the Australian Heritage Places Inventory, Heritage Council of Western Australia indicated that there are no known sites of heritage significance within the vicinity of the Project area.</p> <p>No known Matters of National Environmental Significance as protected under EPBC Act (1999) will be impacted (see Section 3).</p>
Aboriginal heritage	<p>A search of the DIA's database indicated that the Project site does not fall within any recorded Aboriginal Heritage sites.</p> <p>An archaeological and ethnographic heritage survey indicated that no archaeological or ethnographic sites were found within the vicinity of the Project.</p>
Wetlands	<p>A search using the Department of Environment and Conservation (DEC) "Native Vegetation Map Viewer" mapping tool determined that there were no significant wetlands, lakes, rivers, or proclaimed areas located within the Project area.</p> <p>No known Matters of National Environmental Significance as protected under EPBC Act (1999) will be impacted (see Table 6.2).</p>
Surface water/drainage	<p>A search of the DoW's database has confirmed that the proposed works will not disturb or interrupt any natural drainage and surface run-off patterns. An ephemeral creek flows across the northern portion of the intersection and other small ephemeral drainage lines cross the Project area. A twin box culvert will be extended to accommodate the acceleration lane.</p>
Groundwater	<p>No dewatering or drainage modifications are required, hence no change to groundwater level or quality.</p>
Reserves / Conservation areas	<p>There are no conservation areas or reserves adjacent to the Project area</p>

Table 8: Aspects and Impacts – Wodgina Intersection Improvement Works

Aspect	Evaluation of Potential Impacts
Air quality	Not relevant to the proposed works. Local air quality assessment is not required for the Project since: <ul style="list-style-type: none"> • residential and other sensitive receptors are not within 200 meters of the road centre.
Dust	Likely to be a minor issue during earthworks, however there are no sensitive receivers adjacent to the proposed works. Dust can be managed by standard construction dust management techniques.
Noise and vibration	No major sensitive local receivers. Construction works are not expected to significantly contribute to noise levels at the nearest sensitive receptors.
Visual amenity	The proposed works will result in minor and short-term visual impacts during construction.
Public safety and risk	The Project will not pose a risk to public safety due to its isolated location and small scale of operations. A Traffic Management Plan will help manage traffic hazards during works.
Hazardous substances	Not relevant to the proposed works, the Project requires no hazardous substances to be used.
Contamination	The works are within the road reserve and no known previous land use activities on or adjacent to the Project area have had the potential to create contamination, e.g. petrol station. A search of the DEC's contaminated sites database indicates there are no identified contaminated sites within the Project area.
Salinity	There were no visual signs of salinity observed in the Project area. Given the nature and scale of the Project the impact is considered not relevant.
Acid Sulfate Soils	A search of the DEC's acid sulfate soils maps on the Shared Land Information Platform determined that acid sulphate soils will not be a risk to the Project.
Statutory Land Use Planning	As the proposed works are entirely within the existing road reserve no planning scheme amendments are required.

Table 9: Commonwealth Aspects and Impacts – Wodgina Intersection Improvement Works

Aspect	Evaluation of Potential Impacts
World Heritage properties	The Project will not impact any World Heritage properties.
National Heritage places	A search of the Australian Heritage Places Inventory Database located no sites within the vicinity of the Project.
Wetlands of international importance (Ramsar)	A search of the DSEWPaC Protected Matters Search Tool located no Ramsar Wetland(s) within the vicinity of the Project.
Nationally threatened species or ecological communities	A search of the DSEWPaC Protected Matters Search Tool located no threatened ecological communities and no threatened species
Migratory species protected under international agreements	A search of the DSEWPaC Protected Matters Search Tool located no migratory species within the vicinity of the Project.
Commonwealth marine areas	The Project will not impact any Commonwealth marine area or marine protected area.
Commonwealth lands	The Project is not located on and will not impact any Commonwealth lands.
Nuclear Actions	Not relevant to the proposed works.

7. DECISION TO REFER

7.1 Referral to the Department of Sustainability, Environment, Water, Population and Communities

The preliminary impact assessment determined the Project is not likely to have a significant impact on Matters of National Environmental Significance or impact Commonwealth land as outlined in Table 9 of the report. For this reason the Project does not require referral to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities.

7.2 Referral to the Environmental Protection Authority

Due to the small scale of the Project, the low significance of its impacts to the surrounding environment and that it is unlikely the Project will generate significant public interest, the Project does not require referral to the WA Environmental Protection Authority.

8. STAKEHOLDER CONSULTATION

Table 10: Project Consultation

Name	Agency	Date	Comments
Fiona van Rijnsdoud	Main Roads	14/05/2012	
Irene Roberts	Kariyarra Native Title Group	30/04/2012	Input into Archaeological and Ethnographic Heritage Survey Advice. No archaeological or ethnographic sites were identified.
Steven Stewart Jnr		to	
Peter Hughes		01/05/2012	
Kendall Captain			
Reece Edgar			
Steven Stewart			
Cynthia Coppin			
John Stewart			
Cliff Taylor			

9. OTHER APPROVALS/PERMITS/LICENCES

Approval for Mining Proposal – Letter of Intent – Atlas Wodgina Direct Shipping Ore Project – Great Northern Highway Intersection Improvement Works on L45/211 (Reg ID: 35759) was received from the DMP on the 12th July 2012. This approval authorises the section of the intersection improvement works that fall outside of the road reserve and within the miscellaneous licence L45/211.

The design of the upgraded T-junction was approved by MR through the complex works application process on the 9th October 2012.

10. REFERENCES

Beeston, G.R., Hopkins, A.J.M. and Shepherd, D.P. (2002). Land-use and vegetation in Western Australia. Department of Agriculture, Western Australia, Resource Management Technical Report 250.

Big Island Research (2012) *Archaeological and Ethnographic Survey Advice: Work Area Clearance Survey*. Report prepared for Atlas Iron, Perth, Western Australia.

Keighery, B. J. (1994) *Bushland Plant Survey: A Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc). Nedlands, Western Australia.

Outback Ecology Services (2009) *Flora and Vegetation Assessment*. Report prepared for Atlas Iron. Perth, Western Australia.

Woodman Environment Consulting (2011) *Wodgina Ore Stockpile Area Flora and Vegetation Assessment*. Report prepared for Atlas Iron. Perth, Western Australia.

Appendix A

Low Impact Environmental Screening Checklist

Checklist - Low Impact Screening Checklist

The Low Impact Screening Checklist is part of the environmental assessment and approval process, refer to in Figure 2 in the Main Roads environmental guideline Environment Assessment and Approvals. It should be noted that the checklist does not address Aboriginal heritage issues. Please refer to Main Roads guideline *Aboriginal Heritage* for the heritage assessment process.

All projects are to be screened to identify those that are Low Impact.

Projects that have "No" to **all** items are classed as Low Impact and should be implemented using standard contract clauses in the Tender Document Process.

Projects that have "Yes" to **any** item will require further environmental assessment and will be implemented using an Environmental Management Plan.

Tick "Yes" or "No" for every item.

Project Name WODGINA JUNCTION IMPROVEMENT WORKS

ITEM NO.	ITEM	Y	N
1	New road or road reserve to be created or expansion of existing road reserve.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Works require clearing of native vegetation outside the maintenance zone.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Works require clearing of native vegetation that is older than 10 years old within the maintenance zone.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Works to occur outside normal working hours. <u>All geotech works - during normal hours. Permanent works - possible.</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	Passes over, adjoins or drains directly into a wetland or sensitive watercourse.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6	Local natural drainage regime / hydrology will be changed.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7	Dewatering, or a new water bore required.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8	Known potential source of hazardous materials within or adjoining project area. e.g. Acid Sulphate Soils, existing petrol station, industrial site or waste disposal site (landfill)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9	Buildings will require demolition.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Completed By:

Signature

J.J. SCARTH

Date

14/5/2012

Name

J.J. SCARTH

Title

ROADS + CROSSINGS MGR.

To be reviewed by
a Main Roads
Environment Officer

Signature

Name

Date

Title

Comments:

THIS CHECKLIST COVERS THE PROPOSED GEOTECHNICAL WORKS AND THE PERMANENT CONSTRUCTION WORKS.

Appendix B

Flora and Vegetation Assessment (Woodman, 2011)

Atlas Iron Limited

**Wodgina Ore Stockpile Area
Flora and Vegetation Assessment**

December 2011



woodmanenvironmentalconsulting

A.C.N. 088 055 903

DOCUMENT REVISION HISTORY

Revision	Description	Originator	Internal Review	Internal Review Date	Client Reviewer	Client Review Date
A	Draft Report	DC	GW	11/11/2011	A. Parker	22/12/2011
0	Final Report incorporating client comments	DC	GW	22/12/2011		

Report Number: Atlas11-56-01

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Table 1: Conservation Significant Flora Taxa Known within the Vicinity of the Survey Area

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Appendix A: Vascular Plant Taxa Recorded Within the Wodgina Ore Stockpile Survey Area

Appendix B: Point Locations of Significant Flora Taxa

FIGURES

Figure 1: Wodgina Ore Stockpile Area Plant Communities and Significant Flora Locations

1. INTRODUCTION

1.1 Project Description

Atlas Iron Limited ('Atlas') have recently commenced mining of iron ore at their Wodgina mine site, located approximately 100 km south of Port Hedland. As part of plans to upgrade the processing capacity of the Wodgina mine site, Atlas are proposing to construct an ore stockpile area adjacent to the current Wodgina mine site access road. The stockpile area measures 600 m by 200 m. Atlas commissioned Woodman Environmental Consulting Pty Ltd to conduct a flora and vegetation assessment of the Wodgina Ore Stockpile Survey Area ('survey area'), to support a Programme of Works (POW) application for the proposed stockpile area.

1.2 Background

A number of surveys have been conducted recently in the immediate vicinity of the Project area. These include a survey of the Atlas Turner River Hub Project study area by Woodman Environmental (Woodman Environmental in prep. a), a survey of the Atlas Hercules Project Area by Woodman Environmental (Woodman Environmental in prep. b), a survey of the Atlas Iron Wodgina Direct Shipping Ore (DSO) Project area by Outback Ecology Services (2009), and a survey of the Talison Minerals Wodgina Operations Project area by Outback Ecology Services (2009). These surveys have recorded a total of 6 conservation significant flora taxa and 7 introduced (weed) taxa in the general vicinity of the survey area; these are listed in Tables 1 and 2 below. No Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) have been recorded in the vicinity of the survey area, with most vegetation types considered to be common and widespread.

Table 1: Conservation Significant Flora Taxa Known within the Vicinity of the Survey Area

Taxon	Ranking
<i>Eriachne</i> aff. <i>festucea</i>	*
<i>Euphorbia clementii</i>	P2
<i>Gymnanthera cunninghamii</i>	P3
<i>Heliotropium muticum</i>	P1
<i>Mallotus</i> sp.	*
<i>Nicotiana umbratica</i>	P2
<i>Terminalia supranitifolia</i>	P3
<i>Vigna</i> sp. rockpiles (R. Butcher <i>et al.</i> RB 1400)	P3

Note: * represents a potentially undescribed taxon that may be of conservation significance

Table 2: Introduced Flora Taxa Known within the Vicinity of the Survey Area

Taxon	Common Name
<i>Aerva javanica</i>	Kapok Bush
<i>Cenchrus ciliaris</i>	Buffel Grass
<i>Cynodon dactylon</i>	Couch
<i>Flaveria trinervia</i>	Speedy Weed
<i>Passiflora foetida</i> var. <i>hispida</i>	Stinking Passion Flower
<i>Portulaca oleracea</i>	Purslane
<i>Trianthema portulacastrum</i>	Giant Pigweed

2. METHODS

The proposed stockpile area was surveyed by experienced botanists Greg Woodman and David Coultas on the 22nd September 2011. Due to the small size of the survey area, the majority of the survey area was traversed on foot. All known conservation significant flora taxa encountered were recorded during the inspection, with GPS co-ordinates and numbers of individuals noted. Any taxa that could not be identified in the field that were suspected of being of conservation significance were collected for identification at the W.A. Herbarium. All conservation codes were checked for currency using the DEC's *Florabase* online database (DEC 2011a), as this contains the most up-to-date information on the conservation status of all taxa in Western Australia.

Brief plant community recording sites were established in each plant community encountered during the survey. A total of 3 recording sites were established during the survey, with the recording sites incorporating an area within a 50 m radius of a central point. The following parameters were recorded at each site:

- Personnel;
- Site Number;
- Date of survey;
- GPS coordinates (GDA94);
- Site Photograph;
- Topography (including landform type and aspect);
- Soil colour and type (including the presence of outcropping and surface stones);
- Vegetation condition (adapted from Keighery 1994; Appendix F);
- Approximate time since fire;
- Presence of disturbance (if any);
- Height (m) and percentage foliage cover for dominant taxa.

3. RESULTS

3.1 Limitations of Survey

The timing of the survey coincides with the ‘dry’ season in the Pilbara region, during which time very little precipitation occurs. It is therefore likely that ephemeral and geophytic taxa were not present at the time of survey, and therefore only perennial taxa could be identified. However, a significant proportion of the perennial taxa encountered during the survey were in flower; this is likely to be a result of relatively high rainfall from May to July, where approximately 61 mm fell (Bureau of Meteorology 2011). This made identification of perennial taxa, including significant flora taxa, relatively easy.

Botanists from Woodman Environmental have also had extensive experience in the Wodgina area, including in recognising conservation significant flora taxa, and are therefore considered to have been adequately experienced to undertake the survey.

3.1 Flora

A total of 19 vascular flora taxa were recorded in the survey area. This is by no means an exhaustive list of taxa within the survey area; however this list contains taxa observed to be dominant within plant communities in the survey area, as well as conservation significant and introduced taxa identified during the survey. The families Fabaceae (5 taxa) and Poaceae (4 taxa) were the most well-represented. Appendix A presents the list of taxa recorded in the survey area.

One conservation significant taxon was recorded in the survey area: *Euphorbia clementii* (P2). Appendix B presents point location data for this taxon.

Euphorbia clementii (P2) is a semi-succulent herb to 0.6 m in height, and occurs on gravelly hillsides and stony grounds within the Pilbara IBRA region (DEC 2011a). It has a range of approximately 270 km, from near Port Hedland south-east to near Warrawagine Station (DEC 2011b), however only five specimens are lodged in the W.A. Herbarium. This taxon was previously recorded from 83 point locations within the Atlas Turner River Hub study area (Woodman Environmental in prep. a), with most occurring at the Wodgina minesite and haul road areas, where many hundreds of individuals were recorded during searches of proposed infrastructure footprint areas. This taxon was mainly recorded within rocky drainage lines, on orange to red sandy-loams, almost always in areas that had been recently burnt (within the last three years). This species was recorded at 92 point locations (Appendix B; Figure 1) across the survey area, with a total of 503 individuals recorded.

One introduced (weed) species was recorded in the survey area: *Cenchrus ciliaris* (buffel grass). *Cenchrus ciliaris* is a widespread introduced taxon throughout roadsides, creek lines, river edges and most vegetation types from Geraldton to the Pilbara, Kimberley and adjacent desert. It was originally introduced into pastoral regions as a pasture grass, and alters the fire characteristics by generating a high level of flammable fuel (Hussey *et al.* 2007). This taxon was rated as High under the Environmental Weed Strategy for Western

Australia, due to its high level of invasiveness, wide current or potential distribution and high level of environmental impact to structure, composition and function of ecosystems (Department of Conservation and Land Management 1999). *Cenchrus ciliaris* was recorded frequently throughout the nearby Atlas Turner River Hub study area, and dominated the understorey at several locations, with foliage cover of 60 % occasionally recorded (Woodman Environmental in prep. a). *Cenchrus ciliaris* was recorded within a creekline in the south-western part of the survey area. It was recorded at 2 point locations, however was noted as being abundant, with in excess of 1000 plants noted. Point locations for this taxon are presented in Appendix B.

Additionally, the recordings of *Velleia connata* and *Heliotropium vestitum* represent significant extensions to their known geographic ranges (DEC 2011a). These collections will be submitted to the W.A Herbarium. A further collection possibly representing this taxon was also made; the collection superficially differs from the specimen of *H. vestitum* collected during this survey, however its identity could not be confirmed because of restrictions on accessing the W.A. Herbarium's reference collection. It is expected that this collection will prove to be an unusual specimen of *H. vestitum*.

3.2 Vegetation

Three plant communities were identified within the survey area, as described below:

1. Mid sparse shrubland dominated by *Acacia ancistrocarpa* and *A. inaequilatera* over low sparse shrubland dominated by *Ptilotus calostachyus* over low hummock grassland of *Triodia lanigera* on red-brown stony clay-loams on low stony rises
2. Isolated trees of *Corymbia hamersleyana* over tall shrubland dominated by *Acacia tumida* var. *pilbarensis* over low shrubland dominated by *Velleia connata*, *Ptilotus calostachyus* and *Goodenia stobbsiana* over low hummock grassland of *Triodia epactia* on red brown clay-loams in broad drainage lines
3. Low woodland of *Eucalyptus victrix* over tall sparse shrubland dominated by *Acacia pyrifolia* and *A. tumida* var. *pilbarensis* over low sparse shrubland dominated by *Tephrosia rosea* var. *clementii* and *Corchorus parviflorus* over low mixed grassland dominated by **Cenchrus ciliaris* and *Triodia epactia* over low isolated herbs including *Phyllanthus maderaspatensis* and *Euphorbia alsiniflora* on brown clay-loams in creeklines

The vast majority of the survey area had recently (within the last 2 years) been burnt, and therefore fire-following species, including *Velleia connata*, *Ptilotus calostachyus*, *Goodenia stobbsiana* and *Euphorbia clementii* (P2), dominated the lower shrub layer. However, there were several small unburnt patches that aided in determining aspects of the general post-fire climax community structure. These aspects have been incorporated into the descriptions above. Despite the recent fire affecting composition and structure of the vegetation, the vegetation was considered to be primarily in 'Excellent' condition (Keighery 1994), however plant community 3 was ranked 'Good', because of the prevalence of the invasive weed *Cenchrus ciliaris*.

4. DISCUSSIONS AND CONCLUSIONS

Euphorbia clementii (P2) is a relatively poorly-known taxon that was recorded from numerous locations in the survey area, with in excess of 500 individuals recorded. This species is known to respond to the passage of fire, and given that the majority of the survey area was burnt within the last 2 years, this is likely to account for the relatively high numbers of individuals recorded. Large populations of this taxon were also recorded in nearby recently burnt areas during survey for the Atlas Turner River Hub Project (Woodman Environmental in prep. a), with smaller populations recorded during survey for the Atlas Hercules Project (Woodman Environmental in prep. b). It is therefore expected that any impacts to the local and regional conservation significance of this taxon are likely to be minimal. However, it is recommended that known locations of this taxon be avoided if practicable during construction of the stockpile area.

The introduced taxon *Cenchrus ciliaris* is prevalent within a large creek line near the southern end of the survey area. This taxon is particularly invasive, and will spread rapidly into disturbed areas, as its seed is efficiently dispersed by wind, and also on animals. It is therefore recommended that the stockpile area, including the proposed access road, be monitored to facilitate the early detection, and therefore early control and potential eradication from these areas.

As the majority of the survey area has been burnt within the last 2 years, the vegetation appeared at least superficially to be different to vegetation observed in nearby areas by Woodman Environmental as part of studies for the Turner River Hub Project, with a number of fire-response species, including *Velleia connata*, *Ptilotus calostachyus* and *Goodenia stobbsiana* dominating the low shrub layer. However, the vegetation has developed sufficiently to confidently infer that all plant communities described in the survey area are equivalent to widespread and common Floristic Community Types described as part of studies for the Turner River Hub Project. It is therefore considered likely that none of the plant communities described in the survey area are of conservation significance.

5. RECOMMENDATIONS

The following recommendations are given:

1. Known locations of *Euphorbia clementii* (P2) should be avoided if practicable during construction of the stockpile area.
2. The stockpile area should be periodically inspected to detect infestations of the introduced *Cenchrus ciliaris*, and appropriate control measures instigated if infestations are detected.

6. REFERENCES

- Bureau of Meteorology (2011)
Port Hedland Daily Weather Observations. Available:
<http://www.bom.gov.au/climate/dwo/IDCJDW6113.latest.shtml>. Accessed
October, 2011.
- Department of Conservation and Land Management (1999)
Environmental Weed Strategy for Western Australia. Department of Conservation
and Land Management, Perth.
- Department of Environment and Conservation (2011a)
Florabase. Sourced October 2011. Available: <http://florabase.dec.wa.gov.au/>
- Department of Environment and Conservation (2011b)
NatureMap. Sourced October 2011. Available: <http://naturemap.dec.wa.gov.au/>
- Hussey, B.M.J, Keighery, G.J., Dodd, J. Lloyd, S.G. and Cousens, R.D. (2007)
Western Weeds – A Guide to the Weeds of Western Australia (2nd Ed.). The Weeds
Society of Western Australia (Inc.), Victoria Park, Western Australia.
- Keighery, B.J. (1994)
Bushland Plant Survey: a Guide to Plant Community Survey for the Community.
Wildflower Society of WA (Inc.), Nedlands, Western Australia.
- Outback Ecology Services (2008)
*Wodgina Operations and Mount Francisco Vegetation and Flora Survey and DRF
and Priority Targeted Search*. Unpublished report prepared for Talison Minerals,
August 2008.
- Outback Ecology Services (2009)
Wodgina DSO Project Flora and Vegetation Assessment. Unpublished report
prepared for Atlas Iron, October 2009.
- Woodman Environmental Consulting Pty Ltd (in prep. a)
Turner River Hub Project Flora, Vegetation and Mangal Studies. Unpublished
report (Atlas10-27-01). Report in preparation for Atlas Iron Limited.
- Woodman Environmental Consulting Pty Ltd (in prep. b)
Hercules Project Flora and Vegetation Assessment. Unpublished report in
preparation for Atlas Iron Limited.

Appendix A: Vascular Plant Taxa Recorded Within the Wodgina Ore Stockpile Survey Area

Family	Taxon
Amaranthaceae	<i>Ptilotus calostachyus</i>
Boraginaceae	<i>Heliotropium vestitum</i> <i>Heliotropium ?vestitum</i>
Euphorbiaceae	<i>Euphorbia alsiniflora</i> <i>Euphorbia clementii</i> (P2)
Fabaceae	<i>Acacia ancistrocarpa</i> <i>Acacia inaequilatera</i> <i>Acacia pyrifolia</i> <i>Acacia tumida</i> <i>Tephrosia rosea</i> var. <i>clementii</i>
Goodeniaceae	<i>Goodenia stobbsiana</i> <i>Velleia connata</i>
Malvaceae	<i>Corchorus parviflorus</i>
Myrtaceae	<i>Eucalyptus victrix</i> <i>Corymbia hamersleyana</i>
Phyllanthaceae	<i>Phyllanthus maderaspatensis</i>
Poaceae	* <i>Cenchrus ciliaris</i> <i>Cymbopogon ambiguus</i> <i>Triodia epactia</i> <i>Triodia lanigera</i>

Appendix B: Point Locations of Significant Flora Taxa

Taxon	GPS E	GPS N	Number of Plants
<i>Euphorbia clementii</i> (P2)	676429	7661600	4
<i>Euphorbia clementii</i> (P2)	676572	7661592	6
<i>Euphorbia clementii</i> (P2)	676544	7661533	5
<i>Euphorbia clementii</i> (P2)	676534	7661493	2
<i>Euphorbia clementii</i> (P2)	676505	7661434	1
<i>Euphorbia clementii</i> (P2)	676477	7661313	1
<i>Euphorbia clementii</i> (P2)	676482	7661135	1
<i>Euphorbia clementii</i> (P2)	676463	7661103	10
<i>Euphorbia clementii</i> (P2)	676401	7661019	5
<i>Euphorbia clementii</i> (P2)	676366	7660971	4
<i>Euphorbia clementii</i> (P2)	676311	7660833	1
<i>Euphorbia clementii</i> (P2)	676282	7660782	2
<i>Euphorbia clementii</i> (P2)	676262	7660750	6
<i>Euphorbia clementii</i> (P2)	676228	7660730	1
<i>Euphorbia clementii</i> (P2)	675946	7660503	10
<i>Euphorbia clementii</i> (P2)	675894	7660477	12
<i>Euphorbia clementii</i> (P2)	675815	7660332	1
<i>Euphorbia clementii</i> (P2)	675665	7660264	5
<i>Euphorbia clementii</i> (P2)	675587	7660305	2
<i>Euphorbia clementii</i> (P2)	675325	7660305	30
<i>Euphorbia clementii</i> (P2)	675316	7660379	25
<i>Euphorbia clementii</i> (P2)	675455	7660523	15
<i>Euphorbia clementii</i> (P2)	675498	7660560	20
<i>Euphorbia clementii</i> (P2)	675545	7660607	12
<i>Euphorbia clementii</i> (P2)	675584	7660647	5
<i>Euphorbia clementii</i> (P2)	675644	7660701	10
<i>Euphorbia clementii</i> (P2)	675742	7660801	2
<i>Euphorbia clementii</i> (P2)	675785	7660837	5
<i>Euphorbia clementii</i> (P2)	675821	7660871	3
<i>Euphorbia clementii</i> (P2)	675871	7660914	50
<i>Euphorbia clementii</i> (P2)	675922	7660957	20
<i>Euphorbia clementii</i> (P2)	676119	7661164	5
<i>Euphorbia clementii</i> (P2)	676153	7661203	1
<i>Euphorbia clementii</i> (P2)	676267	7661358	20
<i>Euphorbia clementii</i> (P2)	676330	7661435	10
<i>Euphorbia clementii</i> (P2)	676348	7661470	15
<i>Euphorbia clementii</i> (P2)	676392	7661539	2
<i>Euphorbia clementii</i> (P2)	676454	7661592	6
<i>Euphorbia clementii</i> (P2)	676495	7661667	1
<i>Euphorbia clementii</i> (P2)	676541	7661604	1
<i>Euphorbia clementii</i> (P2)	676550	7661581	3
<i>Euphorbia clementii</i> (P2)	676532	7661564	1
<i>Euphorbia clementii</i> (P2)	676530	7661534	1
<i>Euphorbia clementii</i> (P2)	676472	7661433	1

Taxon	GPS E	GPS N	Number of Plants
<i>Euphorbia clementii</i> (P2)	676470	7661394	1
<i>Euphorbia clementii</i> (P2)	676445	7661307	13
<i>Euphorbia clementii</i> (P2)	676424	7661295	7
<i>Euphorbia clementii</i> (P2)	676388	7661086	1
<i>Euphorbia clementii</i> (P2)	676347	7661039	1
<i>Euphorbia clementii</i> (P2)	676347	7660999	3
<i>Euphorbia clementii</i> (P2)	675806	7660434	1
<i>Euphorbia clementii</i> (P2)	675796	7660436	1
<i>Euphorbia clementii</i> (P2)	675790	7660422	8
<i>Euphorbia clementii</i> (P2)	675779	7660411	2
<i>Euphorbia clementii</i> (P2)	675697	7660335	10
<i>Euphorbia clementii</i> (P2)	675669	7660341	1
<i>Euphorbia clementii</i> (P2)	675594	7660359	1
<i>Euphorbia clementii</i> (P2)	675570	7660365	4
<i>Euphorbia clementii</i> (P2)	675518	7660344	3
<i>Euphorbia clementii</i> (P2)	675358	7660356	2
<i>Euphorbia clementii</i> (P2)	675347	7660376	3
<i>Euphorbia clementii</i> (P2)	675329	7660376	6
<i>Euphorbia clementii</i> (P2)	675362	7660412	1
<i>Euphorbia clementii</i> (P2)	675440	7660469	3
<i>Euphorbia clementii</i> (P2)	675452	7660491	7
<i>Euphorbia clementii</i> (P2)	675553	7660555	1
<i>Euphorbia clementii</i> (P2)	675578	7660572	3
<i>Euphorbia clementii</i> (P2)	675640	7660671	6
<i>Euphorbia clementii</i> (P2)	675697	7660711	1
<i>Euphorbia clementii</i> (P2)	675724	7660735	4
<i>Euphorbia clementii</i> (P2)	675808	7660806	4
<i>Euphorbia clementii</i> (P2)	675837	7660828	1
<i>Euphorbia clementii</i> (P2)	675847	7660851	5
<i>Euphorbia clementii</i> (P2)	675863	7660880	1
<i>Euphorbia clementii</i> (P2)	675885	7660896	5
<i>Euphorbia clementii</i> (P2)	675898	7660910	7
<i>Euphorbia clementii</i> (P2)	675948	7660936	3
<i>Euphorbia clementii</i> (P2)	676005	7660957	3
<i>Euphorbia clementii</i> (P2)	676193	7661198	1
<i>Euphorbia clementii</i> (P2)	676237	7661246	1
<i>Euphorbia clementii</i> (P2)	676238	7661265	4
<i>Euphorbia clementii</i> (P2)	676255	7661280	6
<i>Euphorbia clementii</i> (P2)	676264	7661295	3
<i>Euphorbia clementii</i> (P2)	676275	7661319	2
<i>Euphorbia clementii</i> (P2)	676328	7661370	3
<i>Euphorbia clementii</i> (P2)	676352	7661382	2
<i>Euphorbia clementii</i> (P2)	676368	7661397	2
<i>Euphorbia clementii</i> (P2)	676385	7661398	1
<i>Euphorbia clementii</i> (P2)	676367	7661418	4
<i>Euphorbia clementii</i> (P2)	676408	7661490	1
<i>Euphorbia clementii</i> (P2)	676420	7661510	3

Taxon	GPS E	GPS N	Number of Plants
<i>Euphorbia clementii</i> (P2)	676424	7661543	4
* <i>Cenchrus ciliaris</i>	675512	7660282	300
* <i>Cenchrus ciliaris</i>	675382	7660475	1000

Appendix C

Archaeological and Ethnographic Heritage Survey Advice

ARCHAEOLOGICAL AND ETHNOGRAPHIC HERITAGE SURVEY ADVICE

**Work Area Clearance Survey,
Atlas Iron Limited's Mt Dove and Wodgina Access
Road Intersections along the Great Northern Hwy,
Pilbara, Western Australia**

Ref: AI009-10x-BO

Prepared for
Kariyarra Native Title Group & Atlas Iron Limited

Survey Dates
30 April and 1 May 2012

Ownership of Information

This advice has been prepared for submission to the *Kariyarra* Native Title Group. Any cultural information contained within the advice is the property of the people who provided the information. This advice and the information it contains may not be copied in whole or part without written consent of the *Kariyarra* Native Title Group, Atlas Iron Limited and Big Island Research Pty Ltd. However, it is written for the purpose of assisting with Atlas Iron Limited with its Aboriginal heritage approvals processes and any copying associated with this purpose is permitted.

Geographic Co-ordinates

Geographic co-ordinates in this advice were obtained using a hand-held Garmin Global Positioning System device accurate to within +/- 15 m. Geographic co-ordinates in this advice are based on the GDA 94 coordinate system. All locations are in Zone 50K.

Maps

All maps in this advice use data provided by Atlas Iron Limited and Google Earth.

Report Authors

Written by Wendy Reynen BA (Hons) and Amanda Harris PhD

Edited by Kate Morse PhD and Guy Wright PhD

Disclaimer

Big Island is not responsible for omissions and inconsistencies that may result from information not available at the time this advice was prepared.

Introduction

This advice details the results of an Aboriginal archaeological and ethnographic assessment of two nominated areas located along the Great Northern Hwy, approximately 54 km and 87 km from Port Hedland in the Pilbara region of Western Australia. Atlas Iron Limited (Atlas Iron) proposes to widen the turnoff points at the intersections of the Great Northern Hwy to the Atlas Wodgina and Mt Dove access roads to bring them in line with State Government requirements.

This survey was carried out as part of the surveys of the proposed Boodarie Haul Rd for Atlas Iron. Atlas Iron requested that the survey areas located along the Great Northern Hwy be reported separately to the Boodarie Haul Rd surveys (AI009 & AI010). As no sites were identified during this survey Atlas Iron have agreed that an advice rather than a separate report is appropriate.

The objectives of the survey were as follows:

- investigate nominated areas and locate Aboriginal sites as defined by Section 5 of the *Aboriginal Heritage Act 1972*;
- to record aboriginal sites identified to Section 18 level; and
- to provide advice on site management.

The assessment was carried out between the 30th April and the 1st May 2012 by Big Island Research Pty Ltd (Big Island). Representatives of the *Kariyarra* Native Title Group participated in the assessment. Atlas Iron provided logistical support throughout the course of the survey.

The structure and content of this report is consistent with that outlined in the *Guidelines for Aboriginal Heritage Assessment in Western Australia* (Department of Indigenous Affairs 2012) and the *Guidelines for recording Aboriginal Heritage Sites in Western Australia* (Department of Indigenous Affairs 2012).

Synopsis

Big Island was contracted by Atlas Iron Ltd to undertake a Work Area Clearance Survey of two areas located along the Great Northern Hwy (Maps 1 and 2, Appendix One). The first proposed survey area measures 800m x 600m and is located at the intersection of the Atlas Mt Dove access road with the Great Northern Hwy (Mt Dove turn-off survey area). The second proposed survey area is situated at the intersection of the Atlas Wodgina access road with the Great Northern Hwy and measures 600m x 600m (Wodgina turn-off survey area).

Survey area coordinates are provided in Appendix One.

Location, Environment and Disturbance

The two nominated survey areas are located on flat open alluvial plains supporting low shrublands (*Acacia* spp., *Grevillea* spp.) and spinifex (*Triodia* spp.) grasslands. An ephemeral creek flows northeast-southwest across the northern portion of the Wodgina turn-off survey area and several small ephemeral drainage lines criss-cross throughout both survey areas. The ground surface comprises mixed iron-rich and quartz gravels with soft alluvial sediment. Several wash areas are evident.

Ground surface visibility was determined by the density of vegetation cover and was generally high throughout the nominated areas. The eastern sections of both survey areas contain disturbance associated with the Great Northern Hwy. Sections of the survey areas have been disturbed to varying degrees by vehicle access tracks and historical and modern rubbish.

Previously Recorded Sites

A search of the Department of Indigenous Affairs' Register of Aboriginal Sites did not identify any previously recorded Aboriginal sites and/or heritage places within the nominated survey areas.

Survey Participants

The following people participated in the archaeological and ethnographic assessment of the Great Northern highway survey as part of the Boodarie Haul Rd surveys.

Big Island Research	
Richard Cameron	Archaeologist, Field Manager
Daniel Harris	Archaeologist
Klim Gollan	Archaeologist
Wendy Reynen	Archaeologist
Amanda Harris	Anthropologist

Kariyarra Native Title Group	
Irene Roberts ¹	Steven Stewart ¹
Steven Stewart Jnr	Cynthia Coppin ¹
Peter Hughes	John Stewart
Kendall Captain ¹	Cliff Taylor ¹
Reece Edgar	

¹ Attended on the 1st only.

Atlas Iron Limited	
Nick Fabriziani	Heritage Officer
Tim Eldridge	Heritage Officer
Glenn Robertson	Projects Superintendent

Plate 1. Photo of the survey team.



Archaeological Survey

Survey Method

A series of parallel transects some 30m apart was walked by the survey team along the length of each survey area. Topographical features of high archaeological potential, such as freshwater sources and outcropping stone, were targeted as part of this approach.

Artefact type, lithology and a maximum dimension were recorded for all isolated artefacts and a grid reference recorded using a hand held GPS. Retouched/utilised artefacts, formal tools and large or intact grinding materials were recorded in full detail.

Buffer zones

Big Island recommends that buffer zones - areas in which all ground disturbing work is excluded - be observed around the boundaries of all recorded archaeological sites. The extent of the buffer is determined in relation to site type, size, vulnerability to disturbance and the wishes of Traditional Owners. Big Island typically recommends a 30m wide buffer to ensure that sites are not inadvertently disturbed and to allow for the possible 15m \pm inaccuracy of coordinates derived from hand held GPS. Buffer zones are recommended only and are mapped separately to site boundaries. Recommendations for buffer zones are outlined under site descriptions.

Results

Archaeological assessment of the proposed Mt Dove turn-off survey area and the proposed Wodgina turn-off survey area has been completed (Maps 1 and 2). No archaeological sites were identified. A total of seven isolated artefacts were recorded (Tables 1 and 2). Coordinates for surveyed areas are provided in Appendix One.

Table 1. Isolated flaked stone artefacts recorded within the survey areas.

mE	mN	Type	Lith	Max Dim (mm)
676763	7661813	LBF	IS	47
676964	7661805	SPC	IS	58
659782	7694038	SPC	SS	65
676839	7662081	CF	BAS	65

Table 2. Isolated grinding material recorded within the survey areas.

mE	mN	Type	Lith.	L (mm)	W (mm)	T (mm)	# Ground Surfaces	Ground surface shape	Cortex %
676739	7661991	GSB	QZT	90	76	32	1	irregular	60%
676753	7661992	GSB FRAG	GRAN	76	68	26	1	irregular	100
676753	7661992	GSB FRAG	GRAN	62	28	21	1	irregular	100%

Map 1. Atlas Iron Limited: Mt Dove Turn-off Heritage Surveyed Area



Projection and Zone: MGA94, 50K; Date: 08.05.2012
Mapping Data Provided by Atlas Iron Limited
& Google Earth



- LEGEND**
- Heritage Surveyed Area
 - Road Reserve

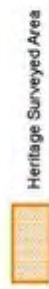
Map 2. Atlas Iron Limited: Wodgina Turn-off Heritage Surveyed Area



Projection and Zone: MGA94, 50K; Date: 08.05.2012
Mapping Data Provided by Atlas Iron Limited
& Google Earth



LEGEND



Heritage Surveyed Area

Ethnographic Survey

Survey Method

Day One – Monday 30 April 2012

Members of the survey team met and discussed the purpose of the assessment at Yandeyarra Community with the Big Island anthropologist, Amanda Harris, and then drove to the site of the proposed Wodgina turn-off (Map 2). There Atlas Iron staff provided technical detail on the proposed works. The survey team was able to traverse and view the project area with Amanda Harris. After assessing the area the team met to consider the ethnographic significance of the area with Amanda Harris.

Day Two – Tuesday 1 May 2012

Members of the survey team met and discussed the purpose of the assessment at Yandeyarra Community with the Big Island anthropologist, Amanda Harris, and then drove to the site of the proposed Mt Dove turn-off (Map 1). There, Atlas Iron staff again provided technical details. Several members of the survey team were able to traverse and view the project area. Two members of the survey team, Irene Roberts and Cynthia Coppin, remained with the vehicles and discussed the area with Amanda Harris. When the other members of the survey team returned to the vehicles a meeting was held between the survey team and Amanda Harris to consider the ethnographic significance of the area.

Results

The survey team described the country where both project areas are located as “hunting ground”. However they noted that since the highway had been constructed the number of animals in the area had decreased. They said they found it necessary to move ever further west for hunting. Irene Roberts and Cynthia Coppin identified several plants in the project areas that were used for food and bush medicine. They indicated that a mens’ ceremonial ground was located at the site of a granite rock several kilometres to the southwest. However all members of the survey team confirmed that both project areas

under consideration in this assessment were not of sufficient ethnographic significance to cause Atlas Iron to alter its plans, and no new sites were identified.

The *Kariyarra* representatives approved the proposed works in both project areas. However they requested that contractors do not leave piles of fill or other construction materials at either project area after the completion of works.

Conclusions

The archaeological assessment of the proposed Mt Dove turn-off survey area and the proposed Wodgina turn-off survey area has been completed (Maps 1 and 2). No archaeological sites were identified. A total of seven isolated artefacts were recorded (Tables 1 and 2).

The ethnographic assessment of the proposed Mt Dove turn-off survey area and the proposed Wodgina turn-off survey area has also been completed (Maps 1 and 2). No ethnographic sites were identified.

Further advice on legislative obligations can be provided on request.

Recommendations

Big Island recommends the following.

1. No places that are of sufficient ethnographic significance to cause Atlas Iron to alter their proposed program were identified during the ethnographic assessment described in this report.
2. Atlas Iron and its contractors should ensure that no unnecessary piles of fill or other construction materials are left at the sites following the completion of works.

3. *Kariyarra* representatives requested that cultural monitors be engaged to supervise any ground disturbing work.

Big Island also recommends that:

4. If any subsurface archaeological material is encountered during ground disturbing work, all work in the vicinity should be stopped and archaeological material left *in situ* while the *Kariyarra* Traditional Owners are notified and agreed management processes determined, with professional assistance as required; and
5. If human skeletal material is uncovered the police must be notified immediately, as required by law, and the Department of Indigenous Affairs and the *Kariyarra* Traditional Owners notified to enable, if required, culturally appropriate management of buried material.

Appendix One – Survey Area Coordinates

Table 3. Wodgina turn-off surveyed area coordinates (GDA94, Zone 50K).

Node	mE	mN
1	677066	7662916
2	676540	7662322
3	676823	7661699
4	677213	7662185
5	677186	7662341

Table 4. Mt Dove turn-off surveyed area coordinates (GDA94, Zone 50K).

Node	mE	mN
1	660511	7694532
2	660089	7694532
3	659693	7694471
4	659755	7693747
5	659998	7693757
6	660705	7693893

Appendix D

Department of Agriculture & Food Advice on Declared Weeds

AGRICULTURE AND RELATED RESOURCES PROTECTION ACT, 1976

Agriculture Protection Board
South Perth, 21 May 2012

PURSUANT to Section 37 of the *Agriculture and Related Resources Protection Act, 1976*, the Agriculture Protection Board hereby lists the classes of plants that are for the time being the subject of a declaration made under Section 35 of that Act, together with the matters specified pursuant to Subsection (2) of that Section in relation to each class:

Declared Plants

Acacias (*Acacia spp.*, all species not native to Australia (except *Acacia farnesiana*)

P1, P2; for the whole of the State . All species not native to Australia (except *Acacia farnesiana*)

African rue (*Peganum harmala*)

P1, P2; for the whole of the State

African thistle (*Berkheya rigida*)

P1, P3; for the whole of the State

Alligator weed (*Alternanthera philoxeroides*)

P1, P2; for the whole of the State

Aquarium Plants (*all types*)

P1; for the whole of the State

Arrowhead (*Sagittaria montevidensis*)

P1, P3; for the whole of the State

Artichoke thistle, cardoon (*Cynara cardunculus*)

P1, P3; for the whole of the State

Arum lily (*Zantedeschia aethiopica*)

P1, P4; for the whole of the State

Athel pine (*Tamarix aphylla*)

P1; for the whole of the State

Bathurst burr (*Xanthium spinosum*)

P1; for the whole of the State

P3; For the municipal districts of Coolgardie (S), Kalgoorlie/Boulder (C).

P2; For the municipal districts of Albany (C), Armadale (C), Ashburton (S), Augusta-Margaret River (S), Bassendean (T), Bayswater (C), Belmont (C), Beverley (S), Boddington (S), Boyup Brook (S), Bridgetown-Greenbushes (S), Brookton (S), Broome (S), Broomehill (S), Bruce Rock (S), Bunbury (C), Busselton (S), Cambridge (T), Canning (C), Capel (S), Carnamah (S), Carnarvon (S), Chapman Valley (S), Chittering (S), Claremont (T), Cockburn (C), Collie (S), Coorow (S), Corrigin (S), Cottesloe (T), Cranbrook (S), Cuballing (S), Cue (S), Cunderdin (S), Dalwallinu (S), Dandaragan (S), Dardanup (S), Denmark (S), Derby-West Kimberley (S), Donnybrook-Balingup (S), Dowerin (S), Dumbleyung (S), Dundas (S), East Fremantle (T), East Pilbara (S), Esperance (S), Exmouth

(S), Fremantle (C), Geraldton (C), Gingin (S), Gnowangerup (S), Goomalling (S), Gosnells (C), Greenough (S), Halls Creek (S), Harvey (S), Irwin (S), Jerramungup (S), Joondalup (C), Kalamunda (S), Katanning (S), Kellerberrin (S), Kent (S), Kojonup (S), Kondinin (S), Koorda (S), Kulin (S), Kwinana (T), Lake Grace (S), Laverton (S), Leonora (S), Mandurah (C), Manjimup (S), Meekatharra (S), Melville (C), Menzies (S), Merredin (S), Mingenew (S), Moora (S), Morawa (S), Mosman Park (T), Mount Magnet (S), Mount Marshall (S), Mukinbudin (S), Mullewa (S), Mundaring (S), Murchison (S), Murray (S), Nannup (S), Narembeen (S), Narrogin (S), Narrogin (T), Nedlands (C), Ngaanyatjarraku (S), Northam (S), Northam (T), Northampton (S), Nungarin (S), Peppermint Grove (S), Perenjori (S), Perth (C), Pingelly (S), Plantagenet (S), Port Hedland (T), Quairading (S), Ravensthorpe (S), Rockingham (C), Roebourne (S), Sandstone (S), Serpentine-Jarrahdale (S), Shark Bay (S), South Perth (C), Stirling (C), Subiaco (C), Swan (S), Tambellup (S), Tammin (S), Three Springs (S), Toodyay (S), Trayning (S), Upper Gascoyne (S), Victoria Park (T), Victoria Plains (S), Vincent (T), Wagin (S), Wandering (S), Wanneroo (S), Waroona (S), West Arthur (S), Westonia (S), Wickiepin (S), Williams (S), Wiluna (S), Wongan-Ballidu (S), Woodanilling (S), Wyalkatchem (S), Wyndham-East Kimberley (S), Yalgoo (S), Yilgarn (S), York (S).

Bellyache bush (*Jatropha gossypifolia*)

P2; For the municipal districts of Albany (C), Armadale (C), Augusta-Margaret River (S), Bassendean (T), Bayswater (C), Belmont (C), Beverley (S), Boddington (S), Boyup Brook (S), Bridgetown-Greenbushes (S), Brookton (S), Broomehill (S), Bruce Rock (S), Bunbury (C), Busselton (S), Cambridge (T), Canning (C), Capel (S), Carnamah (S), Chapman Valley (S), Chittering (S), Claremont (T), Cockburn (C), Collie (S), Coolgardie (S), Coorow (S), Corrigin (S), Cottesloe (T), Cranbrook (S), Cuballing (S), Cue (S), Cunderdin (S), Dalwallinu (S), Dandaragan (S), Dardanup (S), Denmark (S), Donnybrook-Balingup (S), Dowerin (S), Dumbleyung (S), Dundas (S), East Fremantle (T), Esperance (S), Fremantle (C), Geraldton (C), Gingin (S), Gnowangerup (S), Goomalling (S), Gosnells (C), Greenough (S), Harvey (S), Irwin (S), Jerramungup (S), Joondalup (C), Kalamunda (S), Kalgoorlie/Boulder (C), Katanning (S), Kellerberrin (S), Kent (S), Kojonup (S), Kondinin (S), Koorda (S), Kulin (S), Kwinana (T), Lake Grace (S), Laverton (S), Leonora (S), Mandurah (C), Manjimup (S), Meekatharra (S), Melville (C), Menzies (S), Merredin (S), Mingenew (S), Moora (S), Morawa (S), Mosman Park (T), Mount Magnet (S), Mount Marshall (S), Mukinbudin (S), Mullewa (S), Mundaring (S), Murchison (S), Murray (S), Nannup (S), Narembeen (S), Narrogin (S), Narrogin (T), Nedlands (C), Ngaanyatjarraku (S), Northam (S), Northam (T), Northampton (S), Nungarin (S), Peppermint Grove (S), Perenjori (S), Perth (C), Pingelly (S), Plantagenet (S), Quairading (S), Ravensthorpe (S), Rockingham (C), Sandstone (S), Serpentine-Jarrahdale (S), Shark Bay (S), South Perth (C), Stirling (C), Subiaco (C), Swan (S), Tambellup (S), Tammin (S), Three Springs (S), Toodyay (S), Trayning (S), Upper Gascoyne (S), Victoria Park (T), Victoria Plains (S), Vincent (T), Wagin (S), Wandering (S), Wanneroo (S), Waroona (S), West Arthur (S), Westonia (S), Wickiepin (S), Williams (S), Wiluna (S), Wongan-Ballidu (S), Woodanilling (S), Wyalkatchem (S), Yalgoo (S), Yilgarn (S), York (S).

P1; for the whole of the State

P4; For the municipal districts of Ashburton (S), Broome (S), Carnarvon (S), Derby-West Kimberley (S), East Pilbara (S), Exmouth (S), Halls Creek (S), Port Hedland (T), Roebourne (S), Wyndham-East Kimberley (S).

Blackberry (*Rubus laudatus*, and *R. fruticosus* agg. - including *R. anglocandicans*, *R. rugosus*, *R. ulmifolius*)

- P1; for the whole of the State
- P2; For the municipal districts of Boddington (S).
- P4; For the municipal districts of Albany (C), Augusta-Margaret River (S), Boyup Brook (S), Bridgetown-Greenbushes (S), Bunbury (C), Busselton (S), Capel (S), Collie (S), Cranbrook (S), Dardanup (S), Denmark (S), Donnybrook-Balingup (S), Harvey (S), Mandurah (C), Manjimup (S), Murray (S), Nannup (S), Plantagenet (S), Serpentine-Jarrahdale (S), Waroona (S).

Boneseed, bitou bush (*Chrysanthemoides monilifera*)

- P1, P2; for the whole of the State

Bridal creeper (*Asparagus asparagoides*)

- P1; for the whole of the State

Broomrape; branched broomrape (*Orobanche ramosa*; *Orobanche* spp. except *O. minor*)

- P1, P2; for the whole of the State

Cabomba (*Cabomba caroliniana*)

- P1, P2; for the whole of the State

Calotropis (*Calotropis procera*)

- P1; For the municipal districts of East Pilbara (S), Exmouth (S), Port Hedland (T).
- P3; For the municipal districts of Ashburton (S), East Pilbara (S), Port Hedland (T), Roebourne (S).

Camelthorn (*Alhagi maurorum*)

- P1, P3; for the whole of the State

Canadian pond weed (*Elodea canadensis*)

- P1, P3; for the whole of the State

Candle bush (*Senna alata*)

- P1, P3; for the whole of the State

Cape Tulip, one leaf; two leaf Cape tulip (*Moraea flaccida*, *Moraea miniata*)

- P4; For the municipal districts of Albany (C), Augusta-Margaret River (S), Boddington (S), Boyup Brook (S), Bridgetown-Greenbushes (S), Brookton (S), Broomehill (S), Bunbury (C), Busselton (S), Capel (S), Collie (S), Corrigin (S), Cuballing (S), Dardanup (S), Donnybrook-Balingup (S), Dumbleyung (S), Esperance (S), Gnowangerup (S), Harvey (S), Jerramungup (S), Katanning (S), Kojonup (S), Mandurah (C), Manjimup (S), Murray (S), Nannup (S), Narrogin (S), Pingelly (S), Plantagenet (S), Ravensthorpe (S), Serpentine-Jarrahdale (S), Tambellup (S), Wagin (S), Wandering (S), Waroona (S), West Arthur (S), Wickpin (S), Williams (S), Woodanilling (S), Yilgarn (S). and that area of the Cranbrook Shire bordered by Albany Highway, Weir Road, Boyup-Cranbrook Road, Shamrock and Yeriminup Roads and Frankland-Cranbrook Road
- P3; For the municipal districts of Cranbrook (S), Denmark (S), Kent (S). except that area bordered by Albany Highway, Weir Road, Boyup-

Cranbrook Road, Shamrock and Yeriminup Roads and Frankland-Cranbrook Road.
P1; for the whole of the State

Chilean needle grass (*Nassella neesiana*)
P1; for the whole of the State

Chinee apple (*Ziziphus mauritiana*)

P1, P5; For the municipal districts of Broome (S), Derby-West Kimberley (S), Halls Creek (S), Wyndham-East Kimberley (S).

P1; For the municipal districts of Albany (C), Armadale (C), Ashburton (S), Augusta-Margaret River (S), Bassendean (T), Bayswater (C), Belmont (C), Beverley (S), Boddington (S), Boyup Brook (S), Bridgetown-Greenbushes (S), Brookton (S), Broomehill (S), Bruce Rock (S), Bunbury (C), Busselton (S), Cambridge (T), Canning (C), Capel (S), Carnamah (S), Carnarvon (S), Chapman Valley (S), Chittering (S), Claremont (T), Cockburn (C), Collie (S), Coolgardie (S), Coorow (S), Corrigin (S), Cottesloe (T), Cranbrook (S), Cuballing (S), Cue (S), Cunderdin (S), Dalwallinu (S), Dandaragan (S), Dardanup (S), Denmark (S), Donnybrook-Balingup (S), Dowerin (S), Dumbleyung (S), Dundas (S), East Fremantle (T), East Pilbara (S), Esperance (S), Exmouth (S), Fremantle (C), Geraldton (C), Gingin (S), Gnowangerup (S), Goomalling (S), Gosnells (C), Greenough (S), Harvey (S), Irwin (S), Jerramungup (S), Joondalup (C), Kalamunda (S), Kalgoorlie/Boulder (C), Katanning (S), Kellerberrin (S), Kent (S), Kojonup (S), Kondinin (S), Koorda (S), Kulin (S), Kwinana (T), Lake Grace (S), Laverton (S), Leonora (S), Mandurah (C), Manjimup (S), Meekatharra (S), Melville (C), Menzies (S), Merredin (S), Mingenew (S), Moora (S), Morawa (S), Mosman Park (T), Mount Magnet (S), Mount Marshall (S), Mukinbudin (S), Mullewa (S), Mundaring (S), Murchison (S), Murray (S), Nannup (S), Narembeen (S), Narrogin (S), Narrogin (T), Nedlands (C), Ngaanyatjaraku (S), Northam (S), Northam (T), Northampton (S), Nungarin (S), Peppermint Grove (S), Perenjori (S), Perth (C), Pingelly (S), Plantagenet (S), Port Hedland (T), Quairading (S), Ravensthorpe (S), Rockingham (C), Roebourne (S), Sandstone (S), Serpentine-Jarrahdale (S), Shark Bay (S), South Perth (C), Stirling (C), Subiaco (C), Swan (S), Tambellup (S), Tammin (S), Three Springs (S), Toodyay (S), Trayning (S), Upper Gascoyne (S), Victoria Park (T), Victoria Plains (S), Vincent (T), Wagin (S), Wandering (S), Wanneroo (S), Waroona (S), West Arthur (S), Westonia (S), Wickepin (S), Williams (S), Wiluna (S), Wongan-Ballidu (S), Woodanilling (S), Wyalkatchem (S), Yalgoo (S), Yilgarn (S), York (S).

Cleavers (*Galium aparine*)

P1, P2; for the whole of the State

Creeping knapweed (*Rhaponticum repens*)

P1, P2; for the whole of the State

Devil's claw, small fruit Devil's claw, and purpleflower Devil's claw (*Martynia annua*) and (*Proboscidea louisianica*)

P1, P2; for the whole of the State

Field bindweed (*Convolvulus arvensis*)

P3; For the municipal districts of Esperance (S).

P1; for the whole of the State

Floating water chestnut (*Trapa spp*)

P1, P2; for the whole of the State

Gamba grass (*Andropogon gayanus*)

P1, P2; for the whole of the State

Golden dodder (*Cuscuta campestris*)

P1, P2; For the municipal districts of Armadale (C), Ashburton (S), Augusta-Margaret River (S), Bassendean (T), Bayswater (C), Belmont (C), Beverley (S), Boddington (S), Boyup Brook (S), Bridgetown-Greenbushes (S), Brookton (S), Broome (S), Broomehill (S), Bruce Rock (S), Bunbury (C), Busselton (S), Cambridge (T), Canning (C), Capel (S), Carnamah (S), Carnarvon (S), Chapman Valley (S), Chittering (S), Claremont (T), Cockburn (C), Collie (S), Coolgardie (S), Coorow (S), Corrigin (S), Cottesloe (T), Cuballing (S), Cue (S), Cunderdin (S), Dalwallinu (S), Dandaragan (S), Dardanup (S), Derby-West Kimberley (S), Donnybrook-Balingup (S), Dowerin (S), Dumbleyung (S), Dundas (S), East Fremantle (T), East Pilbara (S), Esperance (S), Exmouth (S), Fremantle (C), Geraldton (C), Gingin (S), Gnowangerup (S), Goomalling (S), Gosnells (C), Greenough (S), Halls Creek (S), Harvey (S), Irwin (S), Jerramungup (S), Joondalup (C), Kalamunda (S), Kalgoorlie/Boulder (C), Katanning (S), Kellerberrin (S), Kent (S), Kojonup (S), Kondinin (S), Koorda (S), Kulin (S), Kwinana (T), Lake Grace (S), Laverton (S), Leonora (S), Mandurah (C), Manjimup (S), Meekatharra (S), Melville (C), Menzies (S), Merredin (S), Mingenew (S), Moora (S), Morawa (S), Mosman Park (T), Mount Magnet (S), Mount Marshall (S), Mukinbudin (S), Mullewa (S), Mundaring (S), Murchison (S), Murray (S), Nannup (S), Narembeen (S), Narrogin (S), Narrogin (T), Nedlands (C), Ngaanyatjarraku (S), Northam (S), Northam (T), Northampton (S), Nungarin (S), Peppermint Grove (S), Perenjori (S), Perth (C), Pingelly (S), Port Hedland (T), Quairading (S), Ravensthorpe (S), Rockingham (C), Roebourne (S), Sandstone (S), Serpentine-Jarrahdale (S), Shark Bay (S), South Perth (C), Stirling (C), Subiaco (C), Swan (S), Tambellup (S), Tammin (S), Three Springs (S), Toodyay (S), Trayning (S), Upper Gascoyne (S), Victoria Park (T), Victoria Plains (S), Vincent (T), Wagin (S), Wandering (S), Wanneroo (S), Waroona (S), West Arthur (S), Westonia (S), Wickepin (S), Williams (S), Wiluna (S), Wongan-Ballidu (S), Woodanilling (S), Wyalkatchem (S), Wyndham-East Kimberley (S), Yalgoo (S), Yilgarn (S), York (S).

P1, P4; For the municipal districts of Albany (C), Cranbrook (S), Denmark (S), Plantagenet (S).

Gorse, Furze (*Ulex europaeus*)

P1; for the whole of the State

P2; For the municipal districts of Armadale (C), Ashburton (S), Augusta-Margaret River (S), Bassendean (T), Bayswater (C), Belmont (C), Beverley (S), Boddington (S), Boyup Brook (S), Bridgetown-Greenbushes (S), Brookton (S), Broome (S), Broomehill (S), Bruce Rock (S), Bunbury (C), Busselton (S), Cambridge (T), Canning (C), Capel (S), Carnamah (S), Carnarvon (S), Chapman Valley (S), Chittering (S), Claremont (T), Cockburn (C), Collie (S), Coolgardie (S), Coorow (S), Corrigin (S), Cottesloe (T), Cuballing (S), Cue (S), Cunderdin (S), Dalwallinu (S), Dandaragan (S), Dardanup (S), Derby-West Kimberley (S), Donnybrook-Balingup (S), Dowerin (S), Dumbleyung (S), Dundas (S), East Fremantle (T), East Pilbara (S), Esperance (S), Exmouth (S), Fremantle (C), Geraldton (C), Gingin (S), Gnowangerup (S), Goomalling (S), Gosnells

(C), Greenough (S), Halls Creek (S), Harvey (S), Irwin (S), Jerramungup (S), Joondalup (C), Kalamunda (S), Kalgoorlie/Boulder (C), Katanning (S), Kellerberrin (S), Kent (S), Kojonup (S), Kondinin (S), Koorda (S), Kulin (S), Kwinana (T), Lake Grace (S), Laverton (S), Leonora (S), Mandurah (C), Manjimup (S), Meekatharra (S), Melville (C), Menzies (S), Merredin (S), Mingenew (S), Moora (S), Morawa (S), Mosman Park (T), Mount Magnet (S), Mount Marshall (S), Mukinbudin (S), Mullewa (S), Mundaring (S), Murchison (S), Murray (S), Nannup (S), Narembene (S), Narrogin (S), Narrogin (T), Nedlands (C), Ngaanyatjaraku (S), Northam (S), Northam (T), Northampton (S), Nungarin (S), Peppermint Grove (S), Perenjori (S), Perth (C), Pingelly (S), Port Hedland (T), Quairading (S), Ravensthorpe (S), Rockingham (C), Roebourne (S), Sandstone (S), Serpentine-Jarrahdale (S), Shark Bay (S), South Perth (C), Stirling (C), Subiaco (C), Swan (S), Tambellup (S), Tammin (S), Three Springs (S), Toodyay (S), Trayning (S), Upper Gascoyne (S), Victoria Park (T), Victoria Plains (S), Vincent (T), Wagin (S), Wandering (S), Wanneroo (S), Waroona (S), West Arthur (S), Westonia (S), Wickepin (S), Williams (S), Wiluna (S), Wongan-Ballidu (S), Woodanilling (S), Wyalkatchem (S), Wyndham-East Kimberley (S), Yalgoo (S), Yilgarn (S), York (S).

P3; For the municipal districts of Albany (C), Cranbrook (S), Denmark (S), Plantagenet (S).

Harrisia cactus (*Harrisia martinii*)
P1, P3; for the whole of the State

Hoary cress (*Cardaria draba*, *Lepidium draba*)
P1, P2; for the whole of the State

Horehound (*Marrubium vulgare*)
P1, P2; For the municipal districts of Albany (C), Ashburton (S), Broome (S), Broomehill (S), Carnarvon (S), Cranbrook (S), Cue (S), Denmark (S), Derby-West Kimberley (S), Dumbleyung (S), East Pilbara (S), Exmouth (S), Gnowangerup (S), Halls Creek (S), Katanning (S), Laverton (S), Leonora (S), Meekatharra (S), Menzies (S), Mount Magnet (S), Murchison (S), Ngaanyatjaraku (S), Port Hedland (T), Roebourne (S), Sandstone (S), Shark Bay (S), Tambellup (S), Upper Gascoyne (S), Wagin (S), West Arthur (S), Wiluna (S), Woodanilling (S), Wyndham-East Kimberley (S), Yalgoo (S).

P1, P3; For the municipal districts of Plantagenet (S).

P1, P4; For the municipal districts of Coolgardie (S), Dundas (S), Esperance (S), Jerramungup (S), Kalgoorlie/Boulder (C), Kent (S), Kojonup (S), Ravensthorpe (S).

Horsetails, common horsetail (*Equisetum spp*) (*Equisetum arvense*)
P1, P3; for the whole of the State

Hydrocotyl (*Hydrocotyle ranunculoides*)
P1, P3; for the whole of the State

Hymenachne (*Hymenachne amplexicaulis*)
P1, P2; for the whole of the State

Ivy gourd (*Coccinia grandis*)
P1, P3; for the whole of the State

Jointed goatgrass (*Aegilops cylindrica*)

P1, P2; for the whole of the State

Kochia (*Bassia scoparia*)

P1, P2; for the whole of the State

Lagarosiphon (*Lagarosiphon spp.*)

P1, P2; for the whole of the State

Lantana (*Lantana camara*)

P1; for the whole of the State

Leafy elodea (*Egeria densa*)

P1, P3; for the whole of the State

Mesquite (*Prosopis spp. and hybrids*)

P4; for the area on Mardie Station bordered by the coast, the boundary between Mardie and Karratha stations, the North West Coastal Hwy, Peter's Creek and the boundary between Yarraloola & Mardie stations
P2; for the whole of the State except the area on Mardie Station bordered by the coast, the boundary between Mardie & Karratha stations, the North West Coastal Hwy, Peter's Creek and the boundary between Yarraloola & Mardie stations
P1; for the whole of the State

Miconia (*Miconia spp*)

P1, P2; for the whole of the State

Mimosa; Common sensitive plant (*Mimosa pudica*)

P1, P3; for the whole of the State

Mimosa; Giant sensitive plant (*Mimosa invisa*)

P1, P2; for the whole of the State

Mimosa; Giant sensitive plant (*Mimosa pigra*)

P1, P2; for the whole of the State

Mintweed (*Salvia reflexa*)

P1, P3; for the whole of the State

Needle burr, spiny amaranth (*Amaranthus spinosus*)

P1, P2; for the whole of the State

Nodding thistle (*Carduus nutans*)

P1, P2; for the whole of the State

Noogoora burr (*Xanthium strumarium (formerly X. occidentale)*)

P1; for the whole of the State
P2; For the municipal districts of Albany (C), Armadale (C), Ashburton (S), Augusta-Margaret River (S), Bassendean (T), Bayswater (C), Belmont (C), Beverley (S), Boddington (S), Boyup Brook (S), Bridgetown-

Greenbushes (S), Brookton (S), Broomehill (S), Bruce Rock (S), Bunbury (C), Busselton (S), Cambridge (T), Canning (C), Capel (S), Carnamah (S), Carnarvon (S), Chapman Valley (S), Chittering (S), Claremont (T), Cockburn (C), Collie (S), Coolgardie (S), Coorow (S), Corrigin (S), Cottesloe (T), Cranbrook (S), Cuballing (S), Cue (S), Cunderdin (S), Dalwallinu (S), Dandaragan (S), Dardanup (S), Denmark (S), Donnybrook-Balingup (S), Dowerin (S), Dumbleyung (S), Dundas (S), East Fremantle (T), East Pilbara (S), Esperance (S), Exmouth (S), Fremantle (C), Geraldton (C), Gingin (S), Gnowangerup (S), Goomalling (S), Gosnells (C), Greenough (S), Harvey (S), Irwin (S), Jerramungup (S), Joondalup (C), Kalamunda (S), Kalgoorlie/Boulder (C), Katanning (S), Kellerberrin (S), Kent (S), Kojonup (S), Kondinin (S), Koorda (S), Kulin (S), Kwinana (T), Lake Grace (S), Laverton (S), Leonora (S), Mandurah (C), Manjimup (S), Meekatharra (S), Melville (C), Menzies (S), Merredin (S), Mingenew (S), Moora (S), Morawa (S), Mosman Park (T), Mount Magnet (S), Mount Marshall (S), Mukinbudin (S), Mullewa (S), Mundaring (S), Murchison (S), Murray (S), Nannup (S), Narembeen (S), Narrogin (S), Narrogin (T), Nedlands (C), Ngaanyatjaraku (S), Northam (S), Northam (T), Northampton (S), Nungarin (S), Peppermint Grove (S), Perenjori (S), Perth (C), Pingelly (S), Plantagenet (S), Port Hedland (T), Quairading (S), Ravensthorpe (S), Rockingham (C), Roebourne (S), Sandstone (S), Serpentine-Jarrahdale (S), Shark Bay (S), South Perth (C), Stirling (C), Subiaco (C), Swan (S), Tambellup (S), Tammin (S), Three Springs (S), Toodyay (S), Trayning (S), Upper Gascoyne (S), Victoria Park (T), Victoria Plains (S), Vincent (T), Wagin (S), Wandering (S), Wanneroo (S), Waroona (S), West Arthur (S), Westonia (S), Wickiepin (S), Williams (S), Wiluna (S), Wongan-Ballidu (S), Woodanilling (S), Wyalkatchem (S), Yalgoo (S), Yilgarn (S), York (S).

P4; For the municipal districts of Broome (S), Derby-West Kimberley (S), Halls Creek (S), Wyndham-East Kimberley (S).

Parkinsonia (*Parkinsonia aculeata*)

P1; for the whole of the State

P2; For the municipal districts of Ashburton (S), Carnarvon (S), Coolgardie (S), Cue (S), Dundas (S), East Pilbara (S), Exmouth (S), Kalgoorlie/Boulder (C), Laverton (S), Leonora (S), Meekatharra (S), Menzies (S), Mount Magnet (S), Murchison (S), Ngaanyatjaraku (S), Port Hedland (T), Roebourne (S), Sandstone (S), Shark Bay (S), Upper Gascoyne (S), Wiluna (S), Yalgoo (S).

P4; For the municipal districts of Broome (S), Derby-West Kimberley (S), Halls Creek (S), Wyndham-East Kimberley (S).

Parrot's feather (*Myriophyllum aquaticum*)

P1, P3; for the whole of the State

Parthenium weed (*Parthenium hysterophorus*)

P1, P2; for the whole of the State

Paterson's curse (*Echium plantagineum*)

P1; for the whole of the State

P3; For the municipal districts of Augusta-Margaret River (S), Broomehill (S), Bunbury (C), Busselton (S), Capel (S), Chittering (S), Collie (S), Cranbrook (S), Dalwallinu (S), Dandaragan (S), Dardanup (S), Denmark (S), Donnybrook-Balingup (S), Esperance (S), Gingin (S), Harvey (S), Kent (S), Kojonup (S), Mandurah (C), Moora (S), Murray (S), Ravensthorpe (S), Serpentine-Jarrahdale (S), Tambellup (S), Victoria

Plains (S), Wagin (S), Waroona (S), West Arthur (S), Wongan-Ballidu (S), Woodanilling (S).

- P4; For the municipal districts of Albany (C), Boddington (S), Boyup Brook (S), Bridgetown-Greenbushes (S), Brookton (S), Bruce Rock (S), Corrigin (S), Cuballing (S), Dumbleyung (S), Gnowangerup (S), Jerramungup (S), Katanning (S), Kondinin (S), Kulin (S), Lake Grace (S), Manjimup (S), Merredin (S), Mukinbudin (S), Nannup (S), Narembreen (S), Narrogin (S), Nungarin (S), Pingelly (S), Plantagenet (S), Wandering (S), Westonia (S), Wickepin (S), Williams (S), Yilgarn (S). and those portions of the municipal districts of Carnamah and Coorow west of the Midlands Road

Penny cress (*Thlaspi arvense*)

- P1, P2; for the whole of the State

Perennial thistle or Canada thistle (*Cirsium arvense*)

- P1, P3; for the whole of the State

Physic nut (*Jatropha curcas*)

- P1; for the whole of the State

- P2; For the municipal districts of Albany (C), Armadale (C), Augusta-Margaret River (S), Bassendean (T), Bayswater (C), Belmont (C), Beverley (S), Boddington (S), Boyup Brook (S), Bridgetown-Greenbushes (S), Brookton (S), Broomehill (S), Bruce Rock (S), Bunbury (C), Busselton (S), Cambridge (T), Canning (C), Capel (S), Carnamah (S), Chapman Valley (S), Chittering (S), Claremont (T), Cockburn (C), Collie (S), Coolgardie (S), Coorow (S), Corrigin (S), Cottesloe (T), Cranbrook (S), Cuballing (S), Cue (S), Cunderdin (S), Dalwallinu (S), Dandaragan (S), Dardanup (S), Denmark (S), Donnybrook-Balingup (S), Dowerin (S), Dumbleyung (S), Dundas (S), East Fremantle (T), Esperance (S), Fremantle (C), Geraldton (C), Gingin (S), Gnowangerup (S), Goomalling (S), Gosnells (C), Greenough (S), Harvey (S), Irwin (S), Jerramungup (S), Joondalup (C), Kalamunda (S), Kalgoorlie/Boulder (C), Katanning (S), Kellerberrin (S), Kent (S), Kojonup (S), Kondinin (S), Koorda (S), Kulin (S), Kwinana (T), Lake Grace (S), Laverton (S), Leonora (S), Mandurah (C), Manjimup (S), Meekatharra (S), Melville (C), Menzies (S), Merredin (S), Mingenew (S), Moora (S), Morawa (S), Mosman Park (T), Mount Magnet (S), Mount Marshall (S), Mukinbudin (S), Mullewa (S), Mundaring (S), Murchison (S), Murray (S), Nannup (S), Narembreen (S), Narrogin (S), Narrogin (T), Nedlands (C), Ngaanyatjaraku (S), Northam (S), Northam (T), Northampton (S), Nungarin (S), Peppermint Grove (S), Perenjori (S), Perth (C), Pingelly (S), Plantagenet (S), Quairading (S), Ravensthorpe (S), Rockingham (C), Sandstone (S), Serpentine-Jarrahdale (S), Shark Bay (S), South Perth (C), Stirling (C), Subiaco (C), Swan (S), Tambellup (S), Tammin (S), Three Springs (S), Toodyay (S), Trayning (S), Upper Gascoyne (S), Victoria Park (T), Victoria Plains (S), Vincent (T), Wagin (S), Wandering (S), Wanneroo (S), Waroona (S), West Arthur (S), Westonia (S), Wickepin (S), Williams (S), Wiluna (S), Wongan-Ballidu (S), Woodanilling (S), Wyalkatchem (S), Yalgoo (S), Yilgarn (S), York (S).
- P4; For the municipal districts of Ashburton (S), Broome (S), Carnarvon (S), Derby-West Kimberley (S), East Pilbara (S), Exmouth (S), Halls Creek (S), Port Hedland (T), Roebourne (S), Wyndham-East Kimberley (S).

Pond apple (*Anona glabra*)

- P1, P2; for the whole of the State

Praxelis (*Praxelis clematidea*)

P1, P2; for the whole of the State

Prickly pear (*Opuntia elata*, *O. engelmannii*, *O. ficus-indica*, *O. monocantha*, *O. stricta*)

P1; For the municipal districts of Ashburton (S), Broome (S), Carnarvon (S), Derby-West Kimberley (S), East Pilbara (S), Exmouth (S), Halls Creek (S), Murchison (S), Port Hedland (T), Roebourne (S), Shark Bay (S), Upper Gascoyne (S), Wyndham-East Kimberley (S).

P4; For the municipal districts of Carnarvon (S), Exmouth (S), Murchison (S), Shark Bay (S), Upper Gascoyne (S).

P2; For the municipal districts of Ashburton (S), Broome (S), Derby-West Kimberley (S), East Pilbara (S), Halls Creek (S), Port Hedland (T), Roebourne (S), Wyndham-East Kimberley (S).

Ragwort (*Senecio jacobaea*)

P1, P2; for the whole of the State

Rubber vine (*Cryptostegia madagascariensis*)

P1, P3; for the whole of the State

Rubber vine (*Cryptostegia grandiflora*)

P1, P2; for the whole of the State

Saffron thistle (*Carthamus lanatus*)

P3; For the municipal districts of Albany (C), Augusta-Margaret River (S), Broomehill (S), Bunbury (C), Busselton (S), Capel (S), Carnamah (S), Collie (S), Coorow (S), Cranbrook (S), Cunderdin (S), Dardanup (S), Denmark (S), Donnybrook-Balingup (S), Dowerin (S), Dumbleyung (S), Gnowangerup (S), Harvey (S), Katanning (S), Kellerberrin (S), Kojonup (S), Koorda (S), Mandurah (C), Mount Marshall (S), Murray (S), Plantagenet (S), Serpentine-Jarrahdale (S), Tambellup (S), Tammin (S), Trayning (S), Wagin (S), Waroona (S), West Arthur (S), Woodanilling (S), Wyalkatchem (S).

P1; for the whole of the State

P4; For the municipal districts of Ashburton (S), Beverley (S), Boddington (S), Brookton (S), Broome (S), Bruce Rock (S), Carnarvon (S), Chittering (S), Coolgardie (S), Corrigin (S), Cuballing (S), Cue (S), Dalwallinu (S), Dandaragan (S), Derby-West Kimberley (S), Dundas (S), East Pilbara (S), Esperance (S), Exmouth (S), Gingin (S), Goomalling (S), Halls Creek (S), Jerramungup (S), Kalgoorlie/Boulder (C), Kent (S), Kondinin (S), Kulin (S), Lake Grace (S), Laverton (S), Leonora (S), Meekatharra (S), Menzies (S), Merredin (S), Moora (S), Mount Magnet (S), Mukinbudin (S), Murchison (S), Narembeen (S), Narrogin (S), Ngaanyatjaraku (S), Northam (S), Northam (T), Nungarin (S), Pingelly (S), Port Hedland (T), Quairading (S), Ravensthorpe (S), Roebourne (S), Sandstone (S), Shark Bay (S), Toodyay (S), Upper Gascoyne (S), Victoria Plains (S), Wandering (S), Westonia (S), Wickiepin (S), Williams (S), Wiluna (S), Wongan-Ballidu (S), Wyndham-East Kimberley (S), Yalgoo (S), Yilgarn (S), York (S).

Sagittaria (*Sagittaria platyphylla*)

P1, P3; for the whole of the State

Salvinia (*Salvinia molesta*)

P1, P2; for the whole of the State

Senegal tea (*Gymnocoronis spilanthoides*)

P1, P3; for the whole of the State

Serrated tussock (*Nasella trichotoma*)

P1, P2; for the whole of the State

Shield pennywort (*Hydrocotyle verticillata*)

P1, P2; for the whole of the State

Siam weed (*Chromolaena odorata*)

P1, P2; for the whole of the State

Sicklepod (*Senna tora* - see also *Senna obtusifolia*)

P1, P2; for the whole of the State

Sicklepod, javabean (*Senna obtusifolia*)

P1, P3; for the whole of the State

Skeleton weed (*Chondrilla juncea*)

P1, P2; For the municipal districts of Albany (C), Armadale (C), Ashburton (S), Augusta-Margaret River (S), Bassendean (T), Bayswater (C), Belmont (C), Beverley (S), Boddington (S), Boyup Brook (S), Bridgetown-Greenbushes (S), Brookton (S), Broome (S), Broomehill (S), Bruce Rock (S), Bunbury (C), Busselton (S), Cambridge (T), Canning (C), Capel (S), Carnamah (S), Carnarvon (S), Chapman Valley (S), Chittering (S), Claremont (T), Cockburn (C), Collie (S), Coolgardie (S), Coorow (S), Corrigin (S), Cottesloe (T), Cranbrook (S), Cuballing (S), Cue (S), Cunderdin (S), Dalwallinu (S), Dandaragan (S), Dardanup (S), Denmark (S), Derby-West Kimberley (S), Donnybrook-Balingup (S), Dowerin (S), Dumbleyung (S), Dundas (S), East Fremantle (T), East Pilbara (S), Esperance (S), Exmouth (S), Fremantle (C), Geraldton (C), Gingin (S), Gnowangerup (S), Goomalling (S), Gosnells (C), Greenough (S), Halls Creek (S), Harvey (S), Irwin (S), Jerramungup (S), Joondalup (C), Kalamunda (S), Kalgoorlie/Boulder (C), Katanning (S), Kellerberrin (S), Kent (S), Kojonup (S), Kondinin (S), Koorda (S), Kulin (S), Kwinana (T), Lake Grace (S), Laverton (S), Leonora (S), Mandurah (C), Manjimup (S), Meekatharra (S), Melville (C), Menzies (S), Merredin (S), Mingenew (S), Moora (S), Morawa (S), Mosman Park (T), Mount Magnet (S), Mount Marshall (S), Mukinbudin (S), Mullewa (S), Mundaring (S), Murchison (S), Murray (S), Nannup (S), Narrogin (S), Narrogin (T), Nedlands (C), Ngaanyatjarraku (S), Northam (S), Northam (T), Northampton (S), Nungarin (S), Peppermint Grove (S), Perenjori (S), Perth (C), Pingelly (S), Plantagenet (S), Port Hedland (T), Quairading (S), Ravensthorpe (S), Rockingham (C), Roebourne (S), Sandstone (S), Serpentine-Jarrahdale (S), Shark Bay (S), South Perth (C), Stirling (C), Subiaco (C), Swan (S), Tambellup (S), Tammin (S), Three Springs (S), Toodyay (S), Trayning (S), Upper Gascoyne (S), Victoria Park (T), Victoria Plains (S), Vincent (T), Wagin (S), Wandering (S), Wanneroo (S), Waroona (S), West Arthur (S), Westonia (S), Wickiepin (S), Williams (S), Wiluna (S), Wongan-Ballidu (S), Woodanilling (S), Wyalkatchem (S), Wyndham-East Kimberley (S), Yalgoo (S), York (S).

P1, P3; For the municipal districts of Narembeen (S), Yilgarn (S).

South African Cape rush (*Elegia tectorum*)

P1, P2; for the whole of the State

St. John's wort (*Hypericum perforatum*)

P1, P2; For the municipal districts of Albany (C), Armadale (C), Ashburton (S), Bassendean (T), Bayswater (C), Belmont (C), Broome (S), Broomehill (S), Cambridge (T), Canning (C), Carnamah (S), Carnarvon (S), Chapman Valley (S), Chittering (S), Claremont (T), Cockburn (C), Coolgardie (S), Coorow (S), Cottesloe (T), Cranbrook (S), Cue (S), Dalwallinu (S), Dandaragan (S), Denmark (S), Derby-West Kimberley (S), Dumbleyung (S), Dundas (S), East Fremantle (T), East Pilbara (S), Esperance (S), Exmouth (S), Fremantle (C), Geraldton (C), Gingin (S), Gnowangerup (S), Gosnells (C), Greenough (S), Halls Creek (S), Irwin (S), Jerramungup (S), Joondalup (C), Kalamunda (S), Kalgoorlie/Boulder (C), Katanning (S), Kent (S), Kojonup (S), Kondinin (S), Kulin (S), Kwinana (T), Lake Grace (S), Laverton (S), Leonora (S), Meekatharra (S), Melville (C), Menzies (S), Mingenew (S), Moora (S), Morawa (S), Mosman Park (T), Mount Magnet (S), Mullewa (S), Mundaring (S), Murchison (S), Narrogin (T), Nedlands (C), Ngaanyatjaraku (S), Northampton (S), Peppermint Grove (S), Perenjori (S), Perth (C), Plantagenet (S), Port Hedland (T), Ravensthorpe (S), Rockingham (C), Roebourne (S), Sandstone (S), Shark Bay (S), South Perth (C), Stirling (C), Subiaco (C), Swan (S), Tambellup (S), Three Springs (S), Upper Gascoyne (S), Victoria Park (T), Victoria Plains (S), Vincent (T), Wagin (S), Wanneroo (S), West Arthur (S), Wiluna (S), Wongan-Ballidu (S), Woodanilling (S), Wyndham-East Kimberley (S), Yalgoo (S).

Thatching reed (*Thamnochortus insignis*)

P1, P2; for the whole of the State

Three-horned bedstraw (*Galium tricornutum*)

P1, P2; for the whole of the State

Tutsan (*Hypericum androsaemum*)

P1, P2; for the whole of the State

Tutsan, flair (*Hypericum x inodorum*)

P4; for lands approved for cultivation by the Chief Officer.

P2; for the whole of the State , except lands approved for cultivation by the Chief Officer.

Variegated thistle (*Silybum marianum*)

P1; for the whole of the State

P2; For the municipal districts of Armadale (C), Ashburton (S), Bassendean (T), Bayswater (C), Belmont (C), Beverley (S), Boddington (S), Brookton (S), Broome (S), Broomehill (S), Bruce Rock (S), Bunbury (C), Cambridge (T), Canning (C), Carnamah (S), Carnarvon (S), Chittering (S), Claremont (T), Cockburn (C), Coolgardie (S), Coorow (S), Corrigin (S), Cottesloe (T), Cuballing (S), Cue (S), Cunderdin (S), Dalwallinu (S), Dandaragan (S), Derby-West Kimberley (S), Dowerin (S), Dumbleyung (S), Dundas (S), East Fremantle (T), East Pilbara (S), Esperance (S), Exmouth (S), Fremantle (C), Gingin (S), Gnowangerup (S), Goomalling (S), Gosnells (C), Halls Creek (S), Jerramungup (S), Joondalup (C), Kalamunda (S), Kalgoorlie/Boulder (C), Katanning (S), Kellerberrin (S),

- Kent (S), Kojonup (S), Kondinin (S), Koorda (S), Kulin (S), Kwinana (T), Lake Grace (S), Laverton (S), Leonora (S), Meekatharra (S), Melville (C), Menzies (S), Merredin (S), Mingenew (S), Moora (S), Morawa (S), Mosman Park (T), Mount Magnet (S), Mount Marshall (S), Mukinbudin (S), Mundaring (S), Murchison (S), Narembeen (S), Narrogin (S), Narrogin (T), Nedlands (C), Ngaanyatjaraku (S), Northam (S), Northam (T), Nungarin (S), Peppermint Grove (S), Perenjori (S), Perth (C), Pingelly (S), Port Hedland (T), Quairading (S), Ravensthorpe (S), Rockingham (C), Roebourne (S), Sandstone (S), Shark Bay (S), South Perth (C), Stirling (C), Subiaco (C), Swan (S), Tambellup (S), Tammin (S), Three Springs (S), Toodyay (S), Trayning (S), Upper Gascoyne (S), Victoria Park (T), Victoria Plains (S), Vincent (T), Wagin (S), Wandering (S), Wanneroo (S), West Arthur (S), Westonia (S), Wickiepin (S), Williams (S), Wiluna (S), Wongan-Ballidu (S), Woodanilling (S), Wyalkatchem (S), Wyndham-East Kimberley (S), Yalgoo (S), Yilgarn (S), York (S).
- P3; For the municipal districts of Augusta-Margaret River (S), Boyup Brook (S), Busselton (S), Capel (S), Chapman Valley (S), Collie (S), Cranbrook (S), Geraldton (C), Greenough (S), Harvey (S), Irwin (S), Mandurah (C), Mullewa (S), Murray (S), Nannup (S), Northampton (S), Serpentine-Jarrahdale (S), Waroona (S).
- P4; For the municipal districts of Albany (C), Bridgetown-Greenbushes (S), Dardanup (S), Denmark (S), Donnybrook-Balingup (S), Manjimup (S), Plantagenet (S).

Water hyacinth (*Eichhornia crassipes*)

P1, P3; for the whole of the State

Water lettuce (*Pistia stratiotes*)

P1, P3; for the whole of the State

Willows (*Salix spp*, except weeping willow (*S.babylonica*), pussy willow (*S.x calodendron*) and sterile pussy willow (*S.x reichardtii*))

P1; for the whole of the State

Witchweed (*Striga spp* - all non-indigenous *Striga species*)

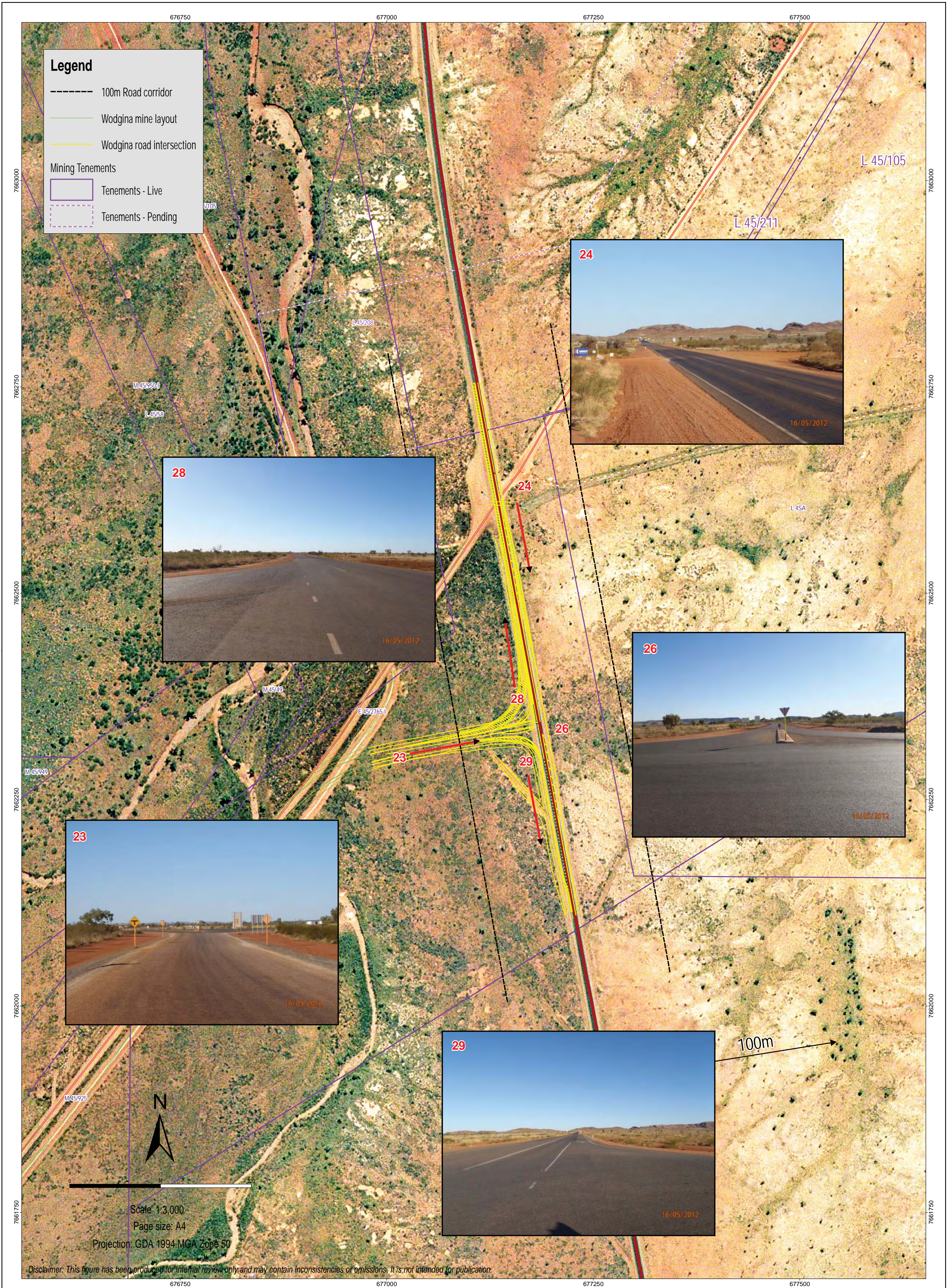
P1, P2; for the whole of the State

Yellow burr weed (*Amsinckia spp.*)

P1, P2; for the whole of the State

Appendix E

Site Photos



Environmental Management Plan

ENVIRONMENTAL MANAGEMENT PLAN

Introduction

This Environmental Management Plan (EMP) has been developed for the project area following the completion of the Preliminary Environmental Impact Assessment (PEIA) report. The aim of this EMP is to minimise the environmental impacts associated with the proposed works as well as to identify areas of responsibilities required for the implementation of management strategies.

This EMP addresses specific issues that were identified during the PEIA. The project management measures identified within this EMP are in addition to the standard environmental management contract specifications used for Category 2 projects. Main Roads' standard environmental contract specifications (Specifications 203, 204, 301, 302 and 304) are to be adhered to where appropriate.

The areas that require special management will be addressed in terms of:

- the timing of the various management actions;
- the topic (e.g. vegetation);
- the objectives for each area;
- the actions that are necessary to minimise the impact;
- the responsible party for implementing the action; and
- whether the action arose from external advice or is a Main Roads requirement.

Communication Plan

Environmental issues specific to the project will be communicated as follows:

Method	Frequency	Participants	Reference	Record
Project Site				
Induction	Prior to Work	All personnel and subcontractors	EMP and Contractor Environmental Policy	Induction Meeting
Toolbox Meetings	Weekly	Project Personnel	Contractor Safety Plan	Minutes of Meeting
Authority Consultation				
Department of Environment and Conservation	As required	Main Roads' Project Manager and Contractor Project Manager	-	Minutes of meeting

External Communication and Complaints

A complaints register shall be maintained by the contractor. All complaints received shall be forwarded to the Main Roads' Project Manager for action. Serious complaints shall be investigated within 24 hours of the complaint being received.

Monitoring

After project completion and project handover, the Asset manager should develop a monitoring program to monitor for those aspects that have been identified as requiring monitoring.

Contingency Measures

Due to the scale and nature of the project, no contingency measures are identified as the inherent environmental risks are small.

Auditing

Due to the scale and nature of the project, there is no requirement for auditing the implementation of the EMP as the environmental risks are small.

ENVIRONMENTAL MANAGEMENT PLAN					
Timing	Topic	Objective	Action	Responsible Party	Advice
All phases of Disturbance	Vegetation Clearing - Record-keeping	All projects should maintain the required records relating to clearing native vegetation under the purpose permit.	Clearing: <ul style="list-style-type: none"> a copy of the PEIA & EMP (Minor projects) for small projects; a map showing the location where the clearing occurred, recorded in an ESRI Shapefile the size of the area cleared (in hectares); and the dates on which the clearing was done. 	Project Manager	DEC
			Revegetation and rehabilitation of areas: <ul style="list-style-type: none"> a copy of each Revegetation Plan; a map showing the location of any area revegetated and rehabilitated recorded in an ESRI Shapefile; a description of the revegetation and rehabilitation activities undertaken; and the size of the area revegetated and rehabilitated (in hectares). 	Project Manager	DEC
All phases of Disturbance	Vegetation Clearing - Record-keeping	All projects should maintain the required records relating to clearing native vegetation under the purpose permit.	Control of weeds and other pathogens: <ul style="list-style-type: none"> a copy of any management plan prepared; and for any pathogen other than dieback, the appropriate steps taken. 	Project Manager	Main Roads
Pre-Disturbance	Vegetation Clearing	Ensure that the overall objectives of the alignment and construction works are compatible with maintaining and, where possible, enhancing the biological integrity of the surrounding environment and minimising vegetation loss and degradation; and Ensure the retention of as many habitat trees, shrubs and vegetated corridors for fauna as possible, particularly where associated with riparian zones.	Selection of designs/locations that minimise adverse impacts on the biological environment.	Project Manager	Main Roads
			Remove visible weeds species within the project area prior to construction to limit the amount of propagative material that may be spread during disturbance.	Contractor	Main Roads
			Any stockpiled vegetation from clearing works shall not be burnt. This vegetation shall be used during any rehabilitation works and either mulched or respread according to the TDP/Revegetation Plan.	Contractor	Main Roads
Pre-Disturbance	Surface Drainage	Maintain the hydrological regime that exists prior to the construction of the proposal.	Stormwater drainage shall be treated and disposed of in accordance with DEC requirements.	Project Manager	DEC

ENVIRONMENTAL MANAGEMENT PLAN					
Timing	Topic	Objective	Action	Responsible Party	Advice
Disturbance	Drilling	Minimise impact of drilling on surrounding environment	<ul style="list-style-type: none"> • Use of a raised blade for clearing tracks and drill pads • Using existing tracks where available • Vegetation stockpiled separately for use in rehabilitation when constructing drill pads • Use of liners and drip trays to minimise hydrocarbon spillage • Use of appropriate machinery to minimise impacts 		
Disturbance	Fire	Ensure that the fire risk associated with the construction of the proposal is minimised.	No fires shall be lit within the project area.	Contractor	Main Roads
			Machinery will be fitted with approved spark arresting mufflers.	Contractor	Main Roads
			A fire extinguisher will be on site at all times.	Contractor	Main Roads
Disturbance	Fauna	Avoid unnecessary impacts to fauna and damage to fauna habitat.	Fauna are not to be fed or intentionally harmed.	Contractor	Main Roads
			No pets or firearms permitted on site.	Contractor	Main Roads
			The WILDCARE Helpline is to be contacted, 9474 9055, in the event of sick, injured or orphaned native wildlife on the site.	Contractor	Main Roads
Disturbance	Rehabilitation	Rehabilitate the project area to meet project commitments.	<ul style="list-style-type: none"> • All waste materials from the development are to be completely removed from the site upon completion of the project. • Vegetation stockpiled separately for use in rehabilitation when constructing drill pads. Drill holes plugged immediately • Drill holes securely plugged below ground at minimum depth of 400mm within 6 months • Excavations backfilled and respread with topsoil and vegetation • Drill pads rehabbed or buried • All rubbish removed from site (including any hydrocarbon spills) 	Contractor	Main Roads