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Dyno Nobel Asia Pacific Limited

Moranbah Ammonium Nitrate Project

Nature Conservation – Flora Assessment Report

September 2006

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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1.1 Introduction

Dyno Nobel Asia Pacific Limited (DN) is a leading global producer of ammonium nitrate with six plants in North America. Dyno Nobel Asia Pacific Limited produces and markets explosives and detonation devices for coal, metals quarry, tunneling, construction and seismic industries. The strategy of DN combines growth through incremental expansion of existing operations with acquisitions and the development, commercialisation and marketing of new products.

Dyno Nobel Asia Pacific Limited, together with its joint venture partner CSBP Limited, a subsidiary of Wesfarmers Limited, operate an ammonium nitrate plant at the existing Queensland Nitrates ("QNP") production facility at Moura, Queensland.

Dyno Nobel Asia Pacific Limited currently provides explosives for many of the mining operations in Central Queensland. To support the provision of explosives, DN is proposing to develop an ammonium nitrate plant in Moranbah. This plant will provide permanent employment for 70 staff for the operation of the facility and during construction a peak of up to 550 construction personnel.

Dyno Nobel Asia Pacific Limited is seeking to construct and operate an ammonia plant, a nitric acid plant, an ammonium nitrate plant, an emulsion manufacturing plant and a construction camp for the above works in the Moranbah area. The combined facility would service the rapidly expanding demand for ammonium nitrate from mining in Queensland. The current concept is to construct a nominal 350,000 tonnes per annum (tpa) plant making ammonium nitrate prill (solid) and ammonium nitrate emulsion (viscous liquid).

The project represents a value-adding downstream processing facility from the utilisation of the significant gas reserves in the Moranbah region. The proposed facility development is to be located on Goonyella Road, approximately 4 km North West of Moranbah. With a total capital investment of approximately $500 million, the project will provide significant benefits for the local and regional economy.

The DN ammonium nitrate plant was declared a significant project by the Queensland Coordinator-General (CG) pursuant to Section 26 of the Queensland *State Development and Public Works Organisation Act 1971* (the SDPWO Act). This declaration requires DN to prepare an Environmental Impact Statement (EIS) for the project under the SDPWO Act – Section 26 (1)(a).

The following flora report answers section 4.7.1.1 of the Terms of Reference for the Environmental Impact Statement.

1.2 The assessment methodology

The flora component of the nature conservation assessment involved desktop and field investigations. Desktop investigation involved searching of government databases and online search tools to determine known biodiversity values of the site. The Queensland

government search tool 'Wildlife Online' was used to obtain a list of flora species previously recorded from the site and surrounding area. At a Commonwealth government level the 'Protected Matters' search tool was used to produce a list of environmental matters of national significance that may be of importance to the project.

The site is mapped as entirely covered in remnant vegetation, under the *Vegetation Management Act 1999* (Qld) (VM Act). Information on the mapping was obtained and was confirmed in a field investigation by a GHD ecologist on 21 April 2006.

A further field investigation of the site was conducted from 8 to 12 May 2006 by two GHD ecologists. This investigation targeted the flora and fauna of the site at three transects, with additional targeted meandering searches conducted over the entire site.

Vegetation structure was measured using three 100 metre x 10 metre (1000m^2) transects, with all species within the transects recorded. Flora species not identifiable on site were sent to the Queensland Herbarium for positive identification.

1.3 Nature conservation legislative requirements

This section describes State and Commonwealth legislation relevant to this project.

1.3.1 *Nature Conservation Act 1992* (Qld)

The Environmental Protection Agency (EPA) is responsible for implementing the *Nature Conservation Act 1992* (NC Act). Under section 73 (a) of the NC Act, the EPA is required to conserve wildlife and its values to:

- ensure the survival and natural development of the wildlife in the wild; and,
- conserve the biological diversity of the wildlife to the greatest possible extent; and,
- identify, reduce or remove, the effects of threatening processes relating to the wildlife; and,
- identify the wildlife's critical habitat and conserve it to the greatest possible extent.

The Nature Conservation (Wildlife) Regulation 1994 (NC Regulation) lists species of flora and fauna that are endangered, vulnerable or rare. It is an offence to interfere with these species without approval from the EPA. A description of the species of flora found during the field investigation is listed in Table 2.

1.3.2 *Vegetation Management Act 1999* (Qld)

The *Vegetation Management Act 1999* (VM Act) regulates the clearing of native vegetation, excluding grasses and mangroves. It is managed by the Department of Natural Resources and Water (DNRW). Under the VM Act, clearing is regulated, and the environmental effects of clearing are managed, in a way that:

- conserves remnant endangered, of concern and not of concern regional ecosystems;
- conserves vegetation in declared areas (there are no declared areas in Queensland at present);

- ensures clearing does not cause land degradation;
- prevents the loss of biodiversity;
- maintains ecological processes; and
- reduces greenhouse gas emissions.

The VM Act is implemented in close association with the *Integrated Planning Act 1997* (Qld) (IPA). Under IPA, clearing of native vegetation is defined as operational works. Under Schedule 8 of IPA, operational works that is the clearing of native vegetation is assessable except where exempted, and a development application must be made to DNRW (which act as the Assessment Manager for the application). In the case of this project, clearing will not be exempted and a development application must be submitted.

The Department of Natural Resources and Water will assess the application for this project to clear native vegetation against the Regional Vegetation Management Code for Ongoing Clearing Purposes - Northern Brigalow region. Regional vegetation management clearing codes seek to ensure clearing is conducted in an appropriate manner for the locale. Issues targeted by the codes include the adequate maintenance of regional ecosystem diversity, salinity, erosion, fragmentation and acid sulphate soils. Clearing applications are processed by the Assessment Manager (DNRW) under the Integrated Development Assessment System as established in chapter three of IPA.

1.3.3 *Aboriginal Cultural Heritage Act 2003*

The *Aboriginal Cultural Heritage Act 2003* (the Cultural Heritage Act) provides protection for items of cultural heritage value in Queensland, and is managed by DNRW. This Act does not issue permits or licenses to undertake activities. Rather, it establishes a duty of care on the person undertaking an activity to exercise due diligence in making sure that there is no damage to items or areas of significant Aboriginal cultural heritage. Cultural heritage is not native title, and can exist on a property regardless of land title (that is, it can still bind the landowner of freehold land).

Vegetation forms an important part of the cultural heritage of indigenous people, and is frequently listed on the Cultural Heritage Database or Register. Where a tree, a group of trees, or any other plant, is listed on the Cultural Heritage Register or Database, it cannot be damaged unless in accordance with a properly prepared Cultural Heritage Management Plan.

Clearing of any type of vegetation (remnant or non-remnant) has the potential to damage Aboriginal Cultural Heritage, and before any clearing takes place the following steps should be taken:

- The DNRW Cultural Heritage Coordination Unit should be consulted;
- A search of the Aboriginal Cultural Heritage Register and the Aboriginal Cultural Heritage Database should be completed – these searches can be conducted through the Cultural Heritage Coordination Unit of DNRW;

- The involvement of recognised local indigenous groups or leaders should be sought. This is because cultural heritage can exist even if it is not listed on the Cultural Heritage Register or Database; and
- If cultural heritage is present on the property, a Cultural Heritage Management Plan should be developed, and local indigenous groups or leaders should be consulted and their views considered in the formulation and implementation of any development or management plans.

The duty of care established under the Cultural Heritage Act requires that a person or corporation exercise all reasonable and practical measures to avoid harming cultural heritage. The points listed above are all considered by guidelines set out under the Act to be reasonable and practical measures that must be taken before undertaking an activity that could harm cultural heritage.

The local indigenous group claiming ownership of the DN plant site were consulted as part of the community consultation process, and they have identified an area of indigenous cultural heritage value in the north eastern section of the site.

1.3.4 *Water Act 2000*

Under section 266 of the *Water Act 2000*, activities involving excavation or the destruction of vegetation in a watercourse require a permit. In deciding such an application, DNRW considers the type and location of the vegetation, the effect of the activity on the watercourse and the reason for the proposal, among other things. Watercourses are closely defined, however generally a watercourse includes any land between the high banks of a stream.

It is unlikely that this project will meet any major obstacles under this Act. Infrastructure will be located in the centre of the lot, in the western section, opposite the only stream on the lot, and river crossings are not expected to be necessary. In general, measures should be implemented during works to address issues such as sedimentation and erosion.

1.3.5 Land Protection (Pest and Stock Route Management) Act 2002

The *Land Protection (Pest and Stock Route Management) Act 2002* (the Land Protection Act) outlines the Queensland Government's legislative approach to weeds and pests. Under the Land Protection Act, weeds are declared in three classes. Class 1 pests and weeds are those currently not commonly present in Queensland, but which if introduced would cause an adverse economic, environmental or social impact. These weeds and pests are subject to control measures from the State Government. Landowners must take reasonable steps to keep their land free of Class 1 weeds and pests. There are no Class 1 weeds on the site.

Class 2 pests and weeds are those that are already established, and which have, or could have, an adverse effect. They are subject to control measures managed by landowners, local government and the community. Landowners must take reasonable steps to keep land free of Class 2 pests and weeds. Class 2 weeds on the site were prickly pear (*Opuntia sp.* and *Eriocereus spp*.).

Class 3 pests and weeds are already established in Queensland. The primary objective of the Land Protection Act in relation to Class 3 pests and weeds is to prevent sale, and therefore, spread. Landowners are not expected to control Class 3 pests and weeds unless their property adjoins an environmentally significant area (generally a national park or other protected area). There are no Class 3 weeds on the site.

1.3.6 *Environmental Protection and Biodiversity Conservation Act 1999* (Cth)

The Commonwealth Department of Environment and Heritage (DEH) manages the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC). The EPBC Act requires that actions that may have a significant impact on matters of national environmental significance be assessed and approved by the Federal Environment Minister. Matters of national environmental significance (called Protected Matters by the EPBC Act) include:

- Ramsar wetlands of international significance;
- National Heritage places;
- Threatened species and ecological communities;
- Migratory species; and
- Commonwealth marine areas.

Protected Matters are listed on a database held by the DEH, and the results of a search for protected matters listed over this site are presented in section 2.3 below.

2. Desktop investigation

2.1 Regional ecosystems

Remnant vegetation is generally classified into regional ecosystems (REs). REs are discrete communities of remnant vegetation that correspond to a particular bioregion and a particular land zone. Each RE has a number that serves as a shorthand description of its characteristics and location - for example, 13.12.4. The first number, 13, indicates the bioregion the RE is located in – in this case, the New England Tableland bioregion. The second number, 12, indicates the RE is found on a certain land zone – in this case, granite rocks on hills with shallow soils of low fertility. The final number, 4, designates the botanical community – *Eucalyptus tereticornis* and *E. caliginosa* grassy open forest.

The Queensland Herbarium, which is part of the Environment Protection Agency (EPA), is responsible for mapping REs, mostly using a combination of satellite imagery, aerial photography and on-ground studies. The Environment Protection Agency generates the RE mapping and passes the draft mapping to DNRW for approval and registration. Under the VM Act, each RE is assigned a conservation status, which is based on its current extent (how much of it remains) in a bioregion. Pre-clearing extent refers to the estimated extent of an RE before European settlement i.e. the pre-1788 extent of an RE. RE conservation status definitions are set out in the schedule dictionary of the VM Act, and are classified as follows:

- Endangered REs have:
  - less than 10% of the pre-clearing extent remaining; or
  - 10-30% of the pre-clearing extent remaining (if the remnant extent of the regional ecosystem is less than 10,000 ha);
- Of concern REs have:
  - 10-30% of the pre-clearing extent remaining; or
  - more than 30% of the pre-clearing extent remaining (if the remnant extent of the regional ecosystem is less than 10 000 hectares);
- Not of Concern REs have:
  - more than 30% of the pre-clearing extent remaining; and
  - the remnant extent of the regional ecosystem is more than 10,000 ha.

In addition, the EPA classifies REs according to condition and the threatening processes to which they are subjected. Under this process:

- Endangered REs have:
  - less than 10% of the pre-clearing extent unaffected by severe degradation and/or biodiversity loss[1]; or

[1] floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 50 years even with the removal of threatening processes; or soil surface is severely degraded, for example by loss of A horizon, surface expression of salinity, surface compaction, loss of organic matter or sheet erosion

- 10-30% of the pre-clearing extent unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10 000 hectares; or,
- a rare[2] RE subject to a threatening process[3].

- Of Concern REs have:
  - 10-30% of the pre-clearing extent unaffected by moderate degradation[4] and/or biodiversity loss.
- Not of Concern REs:
  - do not meet the degradation criteria listed for endangered and of concern REs.

When determining whether a patch of vegetation is remnant vegetation, or meets an RE description, the canopy cover, height and species composition of the vegetation are considered. The vegetation community is remnant if the dominant layer of vegetation has:

- an average of 50% of the canopy cover of the undisturbed canopy of remnant vegetation;
- an average of 70% of the height of the undisturbed canopy of remnant vegetation; and,
- the species composition of the remnant vegetation's undisturbed canopy.

This definition is known as the '50-70-species rule'.

2.1.1 Regional ecosystems on the site

The site proposed for this project has the heterogenous REs 11.5.9 (80%)/11.5.3(20%) and 11.7.2 (80%)/11.5.3 (20%). Both regional ecosystems are classified under the VM Act as 'Not of Concern', with a biodiversity status (set under the EPA Biodiversity Planning Assessment process) of 'No Concern At Present'. These REs are described in Table 1 below. Regional ecosystem mapping for the area is outlined in Figure 1. Neither RE listed below is a threshold RE, meaning that neither is on the threshold of being listed as Of Concern.

[2] preclear extent less than 1000 hectares or patch size 100 hectares and of limited extent across its range

[3] for example, clearing, weed invasion, fragmentation, inappropriate fire regime or grazing, or infrastructure development

[4] floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 20 years even with the removal of threatening processes; or soil surface is moderately degraded

Table 1 Regional ecosystems mapped on the Dyno Nobel Moranbah site

RE	Short Description[1]	Conservation Status	Protected Area Representation	Remnant Extent
11.5.9	*Eucalyptus crebra* & other *Eucalyptus spp*. & *Corymbia spp*. woodland on Cainozoic sand plains/remnant surfaces. Plateaus & broad crests. *Eucalyptus crebra* &/or *Eucalyptus melanophloia* woodland.	VM Act - not of concern BPA[2] – no concern at present	Blackdown Tableland National Park, Taunton National Park Scientific Reserve	At least 10000 ha and > 30% of the pre-clear extent remaining
11.5.3	*Eucalyptus populnea* &/or *E. melanophloia* &/or *Corymbia clarksoniana* woodland on Cainozoic sand plains/remnant surfaces	VMA - not of concern BPA[2] – no concern at present	Carnarvon National Park, Dipperu National Park, Epping Forest National Park, Mazeppa National Park, Narrien Range National Park, Wilandspey Conservation Park	At least 10000 ha and > 30% of the pre-clear extent remaining
11.7.2	*Acacia* spp. woodland on lateritic duricrust. Scarp retreat zone	VMA – not of concern BPA[2] – no concern at present	Blackdown Tableland National Park, Blackwood National Park, Goodedulla National Park, Narrien Range National Park, Taunton National Park Scientific Reserve	At least 10000 ha and > 30% of the pre-clear extent remaining

[1]As per descriptions provided in the Regional Ecosystems Descriptions Database (REDD) Version

[2]Biodiversity Planning Assessment – an Environment Protection Agency method for determining biodiversity values

Under the IPA, the clearing of native vegetation is classified as operational works, and a permit from DNRW is required. Applications to clear native vegetation received by DNRW are assessed against the regional vegetation management code for the area in which clearing is proposed. In the Moranbah area the applicable code is that for the Northern Brigalow region. The proposed clearing for this project will meet the requirements of the Northern Brigalow Regional Ongoing Clearing Code, and a Property Vegetation Management Plan in support of an application to clear has been lodged with DNRW.

2.1.2 Protected areas

The Dyno Nobel Asia Pacific Limited proposed site is located in the Belyando Shire Council. The Belyando Shire contains a number of protected areas: Willandspey National Park, Epping Forest National Park, Peak Range National Park, Narrien Range National Park and Mazeppa National Park. All of the REs mapped for the site are represented in these protected areas (see Table 1), in particular RE 11.5.3, which was the most common RE on the site.

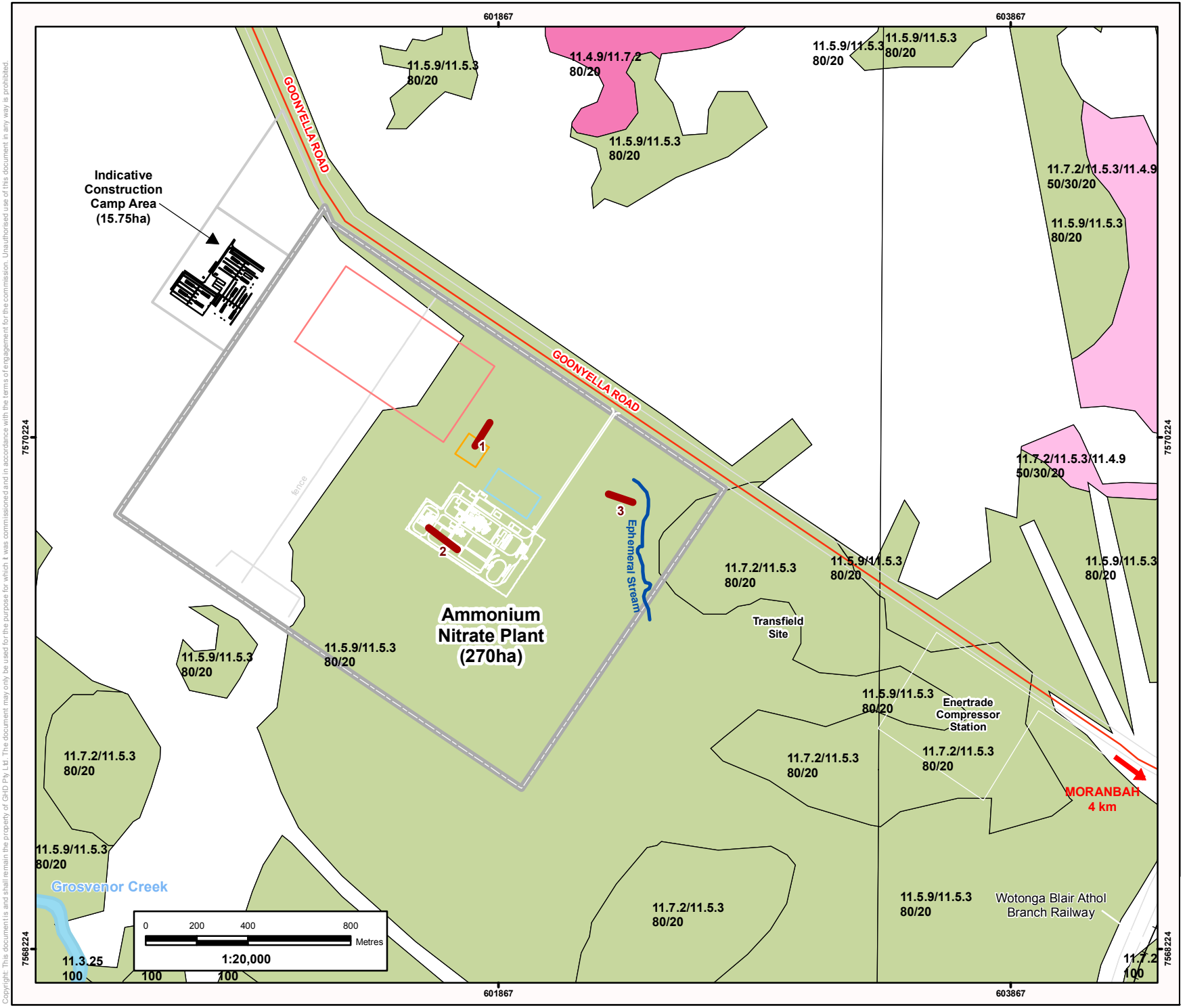
2.2 Wildlife Online

The EPA manages a database of flora and fauna locational reports as part of the Wildlife Online search tool. The search (performed on 3 May 2006) for flora for this site (defined as the locational point S -21.9728 E 147.9869 with a radius of five kilometres) found only one species – *Diploglottis macrantha* (Tamarind). This species is common under the NC Act. *D. macrantha* is a plant found in vine thickets and was not found during the survey. As vine thickets were not found either, it is considered unlikely to be present on this site.

2.3 EPBC Protected Matters search

Under the EPBC, 'protected matters' are matters of national environmental significance (see 1.3.6 above). The DEH operates an online search tool that allows a search of protected matters for a specified location to be conducted. No species of flora were identified in the EPBC protected matters search.

Wetlands of international significance (RAMSAR sites) and a threatened ecological community were identified in the protected matters search. The site is listed as being in the same catchment as the RAMSAR listed areas of Shoalwater Bay and Corio Bay. As these areas are over 100 km away from the study site it is highly unlikely that activities at this site will have a significant impact on these wetlands. In addition, the threatened ecological community Brigalow (open forest dominated or co-dominated by *Acacia harpophylla*) is known to occur in the area. Very small stands of Brigalow were identified during the field investigation, and this result is discussed in section 3.2 below.



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N W E S

Date: 10-08-06 Rev D
Datum: GDA94 (MGA) Zone 55
Source: Base data sourced from the State of Queensland, Department of Natural Resources, Mines. All other infrastructure supplied by Dyno Nobel Asia Pacific Ltd.
File: G:\41\15824\GIS\Maps\Draft figX_Site_RE_Transect_RevD.mxd

Legend

- Ammonium Nitrate Plant Site
- Evaporation Pond
- Generating Facility*
- Raw Water Reservior
- Cadastre
- Watercourse
- Major Road
- Ephemeral Stream
- Transect

Regional Ecosystems

- No mapped vegetation
- Endangered RE (dominant)
- Endangered RE (subdominant)
- Of Concern RE (dominant)
- Not Of Concern RE

RE Numbering System:
11.4.9/11.7.2 = mosaic of two ecosystem types
80/20 = proportion of each ecosystem type
*Generating Facility location is subject to detailed engineering.

Moranbah Ammonium Nitrate Plant

Environmental Impact Statement

Regional Ecosystems

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3. Terrestrial flora

3.1 Methods

Vegetation and the structure of vegetation communities on the site were studied by GHD ecologist Simon Danielsen during a four day site inspection from 8 to 12 May 2006. Three transects were chosen after a thorough examination of the site to represent the diversity of vegetation communities and physical features present. Each transect was established in one of the three broad vegetation assemblages identifiable on site.

Transects were 100 m x 10 m (see Figure 1). Data was recorded on:

- species composition;
- vegetation canopy cover and structure; and
- vegetation height.

This data was recorded on Queensland Herbarium site/transect measurement forms, and vegetation community cover and structure was measured using the Queensland Herbarium methodology for stratifying vegetation at a site, established by Nelder and Wilson (EPA 2005). Detailed site data sheets, as provided by the Queensland Herbarium, are reproduced in Appendix A.

A number of species are of very low density, being found at one location only across the entire site eg. *Santalum lanceolatum* (sandalwood). Meandering traverses of the entire site were conducted so as to encounter plant species not present in the three transects and to maximise exposure to the site. A complete flora species list is reproduced in Table 2.

Species of flora not identifiable with the resources available were collected, dry pressed and submitted to the Queensland Herbarium for formal identification. All printed and electronic resources used for identification purposes have been included in the references list at the end of this report.

3.2 Description of vegetation community

The vegetation community on site was characterised as open woodland, thickening occasionally to woodland (eg. transect 2), on a sand plain with a slope of less than three percent. Two tree layers, a shrub layer and a ground cover were always present at varying densities, with the tallest tree layer being the ecologically dominant layer for the community across the site – see Figure 2. The results of vegetation structure measurements at the three transects are reproduced in Appendix A.

The tallest tree layer ranged from between 10 to 20 m at the tallest, being neither tall nor short woodland. The height of the shrub layer was from 1 to 5 m, with a variable density from mid-dense to very sparse. Ground covers occupied a layer from 1 m to ground level, with a median height of from 30 to 60 cm.

Table 2 Flora species encountered on site 8 to 11 May 2006

Acacia catenulata	*Eriocereus martinii*
Acacia crassa	*Eriachne mucronata*
Acacia excelsa	*Erythroxylum australe*
Acacia harpophylla	*Eucalyptus crebra*
Acacia oswaldii	*Eucalyptus populnea*
Acacia shirleyii	*Evolvulus alsinoides* var *decumbens*
Allocasuarina luehmannii	*Flindersia dissosperma*
Alphitonia excelsa	*Grevillia pteridifolia*
Alstonia constricta	*Grewia retusifolia*
Archidendron basaltica	*Hakea lorea lorea*
Aristida holanthera var. *holathera*	*Marsdenia australis*
Atalaya hemiglauca	*Melaleuca nervosa*
Capparis lasiantha	*Myoporum acuminatum*
Capparis spinosa	*Opuntia* sp.
Carissa ovata	*Owenia acidula*
Cassia brewsteri	*Parsonsia lanceolata*
Casuarina cunninghamia	*Panicum effusum*
Cenchrus ciliaris	*Petalostigma pubescens*
Chrysopogon fallax	*Pittosporum angustifolium*
Corymbia clarksoniana	*Pseudoanthemum variabile*
Corymbia tessellaris	*Santalum lanceolatum*
Crinum sp.	*Senna artemisiodes zygophylla*
Enchalina sp.	*Sida everistiana*
Enneapogon virens	*Terminalia oblongifolia*
Eragrostis lacunaria	*Ventilago viminalis*
Eremophila bignoniiflora	
Eremophila mitchellii	

Figure 2: *Eucalyptus populnea* woodland to open woodland characteristic of site, with sandy soil visible in the foreground

The site is predominately occupied by *Eucalyptus populnea* (poplar box) woodland to open woodland, with *Corymbia clarksoniana* (Clarkson's bloodwood) and less often *Eucalyptus crebra* (narrow-leaf ironbark) appearing as a secondary tree species in the ecologically dominant tree layer. Other species occurring in the tallest tree layer included *Acacia excelsa* (ironwood), *A. harpophylla* (brigalow) and *Ventilago viminalis* (vine tree). The second tree layer was dominated by *E. populnea*, with *C. clarksoniana, Acacia catenulata, A. harpophylla, A. shirleyii* and *Terminalia oblongata* frequently associated.

The medium-dense to sparse shrub layer was dominated by *Eremophila mitchellii* (false sandalwood), sometimes with *Flindersia dissosperma* or *Erythroxylum australe* co-dominant. The ground layer on site was invariably dominated by clumps of *Carissa ovata*, with a suite of grass species present in the areas of deeper sand.

3.2.1 Observations on soils and geology

Soils on the site varied from loam to sand on a relatively flat plain. The loamy grey top-soil degraded rapidly on being disturbed to a fine but thick blanket of 'bull-dust'. At transect 1 and 3 the loam was hard packed and very difficult to penetrate, at least down to 45 cm. Rain tended to pool in depressions across the surface and the soil in these areas became thick and slippery. Cattle tracks were up to 20 cm deep in places where this had occurred. Small clay pans of up to 70 m diameter were apparent in places with little or no growth – in these clay pans the soils were extremely difficult to penetrate. Loamy soils appeared to be dominant in the northern and central section of the lot.

The sand soils were soft and easily penetrated, and appeared to be highly permeable. The sand was a light red colour, and supported a higher diversity of grasses than the loamy soils. These soils, although coarsely textured, still contained a percentage of loam, but were sandier than elsewhere on the site. Sandy soils were dominant in the southern and western sections of the lot.

Little rock was apparent across the site. However, the site had occasional very low ridges of laterite 'gibber' pebbles. These pebbles did not appear as part of the soil profile, but were found sitting on the surface in places on the site in elongated ridges up to five centimetres high.

3.2.2 Transect 1 – *Eucalyptus populnea* open woodland clumps with a mid-dense scrubby understorey on clay plains

Transect 1 was located in a community described as *Eucalyptus populnea* open woodland with a mid-dense shrub layer dominated by *Eremophila mitchellii*, and a dense ground cover layer dominated by *Carissa ovata* (see Figure 3). The shrub layer was the most floristically diverse, with eight species identified (with *Flindersia dissosperma* in particular prominent after *C. ovata*). Fourteen species were identified overall in the 1000 m^2 transect, a greater species richness than that found in the other two transects (see Appendix A). The tree layer was also the tallest of the transects, with a median height of 17 m and a maximum recorded height of 20 m.

Figure 3: *Eucalyptus populnea* open woodland with a mid-dense shrub layer dominated by *Eremophila mitchellii* and a ground cover of *Carissa ovata*

Individual plants often carried evidence of grazing pressure with stems chewed and broken, and there were numerous cattle tracks and scats. It appears cattle regularly

use these clumps for shelter and to supplement grass feed. Fine to medium laterite gravel 'gibbers' were present in places across the transect.

This vegetation assemblage was relatively common across the site, accounting for an estimated 20% of the ground area. It apparently occurs in areas where drainage is impeded (based on observations made on a field visit 21 April 2006, after heavy rain on previous nights) and soils are hard-packed loam. Such vegetation assemblages occur in clumps ranging in size from half to one hectare, being easily discerned from the surrounding *E. populnea* open woodland by the relatively thicker shrub layer and a greater diversity and abundance of non-sclerophyllous plants. The vegetation community at this transect best fits RE 11.5.3 (see Table 1).

3.2.3 Transect 2 – *Eucalyptus populnea* woodland with a very sparse shrub layer on sand plains

Transect 2 was located in *Eucalyptus populnea* woodland with a very sparse shrub layer co-dominated by *Eremophila mitchellii* and *Flindersia dissosperma*, with a sparse to mid-dense ground layer characterised by a high diversity of grasses (see Figure 2). Species richness was low above the ground layer, with six species in total, three of which were present in the shrub layer (see Appendix A). The ground layer had the highest ground cover species richness of the three transects on the site, with seven species in all. The tallest tree layer at this transect had a median height of 13 m, with a maximum recorded height of 15 m.

The transect was located on a relatively open sand plain, with sand being dominant in the soil profile to at least 50 cm deep. This community type was the most common across the site, accounting for an estimated 70% of the surface area on the site and being the 'default' vegetation community. It best fits the RE 11.5.3.

3.2.4 Transect 3 – *Eucalyptus populnea*, *Acacia catenulata* and *A. harpophylla* open woodland on clay with lateritic jump-ups

Transect 3 contains *Eucalyptus populnea* open woodland with small, pure stands of *Acacia catenulata* and *Acacia harpophylla*, over a sparse shrub layer of *Eremophila mitchellii*, with a sparse to mid-dense ground cover of *Carissa ovata*. Ten species of woody plant were identified (see Appendix A). The soil comprised hard packed loam and appeared to share the same characteristics as that found at transect 1.

This transect had the most diverse physical structure of the areas studied on the site, encompassing a lateritic 'jump-up' approximately 20 m above the height of the surrounding plain, with a base circumference of approximately 150 m – see Figure 4. This feature dominated the flora in the immediate area, with *Acacia catenulata*, a wattle more often associated with land zone seven[5], forming a pure stand up to ten metres tall surrounding the 'jump-up'. This small stand most resembles the description of not of concern RE 11.7.2.

[5] Land zones correspond to broad geological categories, or groupings of categories. Land zone 7 is described as exposed or shallowly covered Cainozoic duricrust.

The ‘jump-up’ itself consisted of an outcrop of resistant laterite that appears to have been left behind as the landscape around it has eroded away to form the sand and clay plains currently present across the locale. As mentioned for transect 1 above, fine to medium sized laterite ‘gibber’ pebbles are a common feature of the site, often forming very short (less than 5 cm tall) ridges of 50 m or more.

Figure 4: ‘Jump-up’ with *Acacia catenulata* stand

Also notable at this site was the pure stand of *Acacia harpophylla* located approximately half-way through the transect (see Figure 5). This stand comprised almost 20 individual trees of up to 15 m in height. Two other stands of this type were found in other parts of the lot, with at most 30 individual trees in any one stand.

The vegetation assemblage at transect 3 combined three discrete vegetation groupings; *Eucalyptus populnea* open woodland with a shrub layer dominated by *Eremophila mitchellii* and a ground layer characterised by clumps of *Carissa ovata*; an *Acacia catenulata* stand, associated with the laterite jump-up; and an *Acacia harpophylla* stand.

The first grouping, *Eucalyptus populnea* open woodland, is the most common assemblage on the site (it is estimated to account for at least 70% of the site), and matches the RE 11.5.3. *Acacia catenulata* was only found at this location on the entire site, however stands of *Acacia shirelyii* found nearby provide similar habitat and also meet the definition of RE 11.7.2. The *Acacia harpophylla* stand is a feature that is found elsewhere, accounting for no more than an estimated 2% of the site (see discussion in section 3.3.2).

Figure 5: ***Acacia harpophylla*** **stand at transect 3**

3.2.5 Meandering traverse observations

Meandering traverses of the site were conducted with the object of locating all species on the site. Apart from the common species, such as *Eucalyptus populnea, E.crebra, Corymbia clarksoniana, Acacia excelsa, Eremophila mitchellii, Flindersia dissosperma, Carissa ovata, Alphitonia excelsa* and *Terminalia oblongata*, most other species had an irregular and occasional distribution across the site.

Three of the Acacia species on the site were found in stands – *Acacia catenulata, A. shirleyii* and *A. harpophylla*. *Acacia catenulata* was restricted to one stand surrounding the jump-up at transect 3 (see Figure 4). *Acacia shirleyii* was restricted to two larger stands toward and along the eastern boundary of the site, on either side of an unmarked, dry/ephemeral creek. *Acacia harpophylla* was found in three scattered stands, often where drainage appeared to be poorer and soils harder, in a rough line across the site from transect 3 west to the western boundary.

The north-western corner of the site was characterised by a greater number of dead trees – it appears these trees may have been cleared using chemical methods some years ago. As a result, much of this land is more open than other sections of the site.

Stands of *Corymbia clarksoniana* open woodland were observed in the north-western section of the lot. These stands meet the description of RE 11.5.3.

No species of plant listed as protected under either State or Commonwealth legislation was found during these traverses.

3.2.6 Exotic and weed plant species

Weed species were generally absent from the site. *Opuntia* sp. (prickly pear) and *Eriocereus martini* (Harrisia cactus) had a patchy distribution, appearing as single plants irregularly over the site. These plants are Class 2 declared weeds under the *Land Protection (Pest and Stock Route Management) Act* 2002, and landowners are required to take reasonable steps to control such weeds on their land (see section 1.3.5).

3.3 Discussion

3.3.1 *Eucalyptus populnea* woodland to open woodland

The RE mapping for the site shows RE 11.5.9 comprising 80% of the vegetation, with RE 11.5.3 comprising 20%. The mapping has correctly identified the presence of RE 11.5.3, however it appears to be present at a greater concentration than 20% (it appears to be closer to 100% within the polygon on the subject lot). In terms of the area of the entire lot, RE 11.5.3 appears to occupy approximately 70% (with approximately 30% non-remnant vegetation mapped in a belt across the western boundary).

Regional ecosystem 11.5.3 is Not of Concern under the VM Act, and is described as Of No Concern At Present according to the EPA. It is well represented in protected areas in the Brigalow Belt (see Table 1), and is not a threshold regional ecosystem. Due to the large area of this regional ecosystem currently mapped across the Brigalow Belt bioregion and in the Moranbah area, it is considered that the clearing of 60 hectares for the purposes of this project will not threaten the conservation status of the regional ecosystem.

3.3.2 *Acacia* sp. stands

The remaining 30% of the site is made up of non-remnant vegetation, with 10% of the site consisting of small stands of *Acacia shirleyii, Acacia harpophylla* and *Acacia catenulata*, or comprises an ephemeral, un-named watercourse in the east of the lot. The stands of *Acacia catenulata* and *A. shirleyii* meet the description of RE 11.7.2, and they appear to be restricted to very small laterite outcrops. The regional ecosystem map shows RE 11.7.2 occurring on the property in the far north-eastern corner in a heterogenous polygon with RE 11.5.3. Regional ecosystem 11.7.2 is also Not of Concern under the VM Act, and described as of No Concern At Present according to the EPA.

These stands are restricted to the eastern half of the lot, with the *Acacia catenulata* stand being located close to the front of the lot. Due to the elevated nature of the jump-up feature located with the *A. catenulata* stand, it would be desirable to avoid this site. Similarly, the stands of *A. shirleyii* are located directly to the west of the un-named ephemeral stream near the eastern boundary of the lot. This stream appears to have unstable banks and is undergoing extensive gully erosion. It would be preferable to adopt at least a 100 metre buffer area from the western bank of this stream, and to

retain all vegetation in this buffer area, as a management measure against further erosion.

One of the EPBC Act listed protected matters for the area is Brigalow. Brigalow is the common name for *Acacia harpophylla*, however as a community generally consists of an ecosystem in which *A. harpophylla* and/or *Casuarina cristata* is dominant. Other tree species such as *Eucalyptus populnea* may be co-dominant. The EPBC Act defines Brigalow as being any vegetation unit meeting the description of 18 REs and communities spanning Queensland and New South Wales (see http://www.deh.gov.au/biodiversity/threatened/communities/brigalow.html).

Of the vegetation units listed by the EPBC Act as Brigalow, the *A. harpophylla* clumps found on this site may potentially meet the description of one unit – the Endangered RE 11.4.7. Regional ecosystem 11.4.7 is described as open forest to woodland of *E. populnea* with *A. harpophylla* and/or *C. cristata* on Cainozoic clay plains. Vegetation in RE 11.4.7 is dominated by *E. populnea* and *A. harpophylla* with or without *Casuarina cristata* in a low tree layer. The shrub layer is often tall, and is dominated by *Eremophila mitchellii* and *Geijera parvifolia*.

It is doubtful that the three stands of *A. harpophylla* found on the site represent RE 11.4.7. Whilst *E. populnea* is undoubtedly dominant across transect 3 (in which one of the stands was recorded) and the site in general, *A. harpophylla* is nowhere dominant, even at the small scale of a 100 m by 10 m transect. At transect 3, measurements taken during the site investigation found *E. populnea* dominated the tallest tree layer, whilst *A. harpophylla* was only associated (as opposed to dominant or co-dominant). In the second tree layer, *E. populnea* and *A. catenulata* were co-dominant, with *A. harpophylla* again recorded as being only associated (indicating the transect probably traverses both REs 11.5.3 and 11.7.2). A similar pattern of dominance was observed at the other stands of *A. harpophylla* on the site.

In addition, these *A. harpophylla* stands were found on a land zone of level to gently undulating rises on sandy to loamy soils, with evidence of laterite in places on the surface and an underlying duricrust layer (which outcrops occasionally in places in the east of the site). This description meets that of land zone five. However, the RE 11.4.7 is found on land zone four. Land zone four consists of Cainozoic clay plains, usually forming level to gently undulating plains, above current alluvial systems. Some areas of the site do meet the criteria for land zone seven (exposed or shallowly covered duricrusts), however no Brigalow community is described for land zone seven.

The only Brigalow RE described on land zone five is the Endangered RE 11.5.16. This RE is described as *A. harpophylla* and/or *C. cristata* open forest in depressions on Cainozoic sand plains. However, as discussed above, at all places where *A. harpophylla* occurs the dominant tree is *E. populnea*, with *A. harpophylla* at most associated. As a result, it is highly unlikely that RE 11.5.16 is present on this site.

Therefore, it is doubtful that the very small area on which the three stands *of A. harpophylla* exist could meet any of the Brigalow descriptions on the EPBC Act threatened communities list. The community known as Brigalow is characterised by a dominance or co-dominance of *Acacia harpophylla*, often with other indicator species.

However, *A. harpophylla* occurs nowhere on the site with sufficient above-ground biomass to dominate any of the tree layers, and the site does not contain land zone four. The stands of *Acacia harpophylla* occurring on sand or loamy plains do not meet any separate vegetation community description under the VM Act. Nor do they meet the description of any Brigalow community protected as a Threatened Ecological Community under the EPBC Act.

Thus, it appears that these stands are simply a small, discrete and unique occurrence of *Acacia harpophylla*, and do not indicate the presence of a Brigalow RE or Threatened Ecological Community.

4. Conclusions and recommendations

4.1 Conclusions

In conclusion:

1. No species of flora listed under either the *Nature Conservation (Wildlife) Regulations 1994* (Qld) or the EPBC Act were located on the site.
2. No threatened vegetation community listed under the EPBC Act was found on the site. Although *Acacia harpophylla* was located on the site, it was found in small, discrete stands, was not found on the land zones associated with the protected brigalow community, and was not of sufficient above ground biomass to either dominate or co-dominate the vegetation community in which it was growing. Therefore, it is concluded that the *Acacia harpophylla* on the site exists in very small mono-specific stands, and not in its own RE.
3. Field investigations confirmed the remnant status of the vegetation, with the exception of the belt of non-remnant vegetation mapped across the western border, which appears to have been cleared previously.
4. Field investigations confirmed the RE mapping for the site as RE 11.5.3, with some areas of RE 11.7.2. Both REs 11.5.3 and 11.7.2 are Not of Concern and No Concern At Present, and both regional ecosystems have a remnant extent greater than 10 000 hectares, with more than 30% of the pre-clearing extent remaining.
5. Both REs 11.5.3 and 11.7.2 are well represented in protected areas across the Brigalow Belt.
6. Proposed clearing will meet the requirements of the Northern Brigalow Regional Ongoing Clearing Code. An application to clear approximately 60 ha has been lodged with DNRW.
7. The site has been affected by the grazing of cattle over many years – soils are compacted, the understorey has been grazed and extensive gully erosion is evident in the eastern section of the lot.
8. An area of indigenous cultural heritage significance has been identified in the eastern corner of the lot.

These investigations suggest that the site has little to differentiate itself from other open woodland sites dominated by *Eucalyptus populnea* and/or *Corymbia clarksoniana* found across large areas of the Brigalow Belt bioregion on land zone 5, including extensive representation in protected areas.

Therefore, as the site does not affect any plant protected under the NC Act or the EPBC Act, and as the proposed clearing will meet the objectives of the VM Act, the proposal is considered unlikely to pose any significant threat to flora values within the local and regional area. However, the presence of a significant area of indigenous cultural heritage in the north eastern section of the site, combined with a greater diversity of flora species in that area and active gully erosion in the east, suggest that development should be concentrated on the central and western side of the lot.

4.2 Recommendations

The site is recommended as being suitable for the purpose to which it has been proposed because:

- the slope is negligible (less than 3%);
- no endangered, rare, threatened or near-threatened flora species under the NC Act were detected;
- no Protected Matters under the EPBC Act were located;
- no Endangered or Of Concern regional ecosystems are mapped, or were found, on the site;
- infrastructure can be located adjacent to a large area of non-remnant vegetation, reducing fragmentation of remnant vegetation clumps associated with clearing; and
- the site is already experiencing lowered conservation values through historic and ongoing cattle grazing.

Infrastructure and associated clearing should be concentrated in the central and western section of the lot because:

- large areas in these sections have been previously cleared and are mapped as non-remnant;
- this area has the least floral diversity of the site; and
- an area of cultural heritage value, that may include vegetation, has been identified in the north west.

Appendix A

Site data sheets for flora

SHEET D – Site/transect form Vegetation structure - crown cover measured

Location

Site No. 1 **Recorder:** Simon Danielsen **Day/Date:** 11 May 2006

Purpose Ground truthing of regional ecosystem at Dyno Nobel Moranbah site

Locality: (inc. distance/direction to nearest town) 5 km north west of Moranbah

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E	-	-	-
T1	17	12-20	V
T2	8	6-10	V
T3	-	-	-
S1	4	1-5	M
S2	-	-	-
G	0.6	0-1	D

Structural formation including height: (estimated)

Open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***a*** – associated; ***s*** – suppressed.

Str.	Rel. dom.	Scientific Name
T1	d	*Eucalyptus populnea*
T1	s	*Acacia excelsa*
T1	s	*Ventilago viminalis*
T2	d	*Eucalyptus populnea*
T2	s	*Terminalia oblongata*
T2	s	*Owenia acidula*
T2	s	*Grevillia pteridifolia*
S1	d	*Eromophila mitchellii*
S1	a	*Terminalia oblongata*
S1	a	*Erythroxylum australe*
S1	a	*Flindersia dissosperma*
S1	s	*Archidendron basaltica*
S1	s	*Ventilago viminalis*
S1	s	*Cassia brewsteri*
S1	s	*Owenia acidula*
S1	s	*Acacia oswaldii*
S1	s	*Alstonia constricta*
G	d	*Carissa ovata*
G	s	*Commelina sp.*
G	s	*Grewia retusifolia*

Transect - crown cover measured *(transect intercept method)*

GPS coordinates: **Datum:** GDA94 **Transect length:** 100m

Start point	Zone	5	6	E	0	6	0	1	7	0	6	N	7	5	6	9	7	8	5
End point	Zone	5	6	E	0	6	0	1	6	2	6	N	7	5	6	9	8	4	6

Interval (metres)	Intercept	Str.	Height
3.7-8	4.3 m	T1	12
15.8-17.8	2 m	T2	8
25-29	4 m	T1	12
46.3-47.7	1.4 m	T2	8
91.9-98.20	6.7 m	T1	16
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		

Summary:

Minimum height of plants included in the transect table:	8m
Intercept of EDL 0 - 50m:	11.7 m
Intercept of EDL 50 -100m:	6.7 m
Measured crown cover % of EDL 0 -100m:	18.4 %
Structural formation	Open woodland
Conclusions/notes:	

END

SHEET D – Site/transect form Vegetation structure - crown cover measured

Location

Site No. 2 **Recorder:** Simon Danielsen **Day/Date:** 11 May 2006

Purpose Ground truthing of regional ecosystem at Dyno Nobel Moranbah site

Locality: (inc. distance/direction to nearest town) 5km north west of Moranbah

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E	-	-	-
T1	13	10-15	V
T2	8	6-10	V
T3	-	-	-
S1	4	1-5	V
S2	-	-	-
G	0.3	0-1	M-S

Structural formation including height: (estimated)

Open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***a*** – associated; ***s*** – suppressed.

Str.	Rel. dom.	Scientific Name
T1	d	*Eucalyptus populnea*
T2	d	*Eucalyptus populnea*
T2	a	*Acacia excelsa*
S1	c	*Eremophila mitchellii*
S1	s	*Cassia brewsteri*
S1	s	*Corymbia clarksoniana*
S1	s	*Alstonia constricta*
G	c	*Chrysopogon fallax*
G	c	*Panicum effusum*
G	c	*Eragrostis lacunaria*
G	c	*Aristida holothera* var. *holathera*
G	c	*Eriachne nucronata*
G	c	*Cenchrus ciliaris*
G	c	*Enneapogon virens*

Transect - crown cover measured *(transect intercept method)*

GPS coordinates: **Datum:** GDA94 **Transect length:** 100m

	Zone	E	N
Start point	56	0601973	7569889
End point	56	0601872	7569895

Interval (metres)	Intercept	Str.	Height
7-16.60	9.6 m	T1	14m
14.20 -17	2.8 m	T2	7m
44.40 - 47.90	3.5 m	T1	10m
50.7 – 54.10	3.6 m	T2	7m
54.10 – 63	8.9 m	T1	15
76.50 – 81.50	5 m	T2	9
80 – 88.60	8.6 m	T1	14
92 – 94.80	2.8 m	T2	6
95 - 99.8	4.8 m	T1	13

Summary:

Minimum height of plants included in the transect table:	100 m
Intercept of EDL 0 - 50m:	13.1 m
Intercept of EDL 50 -100m:	22.3 m
Measured crown cover % of EDL 0 -100m:	35.4 %
Structural formation	Woodland
Conclusions/notes:	

END

SHEET D – Site/transect form Vegetation structure - crown cover measured

Location

Site No. 3 **Recorder:** Simon Danielsen **Day/Date:** 11 May 2006

Purpose Ground truthing of regional ecosystem at Dyno Nobel Moranbah site

Locality: (inc. distance/direction to nearest town) 5km north west of Moranbah

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E	-	-	-
T1	13	10 – 15	V
T2	9	6 – 10	S
T3	-	-	-
S1	2	1 – 4	S
S2	-	-	-
G	0.5	0 - 1	S

Structural formation including height: (estimated)

Open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***a*** – associated; ***s*** – suppressed.

Str.	Rel. dom.	Scientific Name
T1	d	*Eucalyptus populnea*
T1	a	*Acacia harpophylla*
T1	s	*Corymbia clarksoniana*
T2	c	*Eucalyptus populnea*
T2	c	*Acacia catenulata*
S1	d	*Eremophila mitchellii*
S1	a	*Acacia catenulata*
S1	a	*Flindersia dissosperma*
S1	s	*Erythoxylum australe*
S1	s	*Capparis spinosa*
S1	s	*Senna artemisiodes ssp. zygophylla*
G	d	*Carrisa ovata*
G	a	*Pseuderanthemum variabile*
G	a	*Sida everistiana*
G	s	*Evovulus alsinoides*
G	s	*Grewia retusifolia*
G	s	*Enchalina sp.*

Transect - crown cover measured *(transect intercept method)*

GPS coordinates: **Datum:** GDA94 **Transect length:** 100m

Start point	Zone	5	6	E	0	6	0	2	2	4	5	N	7	5	7	0	0	9	5
End point	Zone	5	6	E	0	6	0	2	1	5	1	N	7	5	7	0	1	2	7

Interval (metres)	Intercept	Str.	Height
0- 8.7	8.7 m	T2	7
28.6 – 39.8	11.2 m	T1	14
44 – 51.30	7.3 m	T1	12
68.4 – 74.70	6.3 m	T2	9
78.2 – 85	6.8 m	T2	8
86.5 – 90	3.5 m	T2	7
93 – 97.5	4.5 m	T2	7

Summary:

Minimum height of plants included in the transect table:	100 m
Intercept of EDL 0 - 50m:	18.5 m
Intercept of EDL 50 -100m:	0 m
Measured crown cover % of EDL 0 -100m:	18.5 %
Structural formation	Open woodland
Conclusions/notes:	

END

Appendix B

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Appendix C

Property Vegetation Management Plan

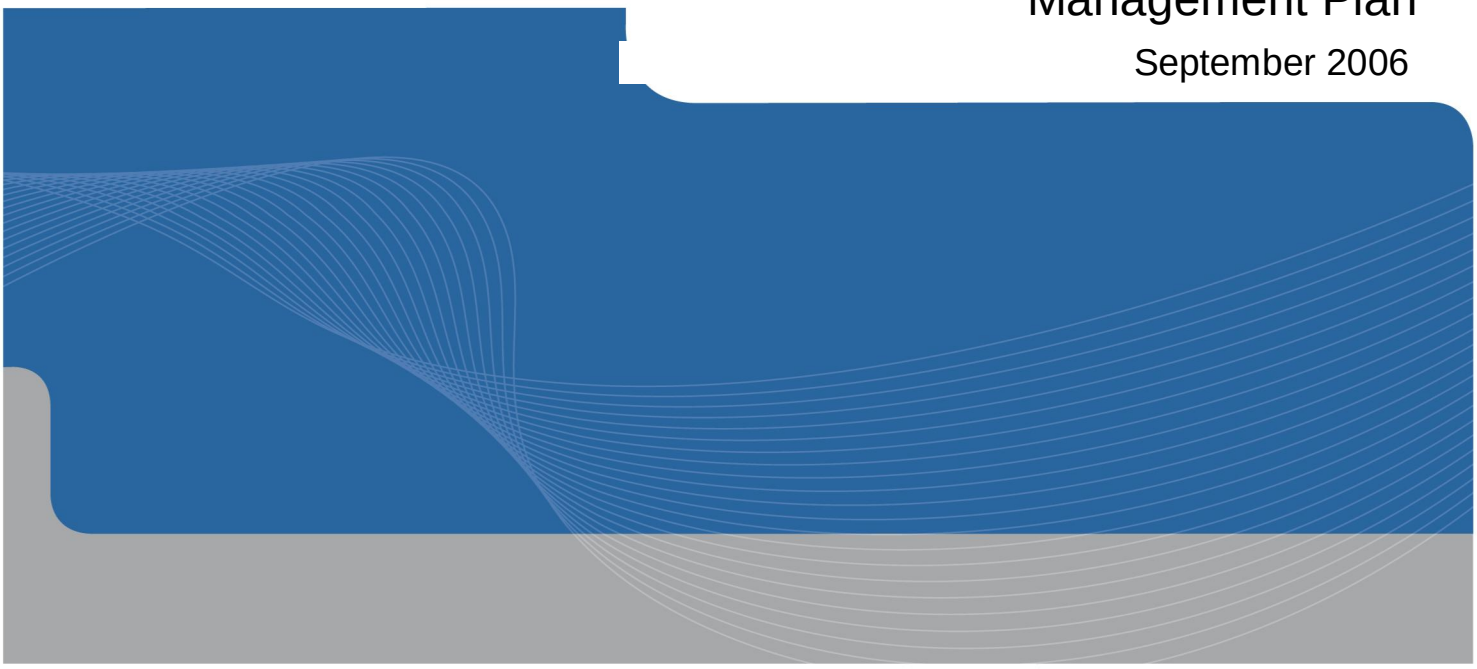
CLIENTS | PEOPLE | PERFORMANCE

Dyno Nobel Asia Pacific Limited

Moranbah Ammonium Nitrate Project

Property Vegetation Management Plan

September 2006



INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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1. Introduction

1.1 Project Description

The Dyno Nobel Group (DN) is a leading global producer of ammonium nitrate with six plants in North America. DN produces and markets explosives and detonation devices for coal, metals quarry, tunneling, construction and seismic industries. DN's strategy combines growth through incremental expansion of existing operations with acquisitions and the development, commercialisation and marketing of new products.

A consortium of investors led by Macquarie Bank acquired DN's Australasian and North American operations in 2005 for $US1.7 billion. DN was listed on the Australian Stock Exchange on 7 April 2006. DN has over 3,500 employees and 33 manufacturing facilities in the United States, Australia, Canada and Mexico, which have a combined capacity of over a million tons of ammonium nitrate.

DN, together with its joint venture partner CSBP Limited, a subsidiary of Wesfarmers Limited, operate an ammonium nitrate plant at the existing Queensland Nitrates ("QNP") production facility at Moura, Queensland.

DN currently provides explosives for many of the mining operations in Central Queensland. To support the provision of explosives DN is proposing to develop an ammonium nitrate plant in Moranbah. This plant will provide permanent employment for 70 staff for the operation of the facility and during construction a peak of up to 550 construction personnel.

DN is seeking to construct and operate an ammonia plant, a nitric acid plant, an ammonium nitrate plant and an emulsion manufacturing plant in the Moranbah area, on 10 SP175258 in Belyando Shire, hereafter referred to as 'the site'. The combined plant would service the rapidly expanding demand for ammonium nitrate from mining in Queensland. The current concept is to construct a nominal 350,000 tonnes per annum (tpa) plant making ammonium nitrate prill (solid) and ammonium nitrate emulsion (viscous liquid).

The project represents a value-adding downstream processing facility from the utilisation of the significant gas reserves in the Moranbah region. With a total capital investment of approximately $500 million, the project will provide significant benefits for the local and regional economy.

1.2 Clearing requirements

In order to construct the plant and its associated infrastructure, clearing of remnant vegetation will be required. This Property Vegetation Management Plan (PVMP) demonstrates how this clearing will meet the requirements of the Regional Vegetation Management Code for Ongoing Clearing Purposes – Northern Highlands (Brigalow Belt Bioregion) (hereafter referred to as 'the code') under the *Vegetation Management Act 1999* (the VMA).

This project was declared to be a significant project under s.26 of the *State Development and Public Works Organisation Act 1971* on the 31st March, 2006. As part of the assessment process, the project has addressed the terms of reference of an Environmental Impact Statement (EIS). Under the Nature Conservation section of this EIS the flora and fauna values of the site were investigated. The results of this investigation are discussed in the Flora and Fauna reports, which are included as attachments to this PVMP, together with a report on the expected impacts and mitigation measures to be taken.

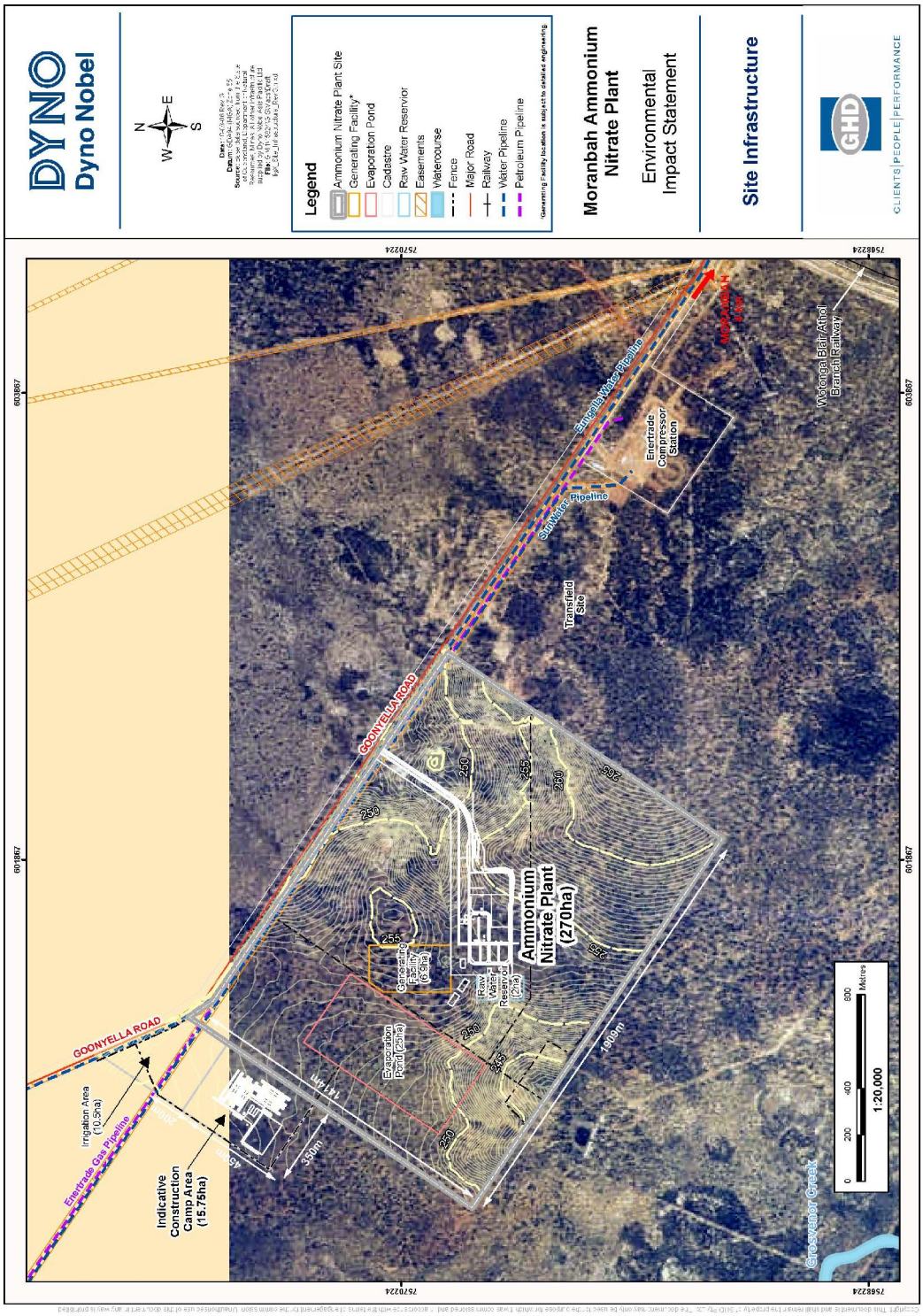

Figure 1-1: Dyno Nobel proposed ammonium nitrate plant locality diagram

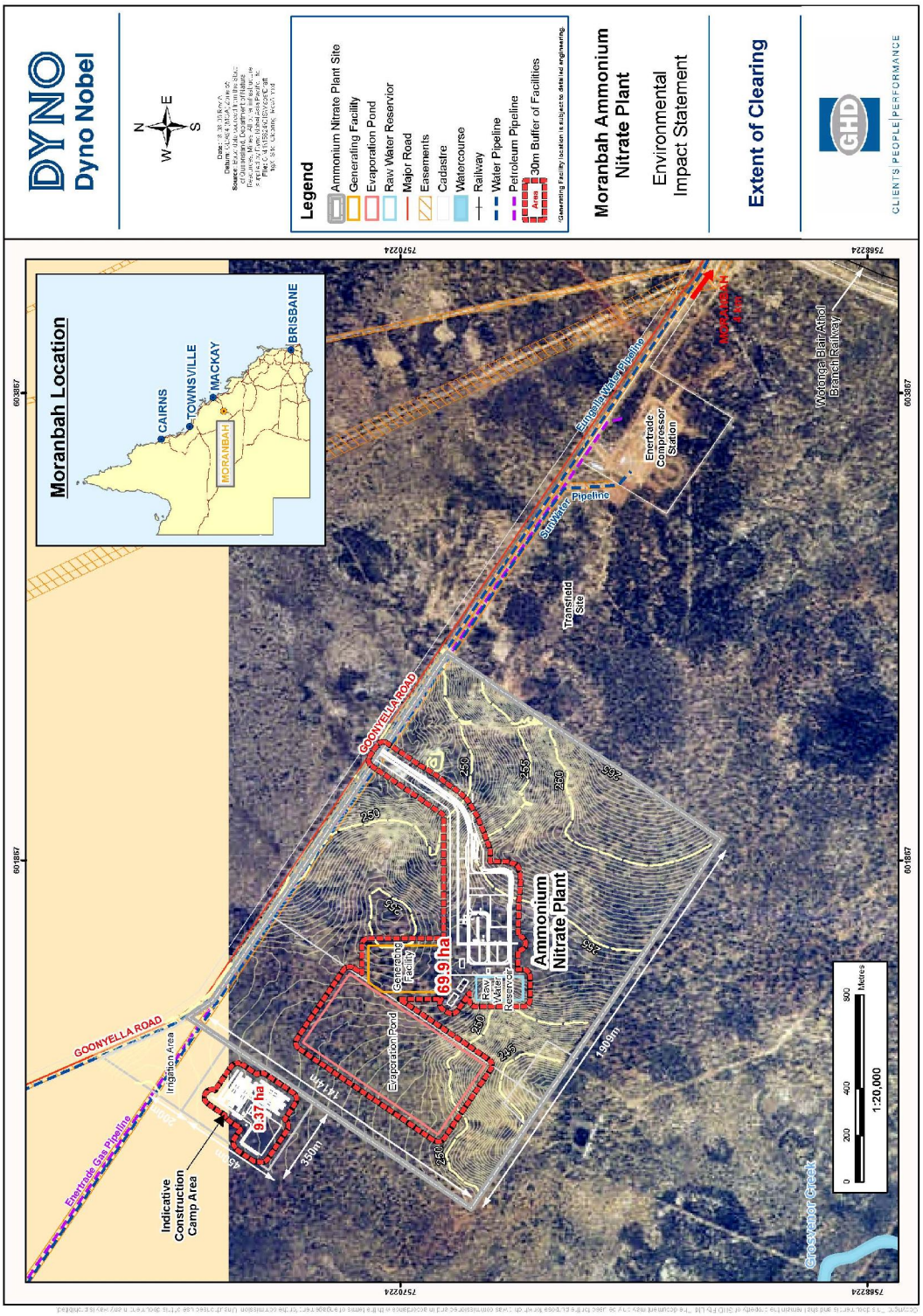

Figure 1-2: **Dyno Nobel Moranbah site alignment and clearing requirements**

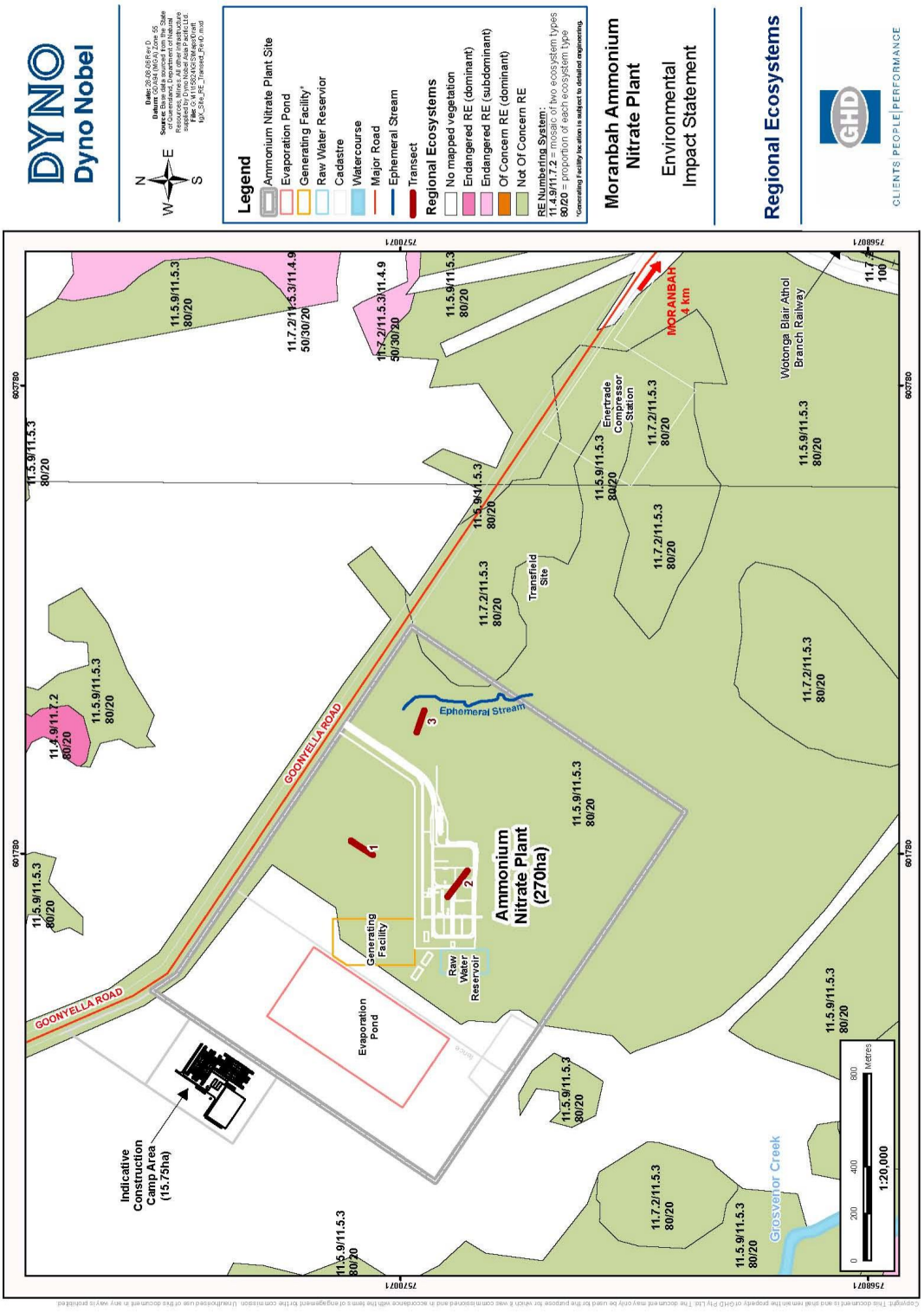

Figure 1-3: Dyno Nobel– Overlay of Remnant Vegetation

1.3 Natural values

1.3.1 Land uses, infrastructure, topography, geology and soils

The proposed ammonium nitrate plant is located in the shire of Belyando. The land is currently zoned rural and is being used for beef cattle grazing. The land will be tenured under the *Land Act 1994* and transferred to freehold tenure from Grazing Homestead Perpetual Lease (GHPL) when the land is gazetted. No infrastructure is currently located on the site, however there is existing gas and water pipelines at the front of the proposed AN plant site.

The topography of the project area is relatively flat (few slopes greater than 3%), with the majority of the site characterised by land zone 5 – near-level uniform sand plains. Some areas in the eastern third of the lot appear to be characterised by land zone 7, duricrusts and associated footslopes, although slopes are still very mild. Surface rock on the site is predominately lateritic gibber. Soils on the lot are predominately loamy to clayey sands in the A horizon, with B horizons featuring sandy loams to medium clays and sandy clays (soils and land assessment report Appendix 7.13)

The closest watercourse is Grosvenor Creek, 2 km to the south of the site. An ephemeral, unmapped drainage line runs from south to north (probably toward the Isaac River) in the north east of the lot, with the property draining generally in an east-west direction.

1.3.2 Water resources

The project site does not impact on any Creek systems near the site. Appropriate sediment and erosion control techniques as outlined in *Soil Erosion and Sediment Control-Engineering Guidelines for Queensland Construction Sites* (1996) will be implemented where required for the project. The construction and operation of the proposed facility should have minimal impact with proposed mitigation measures in place.

1.3.3 Flora and fauna

The proposed ammonium nitrate plant is located within the Brigalow Belt Bioregion. It is characterised by flora and fauna species common to open woodlands (see species list in Table 1 and Table 2 below). The majority of the surrounding area is used for cattle grazing and coal/ coal seam gas exploration. The vegetation on site is subject to land degradation and grazing pressure by cattle and the diversity and quality of the vegetation reflects this disturbance. There are no conservation or reserve areas on the site.

The flora and fauna values on the site were investigated and have been reported on in the attached Flora and Fauna reports, commissioned as part of the EIS.

Three remnant regional ecosystems are mapped on the site (contained within two heterogenous polygons - 11.5.9/11.5.3 [80/20] and 11.7.2/11.5.3 [80/20]) – see Table 4. All regional ecosystems on the lot are described as not of concern. Ground truthing

found that remnant vegetation on the site is almost exclusively 11.5.3, with some patches of 11.7.2 in the north eastern section of the lot (see Figure 4). The ground truthing process and results are outlined in the attached Flora report – section 3.

The site is in an area that is known to have communities of Brigalow (which is listed as endangered under the *Environmental Protection and Biodiversity Conservation Act* 1999 and the *Nature Conservation Act* 1992). Whilst *Acacia harpophylla* was found to be present in small mono-specific stands on the site,

Figure 4: Vegetation and landform typical of regional ecosystem 11.5.3, photographed on site

an intensive flora survey has confirmed that this community is not present on the site – see the discussion in section 3.3.2 of the Flora report.

As much as possible of the proposed ammonium nitrate plant is located within degraded, non-remnant habitat and has been chosen to avoid disturbance to large areas of remnant vegetation. The siting of the plant is dependant on many factors, not least being the need to ensure public safety. Therefore, the construction and operation of the ammonium nitrate plant will involve the removal of some remnant vegetation. However, given the level of previous and current disturbance this will not adversely affect the long-term viability of any of the vegetation communities in the area.

The flora survey assessed the presence of weeds declared under the *Land Protection (Pest and Stock Route Management) Act 2002*. The most significant weed encountered on the ammonium nitrate plant site was prickly pear (*Opuntia* sp.). In addition, no species of flora listed as Endangered, Rare or Vulnerable under State

legislation, or listed under the *Environmental Protection and Biodiversity Conservation Act* 1999, were detected.

A fauna survey was undertaken in the area to identify any species of conservation significance under the *Nature Conservation Act 1992* and the *Environmental Protection Biodiversity Conservation Act 1999* (the report has been supplied with this PVMP). The only species of fauna found on the lot that is listed under any legislation was the little pied bat (*Chalinolobus picatus*). This bat is listed as Rare in the *Nature Conservation (Wildlife) Regulations 1994*. This finding is discussed in section 5.1 of the attached Fauna report.

A desk-top search on available databases indicated that potential fauna on the site may include the squatter pigeon, star finch (eastern and southern), Australian painted snipe, eastern long-eared bat and the Yakka skink. In addition, a further seven species listed as migratory species and protected by international policies have the potential to occur on the site. However, the fauna investigation found that the ammonium nitrate plant site does not support significant habitat for any of the threatened or migratory species mentioned in these searches, and it is not considered to represent a potentially significant impact on any threatened or migratory species that may inhabit or utilise the area.

Table 1 Flora species list for site as recorded in May 2006 during GHD site inspection

Acacia catenulata	**Eriocereus martinii**
Acacia crassa	*Eriachne mucronata*
Acacia excelsa	*Erythroxylum australe*
Acacia harpophylla	*Eucalyptus crebra*
Acacia oswaldii	*Eucalyptus populnea*
Acacia shirleyii	*Evolvulus alsinoides* var. *decumbens*
Allocasuarina luehmannii	*Flindersia dissosperma*
Alphitonia excelsa	*Grevillia pteridifolia*
Alstonia constricta	*Grewia retusifolia*
Archidendron basaltica	*Hakea lorea lorea*
Aristida holanthera var. *holathera*	*Marsdenia australis*
Atalaya hemiglauca	*Melaleuca nervosa*
Capparis lasiantha	*Myoporum acuminatum*
Capparis spinosa	*Opuntia sp.*
Carissa ovata	*Owenia acidula*
Cassia brewsteri	*Parsonsia lanceolata*

Acacia catenulata	**Eriocereus martinii**
Casuarina cunninghamia	*Panicum effusum*
Cenchrus ciliaris	*Petalostigma pubescens*
Chrysopogon fallax	*Pittosporum angustifolium*
Corymbia clarksoniana	*Pseudoanthemum variabile*
Corymbia tessellaris	*Santalum lanceolatum*
Crinum sp.	*Senna artemisiodes* var. *zygophylla*
Enchalina sp.	*Sida everistiana*
Enneapogon virens	*Terminalia oblongifolia*
Eragrostis lacunaria	*Ventilago viminalis*
Eremophila bignoniiflora	
Eremophila mitchellii	

Table 2 Fauna species observed on site in May 2006 during GHD site inspection

Common Name	**Scientific Name**	**Type of Record**
Mammals		
Northern Freetail Bat	*Chaerephon jobensis*	Ana
Eastern Freetail Bat	*Mormopterus species* 2	Ana
Gould's Wattled Bat	*Chalinolobus gouldii*	Ana
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	Ana
Little Pied Bat	*Chalinolobus picatus*	Ana
Greater Broad-nosed Bat	*Scoteanax rueppellii*	Ana
Eastern Cave Bat	*Vespadelus troughtoni*	Ana
Echidna	*Tachyglossus aculeatus*	Ind
Delicate Mouse	*Pseudomys delicata*	Pit, Ell(A)
Eastern Grey Kangaroo	*Macropus giganteus*	Obs
Red Kangaroo	*Macropus rufus*	Obs
*European Rabbit	*Oryctolagus cuniculus*	Obs
*European Fox	*Vulpes vulpes*	Ind

Birds		
Grey-crowned Babbler	*Pomatostomus temporalis*	Obs
Brown Treecreeper	*Climacteris picumnus*	Obs
Varied Sitella	*Daphoenositta chrysoptera*	Obs
Noisy Friarbird	*Philemon corniculatus*	Obs
Yellow-throated Miner	*Manorina flavigula*	Obs
Striped Honeyeater	*Plectorhyncha lanceolata*	Obs
White-throated Honeyeater	*Melithreptus albogularis*	Obs
Grey Shrike-thrush	*Colluricincla harmonica*	Obs
Dusky Woodswallow	*Artamus cyanopterus*	Obs
Magpie Lark	*Grallina cyanoleuca*	Obs
Jacky Winter	*Microeca fascinans*	Obs
Masked Lapwing	*Vanellus miles*	Hrd
Mistletoe Bird	*Dicaeum hirundinaceum*	Obs
Rufous Whistler	*Pachycephala rufiventris*	Obs
Crested Pigeon	*Ocyphaps lophotes*	Obs
Common Bronzewing	*Phaps chalcoptera*	Obs
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Obs
Weebill	*Smicornis brevirostris*	Obs
Yellow Thornbill	*Acanthiza nana*	Obs
Striated Pardalote	*Pardalotus striatus*	Obs
Rufous Fantail	*Rhipidura rufifrons*	Obs
Grey Fantail	*Rhipidura albiscapa*	Obs
Variegated Fairy Wren	*Malurus lamberti*	Obs
Willie Wagtail	*Rhipidura leucophrys*	Obs
Rainbow Lorikeet	*Trichoglossus haematodus*	Obs
Pale-headed Rosella	*Platycerus eximius*	Obs
Galah	*Cacatua roseicapillus*	Obs
Sulphur-crested Cockatoo	*Cacatua galerita*	Obs
Red-winged Parrot	*Aprosmictus erythropterus*	Obs

Double-barred Finch	*Taeniopygia bichenovii*	Obs
Red-backed Kingfisher	*Todiramphus pyrrhopygia*	Obs
Blue-winged Kookaburra	*Dacelo leachii*	Obs
Laughing Kookaburra	*Dacelo novaeguineae*	Obs
Grey Butcherbird	*Cracticus torquatus*	Obs
Pied Butcherbird	*Cracticus nigrogularis*	Obs
Australian Raven	*Corvus coronoides*	Obs
Torresian Crow	*Corvus orru*	Obs
Australian Magpie	*Gymnorhina tibicen*	Obs
Nankeen Kestrel	*Falco cenchroides*	OH
Whistling Kite	*Haliastur sphenurus*	Obs
Black Kite	*Milvus migrans*	OH
Reptiles		
Eastern Bearded Dragon	*Pogona barbata*	Obs
Burns' Dragon	*Amphibolurus burnsi*	Obs
Carnaby's Wall Skink	*Cryptoblepharus carnabyi*	Obs
Major skink	*Egernia frerei*	Obs
Eastern Striped Skink	*Ctenotus robustus*	Obs
A striped skink	*Ctenotus strauchii strauchii*	Obs
Bynoe's Gecko	*Heteronotia binoei*	Obs
A gecko	*Gehyra catenata*	Obs (S)
A gecko	*Gehyra dubia*	Obs (S)
Ocellated Velvet Gecko	*Oedura monilis*	Obs (S)
Myall Snake	*Suta suta*	Pit

Key to Table:

Type	Type of record of fauna from present assessment
Obs	Observed on the ground or in vegetation
Obs (S)	Observed spotlighting
OH	Observed in flight overhead
Hrd	Heard only
Ind	Indirect evidence (e.g. scats, tracks, diggings, burrows).
Pit	Pit trapped
Ell(A)	Elliot trapped (Type A)
Ell(B)	Elliot trapped (Type B)
Ana	Identified from ultrasonic call detection (Anabat)
*	Introduced, non-indigenous species

1.4 Legislative requirements

Legislative Framework

The DN ammonium nitrate plant was declared a significant project by the Queensland Coordinator-General pursuant to s.26 of the Queensland *State Development and Public Works Organisation Act 1971* (the SDPWO Act). This declaration requires DN to prepare an EIS for the project under the SDPWO Act. This process removes duplication with the Commonwealth *Environmental Protection and Biodiversity and Conservation Act* 1999 (EPBC Act) and streamlines approval processes under the *Integrated Planning Act 1997* (IPA).

1.4.1 Legislative requirements for the clearing of remnant vegetation

Under IPA s.1.3.5, operational work is defined as, among other things, 'clearing vegetation, including vegetation to which the VMA applies'. Schedule 8A Table 3 Part 2 of IPA states that the chief executive administering the *Vegetation Management Act 1999* (the VMA) is the assessment manager where an application is for operational work that is the clearing of native vegetation and no other assessable development.

As this application is for operational work that is the clearing of native vegetation, and no other assessable development is being applied for under this application, this application is lodged with the department of Natural Resources and Water (DNRW). This application is for a relevant purpose under s.22A (2) of the VMA, being a declared significant project.

Under the *Integrated Planning Regulation 1998*, Schedule 1 Table 4, where the chief executive administering the VMA is the assessment manager applications to clear native vegetation may be assessed against the relevant regional vegetation management code. In this case, the relevant regional vegetation management code is that for the Northern Highlands (Brigalow Belt) code area. This Property Vegetation Management Plan (PVMP) will address performance requirements set out in this code, and list the areas for which an approval to clear is sought. The Northern Highlands code area applies to clearing proposed in Belyando Shire.

Table 3 provides details of the current tenure over the proposed AN plant site.

Table 3 Lot and plan for the property involved

Lot Number	Shire	Area (ha)
Lot 10 SP175258	Belyando	147.773

2. Assessment against the Regional Code

2.1 Proposed clearing

Remnant vegetation is proposed to be cleared only where required for the ammonium nitrate plant and associated infrastructure). The Dyno Nobel ammonium nitrate plant will comprise of the following infrastructure and other locations requiring clearing (with areas proposed to be cleared in brackets):

- a plant (6 hectares)
- a lay-down area (2 hectares)
- roads (2 hectares total)
- raw water pond (10 hectares)
- evaporation ponds (25 hectares total)
- a power station (2 hectares)

A total of 47 hectares of clearing is being applied for under this PVMP.

Infrastructure will be located as much as possible in non-remnant vegetation. No more than 40 hectares of remnant vegetation, of not of concern regional ecosystem 11.5.3, is proposed to be cleared.

As discussed above, a flora survey confirmed the presence of two regional ecosystems mapped on the site– 11.5.3 and 11.7.2. Despite the regional ecosystem mapping, the relative representation of regional ecosystems is not 80% 11.5.9 to 20% 11.5.3 – rather, it is estimated to be 70% 11.5.3 to 0% 11.5.9, with 5% 11.7.2 in the far eastern section of the lot toward the centre, and 20% non-remnant.

All regional ecosystems on the lot are not of concern.

Table 4 Regional Ecosystems mapped on the lot

RE	Description[1]	Conservation Status[2]
11.5.3	*Eucalyptus populnea* and/or *E. melanophloia* and/or *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces	NOC
11.5.9	*Eucalyptus crebra* and other *Eucalyptus* spp. and *Corymbia* spp. woodland on Cainozoic sand plains/remnant surfaces. Plateaus and broad crests	NOC
11.7.2	*Acacia spp.*woodland on lateritic duricrust. Scarp retreat zone.	NOC

[1] These descriptions conform to the original circumscription of the respective regional ecosystem by Young and Dillewaard (1999) in Sattler and Williams (1999) and as contained in (REDD Version 5, 2005) http://www.epa.qld.gov.au/projects/redd/i .

[2] E = Endangered; OC = Of Concern; NOC = Not of Concern

RE	Description[1]	Conservation Status[2]

[1]These descriptions conform to the original circumscription of the respective regional ecosystem by Young and Dillewaard (1999) in Sattler and Williams (1999) and as contained in (REDD Version 5, 2005) http://www.epa.qld.gov.au/projects/redd/i .
[2]NOC = Not of Concern

2.2 Northern Highlands code region

It is proposed to clear the following regional ecosystem within the Northern Highlands code region (see Figure 1-2):

» not of concern – 11.5.3 (see 2.1 above)

Despite this clearing, with the following mitigation measures adequate representation of regional ecosystems will be maintained and biodiversity will be preserved.

» Clearing of remnant vegetation is to be restricted to the minimum necessary to enable the safe construction, operation and maintenance of the Dyno Nobel ammonium nitrate plant and associated infrastructure footprint including construction of access roads.

» Large hollows-bearing trees are to be flagged and left intact after clearing where possible. These trees, plus rocks and shrubs and small trees, are to be used in rehabilitation activities to provide fauna habitat.

» Weeds will be actively managed by this project.

» Large trees to be cleared will be checked for wildlife before clearing.

» Trees with large raptor nests will be avoided and left intact where possible after consideration of safety, operational and maintenance issues.

Table 5 and Table 6 demonstrate how the proposed clearing will meet the Regional vegetation management code for ongoing clearing purposes for the Northern Highlands (Brigalow Belt bioregion).

Table 5 Mandatory performance requirements for ongoing clearing proposals

Performance Requirements	Solution
PR A.1 To conserve remnant endangered regional ecosystems, clearing does not occur in any "category 1 area" on a Property Map of Assessable Vegetation (PMAV), or where there is no PMAV, in any endangered regional ecosystems except where the Chief Executive is satisfied that the clearing is: • for a project declared to be a *sig*nificant project under the *State Development and Public Works Organisation Act 1971*, section 26; or • necessary to control non-native plants or declared pests; or • to ensure public safety; or • for establishing a necessary fence, firebreak, road or other built infrastructure and no suitable alternative site exists for that fence, firebreak, road or other built infrastructure; or • for thinning; or • to remove encroachment; or • for an extractive industry.	The Dyno Nobel project was declared a significant project by the Co-ordinator General in accordance with section 26 of the *State Development and Public Works Organisation Act 1971* on the 31st March. Additionally no remnant endangered regional ecosystems are on present on the lot.
PR A.2 To conserve remnant of concern regional ecosystems, clearing does not occur in any area shown as a "category 2 area" on a PMAV, or where there is no PMAV, in any of concern regional ecosystems except where the Chief Executive is satisfied that the clearing is: • for a project declared to be a significant project under the *State Development and Public Works Organisation Act 1971*, section 26; or • necessary to control non-native plants or declared pests; or • to ensure public safety; or • for establishing a necessary fence, firebreak, road or other built infrastructure and no suitable alternative site exists for that fence, firebreak, road or other built infrastructure; • a natural and ordinary consequence of other assessable development for which a development approval as defined under the *Integrated Planning Act 1997* was given, or a development application as defined under the *Integrated Planning Act 1997* was made, before 16 May 2003; or • for thinning; or • to remove encroachment; or • for an extractive industry.	The Dyno Nobel project was declared a significant project by the Co-ordinator General in accordance with section 26 of the *State Development and Public Works Organisation Act 1971* on the 31st March. Additionally no remnant of concern regional ecosystems are present on the lot.

Performance Requirements	Solution
PR A.3 To prevent the loss of biodiversity, clearing does not occur to the extent that: • the remnant extent of a not of concern regional ecosystem falls below 30% of its pre-clearing extent or 10 000 hectares in the bioregion; and • the remnant extent of an of concern regional ecosystem falls below 10% of its pre-clearing extent; and • the remnant extent of an of concern regional ecosystem falls below 30% of its pre-clearing extent where its remnant extent is less than 10 000 hectares, except where the Chief Executive is satisfied that the clearing is: • for a project declared to be a significant project under the *State Development and Public Works Organisation Act 1971*, section 26; or • necessary to control non-native plants or declared pests; or • to ensure public safety; or • essential for establishing a necessary fence, road or other built infrastructure and no suitable alternative site exists for that fence, road or other built infrastructure; or • for an extractive industry.	The Dyno Nobel project was declared a significant project by the Co-ordinator General in accordance with section 26 of the *State Development and Public Works Organisation Act 1971* on the 31st March. In addition, clearing of less than 40 hectares is proposed in not of concern regional ecosystem 11.5.3 – this will not reduce the area of this regional ecosystem to less than 30% of its pre-clear extent or 10000 hectares in the bioregion (11.5.3 is not a threshold regional ecosystem)
PR A.4 To prevent the loss of biodiversity, clearing does not reduce the total extent of remnant vegetation in the Brigalow Belt Bioregion (Northern) to less than 70% of the pre-clearing extent of remnant vegetation except where the Chief Executive is satisfied that the clearing is: • for a project declared to be a significant project under the *State Development and Public Works Organisation Act 1971*, section 26; or • necessary to control non-native plants or declared pests; or • to ensure public safety. • for establishing a necessary fence, firebreak, road or other built infrastructure and no suitable alternative site exists for that fence, firebrak, road or other built infrastructure; or • for an extractive industry.	The Dyno Nobel project was declared a significant project by the Co-ordinator General in accordance with section 26 of the *State Development and Public Works Organisation Act 1971* on the 31st March. In addition, clearing of less than 40 hectares will not reduce the total extent of remnant vegetation in the Brigalow Belt Bioregion to less than 70% of the pre-clear extent of remnant vegetation.

Performance Requirements	Solution
PR A.5 To prevent loss of biodiversity, clearing does not occur in an area which is identified on a map prepared by the chief executive of the agency which administers the *Nature Conservation Act 1992* and certified for use for the purposes of this code by the chief executive of the Department of Natural Resources, Mines & Energy, as an area of essential habitat for a species of wildlife listed as vulnerable, rare, near threatened or endangered under that Act, except where the Chief Executive is satisfied that the clearing is: • for a project declared to be a significant project under the *State Development and Public Works Organisation Act 1971*, section 26; or • necessary to control non-native plants or declared pests; or • to ensure public safety; or • for establishing a necessary fence, firebreak, road or other built infrastructure and no suitable alternative site exists for that fence, firebreak, road or other built infrastructure; or • for thinning; or • to remove encroachment.	The Dyno Nobel project was declared a significant project by the Co-ordinator General in accordance with section 26 of the *State Development and Public Works Organisation Act 1971* on the 31st March. In addition, no essential habitat is mapped for the lot.
PR A.6 To ensure clearing does not cause land degradation and to maintain ecological processes, clearing does not occur in Drainage Basin Sub Areas that have less than 30% of the area covered with remnant vegetation, unless the Chief Executive is satisfied that the clearing is: • for a project declared to be a significant project under the *State Development and Public Works Organisation Act 1971*, section 26; or • necessary to control non-native plants or declared pests; or • to ensure public safety; or • for establishing a necessary fence, firebreak, road or other built infrastructure, if there is no suitable alternative site for the fence, firebreak, road or infrastructure; or • for thinning; or • for an extractive industry; or • for clearing regrowth on leases issued under the *Land Act 1994* agriculture or grazing purposes.	The Dyno Nobel project was declared a significant project by the Co-ordinator General in accordance with section 26 of the *State Development and Public Works Organisation Act 1971* on the 31st March. In addition, clearing will not occur in drainage basin sub areas with less than 30% remnant vegetation coverage.

Table 6 Requirements for Clearing for Significant Projects – Northern Highlands Code

PR S.1 - Proposed Solution

AS S.1

- there are no wetlands, lakes or springs along the proposed alignment, as illustrated in Figure 1-1 of the Property Vegetation Management Plan.
- no clearing is proposed in 11.3.27.

The performance requirement has been met.

PR S.2 - Proposed Solution

AS S.2.1 Clearing will not isolate endangered or of concern regional ecosystems, or natural wetlands

AS S.2.2 Clearing will not occur in an area mapped as essential habitat for a species of wildlife listed as vulnerable, rare, near threatened or endangered

AS S.2.3 It is anticipated that 67 hectares will be cleared (mostly non-remnant vegetation) out of an area of at least 230 hectares. Therefore, at least 80% of the pre-clearing extent of remnant vegetation on the lot will be retained - an area of at least 100 hectares. The only perimeter edge (ie, areas where remnant and non-remnant vegetation meet) will be 1830 metres. Therefore, the perimeter to area ratio will be no greater than 20:1.

AS S.2.4 At least 50% of the retained remnant vegetation will be contained within one core area.

In addition, viable networks of wildlife habitat will be maintained by this project because:

1. High levels of connectivity will be maintained in the regional ecosystems through which the plant will be constructed because remnant vegetation will not be cleared unless absolutely necessary. No clearing of remnant vegetation that is endangered or of concern will be conducted. The only clearing proposed consists of a clump of not of concern remnant vegetation directly adjacent to a large area of non-remnant vegetation – no new, isolated polygons will be created under this proposal.
2. The regional ecosystems to be retained surrounding the proposed plant will be representative of all regional ecosystems proposed to be cleared under a clearing permit – no regional ecosystem polygon will be removed from the map as a result of this proposal, and the status of these REs as not of concern will not change as a result of this clearing. None of the areas involved within this development are areas of essential habitat for a species of wildlife listed as vulnerable, rare, threatened or endangered under the Act.
3. The area of vegetation to be cleared is relatively small compared to the polygons of remnant vegetation to be retained by this proposal. This is evident within Figure 1-3. As a result, areas of remnant vegetation retained will be little smaller after the clearing than they were before any clearing commenced. Therefore, areas of vegetation large enough to allow ecosystem functioning will be maintained. It should also be noted that large areas of the regional ecosystem 11.5.3 are represented in areas protected under legislation across the Brigalow Belt region.

4. The proposed corridor will not impact on any areas of remnant vegetation listed as being threshold regional ecosystems by Natural Resources, Mines and Water on the Vegetation Management webpage. All individual polygons will remain a mappable size and so will be maintained despite the proposed clearing. The proposed clearing will maintain at least 50% of the retained vegetation within 1 or 2 Core areas.

Therefore, the performance requirement has been met.

PR S.3 – Proposed Solution

AS S.3.1 The clearing proposed for the ammonium nitrate plant does not occur in or within a), b), c), or d) – **the performance requirement has been met**.

PR S.4 – Proposed Solution

AS S.4.1 The site is to be the location of substantial investment in infrastructure and industrial activity over may years. Clearing will be undertaken mechanically on slopes of less than 4%, and only areas needing to be clear for infrastructure, ponds, fire or safety buffer breaks, or access roads, will be cleared. Erosion would be a threat to the infrastructure and so clearing will be undertaken with the maximum of attention to the potential for soil erosion – see the attached report 'Potential impacts and mitigation – nature conservation';

AS S.4.2 Clearing will only occur in 11.5.3;

AS S.4.3 Clearing is proposed for less than 40 hectares of 11.5.3. The total extent of 11.5.3 on the lot is approximately 150 hectares. This clearing will not reduce the pre-clear extent of 11.5.3 to less than 30% on the property;

AS S.4.4 Clearing will not occur in areas of 11.5.9, therefore proposed clearing will not reduce the pre-clear extent of 11.5.9 to less than 50% on the property;

AS S.4.5 Although basal area was not calculated during the field investigations, the fact that the dominant trees on the lot are mature *Eucalyptus populnea*, *E. crebra* and *Corymbia clarksoniana* up to 25 metres in height, and that the community structure is woodland to open woodland, suggests that the basal area/ hectare is highly likely to exceed $4m^2$. The flora report, based on observations made during the field investigations, contains a detailed description and field measurement sheets;

AS S.4.6 Clearing will not occur in 11.12.2;

AS S.4.7 Slopes on the lot in general rarely exceed 5% - on the area where clearing is proposed slopes do not exceed 4%;

AS S.4.8 Soils are sandy clays and are deeper than 45cm (six pits were dug for fauna trapping) – the acceptable solution is met because clearing will not occur on soils with a depth of less than 45cm AND on dispersible soils where the soil A horizon is less than 30cm.

Therefore, the performance requirement has been met.

PR S.5 - Proposed Solution

Clearing in regional ecosystems will be minimal for this project. Proposed clearing activities will not result in increased salinity or waterlogging, or the salinisation of ground or surface water.

AS S.5

A. Proposed clearing will not occur in the *Eucalyptus thozetiana* component of regional ecosystem 11.7.1;

B. Proposed clearing will not occur in potential recharge or discharge areas;

C. Proposed clearing will not occur within 500m of a potential discharge area. Data on basal area/hectare was not collected during field investigations, and a potential discharge area (an ephemeral stream with a 2 - 3m deep channel) exists on the lot. However, it is not considered that the clearing proposed will increase groundwater flows into this potential discharge area, because groundwater is potentially found at approximately 30m from the surface on this lot, and because the proposed clearing will not significantly reduce the amount of vegetation, remnant or otherwise, on the lot or in the contributing catchment;

D. Proposed clearing will be less than 40 hectares and it highly unlikely that this will reduce the extent of remnant vegetation to less than 30% of the pre-clearing extent of remnant vegetation at catchment level;

E. Proposed clearing will not occur in an area subject to waterlogging or at risk of waterlogging as a result of clearing;

F. Proposed clearing will be less than 40 hectares and it highly unlikely that this will reduce the extent of remnant vegetation to less than 30% of the pre-clearing extent of remnant vegetation at catchment or groundwater flow system levels.

Therefore, the performance requirement is met.

PR S.6 – Proposed Solution

AS S.6.1 Clearing for the proposed ammonium nitrate plant will only occur within regional ecosystems 11.5.3, listed as not of concern. Clearing will not occur in any endangered or of concern regional ecosystems, or in a category 1 or category 2 area shown on a property map of assessable vegetation (PMAV).

Therefore, the performance requirement is met.

PR S.7 – Proposed Solution

AS S.7.1 Clearing is proposed for not of concern regional ecosystem 11.5.3 only;

AS S.7.2 Clearing of 11.5.3 will less than 40 hectares. The pre-clearing extent of 11.5.3 on the property is approximately 150 hectares (it is difficult to determine exactly how much of 11.5.3 is on the property, as it is interspersed with 11.5.9 – however, there is much more 11.5.3 than 11.5.9). Clearing would have to be substantially greater than that proposed to fail this acceptable solution;

AS S.7.3 Clearing will not occur in 11.5.9;

Therefore, the performance requirement is met.

PR S.8 – Proposed Solution

AS S.8.1 Clearing will not occur in any areas of vegetation retained as a condition of a previous development permit.

AS S.8.2 Clearing will be limited to the extent that is reasonably necessary for the construction and operation of the significant project and clearing of any vegetation will be minimised wherever possible. The infrastructure has been located in non-remnant vegetation to the greatest extent possible.

Therefore, the performance requirement has been met.

Reports to be reviewed with the PVMP when assessed against the VMA

- Flora report (Appendix 7.5);
- Fauna report (Appendix 7.5);
- Nature Conservation Impacts and Mitigation report (Appendix 7.5); and
- Land Suitability Report (Appendix 7.13).

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