Dyno Nobel Group

Initial Advice Statement

For Moranbah

Ammonium Nitrate Project

March 2006

TABLE OF CONTENTS

LIST OF TABLES

Table of Abbreviations

Abbreviation	Description
CH_4	Methane (major component of coal seam gas)
CO	Carbon monoxide
CO_2	Carbon dioxide
NH_3	ammonia
HNO_3	nitric acid
NA	nitric acid
NH_4NO_3	ammonium nitrate
AN	ammonium nitrate
ANSOL	ammonium nitrate solution
^{o} C	Degrees CentigadeCentigrade
DN	Nominal diameter
ERA	Environmental risk analysis
EP	Environmental protection
g/s	grams/second (velocity)
kmol/h	Kilogram moles/hour
L	litre
Nm^3/s	Normal cubic metres/second
m/s	metres/second (velocity)
m	metres
ML	Megalitre
MW/a	Megawatts/year
ML/a	Megalitres/year
MW	Megawatt
pa	Per annum
PJ/a	Petajoules/year.
PSA	Pressure Swing Adsorption
PPE	Personal protection equipment
RF	Reformer furnace
SIS	Safe instrument system
T	Tonnes
Tpa	Tonnes per annum
V	Volts

EXECUTIVE SUMMARY

The DYNO NOBEL Group is seeking to construct and operate a new Ammonium Nitrate plant (AN) and an Emulsion manufacturing plant in Queensland. DYNO NOBEL, together with its partner, is investigating the potential for expansion of its existing QNP facility at Moura. DYNO NOBEL alone cannot ensure that the Moura expansion will occur. Therefore it has commenced studies to have such a facility located in the Moranbah area. The combined plants would produce ammonium nitrate emulsion and prill to service the rapidly expanding demand for AN from mining, in Queensland and NSW. The current concept for a Moranbah operation is to construct a nominal 250,000 tonnes per annum (Tpa) plant expandable to 350,000Tpa making AN prill (solid) and AN emulsion (viscous liquid).

Project Status and Timing

DYNO NOBEL is completing studies for the project and will select a site for the Moranbah plant shortly. The project's indicative key completion dates are as follows:

Key tasks	Indicative Completion Dates
Impact Assessment & Integrated Planning Act approval	November 2006
Access to site	July 2006
Supply product to customers	July 2008

Site Choices

Selection of Moranbah as DYNO NOBEL's preferred site for the AN plant has followed a broad investigation of options across Queensland. Key selection factors for Moranbah as the preferred location are:

- Availability of sufficient freehold or leasehold land for the planned size of the project and potential expansion area critical to the viability of the project
- Low probability of requiring Commonwealth Environmental approvals
- The opportunity to share existing infrastructure (gas, water, rail, road, power) thereby reducing the environmental impact of new facilities and capital costs
- Low risk of impacting 'Endangered' Regional Ecosystems and declared flora and fauna
- Reasonably flat terrain providing minimal disturbance to the existing landscape
- Low risk for potential public amenity disturbance

The preferred, but as yet uncommitted site at Moranbah is located approximately 2.5 km north of the town of Moranbah on the western side of the Goonyella road and north of the railway line. The preferred area is in the vicinity of the existing Enertrade gas compression facility.

Benefits to Queensland

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 $350 million, the project will provide significant benefits for the local and regional economy including:

MARKET & ECONOMIC IMPACTS

- Maintain and enhance regional competition for explosives
- production of explosive precursor products for local markets

- supplement the current shortage of AN product presently required by the Queensland mining industry
- contribution to the regional economy of Australia resulting from export earnings, taxes, salaries, and purchases of goods and services during the construction and operation phase of the development
- local AN production will reduce imports, improving Gross State Product and the balance of trade. At current import prices for AN, the replacement value (including transport) of imported product is greater than $125 million per annum.
- contribution to the local economy of the Moranbah area, both directly and indirectly, as a result of the long-term direct employment of approximately 90 full time staff that will occur during the operational phase of the development.
- Significant local/regional diversification of economic use and employment opportunities

EMPLOYMENT

- additional employment and training opportunities during the 22 month construction phase for an average of 200 workers increasing to 400 workers at the peak
- strong corporate preference for training local staff in order to provide a stable local workforce for long term plant operation post construction employment for 70 full time permanent positions
- additional employment and training opportunities for transport staff for 20 permanent positions locally sourced
- the plant has an expected life span of 35 years ensuring secure long term employment in skilled positions for employees

ACCOMMODATION

- contribution to superior medium to long term accommodation solutions in partnership with state, local government and other stakeholders

IMPACT ON RESOURCES

- improved utilisation of existing infrastructure (gas, water, rail, road, power) thereby reducing the environmental impact of new facilities and capital costs
- the plant will use local coal seam methane, a product lost to the atmosphere and/or required to be removed prior to coal production, as its primary feedstock. AN has a sale value many times that of coal seam methane.
- Expansion of Moranbah. DYNO NOBEL will co-operate with Belyando Shire, Sunwater, State authorities and other stakeholders in advancing the provision of housing, water and infrastructure expansion to accommodate the workforce required by the plant.

AUSTRALIAN EMPLOYER

- A consortium of investors led by Macquarie Bank Limited in 2005 recently acquired DYNO NOBEL. DYNO NOBEL is currently advancing its listing on the Australian Stock Exchange, with the float scheduled to occur in April 2006. As a listed Australian company, DYNO NOBEL will be a substantial contributor to the Australian economy, with sound reasons to continue to promote the company's growth in its primary Australian markets, of which Queensland is a major component.

Conclusion

The proposed AN project will be a significant employment generator throughout its working life, relative to the capital cost of the project. The relatively small footprint of the plant (9 hectares for plant within 100 hectares buffer) and its likely location provide low community impact whilst creating opportunity and income in regional Queensland.

As a leading global producer and marketer of explosives DYNO NOBEL understands the technology and recognises the low and manageable impacts associated with the long standing manufacturing process that is well understood.

1. INTRODUCTION

1.1 BACKGROUND

The DYNO NOBEL Group proposes to develop an Ammonium Nitrate (AN) plant and an Emulsion manufacturing plant in the Moranbah area to the value of $350 million. The capacity of the plant will be a nominal 250,000 Tpa capable of expansion to 350,000 Tpa.

The plants produce separate products i.e.. Ammonia (NH_3 gas); Nitric Acid (NA); and AN. The ammonia is made from the coal seam methane, the NA from the ammonia and the AN from a reaction between ammonia and NA (refer figure 2.3). AN solution will be used to make AN prill (a solid) and AN emulsion (a viscous liquid).

DYNO NOBEL and CSBP jointly operate an AN plant in Moura, Queensland. Investigations for expansion of that facility are reaching conclusion.

1.2 THE PROPONENT

DYNO NOBEL is a leading producer of explosives and explosive precursors. DYNO NOBEL is widely acknowledged to be one of two significant suppliers of integrated AN and initiation systems in the world.

DYNO NOBEL produces and markets explosives and detonation devices for coal, metals quarry, tunnelling, construction and seismic industries. DYNO NOBEL's strategy combines growth through incremental expansion of existing operations with acquisitions and the development, commercialisation and marketing of new products and international opportunities.

A consortium of investors led by Macquarie Bank acquired DYNO NOBEL in 2005 for $US1.7 billion. Listing of DYNO NOBEL on the Australian Stock Exchange is scheduled for April 2006. As a listed Australian company, DYNO NOBEL will be a major listed corporation and a substantial contributor to the Australian economy. The Macquarie consortium retained DYNO NOBEL's operations in Australia, New Zealand, Canada and the United States with a total workforce of approximately 3,000 employees.

1.3 THIS DOCUMENT

The purpose of this document is to identify the key issues associated with the proposal and describes a draft scope of works proposed to resolve any issues that arise. As such it describes the proposed construction and operation of the project and presents a summary scoping of the potential effects of the proposal, and identifies the range of studies proposed to address these factors and potential community concerns.

This document is structured as follows:

Section 1	Introduction	Background The proponent Purpose and scope of the document
Section 2	The Proposal	Location Elements, activities and infrastructure that constitute the project Project justification and alternatives considered Construction and operational processes Waste management Hazard & risk and health & safety issues External infrastructure requirements Economic indicators (capital, revenue, exports, contribution to local/state/national economies) Employment, during construction and operation Proposed timeframes for the project Financing requirements & implications Additional studies needed
Section 3	Existing Environment	Natural – including land, water, air, ecosystems, flora & fauna (terrestrial/aquatic/marine) Socio-economic – including economic characterisation, community structure, social services, cultural heritage, native title Built – including infrastructure, community amenities Land tenure, ownership Planning schemes, government policies
Section 4	Potential Impacts	Natural environment during construction and operation Social environment (as above) Economic effects – on local, state & national levels Built environment
Section 5	Environmental Management	Outline of key environmental management strategies during: - construction/commissioning - operation - closure/final rehabilitation
Section 6	Cost and benefits	Potential costs and benefits to local, state

	summary	and national economies Potential costs and benefits to natural and social environments
Section 7	References and Data Sources	

2. THE PROPOSAL

2.1 PROJECT LOCATION & COMPONENTS

DYNO NOBEL is looking to increase its production capabilities within Australia to meet growing demands in the region. Demand for AN is highest in Queensland and the timing of new supply must be consistent with the development of new mines.
DYNO NOBEL therefore proposes to construct and operate an AN plant in the Moranbah area, Queensland if the timing can meet customer expectations.

Technical grade AN and emulsions are the major raw materials for the most widely used explosives in open cut mining operations. Prilled AN is produced as small, solid, round non-volatile granules and is classified as a class 5.1 oxidising agent under the *Queensland Workplace Health and Safety Act 1995* and associated codes and regulations. This product is stable and non-volatile. AN emulsion is a precursor for explosives manufacturing in situ. The NA produced with be used in the manufacturing process.

The project will involve construction and operation of the following major components:

- Ammonia gas (NH3) will be manufactured from coal seam methane gas sourced locally
- NA will be produced from ammonia and atmospheric air. The raw materials are combined at elevated temperature and pressure and passed over a platinum containing catalyst where the ammonia reacts with oxygen in the air. The resultant process gas is passed through the heat exchanger train where the major portion of this reaction energy is recovered as heat. The process gas is cooled and oxidised further in the cooler condenser and absorber where nitric oxide, nitrogen dioxide, oxygen and water combine to form NA.
- 250,000 Tpa AN plant expandable to 350,000 Tpa. AN solution will be used to make ammonium nitrate prill (a solid) and ammonium nitrate emulsion (a viscous liquid). The AN plant will comprise the following main components:
  - internal power (electricity) for the NA and AN plants may be sourced where needed from the Ammonia distribution system. Internal power is the generation of electricity within the plant (from the ammonia synthesis reaction and production of nitric acid). Steam is generated from waste heat, which in turn can generate electricity.
  - NA product storage facilities of 2,500 tonnes (1 tank) 60% concentration
  - AN prill storage facilities of 11,000 tonnes
  - AN solution (concentrated liquid AN (ANSOL)) stored in a 480 tonne tank; and emulsion stored in three 120 tonne tanks within the Emulsion plant area
  - fuel (diesel and/or emulsifiers) storage (2 x 20m^3);
  - liquid nitrogen storage (2 x 12m^3);
  - plant infrastructure (systems required to operate the plant but not part of the manufacturing process such as roads, buildings, building services, security, communications etc)

- utilities (fluids not directly in the manufacturing process such as steam, compressed air, water, power etc)
- Imported power, utilities and services including water and communications
- Access roads to Queensland Main Roads standards, and connecting water and gas pipelines
- Treated wastewater (wastewater treatment is the treatment of wastewater prior to reuse or discharge from the plant into the evaporation lagoons)

The operational plant will require 70 personnel for 24-hour operation and maintenance. The project is anticipated to have a lifespan of at least 35 years.

2.2 PROJECT JUSTIFICATION & ALTERNATIVES CONSIDERED

2.2.1 Project Justification

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 $350 million, the project will provide significant benefits for the local and regional economy including:

- production of explosive precursor products for local markets
- local value adding to the coal seam methane resource
- maintain regional competition for explosives
- supplement the current shortage of AN product presently required by the Queensland mining industry. Local AN production would reduce imports, improving Gross State Product and the balance of trade. At current import prices the replacement value (including transport) of imported AN is greater than $125 million per annum.
- contribution to the regional economy of Australia resulting from export earnings, taxes, salaries, and purchases of goods and services during the construction and operation phase of the development
- contribution to the local economy of the Moranbah area, both directly and indirectly, as a result of the long-term direct employment of approximately 90 full time staff that will occur during the operational phase of the development.
- significant diversification of economic use and employment opportunities
- provision of additional employment and training opportunities during the construction phase of the plant
- contribution to superior medium to long term accommodation solutions in partnership with state, local government and other stakeholders

- provide water security for Moranbah in partnership with state, local government, Sunwater and other stakeholders

2.2.2 Location Considerations

Current typical land uses in Moranbah and the surrounding areas in the Belyando Shire include residential, beef cattle grazing, coal mining and natural environment. A number of existing and proposed water, power and gas pipeline easements cross or are located within the region. The topography of Moranbah is gently undulating to level plains in a predominantly rural environment. A mix of broad scale grazing and mining activity.

Although the preferred site location has not been finalised, studies are concentrating on an area approximately 2.5 km's northwest of Moranbah as identified in Figure 2.1. Land Tenure for the proposed area is Grazing Homestead Perpetual Lease, with current planning scheme zoning of Rural A. Figure 2.1 also indicates surrounding land use (including the nearest residential development) and infrastructure located in and around the proposed site.

The town of Moranbah has a resident population of approximately 8,000 persons, plus 2,000 in the surrounding rural community, and primarily services the mining industry activities. The centre provides a range of government and community facilities and has a number of accommodation types. Employment is strongly based on the coal industry and grazing.

Preliminary investigations indicate there are no significant topographical constraints to the AN plant development. Site investigations in the Moranbah area are progressing and selection will be finalised shortly. Key factors in selecting Moranbah as the preferred location are:

- availability of sufficient freehold or leasehold land area on which Native Title has been extinguished
- the need for Commonwealth Environmental approval is considered low
- reasonably flat terrain minimises the need to disturb the existing landscape
- low risk for potential disturbance of public amenity
- low risk of impacting 'Endangered' Regional Ecosystems and declared flora and fauna
- proximity to gas source as a feedstock for AN production
- proximity to rail and road infrastructure for access to national and international markets
- recent discussions between DYNO NOBEL and Sunwater indicate reliable water supply will be available from the Burdekin to Moranbah pipeline
- accommodation security being developed through state, local government and industry initiatives
- recent successful precedent in reaching agreement with Traditional Owners on cultural heritage management

2.2.3 Alternatives Considered

DYNO NOBEL and CSBP Limited, a wholly owned subsidiary of Wesfarmers Limited, have jointly operated an AN plant in Moura, Queensland and investigations for expansion of that facility are reaching completion.

DYNO NOBEL is concurrently investigating the benefits of the construction and operation of an AN plant in the Moranbah area, Queensland to ensure that it can meet the requirements of the Queensland mining industry under any circumstance.

2.2.4 Manufacturing Process

Refer figure 1.1 for the AN manufacturing process.

2.3 PLANT EXAMPLE

An example of an AN plant has been provided hereunder:

2.4 CONSTRUCTION SUMMARY

The construction period is approximately twenty-two months. Movement of equipment and bulk materials will require approximately 200-250 transport movements involving approximately 2-3 movements per day over an estimated 100-day period. This may reduce to approximately 1 per day for the remainder of the construction period. A few items will require oversize transport. Specific routes, times and escorts will be arranged with the appropriate agencies.

Land disturbance and vegetation clearing will be limited to the minimum required to accommodate necessary infrastructure and lay-down areas.

The main activities and estimated timeframes associated with construction (a number of which are concurrent) are:

Foundations	9 months
Steel structure work	4 months
Equipment installation	6 months
Piping prefabrication and installation	7 months
Electrical installation and instrumentation	6 months
Painting	8 months
Insulation	5 months

The peak workforce of 400 people is estimated with a normal range from 150-200 during most construction activities. The construction workforce may be accommodated in a construction camp on a site near the plant or within existing construction camp facilities in the vicinity of the established townships of Moranbah.

2.5 UTILITIES REQUIRED DURING CONSTRUCTION PHASE

The AN project may require the following utilities during construction:

Water: Approximately 2 kl/hr (1600 kl/yr) may be required during the construction phase. This water will be used for dust suppression, commissioning requirements as well as domestic water supply.

Electricity: Power for construction needs up to 0.52MW at 415V capacity.

Communications: During construction, it is envisaged that local phone communications may be established in conjunction with other users in the area.

2.6 CONSTRUCTION WASTES

Construction of the AN plant is anticipated to generate approximately 43x10m^3 bins per week of solid waste for the duration of the construction phase.

Construction wastes will be divided into hazardous or non-hazardous in accordance with applicable Queensland regulations. Examples of typical construction wastes are shown in Table 2.1. These wastes will be disposed of as appropriate in local landfill areas and waste treatment plants, subject after further discussion with the Belyando Council.

Table 2.1 Typical Construction Waste Classifications

Waste	Classification
Construction debris contaminated by oil or organic compounds	PotentiallyMay be hazardous
Empty drums	Potentially hazardous – not to be recycled for other purposes on site without the Construction Manager's approval.
Empty paint and coating containers (water based	Non-hazardous

without metals)	
Empty paint and coating containers (oil based without metals)	Non-hazardous
Aerosol containers	Non-hazardous if empty and depressurised
Trash (waste paper, plastics, cardboard etc)	Non-hazardous
Wood and scrap metal (incl. packing cases etc)	Non-hazardous
Vegetation	Non-hazardous
Spent oils	Non-hazardous
Excess fill	Non-hazardous
Domestic garbage and food waste	Non-hazardous
Domestic wastewater and sewage	Non-hazardous

2.7 OPERATIONS SUMMARY

Transport of materials from, and product to, the site may be by road. Transport usage at the site is expected to average:

- prill 9 vehicles per day (B triples 65 T/vehicles)
- emulsion 3 vehicles per day (50 tonne tankers)
- miscellaneous 2 vehicles per day (semi-trailers)

Rail transport may be utilised if it is more practical and efficient.

The process may generate a range of atmospheric emissions, wastewater discharges, and solid and semi-liquid wastes for appropriate disposal. These are discussed further in Section 2.6 of this report. Table 2.2 summarises the proposed types and indicative volumes of materials that may be maintained on-site during the AN plant operation.

Table 2.2 Summary of Products to be Stored On-site During Operations

Product	Volume	Storage Method
NA (60% solution)	2,800 tonnes	Liquid at atmospheric temperature and pressure
AN Prill	11,000 tonnes	Solid at atmospheric temperature and pressure
AN Solution at Emulsion plant Emulsion	Up to 480 tonnes And Up to 480 tonnes	Liquid at atmospheric pressure – temperature 130 deg C Ambient temperature
Fuel (diesel and/or emulsifiers)	Typically 2 x 20m^3	Liquid at atmospheric temperature and pressure
Liquid Nitrogen	Typically 2 x 12m^3	Liquid
Chemicals*	Various minor quantities for use in the process	

* Note: Chemicals typically include ammonia, NA and sulphuric acid. These chemicals are hazardous under the Transport of Dangerous Goods Code and will be stored and handled in accordance with the relevant codes.

2.7.1 Ammonia Source

It is intended that the source of ammonia will be via local manufacture using coal seam methane gas. The methane gas is processed to extract hydrogen that is combined with nitrogen extracted from the atmosphere to produce ammonia. The general reactions are:

$CH_{4\,(g)} + H_2O_{(g)} \rightarrow CO_{(g)} + 3H_{2\,(g)}$
$CO_{(g)} + H_2O_{(g)} \rightarrow CO_{2\,(g)} + H_{2\,(g)}$
$N_{2\,(g)} + 3H_{2\,(g)} \rightarrow 2NH_{3\,(g)}$

2.7.2 NA Manufacture

NA is produced from ammonia and atmospheric air. The raw materials are combined at elevated temperature and pressure and passed over a platinum containing catalyst where the ammonia reacts with oxygen in the air. The resultant process gas is passed through the heat exchanger train where the major portion of this reaction energy is recovered as heat. The process gas is cooled and oxidised further in the cooler condenser and absorber where nitric oxide, nitrogen dioxide, oxygen and water combine to form NA.

The atmospheric air is filtered and then compressed. The compressed air is then cooled, reheated and filtered in a high efficiency filter before entering the ammonia/air mixer.

Liquid ammonia is revaporised by reheating it. The resultant gas is combined with air, the mixture is ignited and passed over a catalyst to produce weak NA.

2.7.3 AN Manufacture

AN is produced by an exothermic reaction between gaseous ammonia and liquid NA. The resultant hot AN solution (approximately 200°C) is then passed through a flash tank where the water in the diluted NA is converted to process steam. The two-phase stream of AN and steam thus produced is separated under pressure in a vapour / liquid separator. The AN solution is depressurised to atmospheric pressure and concentrated in the evaporator. The concentrated AN solution is collected in a tank and pumped to the top of the prilling tower to form the final product – prilled AN.

2.7.4 Prilling

Prilling is the process of forming solid particles from a solution that is maintained at a higher temperature than the saturation and crystallisation temperature.

In the prilling process the AN solution is sprayed through nozzles at the top of a tower. Prills are formed by the surface crystallisation of droplets that are produced as the result of the natural fragmentation of a liquid flowing through a hole. During their fall the AN droplets are cooled by a counter-current of air.

Prills are then dried, cooled, screened, coated, weighed and sized for product quality. Prills that are out of specification return to the recycle system. “On-spec” prill is conveyed to storage for bagging and/or dispatch.

2.7.5 Emulsion Manufacture

AN solution is also blended with process oils (emulsifiers, mineral oils, and diesels), then cooled and stored as an emulsion. The emulsion plant produces up to 30 tonnes per hour of AN based emulsion suitable for sensitisation (density lowering) via special bulk explosive vehicles located in the surrounding mining operations. The manufacture of emulsion is considered low risk.

2.7.6 Heat Recovery

- There are a number of heat recovery stages within the above processes. These include:
- Using flue gas from the reformer to preheat the reformer feeds
- Recovery of heat from the steam reformer for use in the plan
- Recycling tail gas from the PSA to the reformer
- Using hot gases from the ammonia converter to generate high-pressure steam for use in the process; and
- Recovered heat in the plant to assist in powering air compressors and production of steam.

2.7.7 AN Dispatch

The product is despatched to customers in bulk. The prill is transported either in truck tanks or 1.2 tonne bulk bags, both loaded from a conveyor and hopper. Bulk bags are loaded onto truck trays using a forklift.

AN prill and emulsion will be transported in accordance with the requirements of the National Code for Transport of Dangerous Goods – edition 6.

2.7.8 Safety Systems

Whilst the risk of significant fire or explosion is low onsite, fire-fighting facilities such as hydrants with hoses will be provided consistent with normal practice. Fire fighting equipment will be fitted out in such a manner that the plant operators are able to fight fires and rapidly provide cooling water to at risk equipment.

Safety equipment including firewater monitors with fogging nozzles, hydrants, mobile and portable fire extinguishers, protective clothing and self-contained breathing apparatus will be provided. Fixed water spray systems will be installed for key facility components.

2.7.9 Vent System

The vent system will collect and discharge transport relief gases and liquids as well as waste gases such as ammonia and steam to a remote location where they will be safely vented. Combustion products will consist almost entirely of carbon dioxide, water vapour, and elemental nitrogen, with trace quantities of NO_X from ammonia streams. The flare system is an emergency device and under normal operation will only burn pilot gas.

Refer to tables 2.3 Typical Stack Characteristics Forecast and 2.4 Emission Rates of Total Suspended Particulates and Oxides of Nitrogen.

Table 2.3 Typical Stack characteristics forecast

Parameter	Units	AN plant	NA Vent	RF
Stack Height	m	65	65	35
Exit Temperature	o C	40	130	173
Stack Diameter	m	1.8	1.3	1.3
Flow Rate	kmol/h	5300	2600	2500
Volumetric flow	Nm3/s	32.9	16.0	15.3
Exit velocity	m/s	14.8	17.8	18.9

Parameter	Units	AN plant	NA Vent
Stack Height	m	65	65
Exit Temperature	o C	40	130
Stack Diameter	m	1.8	1.3
Flow Rate	kmol/h	5300	2600
Volumetric flow	Nm3/s	32.9	16.0
Exit velocity	m/s	14.8	17.8

Note: AN - ammonium nitrate plant, NA - nitric acid vent,

Table 2.4 Typical Emission rates of total suspended particulates and oxides of nitrogen

Pollutant	Units	AN plant	NA Vent	Air Heater
Particulates	g/s	1.35	-	-
Oxides of nitrogen	g/s	-	4.92	6.29

Pollutant	Units	AN plant	NA Vent
Particulates	g/s	1.35	-
Oxides of nitrogen	g/s	-	4.92

Note: AN - ammonium nitrate plant, NA - nitric acid vent,

2.7.10 Process Interlocking and Alarm Systems

An interlocking system is the safest method of controlling a complex chemical plant. One control system interlocks with another to ensure the plant (and processes) are controlled as an integrated system and not independently. The interlocks of the plant are divided into safety relevant trip functions and process related interlocks. Safety related trips are realized in a separate emergency shutdown system (safe instrument systems (SIS)) that consists of a certified, failsafe programmable logic controller (PLC). The process related trips are connected to a distributed control system (DCS). The SIS will be connected to the DCS via a signal link (data bus).

Alarm management (display and data logging) will be executed at the DCS operator stations. The station will allow operators to recognise the alarms in the order in which they appear. Shutdown actions will be announced by an audible signal from the DCS together with a flashing display of the pertaining tag number.

2.7.11 Gas Detectors and Personal Protection Equipment (PPE)

Gas detectors will monitor the atmosphere surrounding potential leak points of combustible or toxic gases (pumps, compressors, pressure relieving devices, valve stations) to prevent injury to personnel. Gas detectors will be installed if necessary at strategic locations such as classified indoor locations; air intakes and outlets for buildings; permanent ignition sources such as furnaces in the gas let-down station, coal seam gas, ammonia plant, ammonia storage and possibly the reformer (CO).

PPE includes canister-type gas masks and Self Contained Breathing Apparatus (SCBA) and will be provided at appropriate points throughout the plant. Safety goggles, rubber gloves, boots, and aprons will be worn for dangerous work as indicated by procedures established for plant operators.

Refer table 2.4 Typical Emission Rates of Total Suspended Particulates and Oxides of Nitrogen for toxic gasses.

2.7.12 Emergency Management

An emergency team will be established from members of permanent staff who will integrate, if required, with the local emergency services to deal with any hazardous situations.

The efficiency and effectiveness of the team will be maintained through a system of training that uses a range of scenarios of increasing difficulty and related to major plant hazards. The approved emergency procedures will be used as the basis for training.

2.7.13 Maintenance

The plant and equipment will be maintained using a reliability centred system that makes full use of condition monitoring techniques. The plant will normally operate continuously for 350 days per year and use the remaining 15 days for maintenance and inspection purposes.

2.7.14 Audit

High standards of safety, operational, engineering, maintenance and environmental management will be established. To maintain these standards, management will receive feedback of performance through a comprehensive system of audit and critique, the audit findings will be formally reported, and deficiencies will be tracked through to completion.

2.7.15 Operational Workforce and Accommodation

The plant will require approximately 70 personnel for operations, maintenance and administrative functions. Offices, control rooms and workshops may be provided to accommodate the operational activities. The personnel will reside at Moranbah.

Whilst the future expansion of the Moranbah township is under review, DYNO NOBEL will work with Belyando Shire Council and major stakeholders and contribute to the provision of an accommodation solution.

2.7.16 Utilities

Utility requirements of the plant include potable water, process water, firewater, electricity, plant and instrument air, fire protection, communications and fuel storage.

2.7.16.1 Water Supply

Up to 2600ML/year of water will be required for the operation of the entire plant, for process demand, domestic purposes and dust suppression.

2.7.16.2 Power supply

Electrical power will be sourced from mains and either generated on site or offsite in partnership with electricity or gas suppliers. The AN plant and support facilities may import electrical power, and, when needed, generate electricity from waste heat from the formation of ammonia in the Ammonia plant. However, to facilitate the start up of the plant and to obtain back up power in the event of failure or during maintenance periods, the AN plant may have back-up gas generators. Whilst the need for back-up generators has not been determined, if required, the probable size is 2 by 10 MW generators.

The energy efficiency of the AN plant has been estimated at approximately 16GJ/tonne of AN product. This is the energy consumption for the manufacture of 1 tonne of AN (gas and electricity). This will be further assessed and benchmarked against other comparable projects as part of future technical studies, with the objective of achieving best practicable measures to optimise energy and greenhouse efficiency.

There is no carbon absorbed in the manufacture. The carbon of the coal seam gas is discharged to the atmosphere.

2.7.16.3 Fuel storage

Diesel fuel for backup firewater pumps and emergency generators will be stored in diesel storage tanks. Typically the 2 x 20m^3 tanks will be used for storage in accordance with Australian Standard AS 1940 and provided with a full containment bund to hold both the entire contents of the tanks and a 24-hour rainfall event anticipated once per 25-year return period.

2.7.16.4 Effluent treatment

The facility will includes effluent treatment for both the wastewater streams and potentially contaminated storm-water. One effluent stream will be discharged to the evaporation lagoons. This is a combination of streams from the cooling tower (blow-down) and the wastewater from the water treatment. Wastewater and contaminated storm-water may be routed to a corrugated plate interceptor (CPI) oil/water separator unit for removal of oil, grease and suspended solids. A separate treatment plant will be provided for treating domestic wastewater. It is intended that there will be no release of discharge off site.

The plant will be designed to maximise water re-use and efficient consumption of water to meet process requirements.

2.7.17 Product Sales

The AN product is dispatched to customers in bulk. Two systems for transportation are utilised, the first system involves prill being loaded directly from a conveyor and hopper into truck transportation tanks. The 1.2 tonne bulkbags are also loaded using a conveyor and hopper system with prill being fed onto the conveyor using a front-end loader. Bulkbags are loaded onto truck trays using a forklift.

AN prill and emulsion will be transported in accordance with the requirements of the National Code for Transport of Dangerous Goods. Transport of product will primarily occur during weekdays. However, deliveries of product to the mines will be required infrequently on weekends. Based on the existing transport requirements and predicted markets for the increased output peak delivery times are anticipated to be early morning and late afternoon (return).

Rail may be incorporated into the total logistic solution pending discussions with Queensland Rail where practical and efficiencies exist.

2.8 OPERATIONS WASTES

2.8.1 Typical Solid and liquid wastes

A list of indicative solid and liquid wastes anticipated to arise during operation of the plants is presented in Table 2.5 below.

Table 2.5 Typical Operations Solid and Liquid Wastes

	AN	NA	Emulsion
Waste	**Indicative Quantity/month** *	**Indicative Quantity/month** *	**Indicative Quantity/month** *
Waste Oil	<1000 litres	< 200 litres	No more than 800 litres
Empty Drums	40 x 205 L drums 20- x 20 L drums		40 x 205 L drums -60 x 20 L drums
Rags and absorbents	1 x 240 L	1 x 240 L	2 x 240 L
Septic Waste	(on-site treatment of septic waste proposed)	(on-site treatment of septic waste proposed)	(on-site treatment of septic waste proposed)
Non-hazardous chemical additive drum	~ 30 x 205 L		
Catalysts		**Will be leased from specialist company	

Note: * This represents a list of indicative wastes requiring management and off-site disposal, based on DYNO NOBEL's experience at the existing Queensland Nitrates Plant. Final details of operational wastes and best practicable management methods will be further characterised as part of the EIS process.
Note: **: The catalyst is in the manufacture of NA. It is leased from a specialist company that performs this worldwide. As the catalyst can be re-used the leasing arrangement is the most convenient.

Note (also): Water has not been included as it is not a process waste. Most of the water intake to the plant ends up as the evaporation from the cooling tower (80%). Some (less than 10%) is sent to the evaporation lagoons, depending on the wastewater treatment process. Some is also lost in the product. Water vapour has been included as an emission.

Key air emissions from the operational plant are anticipated to include:
- Oxides of Nitrogen (NO_X);
- H_2O as water vapour;
- Ammonium Nitrate (NHNO) as particulates.

Typical emission rates for a plant of the size proposed are given in Table 3.4.

The proposed technologies for the plant incorporate selective catalytic NO_x reduction system, 100% air recycling in the prilling tower and venting of ammonia storage tanks. These measures ensure ambient air quality is maintained and emissions to atmosphere are minimised.

Table 2.6 Typical Atmospheric Discharges Anticipated During Normal Plant Operation

Plant Area	Parameter(s)	Typical Concentration
NA Plant	Oxides of Nitrogen (NO_X) Nitrogen (N_2) Water Vapour (H_2O)	<50 ppm 97.1 % mol 0.4 % mol
AN Plant – Prilling T	Ammonium Nitrate particulates	<100 mg NH_4NO_3 / nm^3
Emulsion plant	(No emissions to atmosphere?)	

The flare system is an emergency device and under normal operation will only burn pilot gas. It is used for control/disposal of emergency process emissions. Combustion products will consist almost entirely of carbon dioxide, water vapour, and elemental nitrogen, with trace quantities of NO_X from ammonia streams.

2.8.2 Odour

It is not anticipated that the odour emissions from the AN Plant or effluent treatment facility will be at levels to cause impacts to nearby residents. Treatment and detection systems are designed to reduce the risk of odours being produced as levels that maybe considered offensive.

3. EXISTING ENVIRONMENT

The existing environment of the Moranbah area is described in the following section in regard to it's physical, biological and socio-economic characteristics. In recent years the area has seen rapid industrial development from the coal and energy market sectors and supporting infrastructure. This development has included greenfield coal mines, coal bed methane, associated gas pipelines and gathering lines and associated powerlines, water pipelines, railway lines and residential and commercial developments in the town of Moranbah.

These developments have required environmental assessments including detailed specialist studies of the area. Consequently, the existing environment has been relatively well studied in a broader geographic sense. It also means the environment has been moderately disturbed from these developments and an additional project must be considered for the cumulative impacts it will cause. These issues are further discussed in Section 4 and will be addressed as part of the EIS process.

3.1 PHYSICAL ENVIRONMENT

3.1.1 Soils & Topography

Soils of the Moranbah area are varied, ranging from loamy or occasionally sandy red earths, to a variety of clays. Some areas consist of Gilgai landscapes, which refer to the microrelief of soils produced by expansion and contraction with changes in moisture. Gilgai is found in soils that contain large amounts of clay, which swells and shrinks noticeably with wetting and drying. The relatively low rainfall and high evaporation typical of this region largely eliminates leaching in all but the most permeable coarse textured soils. The topography of Moranbah is gently undulating to level plains in a predominantly rural environment.

3.1.2 Air Quality and Noise

The Moranbah area has historically been a rural environment, however the relatively recent coal mining activities and associated industrial development have changed the environment. The present and potential future quality of the air shed is influenced by point source emissions from industry, which is significantly influenced by local climatic conditions.

The existing noise environment is influenced by a range industrial developments nearby. Adjacent to the proposed study area is a compression station, expected to contribute significantly to local noise levels. Traffic movement along Goonyella Road, which links with the Peak Downs highway, is a source of noise near the proposed study area, as is the Blair Athol railway running adjacent to the study area on the eastern border.

Residential and commercial developments further to the east of the study area are expected to be associated with typical urban and industrial noise emissions.

3.2 BIOLOGICAL ENVIRONMENT

3.2.1 Flora & Fauna

A desktop search of regional ecosystems mapping for the proposed study area is shown in Figure 3.1. 'Endangered' Regional Ecosystems (RE) occur throughout the shire but are predominantly located to the south and west of the study area e.g. Brigalow community (Acacia harophylla). DYNO NOBEL commits to choose a preferred site that does not impact an 'Endangered' RE habitat. If possible, communities of 'Of Concern' will also be avoided.

A search of the EPBC protected matters report, indicated that areas that would potentially trigger a matter of National Environmental Significance under the EPBC Act (NES) were found in the Moranbah region. This included one threatened ecological community, seven threatened species and seven migratory species identified. The protected matters report also found that the study area is within the same catchment as a Ramsar Wetland.

3.2.2 Water Quality

Within Moranbah is the slow flowing ephemeral Grosvenor Creek. Grosvenor Creek is located to the south of the study area, and flows south of the Moranbah township. Most rainfall and therefore flows in the creek are experienced in the summer months. To the north east of the study area is the Isaac River, which is one of the major tributaries of the Fitzroy River system of central Queensland. Grosvenor Creek and Isaac River are identified in Figure 3.1.

3.3 SOCIO-ECONOMIC

3.3.1 Social & Economic

Moranbah was established in 1971 as a purpose built mining town in the northern part of Belyando Shire. The town is mainly built on the development of houses constructed for mine workers and their families and most residents are associated with the local mines in the area including Goonyella/Riverside, Peak Downs, Henry Walker Elton, South Walker, Saraji, Coppabella and Moranbah North.

Population declines have occurred since the 1990's due to a downturn in the mining industry and out-migration to other towns. However, the recent growth in coal mining activity has seen the estimated resident population increase to 6,673 as at June 2003 with an average age of 35 years. The main source of wealth for the Moranbah area is coal mining on which the town was built.

The town of Moranbah is zoned residential and with pockets of special use, while the majority of land surrounding Moranbah is zoned as rural. Moranbah is also well serviced with essential social infrastructure services and facilities available to residents. Moranbah has 2 primary schools, 1 high school, preschools, childcare centres and a well-equipped cultural centre with art gallery, library and community meeting rooms and various other facilities. Land use are shown in Figure 3.1

3.3.2 Cultural Heritage & Native Title

The following legislation is relevant to the protection of both Aboriginal and European cultural heritage and therefore must be considered for the proposed project:

- *Aboriginal Cultural Heritage Act 2003*
- *Queensland Heritage Act 1992*
- *Native Title Act 1993*
- *Environmental Protection & Biodiversity Conservation Act 1999*
- *Aboriginal and Torres Strait Island Heritage Protection Act 1984*
- *Torres Strait Islander Cultural Heritage Act 2003*

There are a number of Traditional Owners that have interest over land within the Belyando Shire. A search of the National Native Title records for the study area indicates there are two Indigenous groups a claim over the land, the Barada Barna Kabalbara & Yetimaria People # 4, and the Wiri People # 2.

Information from the central west region of Queensland indicates a rich aboriginal cultural history in the area. Stone artefact scatters are common site of significance, as are scar trees and rock art sites.

3.4 LEGISLATIVE APPROVALS AND REQUIREMENTS

DYNO NOBEL Group is required to give due consideration to the likely environmental impacts of the proposal under various federal, state and local legislation, guidelines and policies. This section identifies key legislation and provides a description of other documents and guidelines relevant to environmental management of the proposal. It is not intended that this section provides a legal review of the proponent's obligations but is simply to highlight key environmental legislation relevant to this proposal.

Environment Protection Biodiversity and Conservation Act, 1999 (Commonwealth) and the ***Vegetation Management Act 1999 (Qld).***

The *Environmental Protection Biodiversity and Conservation Act 1999* (Cmwlth) (EPBC Act) and Vegetation Management Act, 1999 (Qld) (VM Act), provide for the conservation and management of species and communities of flora and fauna deemed to have conservation significance.

The EPBC Act deals with matters of National Environmental Significance (NES) including; "migratory species" and "threatened species and ecological communities". Based on an EPBC Protected Matters report for the study area, the project may give rise to matters of National Environmental Significance. Detailed specialist studies as part of the Environmental Impact Statement (EIS) will determine whether this is the case. A referral will also be submitted to the Department of the Environment and Heritage (DEH) in accordance with requirements of the EPBC Act.

Under the VM Act, Regional Ecosystems (RE) deemed to be "of concern" or "endangered" will be protected. State Government will require a project's proponent to obtain necessary approvals prior to clearing any protected vegetation communities on leasehold land. Regional ecosystem mapping for the study area indicates "not of concern" regional ecosystems occur within the study area. An application can be made under the VM Act for an ongoing clearing permit, as the project is expected to be declared to be a significant project under the *State Development and Public Works Organisation Act 1971*, section 26.

Nature Conservation Act 1992

The Nature Conservation Act 1992 provides for the protection of native plants and animals in Queensland. The Act lists classes of protected species according to their status and provides guidance on their management. If the chosen site contains listed species under the Act, approval will be required from the EPA prior to any clearing or other activities that may impact the listed species. A detailed flora and fauna study as part of the EIS will be conducted, which will enable determination of any necessary approvals under the Act.

State Development and Public Works Organisation Act 1971

Part 4 of the *State Development and Public Works Organisation Act 1971* (SDPWOA) provides for the conduct of impact assessment through the preparation of an EIS. The impact assessment process ensures that proper account is taken of environmental effects associated with projects declared to be significant. DYNO NOBEL is seeking declaration under section 26 of the State Development & Public Works Organisation Act 1971 significant project. The EIS will address all impacts associated with the project, and will provide management measures to reduce the environmental impacts identified in the EIS.

Environmental Protection Act, 1994 (Qld)

Sections 36 and 37 of the Environment Protection Act 1994 (Qld) (EP Act), notes that all persons have a duty of care to the environment. Therefore, it is not permissible to cause environmental harm (as defined in the Act) whilst undertaking any activity unless all reasonable and practical means are taken to minimise that harm. DYNO NOBEL Group has a duty of care to comply with the Act, and take all reasonable steps to minimise harm. The EIS will be conducted in accordance with DYNO NOBEL's obligations under the EP Act by ensuring all reasonable and practical steps are taken to minimise harm.

The EP Act provides for the management of Environmentally Relevant Activities (ERA's), while Schedule 1 of the *Environmental Protection Regulation 1998* lists specific ERA's and their associated activities. Under Schedule 1 of the Environmental Protection Regulation, the project falls under the category of "chemical manufacturing, processing or mixing" and "chemical storage", therefore requiring development approval and a registration certificate to become a "registered operator" under the EP Act. An application will be made to the EPA for the applicable ERAs associated with the project.

The EP Act outlines the scope and content for preparing environmental protection policies to protect Queensland's environment. These policies may be made about the environment or anything that affects or may affect the environment. It should also be noted that all subordinate legislation to the Act, such as the following environmental protection policies, binds all persons. DYNO NOBEL Group will give consideration to these policies throughout the project and will make a commitment to comply with applicable provisions.

Environmental Protection (Noise) Policy, 1997 Qld (EPP Noise)

DYNO NOBEL are aware of the requirements outlined under the EPP Noise and the AS 2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites. The EPP Noise sets acoustic quality objectives, and also deals with the evaluation procedure and the approval of a Draft Environmental Management Plan (EMP). DYNO NOBEL Group are committed to complying with all relevant acoustic quality objectives in the policy and will implement an EMP that address noise issues and provides for measures that ensure acoustic quality objectives are achieved. Part 4 of the policy deals with abatement of unreasonable noise and is intended to provide measures for nuisance noise control. Part 6 sets out details of the procedures and equipment suggested for making noise assessment.

Environmental Protection (Air) Policy, 1997 Qld (EPP Air)

DYNO NOBEL is aware of the requirements outlined under the EPP Air. Part 3 of the policy covers environmental management decisions and air pollution dispersion modelling and monitoring of releases, which will be addressed in the EIS process. Part 4 covers management of certain sources of contamination with Part 5 requiring a whole-of-government approach to managing the air environment. Schedule 1 states air quality indicators for carbon monoxide, lead, nitrogen dioxide, ozone, particles and sulphur dioxide. Goals for each of these pollutants are also stated. The DYNO NOBEL Group will aim to achieve these goals as set out in the EPP Air for air emissions associated with the construction and operation of the facility.

Environmental Protection (Water) Policy, 1997 Qld (EPP Water)

DYNO NOBEL are aware of the requirements outlined under the EPP Water and that it is prohibited to deposit or release materials including building waste, cement or concrete, rubbish or oil into a roadside gutter, stormwater drain or a watercourse, or a place where it could be washed into these places. DYNO NOBEL Group is committed to complying with the EPP Water, ensuring all steps are taken to minimise impacts to waterways including the Grosvenor Creek south of the study area, and Isaac River to the north.

Environmental Protection (Waste Management) Policy (2000) (EPP Waste)

DYNO NOBEL are aware of the requirements outlined under the EPP Waste. The Waste EPP provides a strategic framework for managing waste in Queensland. This is achieved by establishing a preferred waste management hierarchy and principles for achieving good waste management, which should be applied by both government and industry. The waste hierarchy ranges from the most preferred to the least preferred method: waste avoidance - waste reuse - waste recycling - energy recovery from waste - waste disposal. DYNO NOBEL group will implement measures throughout each phase of the project in accordance with the Waste Management Policy's preferred method of waste management.

The EPP Waste also defines the required contents of waste management programs, which DYNO NOBEL Group may be required to implement as a condition for operating ERA. Any waste management plans that are developed will be in accordance with the

Environmental Protection Waste Management Policy and will observe the preferred method of waste management.

Dangerous Goods Safety Management Act

The overall objective of the *Dangerous Goods Safety Management Act 2001* is to provide protection for people, property and the environment caused by hazardous materials.
A licence is required for any premises where the quantity of liquids stored exceeds the minor storage exemption limits set out in the *Australian Standard - AS1940 "The Storage and Handling of Flammable and Combustible Liquids"*.

Under the Dangerous Goods Safety Management Act 2001 and associated Regulations the status of the development will need to be determined. Following an assessment to determine the status, it is likely to be considered a major hazard facility. Preliminary investigations indicate the facility is likely to be classified a major hazard facility based on quantity of stored ammonium nitrate prill on site. If declared a major hazard facility, this will result in certain duties being required under the Act.

The first step in this process is to advise the Chemical Hazards and Emergency Management Unit in the Department of Emergency Services that it is likely the facility will be a major hazard facility. This step is done after the preliminary hazard analysis conducted for the EIS, when it is fully known whether there are offsite risk impacts and when details of these risks are known. If the facility is declared a major hazard facility, notification will be required at least 6 months prior to commencement of operations.

The preliminary hazard analysis would be required under the Terms of Reference of the EIS, under the *Integrated Planning Act 1997*.

Integrated Planning Act 1997 (IPA)

The initial Impact Assessment process will be reviewed by the Queensland Government, Co-ordinator General department. This approval process will complete some of the tasks associated with the Integrated Planning Act 1997 (IPA). Therefore by gaining approval from the department of the Co-Ordinator General the timeframes for the IPA process will be reduced.

The *Integrated Planning Act 1997* (IPA) forms the foundation of Queensland's planning and development assessment legislation, and provides the following purposes:

- Defines development;
- Establishes levels of assessment for development; and
- Establishes a process for making, assessing and deciding development applications, namely the Integrated Development Assessment System (IDAS).

As defined under the IPA, the proposed ammonium nitrate plant constitutes two aspects of development:

- Material Change of Use (MCU); and
- Environmentally Relevant Activity (ERA).

The level of assessment for the proposed development is determined under Schedule 8 of the IPA and the respective local government Planning Scheme, namely the Belyando Shire Transitional Planning Scheme.

In accordance with Schedule 8, Part 1, Table 2 of the IPA, making a material change of use for an environmentally relevant activity, for which no code of environmental compliance has been made under the Environmental Protection Regulation 1998, is Code Assessable development.

As identified under the *Environmental Protection Regulation 1998*, an ammonium nitrate plant, defined as 'chemical manufacturing, processing or mixing', is an ERA, for which it has been assumed for the purposes of this IAS, no code of environmental compliance has been made. All operators of environmentally relevant activities (other than mining or petroleum activities) must have development approval and be 'registered operators'. As a result, an application for a development permit for an ERA meeting the relevant provisions of the EP Act is required to be submitted to the Environmental Protection Agency. Operators apply to be registered, with registration authorising the registered operator to carry out the activities at the place stated in the certificate.

The IDAS identifies the process and the applicable time frame for the assessment of the required Code Assessable development application.

Belyando Shire Transitional Planning Scheme

The proposed development site falls within the Belyando Local Government Area and on land within the Belyando Shire Transitional Planning Scheme. The preferred plant site is designated as Rural A Zone, in accordance with the scheme.

Initial investigations suggest that an ammonium nitrate plant would be defined as either a 'Heavy Industry' or a 'Noxious or Hazardous Industry'. For both uses, the relevant columns of assessment for the Rural A Zone indicate that the proposed development (material change of use) would be identified as Impact Assessable development. This will therefore require the lodgement of a Material Change of Use development application to the Belyando Shire Council, to be assessed against the requirements of the entire Belyando Shire Transitional Planning Scheme. In addition, the development application will be required to be publicly notified providing the community with the opportunity to lodge submissions with Council relating to the proposed development.

4. POTENTIAL IMPACTS

4.1 PHYSICAL ENVIRONMENT

4.1.1 Soils & Geology

To prepare the AN Plant site approximately 9 ha of land would be cleared of vegetation and earthworks conducted to level the area. The majority of the 100 ha site will remain as a buffer area and native vegetation not cleared will be retained as habitat.

To mitigate impacts arising from soil erosion, construction activities shall be undertaken in accordance with a site drainage plan. The site drainage plan can include the provision for diverting stormwater from adjacent land to prevent it from entering the construction area and directing run-off from exposed surfaces. Areas within the Facility boundary not being utilised during operations of the facility and verges of facility access roads can be landscaped to provide soil stabilisation and prevent erosion. The EIS will identify the full range of potential impacts and identify various mitigation measures to reduce impacts. A construction environmental management plan can specifically address appropriate sediment and erosion control requirements for the construction phase of the project. Assuming Best Practice erosion control is implemented, impacts on soil loss and erosion are expected to be low.

4.1.2 Air Quality and Noise

During construction dust emissions have the potential to impact the local community, however they are not expected to cause any significant loss of amenity. Based on similar sized construction projects, 60-75% of particle emissions would be less than 10 microns, with larger particles settling rapidly. Appropriate mitigation measures can significantly decrease impacts, including the use of dust suppression techniques, reduction of vehicles on unsealed roads and revegetation of cleared areas.

During operation of the AN Plant atmospheric emissions of pollutants will include Oxides of Nitrogen (NO_x - approximately 46 Tpa) and , Ammonium Nitrate (NH_4NO_3 – 92 Tpa), and particulates may be released annually. Typically 10% of the NO_x is emitted in the form of NO_2 with the remainder as nitric oxide (NO).

While individual stack emissions are predicted to be minimal (based on similar sized plants elsewhere), the emissions will contribute to the cumulative loads in the Moranbah airshed. Dispersion modelling will be carried out for the project as part of the EIS, assessing the impact and recommending mitigation strategies or technologies to reduce impacts. The air quality guidelines in the EPP Air will be used to develop mitigation controls relating to aesthetic enjoyment of places, visual and local amenity, biological integrity and other (unspecified).

Noise emissions resulting from the construction of the plant will include increased road traffic, earthmoving equipment and associated machinery. Noise modelling will be conducted as part of the EIS to determine the predicted noise levels at the plant boundary and nearest residence. Given the temporary nature of the construction activity and the rural setting of the proposed site, increased noise impacts are expected to be low and temporary in nature. The noise guidelines in the EPP Noise will be used to develop mitigation controls in the EMP.

4.1.3 Waste Disposal

During construction of the plant, it is anticipated approximately 4 x 10m3 bins per week of solid waste for the duration of the construction phase will be generated. Construction wastes will be divided into hazardous or non-hazardous wastes according to applicable Queensland regulations. Details of typical construction wastes can be found in Table 2.1 of this report.

Waste from the ongoing operation of the plant can be managed through the operational EMP, which will be developed as part of the EIS for the project. The waste guidelines in the EPP Waste will be used to develop mitigation controls in the EMP.

4.1.4 Traffic Impacts

An increase in vehicles transporting construction materials and equipment to the site will occur during the construction phase of the project. Furthermore, local traffic along major surrounding roads adjacent to the proposed site will increase as a result of construction activity. The Belyando Shire Council should be advised if significant increases in vehicle use on minor roads are expected.

Given the temporary nature of construction activity in a specific area, increased traffic impacts are expected to be low. However, a traffic management plan will be developed as part of the EMP to mitigate potential disruptions to traffic flow. This can be investigated further as part of the EIS.

4.2 BIOLOGICAL ENVIRONMENT

4.2.1 Flora & Fauna

As the preferred site has not been finally settled the flora and fauna values have not been assessed. However, if natural vegetation does occur at the site, potential impacts on flora and fauna will primarily relate to the loss of habitat as a direct result of clearing of native vegetation to allow for the construction of the facility. Approximately 9 ha of land is expected to be cleared for the AN Plant site, resulting in loss of vegetation and associated fauna habitat. A more detailed assessment of the proposed site will be conducted as part of the EIS, including a comprehensive flora and fauna field assessment to determine the extent of Regional Ecosystems, threatened or declared species potentially impacted at the site.

The EIS will include a field flora and fauna assessment that will determine the presence of RE, threatened and declared species and Ramsar wetlands likely to occur within the area. The final selection of an AN Plant site will consider the impacts to flora and fauna and possible avoidance of significant value areas.

4.2.2 Water Quality & Hydrology

Disturbance to hydrological characteristics could potentially occur, which will impact on water runoff patterns and volumes in the localised area. Construction activities may impact on water quality through the temporary increase in sediment runoff during rainfall events. Receiving water quality impacts may include increased levels of suspended solids and turbidity associated with stormwater runoff entraining sediments by coming into contact with bare or disturbed ground surfaces, or by the action of runoff on erosion-prone soils.

A number of measures can be implemented to reduce impacts to surface water quality during the construction stage of the project:

- Designing drainage works to ensure that potentially contaminated run-off waters from hard surfaces are directed to an evaporation pond for treatment;
- Minimising clearing or alterations to the natural topography and landform during construction of the AN Plant, storage buildings, water storage tanks and evaporation ponds;
- Minimising the effects of surface water run-off by grading affected surfaces, revegetating and utilising anti-erosion measures such as contour banking, berms and installation of diversion channels to divert waters of disturbed land onto stable grassed areas.

During construction and ongoing operation of the plant, water quality impacts can be mitigated through appropriate control procedures. In addition, an appropriate stormwater management system can further mitigate against water quality impacts. This aspect will be addressed during the detailed design of the plant. The water guidelines in the EPP Water will be used to develop mitigation controls in the EMP.

4.3 SOCIO-ECONOMIC

4.3.1 Social & Economic

A range of socio-economic impacts will be associated with the proposed project. The potential economic benefits of the project as explained in Section 6 and the Executive Summary. Potential key impacts that have been identified as the following:

- Public risk considerations resulting from operation of the plant and transport of ammonium nitrate product to respective markets via road or sea;
- Potential impact to sites of Aboriginal cultural heritage significance;
- Employment impacts for spouses and families associated with workers at the plant. Impacts may arise due to limited availability of employment for these members of the community;
- Potential for social isolation of individuals and families relocating temporarily to the town of Moranbah, and who do not have social or emotional support networks in the town;
- Impact of attracting members of the workforce from local cattle stations, removing limited trained staff from existing businesses;
- An increased need for additional worker housing stock in the region will be required, particularly during the construction period when up to 400 workers will be required during the peak of construction;
- Restriction of residential development on land close to the AH Plant site;
- Increased demand for services with the additional workforce;
- Increase in Moranbah's population as a result of new employees and family during plant operation;

- An increase in traffic from greater number of workers in the area will occur, as will increased traffic during the construction phase of the project;
- Localised noise generation at AN Plant site potentially impacting residents, and
- Modification of the present visual aesthetics of the area.

There are a number of mitigation measures than can be employed to reduce socio-economic impacts associated with the project. The following provides potential mitigation strategies associated with the previously identified impacts:

- Restrictions on the construction and operational times for the plant to minimize disturbance to residents;
- Comprehensive environmental monitoring programs (of greenhouse gases and plant stacks) to ensure levels of emissions do not exceed recommended guidelines, and to avoid disturbance to residents;
- Specific stakeholder and consultation management plan developed to ensure engagement with residents is effective and informative and as transparent as possible. A key aspect of this would be informing the community of planned haulage routes and times during the construction phase;
- Design measures that minimize the potential visual impact of the plant should be devised;
- Planned routes and timing for construction traffic will be employed to minimize disturbance;
- Development and implementation of a "good neighbour policy" to address land holder issues;
- Encourage the organization of social events between existing and new community members with the involvement of DYNO NOBEL Group;
- Implement a project management committee consisting of DYNO NOBEL Group, construction companies, local stakeholders and community members;
- Preparation of a detailed Hazard and Risk Assessment and Emergency Response Plans and procedures to effectively deal with potential plant failures, emergencies and recovery of any incident. Regular reviews and reporting of the plant's safety and environmental management (yearly basis).
- Restrictions on operational times for the plant to minimize disturbance to residents

The EIS will assess effects of the full range of socio-economic impacts, including the additional demand for housing and services in Moranbah. The EIS will also identify measures to overcome these impacts and engage key stakeholders in the EIS process. Community consultation for the project will be aimed at hands-on information sharing and relationship building with key stakeholders. Key stakeholders may include, but are not limited to, landowners and citizens of communities, business and industry groups, and environmental groups. Key stakeholders will be identified early in the process to ensure an appropriate stakeholder engagement program is developed.

4.3.2 Visual Amenity

The AN Plant will impact on visual amenity of the immediate surrounding area due to the size and scale of the facility. However, due to the isolated nature of the study area within a rural environment, visual impacts will be minimal. In addition, there will be a considerable buffer of vegetation surrounding the site, as the site's footprint is only 9 ha but the total area sought is 100 ha. This buffer will further reduce visual impacts.

4.3.3 Cultural Heritage & Native Title

There are several Traditional Owner groups that have historical connection with the land within the Belyando Shire. A search of the Native Title Tribunal records for the Shire indicate there are seven active native title claims, including two groups, the Barada Barna Kabalbara & Yetimaria People # 4, and the Wiri People # 2.

A comprehensive archaeological study will be conducted as part of the EIS in direct consultation with these groups. Should sites of cultural heritage significance be discovered on the AN Plant site, consultation with the groups will continue to determine the course of action.

As part of this consultation a Cultural Heritage Management Plan (CHMP) may be required under the *Aboriginal Cultural Heritage Act 2003*. A CHMP will outline how the project will be managed to avoid or minimize harm to Aboriginal cultural heritage, and will be developed in consultation with the Traditional Owner groups. Consultation with Traditional Owners will also continue during the project to negotiation an agreement for the Native Title claims over the area of the chosen site. This may involve the negotiation of an Indigenous Land Use Agreement (ILUA) or similar. DYNO NOBEL commit commits to negotiate with the Traditional Owners to reach an amenable outcome for both parties.

5. ENVIRONMENTAL MANAGEMENT

An Environmental Management Plan will be prepared as part of the EIS for the specific purpose of ensuring minimal environmental impact as a result of the project. Strict monitoring of the contractors' operations will be required in order to ensure compliance with the EMP. The EMP will address key management strategies for the planning and design, construction and operational phases of the project, and will also address decommissioning of the facility and final rehabilitation measures.

5.1 PLANNING AND DESIGN

The Planning and Design EMP will be prepared in the early stages of the project prior to initial planning and detailed design of the facility. The Planning and Design EMP will ensure measures to reduce impacts to the environment are implemented in the planning and designing of the facility. It will contain specific guidelines that will result in a reduction in environmental impacts for engineers to consider when preparing facility plans. DYNO NOBEL Group are committed to ensuring the facility is planned and designed appropriately to reduce environmental impacts and make maximum use of mitigation measures through appropriate design considerations.

Planning and Design EMP Commitment
DYNO NOBEL is committed to ensuring the project is designed with the incorporation of environmental impacts. The Planning and Design EMP will be prepared at the beginning of the EIS development to ensure full details of the EMP are incorporated the engineering design of the AH Plant.

5.2 CONSTRUCTION

The Construction EMP will be prepared for the construction phase of the project. It will be developed to outline the control measures to be implemented ensuring that environmental impacts are minimised during the construction phase. The Construction EMP will contain achievable objectives based on proven technology and will address the findings of the EIS.

The Construction EMP will be developed to conform to the Queensland Department of Environment Guidelines for the Preparation of an Environmental Management Plan (EM Plan). Preliminary performance criteria for noise, air emissions and waste will be incorporated. Measures to restrict vegetation clearance during the construction phase will be included. Full details for the Construction EMP will be prepared, in consultation with the EPA, as early as possible after management approval to proceed with the project has been given, as project design progresses during detailed design.

Construction EMP Commitment
DYNO NOBEL is committed to achieving the best industry performance in environmental management, with the aim of addressing environmental issues at each stage of the project. The Construction EMP will be prepared well before construction activities commence to ensure full details of the EMP will be incorporated during the construction phase.

5.3 OPERATION

The Operation EMP will provide for management of environmental impacts throughout the operation of the facility. The Operation EMP will include environmental monitoring and reporting on project operations to representatives from the EPA and DNRM&W as per tthe approval conditions. Details of reporting and monitoring procedures will be provided for in the detailed EMP. Monitoring and reporting procedures in the operational EMP will address the findings of the EIS.

Operational EMP Commitment
DYNO NOBEL is committed to ensuring all operational phases of the project are managed appropriately to minimise ongoing impacts to the environment.

5.4 EMERGENCY RESPONSE PLAN

DYNO NOBEL is committed to achieving the highest performance in occupational health and safety with the aim of creating and maintaining a safe and healthy work environment. A draft Emergency Response Plan (ERP) will be developed as part of that commitment, in order to ensure that there is a defined set of arrangements to prepare for, respond to, and recover from any potential emergency situation.

Emergency Response Plan Commitment
DYNO NOBEL will ensure an emergency response plan is prepared that addresses potential emergency situations that may arise at the facility. The proponent is committed to ensuring all staff and visitors to the facility are aware of the ERP and the procedures to be undertaken in an emergency.

5.5 DECOMMISSIONING

Prior to decommissioning, a rehabilitation plan for this phase of the project will address specific remediation measures, with the aim of returning the site to it's original condition as far as practical. DYNO NOBEL is committed to ensuring rehabilitation is undertaken which will ensure environmental values consistent with the original condition of the site and the surrounding environment. The rehabilitation plan will provide detailed replanting and rehabilitation measures to return vegetation to the site and reduce erosion issues.

Decommission Response Plan Commitment
DYNO NOBEL is committed to the implementation of a decommissioning and rehabilitation EMP.

5.6 INTEGRATED ENVIRONMENTAL MANAGEMENT SYSTEM

Under the EP Act, an Integrated Environmental Management System (IEMS) is required when making a single application for multiple ERA's, referred to as an Integrated Licence. The proposed Facility involves multiple ERA's, as defined in the Environment Projection Act, 1994. These include >100,000 tonnes per annum Chemical Manufacturing and Chemical Storage >1,000m3.

An IEMS will be developed as part of the application for an ERA. The IEMS structure will be based on the International Environmental Management Standard ISO 14001. After formal issue, the IEMS will be a dynamic document for the duration of the operation of the facility, and will be regularly updated in consultation with the relevant authorities to incorporate changes in environmental management procedures in light of new technologies, legislation and environmental policies for DYNO NOBEL.

6. COMMUNITY CONSULTATION

Community and stakeholder consultation in the planning and design phase of any project is an important component, leading to an informed decision making processes throughout the whole life of a project (from inception to decommissioning). An appropriate community and stakeholder consultation plan needs to be developed and revised throughout and within all stages of the project to ensure it addresses all issues in a manner that best suits the community, stakeholders and the project at the local, regional, state and national level.

It is important to recognise the place of the project in the local, regional, state and national context in relation to community and stakeholder consultation. In particular at the local level, gaining an understanding of the project's impact on the local community (both positive and negative).

Planning

By providing the community with the opportunity to have input into the project planning stage (e.g. through the development of the EIS) the community begins to learn and understand the project and its objectives. The development of two-way communication channels allows the project to address community issues in relation to the project, decreasing the level of community anxiety and increasing the potential for community support. This is particularly important in the identification of impacts and the development of mitigation strategies in the Social Impact Assessment (SIA). Opportunities exist to support community events and address community needs as identified through these channels, increasing the level of support for the project in the community and with stakeholders.

Stakeholder consultation in the planning stage of a project allows the regulatory stakeholders to understand the project and influence project decision making to ensure approval are received in an efficient manner.

Construction

Building on the information identified in the planning stage, the community and stakeholder consultation during the construction stage of a project is important to keep the community and stakeholders updated with project timeframes and construction tasks that impact on them (e.g. road closures and environmental auditing reports). It is important to provide the community and stakeholders with communication channels to the project team, allowing them to ask questions and provide comment on impacts – creating a flexible process for the implementation of management and mitigation strategies.

Operation

Similar to the construction phase, it is important for two-way communication channels to be maintained between the project team and the community and stakeholders throughout the operational life of the project.

Decommissioning

The decommissioning of projects is an integral stage in the community and consultation program, and must be addressed through all phases of the project, not just at the decommissioning stage. It allows the community and stakeholders to prepare for the social and environmental impacts of the decommissioning.

7. COST & BENEFITS SUMMARY

With a total capital investment of approximately $350 million, the project will provide significant benefits both for the local, state and national economy. However, there will be some costs associated with the project including social and environmental costs. Costs & benefits are detailed below.

Local Costs & Benefits

The local economy of Moranbah will benefit considerably from the project, both directly and indirectly, as a result of the long-term employment that will occur during the operational phase of the development, and short-term employment during the required 22-month construction phase.

The plant has an expected life span of 35 years ensuring secure long long-term employment in skilled positions for employees, therefore proving a social benefit through the availability of long long-term employment opportunities. However, a social cost may arise through difficulties in providing accommodation for additional workers, particularly for the additional 400 workers required during the peak of the construction period. A social cost may also arise from the pressure on services in Moranbah through an increase in population. A cost to some members of the local community may arise through attracting employment away from the cattle industry, which is currently suffering from a skilled worker shortage in the region.

State Costs and Benefits

Importing of AN into the State will be reduced as a result of the project, resulting in an improvement in Gross State Product. Competition for explosives will be maintained at a state level through this facility, and the contribution to the economy of Australia from export earnings, taxes, salaries and purchases of goods and services during the construction and operation phase of the development will have a flow on effect for the economy at a state level.

National Costs and Benefits

Contribution to the economy of Australia from export earnings, taxes, salaries and purchases of goods and services during the construction and operation phase of the development will have a flow on effect for the national economy. The imminent listing of DYNO NOBEL on Australian Stock Exchange is also beneficial for the national economy. A potential natural cost associated with the project is air emissions, which may contribute to the national level of greenhouse gas emissions.

8. REFERENCE & DATA SOURCES

Queensland Government (2006) *Declared Significant Projects* [Web Document], http://www.coordinatorgeneral.qld.gov.au/major_projects/significant.shtm, accessed 2nd March 2006.

Department of Environment and Heritage (2006) Environment, Protection, Biodiversity and Conservation Act Search, http://www.deh.com.au