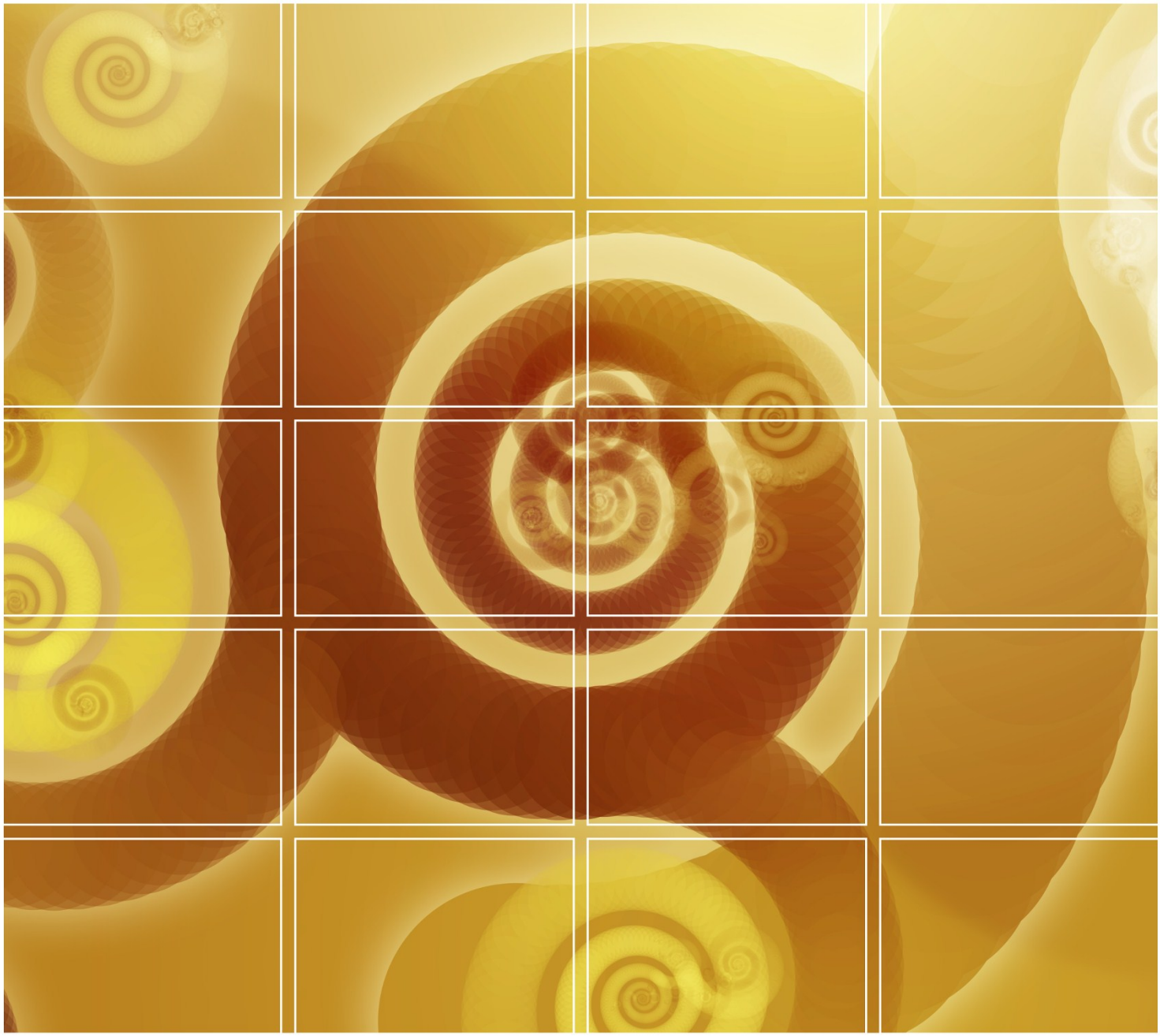

Ammonium Nitrate Storage and Distribution Facility

Environmental Impact Statement—Final Volume I

Crawfords Freightlines

December 2012

0143175

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FINAL REPORT

Crawfords Freightlines Pty Ltd

Ammonium Nitrate Storage and Distribution Facility *Environmental Impact Statement*

December 2012

Reference: 0143175

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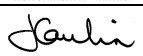
Signed:	
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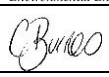
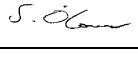
Signed:	
Date:	*18 December, 2012*
Approved by:	*Steve O'Connor*
Position:	Partner
Signed:	
Date:	*18 December, 2012*

Environmental Resources Management Australia Pty Ltd Quality System

Quality-ISO-9001-PMS302

Ammonium Nitrate Storage and Distribution Facility

Environmental Impact Assessment

Crawfords Freightlines

December 2012

0143175_Final

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SUBMISSION OF ENVIRONMENTAL IMPACT STATEMENT (EIS)

PREPARED UNDER THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

EIS PREPARED BY

Names: *Steve O'Connor*

Qualifications: *BTP (Hons), MSc (Hons)*
FPIA, CPP

Address: *53 Bonville Avenue,*
THORNTON NSW, 2322

in respect of: *Crawfords Freightlines Pty Limited is seeking approval to store and distribute 13,500 tonnes per annum of bagged Ammonium Nitrate at its Sandgate facility. The development includes minor building modifications to improve product storage and building material compatibility, construction of Water Sensitive Urban Design (WSUD) onsite stormwater treatment measures, minor site regrading, surface stabilisation, roof water capture/storage and installation of a wheel wash bay.*

DEVELOPMENT APPLICATION

Applicant Name: *Crawfords Freightlines Pty Limited*

Applicant Address: *158 Old Maitland Road,*
Sandgate NSW 2304

Land to be developed: *Lot 12 DP 625053*

ENVIRONMENTAL IMPACT STATEMENT

An environmental impact statement (EIS) is attached.

CERTIFICATE

I certify that I have prepared the contents of this Statement and to the best of my knowledge

- *it is in accordance with clause Part 3 6(f) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000;*
- *it contains all available information that is relevant to the environmental assessment of the development to which this statement relates; and*
- *it is true in all material particulars and does not, by its presentation or omission of information, materially mislead.*

Signature: 

Name: Steve O'Connor

Date: 18 December 2012

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ABBREVIATIONS

ACM	Asbestos containing materials
ADG	Australian Dangerous Goods Code
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
ALARP	As low as reasonably practicable
ALS	Australian Laboratory Services
AMG	Australian Map Grid
ANPI	Australian National Pollutant Inventory
ANZECC	Australian and New Zealand Environment Conservation Council
APZ	Asset protection zone
AQIS	Australian Quarantine and Inspection Service
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AS	Australian Standard
ASL	Above sea level
ASS	Acid sulphate soils
BCA	Building Code of Australia
BGS	Below ground surface
BoM	Bureau of Meteorology
BFHA	Bushfire Hazard Assessment
BTEX	Benzene, toluene, ethylbenzene, and xylenes.
CLM Act	*Contaminated Lands Management Act 1997*
CO_2-e	Carbon Dioxide equivalent
Crawfords	Crawford Freightlines Pty Ltd
dB	Decibel
DCP	Development Control Plan
DECC	Department of Environment and Climate Change (NSW)
DECCW	Department of Environment, Climate Change and Water (NSW)
DEWHA	Department of Environment, Water, Heritage and the Arts (Commonwealth)
DGRs	Director-General's Requirements
DP	Deposited Plan
DPI	Department of Planning and Infrastructure
DSEWPaC	Department of Sustainability, Environment, Water, Populations and Communities (Commonwealth)
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPA	NSW Environmental Protection Agency
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPI	Environmental Planning Instrument
EPL	Environmental Protection Licence
ERM	Environmental Resources Management Australia Pty Ltd

ESA	Environmental Site Assessment
ESD	Ecologically Sustainable Development
FDI	Forest Fire Danger Index
GDEs	Groundwater dependent ecosystems
GHG	Greenhouse gas
GPS	Global Positioning System
ha	Hectare
HAZMAT	Hazardous Materials
HIPAP	Hazardous Industry Planning Advisory Paper
HWC	Hunter Water Corporation
IBC	Intermediate Bulk Container
IMDG	International Maritime Dangerous Goods
INP	Industrial Noise Policy (EPA, 2000)
LEP	Local Environment Plan
LGA	Local Government Area
LiDAR	Light Detection and Ranging
LOR	Level of Reporting
LOS	Level of Service
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
MHF	Major Hazard Facility
NHVAS	National Heavy Vehicle Accreditation Scheme
NCC	Newcastle City Council
NEPM	National Environment Protection Measure
NES	National Environmental Significance
NGA	National Greenhouse Accounts
NOW	New South Wales Office of Water Group of DECCW
NPWS	National Parks and Wildlife Service Group of DECCW (NSW)
NP&W Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
NV Act	*Native Vegetation Act 2003*
NVIA	Noise and Vibration Impact Assessment
OCP	organo-chlorine
ODS	Ozone-depleting substances
OEH	Office of the Environment and Heritage
ORP	Oxidation-reduction potential
OPP	organo-phosphate pestices
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated biphenyls
POEO Act	*Protection of the Environment Operations Act 1997*
PHA	Preliminary Hazard Assessment
PM10	Particulate matter less than 10 microns
PMST	Protected Matters Search Tool
PSNC	Project Specific Noise Criteria
PSNL	Project Specific Noise Levels
RBL	Rating Background Level
RMS	Roads and Maritime Service

RTA	Roads and Traffic Authority
RF Act	*Rural Fires Act 1997*
RFS	Rural Fire Service
SEPP	State Environmental Planning Policy
SEPP 14	State Environmental Planning Policy 14 – Coastal Wetlands
SEPP 33	State Environmental Planning Policy No. 33 Hazardous and Offensive Development
SEPP 55	State Environmental Planning Policy 55 – Remediation of Land
SES	State Emergency Service
SFPP	Special fire protection purpose
SIS	Species Impact Statement
SMF	Synthetic mineral fibres
SMP	Crawfords Safety Management Plan
TEOM	Tapered Elemental Oscillating Microbalance
TDS	Total Dissolved Salts
TIA	Traffic Impact Statement
TRH	Total Recoverable Hydrocarbons
TSC Act	*Threatened Species Conservation Act 1995*
TSP	Total Suspended Particulates
UN	United Nations
Water Act	*Water Act 1912*
WCG	EPA Waste Classification Guidelines
WM Act	*Water Management Act 2000*
WHS Act	*Work Health and Safety Act 2011*

GLOSSARY

Acid Sulphate Soils	Soils and sediments containing iron sulfides, the most common being pyrite, that when exposed to air produce sulfuric acid.
Ammonium nitrate	A chemical compound NH4NO3, comprising of a white crystalline solid at room temperature. Commonly used in agriculture and as a oxidising agent in explosives.
Aquifer	A water bearing stratum of permeable rock, sand or gravel, able to transmit substantial quantities of water
B-Double	A semi-trailer truck consisting of a prime mover towing two semi-trailers.
Bioregion	Region in which the boundaries are primarily determined by (or reflect) similarities in geology, climate and vegetation.
Brackish	Water that comprising of a mix of freshwater and saline water.
Cleared Land	Where the native over-storey has been cleared, there is no native mid-storey and less than 50% of the groundcover vegetation is native species or greater than 90% of the groundcover (dead or alive) is cleared.
Community	The recognisable association of species that regularly occur together in similar environments.
Contamination	The presence of a minor and unwanted constituent
Critical Habitat	Habitat declared to be critical in relation to that species or ecological community under the *Threatened Species Conservation Act 1995* or under the *Environment Protection and Biodiversity Conservation Act 1999*
Day	The period from 7am to 6pm Monday to Saturday, and 8am to 6pm on Sundays and Public Holidays.
Director-General	Director-General of Department of Planning and Infrastructure, or delegate.
Endangered	A species, population or ecological community that is likely to become extinct or is in immediate danger of extinction.
Endangered Ecological Community	Ecological community specified as endangered under Part 3 of Schedule 1 of the *Threatened Species Conservation Act 1995* or under the *Environment Protection and Biodiversity Conservation Act 1999*.
Fauna	The animals of a particular region, habitat or geological region
Flora	The plants of a particular region, habitat or geological region
General Solid Waste	Either putrescible (ability to decay) or non-putrescible as per the definition of the waste classification guidelines (2009).
Greenhouse gas	A gas that contributes to the greenhouse gas effect by absorbing infrared radiation.
Groundwater	Water held underground in the soil or in pores and crevices in rock
Habitat	An area or areas occupied or periodically occupied by a species, population or ecological community and includes any biotic or abiotic component necessary to sustain survival and reproduction
Hazardous Waste	Containers that previously contained a substance of Class 1, 3, 4, 5 or 8 within the meaning of the Transport of Dangerous Goods Code, or a substance to which Division 6.1 of the Transport of Dangerous Goods Code applies, from which residues have not been removed by washing or vacuuming; coal tar or coal tar pitch waste comprising of more than 1% of coal tar or coal tar pitch waste; lead-acid or nickel-cadmium batteries; lead paint waste arising otherwise than from residential premises or educational or child care institutions

Hydraulic Conductivity	A coefficient of proportionality describing the rate at which water can move through a permeable medium.
Hydraulic Gradient	The change in total head with a change in distance in a given direction.
Indigenous	Native to, or originating in, a particular region or country.
Liquid Waste	Material that has an angle of repose of less than 5 degrees above horizontal; becomes free-flowing at or below 60 degrees Celsius or when it is transported; or is generally not capable of being picked up by a spade or shovel.
Mitigation	Activities associated with reducing the impacts of the project prior to or during those impacts occurring.
Native Species	A species that is indigenous to Australia or an external Territory, or periodically or occasionally visits .
Negligible	Small and unimportant, such as to be not worth considering.
Night	The period from 10pm to 7am Monday to Saturday, 10pm to 8am on Sundays and Public Holidays.
Noxious	Harmful to the environment or ecosystem.
Peak Periods	Time of highest frequency traffic movements.
pH	Measure of the acidity or alkalinity of a substance, with 1 being the most acidic, 7 being neutral and 14 being the most alkaline
Population	A group of animals or plants of the same species, potentially capable of interbreeding and sharing the same habitat in a particular area at a particular time.
Ramsar wetland	Under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth), a Ramsar wetland is either an Australian wetland on the List of Wetlands of International Importance kept under the Ramsar Convention; or a wetland declared to be a Ramsar wetland by the Commonwealth Environment Minister.
Rehabilitation	Making the land useful again after a disturbance. It involves the recovery of ecosystem functions and processes in a degraded habitat.
Relic	Any deposit, artefact, object or material evidence that: (a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and (b) is of State or local heritage significance.
Remediation	The removal of pollution or contaminants from environmental media.
Sediment	Any usually finely divided organic and / or mineral matter deposited by air or water in non-turbulent areas .
Sensitive Receiver	Locations that are particularly vulnerable to noise and vibration impacts.
Soil Profile	The physical and chemical features of the soil imagined or seen in vertical section from the surface to the point at which the characteristics of the parent rock are not modified by surface weathering or soil processes.
Species	A group of biological entities that (a) interbreed to produce fertile offspring; or (b) possess common characteristics derived from a common gene pool.
Special Waste	A class of waste that has unique regulatory requirements.

Terrestrial	Pertaining to land, the continents, and/or dry ground. Contrasts to aquatic
Topography	Description or representation of natural or artificial features of the landscape; the description of any surface, but usually the earth's
Underlain	A layer of rock or soil situated under.
Vulnerable	A species or ecological community that is rare, not presently endangered but likely to become endangered unless the circumstances and factors threatening its survival or evolutionary development cease to operate.
Watertable	The surface where the water pressure head is equal to the atmospheric pressure
Weed	A plant that is considered undesirable because it threatens the persistence of native plants
Wetland	Low-lying areas regularly inundated or permanently covered by shallow water. Usually important areas for birds and other wildlife.
Wildlife Corridor	A strip of habitat that facilitates fauna movement between otherwise isolated patches of habitat.

EXECUTIVE SUMMARY

Introduction

Environmental Resources Management Australia Pty Ltd (ERM) was commissioned by Crawfords Freightlines Pty Ltd (Crawfords) to undertake investigations and prepare an Environmental Impact Statement (EIS) in relation to a parcel of land located at 158 Old Maitland Road, Sandgate NSW (the site), known as Lot 12 in Deposited Plan (DP) 625053 for an Ammonium Nitrate (AN) Storage and Distribution Facility. The site is currently owned by Sierra Sun Pty Ltd, with portions of the site leased to Crawfords for their storage and distribution operations which is a permitted land use under the current zoning (IN3 Heavy Industrial (Newcastle City Council (NCC) Local Environmental Plan (LEP) 2012).

The EIS describes the project, outlines relevant statutory provisions, identifies the key issues and comprehensively assesses potential environmental and socio-economic impacts. It describes a range of management and mitigation measures to ensure that short term impacts are minimised and that there is a net benefit from the development in the medium to long term.

This EIS has been prepared to meet the requirements provided by the Director-General of the Department of Planning and Infrastructure (DPI) and to address issues raised by the relevant government authorities and other stakeholders. The assessment has focussed on issues with the potential to impact upon the environment as identified by the environmental risk assessment undertaken for the project.

Background

Crawfords has operated a storage and distribution facility for AN at the site since 2009. The development involves the storage of up to 13,500 tonnes of AN in existing warehouses and in an outdoor storage area within the grounds adjoining the warehouses. The storage of over 2,000 tonnes of any Chemical Substance requires a licence under the POEO Act 1997. The site also stores subsidiary mixed items and acts as a licenced quarantine facility. At present Crawfords are limiting the amount of AN stored on site to less than 2,000 tonne. Historically the site has operated at levels up to the proposed volumes.

A shipment of AN generally enters the country via the Port of Newcastle or the Port of Sydney. It then travels to the site via road (from the Port of Newcastle) or rail (from the Port of Sydney). The AN is stored on site and then distributed to various mining operations within the region via heavy transport vehicles.

Stakeholder Consultation

Various government agencies have been consulted in regards to the proposed storage facility including Newcastle City Council (NCC), the Office of Environment and Heritage (OEH) and the New South Wales Office of Water (NoW). St Joseph's Home, a nursing home to the north of the facility, has also been consulted.

Hazard Analysis - A hazard analysis was undertaken by Health and Safety Essentials (HSE) to identify the hazards involved in the storage and distribution of AN at the site. The analysis investigated individual fatality risk, injury risk and risk of property and accident propagation. This was based on scenarios involving storage, vehicle and truck movement and the use of the conveyor/auger. The hazard analysis demonstrated compliance with the qualitative principles for land use safety stated in Hazardous Industry Planning Advisory Paper (HIPAP) No 4. The risk associated with the operation of the site was seen to be 'As Low As Reasonably Practicable' (ALARP).

Infrastructure and services – The existing storage sheds have the capacity to store the proposed levels of AN. The proposal would involve minimal building works to upgrade existing facilities in accordance with AS 4326. In addition minimal construction activities are proposed to upgrade environmental controls such as a range of Water Sensitive Urban Design (WSUD) measures. These are proposed within the site to retain and filter stormwater runoff to reduce the concentrations and loads of stormwater pollutants discharging from the site. The measures include the capture and storage of stormwater from roof areas; construction of a wheel wash bay; construction of five sedimentation and biofiltration basins; site regrading for effective site drainage; and layering of aggregate over unsealed trafficable areas to reduce erosion and sedimentation disturbance.

Water – A Stormwater, Flooding and Receiving Water Quality Assessment was undertaken by BMT WBM and outlines objectives and requirements for stormwater control and improvement, flooding impacts and receiving water quality for the proposal. The assessment determines that existing stormwater drainage system would be inadequate for the purpose of capturing and conveying stormwater from the site to Newcastle City Council's standards as there is currently insufficient inlet capacity within the site to capture the design minor flows. The assessment identifies and recommends various engineered solutions and WSUD measures to ensure compliance with the Council's standards.

The assessment identifies that the site is at risk from Hunter River flooding. Events modelled include the 20 year (5%), 50 year (2%) and 100 Year (1%) Annual Exceedance Probability (AEP) and Probable Maximum Flood (PMF). BMT WBM investigated the potential impacts on water quality in the receiving environment that could result from the release of AN from the site under flood conditions.

It is predicted that the AN release from storage Sheds A, B and C would result in ammonia concentrations in the local area in excess of the relevant toxicity trigger value (TTV) provided by the ANZECC guidelines. The proposed building upgrades together with efficient and effective site emergency response plans will limit the amount of AN released from the storage sheds in the event of a flood.

Hazardous Materials – A HAZMAT assessment was undertaken by ERM and identified Asbestos Containing Materials (ACM), synthetic mineral fibres (SMF), lead paint, polychlorinated biphenyls (PCBs) and ozone-depleting substances (ODSs) at the facility. A number of control measures have been identified to minimise impacts from these items. An Asbestos Management Plan also prepared by ERM identifies control measures and responsibilities to minimise the risks of ACM and monitor the condition of ACM on site.

Contamination – A Phase 2 targeted Environmental Site Assessment (ESA) was undertaken by ERM and was based on the number of potentially contaminating activities identified in the Phase 1 ESA (ERM) that have historically occurred in the vicinity of the site. Elevated levels of ammonium and nitrogen were identified in the soil and groundwater in current and historic handling areas of ammonium nitrate. PAHS and metals were also identified in the fill material, however it was determined that this was not related to the site's current activities. Minor dissolved metal exceedances were identified in the groundwater which is thought to be caused by historic fill material. Elevated concentrations of Ammonia (as N) in groundwater are considered significant and warrant notification of the site under Section 60 of the Contaminated Land Management Act. At this stage these levels are not considered to cause risk to human health or impact upon drinking water sources.

Noise and Vibration – The operational noise impact assessment indicateds that calculated noise levels are at or below the daytime Project-Specific Noise Levels (PSNL). Impacts during the daytime period are not anticipated. Calculated noise levels may exceed the evening and morning shoulder period PSNL by up to 4 dB(A) during both calm and adverse meteorological conditions. Sleep disturbance (and awakenings) impacts potentially associated with maximum noise level events during the morning shoulder period are unlikely to occur. The construction noise impact assessment indicates that calculated noise levels are below the 'Highly Noise Affected Management Level' at all locations. During potential worst-case works, calculated noise levels are above the 'Noise Affected Management Level' at a limited number of locations; however are marginal and are not significant. Recommended mitigation measures have been given which reduce the evening PSNL and within 1 dB(A) of the morning shoulder period PSNL. The findings of the road traffic noise impact assessment indicates that calcualted noise levels associated with site vehicle movements are significantly below the relevant project-specific road traffic noise level criteria.

Vibration levels associated with the site are expected to be significantly below the relevant structural damage safe limits and human annoyance guideline values for both construction and operational phases of the project. The potential risk of vibration impacts is limited and the magnitude of any impacts will be insignificant.

Air Quality and Greenhouse Gas – The project would have minimal impacts on air quality in terms of dust deposition, annual average PM_{10} and TSP. All criteria investigated for the proposed increase in storage at the site found levels would be below the NSW EPA nominated criteria. Potential impacts from dust would be mitigated onsite to reduce impacts to surrounding receivers.

GHG associated with the project would be primarily from vehicle movement to and from site. Mitigation measures to reduce these impacts would come from efficiency of vehicles, driver behaviour and optimal loading.

Traffic – The increased volume of AN stored at the site would negate the need for a secondary storage site, therefore reducing the need to double handle material. This would result in less truck movements along public roads, creating a safer road environment. An analysis of the current and predicted local traffic environment found that the area's road network would be able to support the vehicle movements associated with the proposed facility until at least 2022.

Ecology – The wetlands surrounding the site although disturbed provide known and potential habitat for threatened fauna species and migratory birds. Elevated concentrations of nitrates and total phosphorus were recorded in the surrounding water bodies, with increased pH levels at the 2HD swamp. Impacts to weeds and water quality were recorded in the surrounding habitats however, the proposed operations are unlikely to significantly impact the surrounding habitat areas. A range of WSUD measures are proposed within the site to retain and filter stormwater runoff to reduce the concentrations and loads of stormwater pollutants discharging from the site. The measures include the capture and storage of stormwater from roof areas; construction of a wheel wash bay; construction of five sedimentation and biofiltration basins; site regrading for effective site drainage; and layering of aggregate over unsealed trafficable areas would improve site drainage and reduce nutrient load captured and discharged in stormwater. This would improve water quality.

Heritage – A search of various heritage databases failed to identify any listed indigenous or non-indigenous objects at the site. This was expected given the site is an operational industrial facility in a highly modified environment. A number of non-indigenous items are located with the local area. These items are not expected to be impacted upon by the proposed development.

Visual – The proposed development is located in an established industrial estate surrounded by modified wetland and road and rail corridors. The proposed works would not detract from the areas visual amenity, given the highly disturbed nature of the site.

Socio-economic – The proposed AN facility will have a positive economic impact through providing continued employment to the employees of Crawfords. It would also allow the operation of various mining operations in the Hunter Valley and further afield to continue blasting. Impacts to surrounding businesses would be negligible given the transport routes to and from the storage facility.

Bushfire – The Bush Fire Hazard Assessment found that the development can be managed to provide acceptable bush fire protection measures such that it meets the aims and objectives of Planning for Bush Fire Protection (NSW RFS 2006). Asset Protection Zones (APZs) have been incorporated to minimise the risk of spread of fire to the nearby wetlands.

Waste – The proposal would produce a number of different types of waste. Provided the mitigation measures set out in this EIS are followed, the site's waste would be managed in way that would not impact the surrounding environment.

Cumulative impacts – The proposed facility is located within an established industrial estate. Negative impacts to surrounding land users are not expected given the previous operations on the site and the various mitigation measures proposed. Consultation with the Roads and Maritime Services (RMS) has confirmed that the construction and operation of the Newcastle Inner City Bypass adjacent to the site would not impact upon the proposals. The operation of the storage facility would not place a strain on local, regional or global resources.

Environmental Management Plans

A site Environmental Management Plan (EMP) will be prepared for construction impacts and the operation of the AN storage and distribution facility to minimise potential environmental impacts. The CEMP and OEMP will comprise a range of management plans including a stormwater management plan.

Conclusion

Based on the extensive specialised investigations which have been undertaken, it was concluded that the proposed AN storage and distribution facility would have negligible adverse environmental and social impacts. This is largely due to the highly modified nature of the site, the minimal construction work required and the previous storage and handling of AN on site. It was also found the safety risks associated with the storage, handling and transportation of AN at the site were seen as acceptable and would not pose a risk to employees or surrounding land users.

1 BACKGROUND

This Chapter provides background information about the proposal, including its historical context and geographical setting. A description of the purpose and structure of this EIS is also provided.

1.1 INTRODUCTION

Crawfords Freightlines Pty Ltd (Crawfords) is seeking approval to store and distribute 13,500 tonnes (t) of bagged Ammonium Nitrate (AN) from existing warehouses at its Sandgate facility. Crawfords do not produce, process, or reprocess goods on site. Packaging operations are limited to decanting flexible Intermediate Bulk Containers (IBCs) of AN into bulk tipping trailers or bulk shipping containers.

The site is located at Lot 12 DP 625053 Old Maitland Road, Sandgate, New South Wales (NSW) and has an area of 8.77 hectatres (ha). A locality plan is presented as *Figure 1.1* and the proposal is shown in *Figure 1.2*.

Crawfords lease the majority of the site from Sierra Sun Pty Ltd, with a smaller portion, to the north of the administration buildings, leased by Scafflink Australia Pty Ltd (Scafflink). Crawfords lease the administration building and Sheds A, B, C and part of Shed D as well as the outdoor storage compounds adjacent to Sheds B and C. Crawfords sub-lease a dedicated section adjacent to Shed D to the Australian Quarantine Inspection Service (AQIS) (refer *Figure 1.2*).

1.1.1 Proposal Overview

The proposal is classified as 'State Significant Development (SSD)' under Part 4, Division 4.1 of the EP&A Act 1979. Division 4.1, clause 89C (2), states that *"A State Environmental Planning Policy (SEPP) may declare any development, or any class or description of development, to be State significant development."*

Clause 8(1b) of the *State and Regional Development SEPP 2011* declares development to be 'State Significant' if the development is specified in Schedule 1 or 2 of that policy. Clause 10(3) of Schedule 1 states:

*"Development for the purpose of the manufacture, storage or use of dangerous goods in such quantities that constitute the development as a major hazard facility(MHF) within the meaning of Chapter 6B of the Occupational Health and Safety Regulation 2001"(*OH&S Regulations). AN is classified as a Class 5 dangerous good.

The definitions listed in Chapter 6B of the OH&S Regulations states that a MHF is "*a facility at which Schedule 8 materials are present or likely to be present in a quantity that exceeds their threshold quantity.*" Schedule 8 lists AN with a threshold quantity of 2,500 t.

Client:	Crawfords Freightlines Pty Ltd		
Drawing No:	0143175h_EIS_C001_R0.cdr		
Date:	15/10/2012	Drawing size: A4	
Drawn by:	JD	Reviewed by: JC	

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Figure 1.1 - Locality Plan

Crawfords Freightlines Pty Ltd - Environmental Impact Statement

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney

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Figure 1.2 - Site Plan

Crawfords Freightlines Pty Ltd - Environmental Impact Statement

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney

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The proposal seeks approval for the storage and distribution of product above this threshold. Therefore the operation is defined as a MHF, which is considered to be 'State Significant Development'.

It is noted that the *Occupational Health and Safety Regulation 2001* has been repealed and replaced by the *Work Health and Safety Act 2011*. Notwithstanding this, the OH&S Regulations are still applicable until the provisions in the State and Regional Development SEPP are amended.

To facilitate the storage of a Class 5 dangerous good, Crawfords propose the following building modifications in accordance with AS 4326.

Sheds A and B:

Sheds A and B are of similar design and construction. They have reinforced concrete flooring with concrete bunding to a height of 0.550 metres (m) around the perimeter of the building, with the exception of doorways. Timber panelling is used to line the walls of Sheds A and B starting from top of the concrete bund wall and extending to a height of three metres. Steel sheeting lines the walls above the timber panelling to the intersection with the roof. The roofs of Sheds A and B have recently been replaced with steel and polycarbonate roof sheeting.

Precast concrete doors have been retrofitted to the rear access doors of Shed A and B to a height of three metres. This arrangement is also proposed for the two openings at the front of the buildings as a flood emergency response. The concrete panels will be securely placed within close proximity of the buildings and will be manoeuvred into place by forklift.

AS 4326 requires floors of storage areas shall have immediate access from outside the building. In addition stores should be constructed or treated by non-combustible materials that are resistant to attachment by oxidizing agents. The timber panelling that exists in Sheds A and B is considered to be a combustible material and is therefore incompatible with AS 4326. Crawfords propose to treat the timber to a height of three metres on the inside and outside of the building with reinforced concrete. The method proposed includes a method by vertically 'shotcreting' reinforcing mesh which has been fixed to the walls thereby effectively encapsulating the timber inside two layers of concrete and seal any gaps in the walls.

The only door which will not have concrete reinforcement will be the personal access door. This will be completely sealed on the outside of the building with one tonne sand bags in times of significant flooding.

Shed C is constructed differently to Sheds A and B. Shed C has reinforced concrete flooring. Steel sheeting lines the walls to the intersection with the roof and the roof is lined with Asbestos and polycarbonate sheeting.

Reinforced concrete panels to a height of three metres will be cast in situ and secured to new footings inside the existing steel sheeted walls of Shed C. This arrangement will ensure compliance with AS 4326 with regard to building material compatibility. Similar to Sheds A and B personal access doors will not be reinforced.

1.2 COMPANY PROFILE

Crawfords is a privately owned transportation company occupying sites as Sandgate and Singleton in NSW and Gracemere in Queensland. Crawfords is one of the region's leading suppliers of transport solutions and is one of three intermodal hubs based in Newcastle offering local, intrastate and interstate road transport. Crawfords is also a company operated rail service with access to Sydney Ports.

The Crawfords fleet consist of 47 trucks and five light vehicles. Heavy vehicles include table tops, semi-trailers, B-doubles and double road trains utilising over 160 trailers such as flat tops, skel trailers, tankers, tippers, tautliners, side loaders and specialised equipment.

The Sandgate facility is an AQIS approved premises with the capacity to handle anything from heavy mining machinery to fragile aircraft parts.

Crawfords service the mining, agricultural and manufacturing industries, specialising in Dangerous Goods (including Class 1) transportation.

1.3 HISTORY

1.3.1 Site History

A search of historical records was undertaken as part of the ERM's Phase I Environmental Site Assessment (Phase I ESA).

An aerial photograph dated 1954 from the NSW Department of Lands shows the site as undeveloped grass/wetland, with no distinct buildings, and a number of trees scattered across the site.

Aerial photographs detail no significant changes from 1954 to1959. The site remains as undeveloped grass/wetland however; there is evidence of increased standing water across the site. The areas surrounding the site remain undeveloped with the exception of The Great Northern Railway and Sandgate Cemetery. The area to the west of the site beyond the railway line appears to contain a significant amount of standing water. Aerials photographs from 1961 and 1965 (NSW Department of Lands) show the site unchanged.

A review of aerial photographs from 1974 (NSW Department of Lands) show the establishment of the site including Shed D, an administration building and a warehouse structure similar to Shed C. The site appears to be utilised as a storage facility with evidence of shipping containers scattered throughout the property. Given the infrastructure in the 1974 photographs, it is considered likely that the importation of fill material was required to level the site. The photographs shows significant developments surrounding the site including a landfill, warehouses, access tracks a transmission tower.

The 1983 aerial photographs illustrate that the site has undergone development to include Shed A, Shed B and an extension/refurbishment of Shed C. The remaining area appears to be utilised as a shipping container storage facility with access roads in general layout observed today. Reviews of 1993 and 2004 aerial photographs, as well as a Nearmap aerial photo dated 2011 show no significant changes to the development on the site.

1.3.2 Operational History

Prior to Crawfords occupying the site, it R&H Transport Pty Ltd then Toll Resources Pty Ltd operated a storage and distribution facility on the site similar to that which Crawfords currently operate. Until late 2011 Impact Fertilisers Pty Ltd occupied Sheds A and B where they stored and distributed bulk fertiliser.

Crawfords first occupied the site in December 2008. Prior to this Crawfords operated from their Singleton depot as a transporter of general freight and AN (no storage of AN occurred at the Singleton site).

In December 2008 Crawfords obtained a licence from WorkCover NSW for the storage of 10,000 t of AN (5,000t in shed D and 5,000 t in shipping containers in the outdoor storage compound to the south of Shed B).

In August 2010, Crawfords obtained the lease for Shed C which was previously held by Toll Resources. At this time Crawfords submitted an application to extend the WorkCover licence, which was granted in September 2010. The extended licence covered the additional storage of AN up to 13,500 t (5,000 t in Shed D; 3,500 t in Shed C; 1,500 t in shipping containers in the Shed C outdoor storage compound and 3,500 t in shipping containers in the outdoor storage compound to the south of Shed B).

In December 2011 following site inspections from Council and the EPA, Council issued the owners and occupiers of the premises a Notice of Intention to Give an Order. The terms of the proposed order were to "*cease use of the premises as a chemical storage facility, including but not limited to the storage of Ammonium Nitrate*." The EPA also issued a Notice of Preventative Action to Crawfords.

On 20 December the EPA issued a Variation of Prevention Notice. The Notice directed Crawfords to take the following actions:

- from 6 January 2012, maintain an accurate, up to date record of all chemical substances stored at the premises;
- between 6 January 2012 and 31 January 2012, Crawfords must not receive any AN products for the purposes of storage while the quantity of AN while the quantity stored at the premises exceeds 2,000 t or if the receivable of AN would cause the quantity stored at the site to exceed 2,000 t;
- by 1 February 2012, reduce in the quantity of AN products stored at the premises to below 2,000 t; and
- from 1 February 2012, maintain the total quantity of all chemical substances stored at the premises to below the quantities specified under Schedule 1 of the POEO Act under 'Chemical Storage'.

1.4 PROJECT APPLICATION AREA

1.4.1 Site Description

The proposal is situated in Sandgate approximately 10 kilometres (km) to the north-west of Newcastle Central Business District (CBD) and approximately 6.7 km west-north-west of industrial operations on Kooragang Island, NSW, within the local government area (LGA) of the City of Newcastle.

The site (Lot 12 DP625053) is located at the southern apex of a small industrial area at Sandgate (refer *Figure 1.2*). Access to the site is via Old Maitland Road, off the Pacific Highway.

The site is bound by the Main Northern Railway (Newcastle-Maitland (Hunter) railway line) to the west and south, where rail container deliveries are made; the Newcastle Inner City Bypass (Shortland to Sandgate) which is under construction to the south; Sandgate Cemetery and the Pacific Highway to the east and Old Maitland Road to the north; the Hunter River is situated approximately 820 m to the east between Sandgate and Kooragang Island. The site has an elevation that ranges between 1.35 m to 2.80 m Australian Height Datum (AHD).

Land Zoning

The site is zoned IN3 – Heavy Industry Zone in the Newcastle Local Environmental Plan (LEP) 2012. This zone applies to heavy industrial land, predominantly around Hexham and Sandgate. It is land where the type of industrial development is of high impact and is generally located away from other land uses. The proposal to store and distribute AN, aligns to the objective of the zone.

1.4.2 Land Use and Ownership

The site is owned by Sierra Sun Pty Ltd who leases the part of the site to Crawfords.

The site occupies a total area of 87.7 ha, of which, 3,197 m² is currently leased by Scafflink Australia.

Crawfords has a lease over Shed A, Shed B, Shed B outdoor storage compound; Shed C; Shed C outdoor storage compound and part of Shed D. The site accommodates the following land uses:

- Administration Buildings – Located in the eastern portion of the site these buildings consist of three sections; the northern, central and southern sections. An asphalt sealed car park is situated directly adjacent to the west;
    - Northern Administration Building – Currently leased by Scafflink Australia;
    - Central Administration Building – Includes a caretaker's office, men's amenities and private shift workers quarters; and
    - Southern Administration Building – Includes office areas and amenities.
- Wash Bay – This facility including a water treatment system located directly adjacent to the west of Shed D occupying an area of 280 m². This area is an extension of Shed D and is constructed of a reinforced concrete floor, exposed steel frame and metal cladding. Chemicals utilised within this area include solvents (degreaser) and chlorine (treatment recycled water) with approximate storage volumes of 20 litres (L) and 200 L, respectively;
- Workshop – Consisting of an area of approximately 1,000 m² to the south of Shed D. The workshop is an open area over a cement stabilised roadbase which currently houses three shipping containers utilised for storage, along with small volumes of containerised fuels and oils;
- Southern Storage Facility – Consisting of an area of approximately 17,500 m² in the southern portion of the site partly covered by asphalt and cement stabilised roadbase. This area is utilised for shipping container, aluminium and AN transit storage;
- Storage Yard – Currently occupies and area of 5,683 m² north of Shed A and is utilised for timber storage;
- Rail Siding – The site is connected to The Great Northern Railway by a rail siding which runs parallel to the site's western boundary. The siding is approximately 600 m in length; and

- Scaffolding Yard – Occupying an area of 3,197 m² currently leased and occupied by Scafflink Australia therefore not included in the investigation. This area is utilised as a metal scaffolding storage facility.

Shed C and its surrounds and Shed D are licensed to store 5,000 t of AN in each shed. The area to the south of Shed B is licensed to store 3,500 t of AN in shipping containers. Crawfords has taken over the lease of Shed A and Shed B. Hence, it is proposed to store AN in Shed A (4,500 t), Shed B (3,500 t), Shed C (3,500 t) and two outdoor compounds (1,000 t in each). It is proposed to have general storage in Shed D and general storage in outdoor storage areas.

The site is highly disturbed with negligible remnants of the natural environment. Such remnants come in the form of scattered and degraded vegetation at the edge of the site boundary. The remainder of the site comprises of buildings surrounded with hard stand material comprising of 30-50% asphalt and 50% concrete road base. The site has received large volumes of imported fill to raise, level and stabilise the ground surface conditions prior to and during construction of the facility.

1.4.3 Surrounding Land Uses

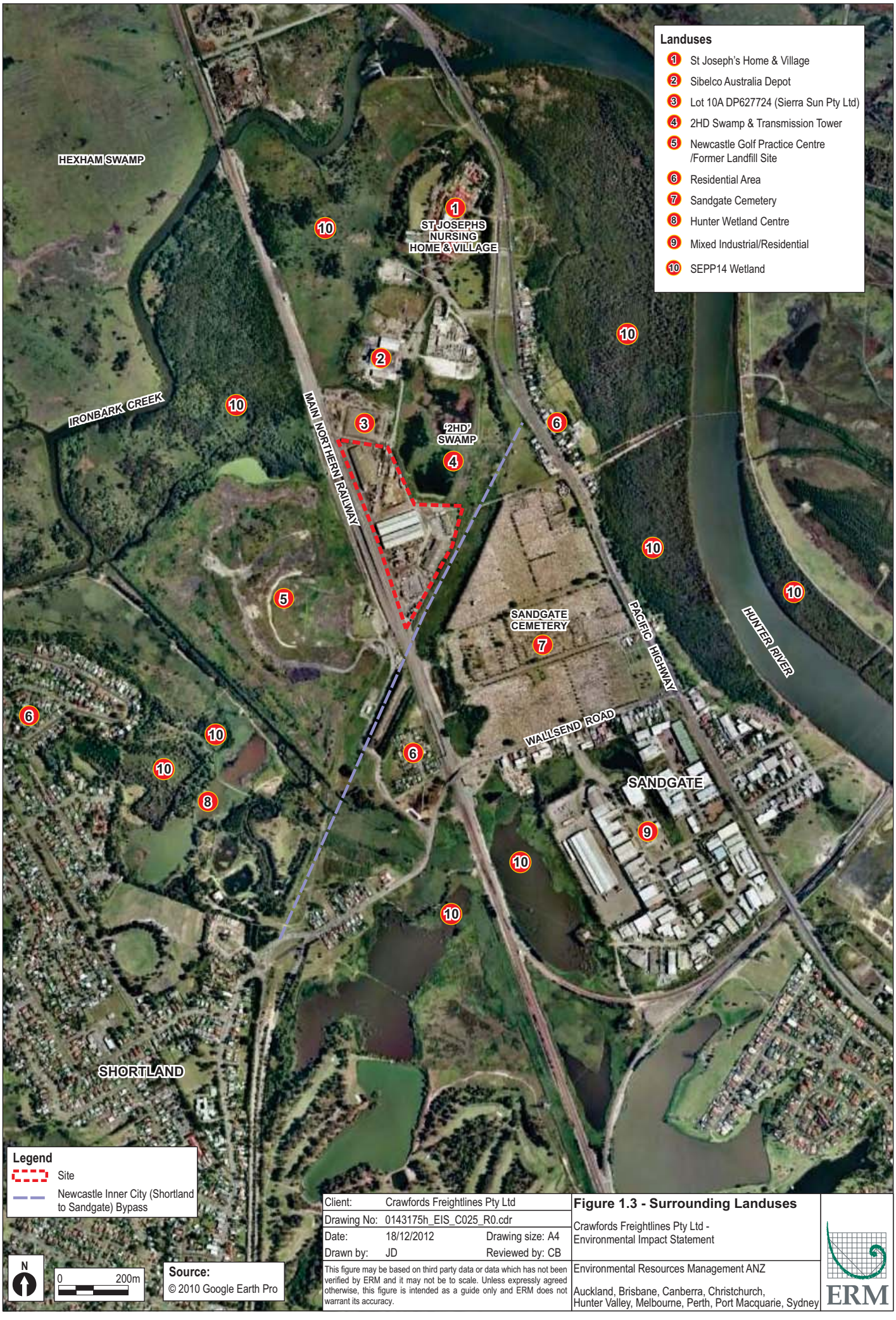
Land uses and activities directly surrounding the site are generally limited to minor industrial and commercial uses, wetland areas and residential areas (see *Figure 1.3*).

To the north of the site are industrial premises situated within the same industrial precinct as Crawfords. Further north of the site, in an elevated position on a hill is St Joseph's Home (residential aged care) and St Joseph's Village (independent living).

Immediately adjacent to the northern boundary is a portion of land owned by Sierra Sun Pty Limited which currently stores stockpiled magnetite, formally identified as Lot 22 in DP 627724. Beyond this parcel of land is the depot of a mining company, Sibelco Australia, approximately 200 m north of the site. Located immediately to the northeast boundary is wetland known as the "2HD Swamp" which is currently occupied by the 2HD transmission tower.

Immediately west of the site is the Main Northern Railway and beyond this Newcastle Golf Practice Centre and the former Council landfill site commonly known as Astra Street Landfill, Shortland. West of the Main Northern Railway are SEPP 14 Hunter Wetlands, which are classified as a Ramsar wetland of international significance.

To the south and southeast is a corridor of land which is currently under construction for the Newcastle Inner City (Shortland to Sandgate) Bypass. Further to the southeast is the Sandgate Cemetery and mixed industrial and residential areas. The nearest residential areas are located along the Pacific Highway approximately 300 m to the northeast of the site.



Client:	Crawfords Freightlines Pty Ltd		
Drawing No:	0143175h_EIS_C025_R0.cdr		
Date:	18/12/2012	Drawing size: A4	
Drawn by:	JD	Reviewed by: CB	

Figure 1.3 - Surrounding Landuses

Crawfords Freightlines Pty Ltd - Environmental Impact Statement

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney

ERM

1.5 OPERATIONAL DESCRIPTION

1.5.1 Material Description of Ammonium Nitrate

AN is a salt of ammonium and nitric acid. Crawfords import AN as a porous prill product (brands include Prillex, Detrapil, Nitropril) which comprises approximately 99% AN (NH_4NO_3) and 1% moisture and additives (refer to *Photograph 1.1* and *Table 1.1)*.

Photograph 1.1 Example of Prilled Ammonium Nitrate

Nearly all the AN product stored and distributed by Crawfords is imported via sea transport into Australia and therefore must comply with the International Maritime Dangerous Goods (IMDG) Code. Where AN in packaged form is carried, it must comply with all the specific and general requirements contained in the IMDG Code that relate to the material itself, the package in which it is shipped and the relevant stowage, segregation and consignment procedures.

In Australia, AN is classified under the Australian Dangerous Goods Code (ADG Code) 7th Edition, as 'Class 5 – Oxidising Agents and Organic Peroxides.' Subclass 5.1 of the ADG Classification Code states: "*oxidising agents; substances which, although not necessarily combustible, may readily liberate oxygen, or be the cause of oxidisation processes. As a result they may start a fire in other materials or stimulate the combustion of other materials thereby increasing the violence of a fire.*"

The AN stored and distributed by Crawfords is used as an explosive precursor in the mining industry therefore, it is of a very high quality and subject to strict security control.

Table 1.1 Ammonium Nitrate Classification

United Nations (UN) Number	1942
Proper Shipping Name	AMMONIUM NITRATE, with not more than 0.2% total combustible material, including organic substance, calculated as carbon to the exclusion of any other added substance
Dangerous Goods Class	5.1
Packing Group	III
Special Provisions	(306) This entry may only be used for substances that do not exhibit explosive properties of Class 1 when tested in accordance to Test Series 1 an 2 of Class 1 (united nations Manuel of Tests and Criteria, Part 1). *Test Series 1:* To determine if a substance has explosive properties *Test Series 2*: To determine if a substance is too sensitive for inclusion in Class 1

Source: ADG Code, 7th Edition

1.5.2 Receiving, Storage, Handling and Transportation

Receiving Product

Crawfords customers import product from different regions around the globe including South America, Scandinavia and Asia. Some product is secured locally from Orica on Kooragang Island. The imported bagged product is received via Port Botany, Sydney; Port of Newcastle and directly from Orica's batching plant on Kooragang Island. The proportion of product arriving via each of these locations varies depending on various commercial arrangements of Crawfords' customers. On occasion, imported AN is supplemented with surplus product taken from Orica, however this is an ad hoc arrangement only. The typical breakdown of supply source of inbound product is set out in *Table 1.2* .

Table 1.2 Typical Breakdown of Supply Source of Inbound Product

Supply Source	Type	Average Tonnes per annum
Sydney Ports	Bulka Bags in containers	21,000
Newcastle Port (M4 berth)	Bulka Bags as break bulk cargo	18,000
Kooragang Port (K2, K3 berths)	Bulka Bags as break bulk cargo	18,000
Orica Kooragang	Bulka Bags	As required

1. Crawfords have no current contractual arrangements in place with Orica for storage at Sandgate.

Once the shipment of product is on-route from these locations, Crawfords can commence organising storage and distribution logistics and timing. Historically, approximately 75,000 t is handled through the site per annum.

The bagged product is strictly controlled for sea transport under the IMDG Code. The receiving country will not accept a delivery if the product does not have the United Nations (UN) packing symbol on the bags which demonstrates that the bags have been manufactured and tested in accordance with the relevant UN Code. Chapter 6.5 of the IMDG Code relates to the '*Requirements for the Construction and Testing of Intermediate Bulk Containers (IBCs)'*. This chapter describes the construction and testing requirements for the standardised manufacture of flexible IBCs to ensure that each individual container or bag is appropriate for the transportation of dangerous goods, in this case AN. Therefore each bag that is received by Crawfords displays the UN packing symbol marking and a Certificate of Analysis verifying that the properties of AN supplied meet products description for classification (UN 1942) for each shipment of AN received. Flexible Intermediate Bulk Containers (IBCs) must be slit proof and water resistant or be fitted with a slit proof or water resistant liner.

IMDG Code states that "*the design type of each IBC shall be tested in accordance with procedures established and approved by the competent authority for each IBC design type before such an IBC is used. An IBC design type is defined by the design, size, material and thickness, manner of construction and means of filling and is charging but may include various surface treatments*" (IMDG Code, Chapter 6.5.4.1.1).

The types of tests that the Flexible IBCs undergo include:

- Bottom lift;
- Top lift;
- Stacking;
- Drop;
- Tear;
- Topple; and
- Righting.

The quality, strength and integrity of each flexible IBC is paramount in for the storage and distribution of a 'dangerous good' of this nature.

Port Botany, Sydney

- AN is received in flexible IBCs (1.0-1.25 t per IBC; 20 t per container) in shipping containers by rail from Port Botany, Sydney;
- the maximum shipment received at Port Botany is 400 t which is the maximum berth-limit at the Port;
- the container-wagons are delivered to the rail-siding at the site, lifted off by container-forklift and unloaded immediately into the warehouses so that empty containers can be returned as quickly as possible; and
- standard unloading time is one working day.

Port of Newcastle

- AN is received in IBCs (1.0-1.25 t per bag) through the Port of Newcastle as a break-bulk shipment (ie bags transported in hold of ship with no pallets and no shipping containers);
- the maximum shipment is 3,000 t which is the maximum berth-limit at the Port; and
- unloading is generally completed in 5 x 8-hour shifts using Crawfords fleet of single and double flatbed semi-trailers.

Orica, Kooragang Island

- AN is received at the site in IBCs (1.0-1.25 t per bag) on single and double flatbed trailers on timber pallets; and
- once the product is received on site it is stored in the warehouses or in shipping containers in the outdoor storage compounds.

Approximately 50% of activity on site accounts for the movement and storage of AN. Subsidiary storage products include:

- locally produced aluminium finished products which are packed into shipping containers for export. Products include billets, round bar and ingots. These products are received by road and dispatched on site by train;
- timber logs, received by road, dispatched on site by train;
- steel products received for One Steel at Hexham and Koorgang Island, received by train, dispatched by truck; and
- general freight such as large bulky machinery and equipment as requested by clients for storage and distribution.

Storage

General Arrangements

AN is required to be stored in accordance with the Australian Standard *AS4326-2008 Section 9 'Specific Requirements for Ammonium Nitrate'*. The Australian Standard sets requirements for the stacking and storing of AN to ensure that the product is stored safely. Crawfords propose to store AN in accordance with AS 4326, as required by WorkCover NSW. The following storage arrangements are proposed (see *Photograph 1.2*).

- maximum store capacity is less than 5,000t;
- maximum stack size of 500t;
- flexible IBCs stacked three-high (less than four metres), with each layer set-back by a half-bag from the layer below on all sides of the stack;
- separation between stacks of at least three metres;
- separation between outer wall of the building and the nearest stack of at least 1.2 m; and
- stores separated from the site boundary by at least 8 metres as required by WorkCover NSW.

In addition to the storage requirements AN is to be kept well clear of vegetation and other combustible materials for a distance of at least five metres around the external perimeter of the stores. The nearest vegetation is 30 m to the east of Shed A. Other storage areas are separated from vegetated areas by more than 60 m.

Proposed Storage Arrangements

The proposal involves the storage of up to 13,500 t of AN in existing warehouses and in containers located in dedicated outdoor storage areas (refer *Photograph 1.2* and *Photograph 1.3).*

- Shed A– 4,500 t (indoor only);
- Shed B – 4,500 t (3,500 t indoor and 1,000 t outdoor); and
- Shed C – 4,500 t (3,500 t indoor and 1,000 t outdoor).

<u>Shed A and Shed B</u>

Each shed occupies an area of approximately 4,440 m² (37m x 120 m) and were previously leased by Impact Fertilisers Pty Limited. Both sheds are generally constructed of reinforced concrete floors, exposed steel frames metal roof sheeting and timber/metal cladding to the walls.

Shed C and Shed D

Shed C with an area of approximately 3,120 m² (30 m x 104m) and consists of a main warehouse area utilised for the storage of AN. Shed D with an area of approximately 3,600 m² (40 m x 90 m) is partly used as a warehouse area for the storage of AN and general freight. To the western end of this building is a small office and an amenities area. Within the eastern section of is a quarantine inspection area. Both sheds are generally constructed of reinforced concrete floors, exposed steel frames and metal cladding to the walls and roof.

Photograph 1.2 General stacking arrangement inside Crawfords warehouse

Photograph 1.3 Stacking Arrangement inside Shipping Container within Storage Compound.

Photograph 1.4 Transportation of AN by Forklift

Photograph 1.5 Crawfords conveyor system.

Photograph 1.6 AN Transportation.

Product Handling and Transportation

As detailed above the bagged product arrives at the site via train or heavy vehicle.

Port Botany, Sydney

Crawfords operate a dedicated rail siding and the trains normally consist of 40 carriages each with a 20 tonne capacity. They arrive at the site an average of three times per week. The container-wagons are delivered to the rail-siding at the site, lifted off by container-forklift and the AN is emptied immediately into the respective stores so that empty containers can be returned as quickly as possible. The standard unloading and reloading time is one working day.

Port of Newcastle

One ship carrying AN is typically received at the Port of Newcastle per month. To unload the vessel will typically involve five of Crawfords B-double vehicles working in concurrent 12 hour shifts over a 24 hour period and requires 2 days to unload the product and deliver it to the site.

Product Handling on Site

The bags of AN are transported around the site and stacked in respective stores by forklift (refer *Photograph 1.4)*. The forklift carries the bags by the reinforced loop at the top which is the recommended method for transportation, loading and stacking.

Product Distribution

Depending on customer requirements, the AN is distributed in both flexible IBCs or is decanted form these bags into bulk transport trailers (refer *Photograph 1.5*).

AN is normally distributed from the site in flexible IBCs on flat-top trucks direct to Hunter Valley and other NSW mining areas. Single trailer vehicles carry up to 20 flexible bags (approximately 25 t) while B-double vehicles (two trailers) carry up to 30 flexible IBCs (approximately 37.5 t). The number of trucks per day varies depending on when a shipment of product is received, approximately three to four vehicles per day is typical to meet customer requirements.

The product is also distributed in bulk where the flexible IBCs are emptied into a hopper and transferred by a diesel powered conveyor and an electric screw conveyor (auger) into bulk carriers or transport trailers. This processing is conducted inside the sheds to ensure product quality is maintained. Approximately five bulk trailers per day are distributed in this manner with single trailer vehicles carrying approximately 23 t and B-double vehicles carrying approximately 35 t in total.

1.5.3 Plant and Equipment

The following plant and equipment are involved in the processing and transportation of AN at the site.

Conveyors

A diesel powered belt conveyor and an electric screw-conveyor (auger) are used to decant AN from the flexible IBCs to bulk transport trailers. Standards and Codes relating to handling of AN specify requirements for belt conveyor and electric screw-conveyors. These include:

- AS 4326-2008 The storage and handling of oxidising agents;
- Australian Explosives Industry and Safety Group: Code of good practice – Precursors for explosives – Section 6; and
- AS 2187.2-2006 Explosives – Storage and use – Use of explosives. Section 3.4.1.

A conveyor compliance audit was conducted in 2011 by Downer (Downer Reload Equipment and Amenities Compliance Audit). All areas of concern have been rectified to gain ongoing compliance with the mentioned Standards and Codes.

Maintenance and inspection is conducted after every 100 hours of use, which transfers to approximately every one to two months depending on demand.

Forklifts

Three 15 L diesel-powered forklifts are used to transfer AN between vehicles, shipping containers and storage sheds. The site has an additional eight forklifts for moving other items.

AS 4326 specifies requirements for the handling of AN by forklifts. A forklift compliance audit was conducted in 2011 by Downer (Downer Reload Equipment and Amenities Compliance Audit). All areas of concern have been rectified to gain ongoing compliance with the mentioned Standard.

Pre-start checks are conducted daily for each forklift. Maintenance is conducted by Crawfords mechanics every 250 hours.

Vehicles

Crawfords has a fleet consisting of over 47 trucks and five light vehicles. The types of trucks include Western Star, Volvo, Kenworth, Nissan UD, Scania, Mercedes and Isuzu. These vehicles range in engine size from 4.4 L to 15 L.

Crawfords operate a fleet of vehicles and undertakes maintenance of such vehicles under the National Heavy Vehicle Accreditation Scheme (NHVAS) which gives accreditation for recognising operators who have good safety and management systems in place. Trailers used to transport AN are licenced to transport dangerous goods by the NSW Office of Environment and Heritage (OEH).

1.5.4 Operating Hours and Workforce

The primary operating hours of the site are proposed as follows:

- Monday to Saturday, 06:00am to 22:00pm; and
- Saturdays and Sundays, 06:00am to 22:00pm if required.

Given the nature of the operations and deliveries at the site, activity a can occur outside these hours. Drivers and yard staff typically work between 06:00am and 18:00pm, while five yard staff operate the afternoon shift between 12:00noon and 22:00pm. Office staff work eight hour shifts between the hours of 06:00am and 18:00pm.

Crawfords at Sandgate employ 65 staff comprising of 30 drivers, 15 office staff and 20 yard staff. Given the nature of the operations, this number of workers is rarely present at the site at the one time.

1.5.5 Utilities

Site utilities include electricity, telecommunications and potable water. The site is serviced by reticulated sewer however a septic system for sanitary wastewater currently exists to the east of the administration building. Potable water is used for domestic and sanitary purposes, cleaning, fire protection and dust suppression.

The site is connected to the state electrical grid. Electricity provides the lighting to all Sheds, as well as various plant and equipment in the administration office and around the site.

1.6 DIRECTOR GENERAL'S REQUIREMENTS

The proposal was determined to be State Significant Development (SSD) to which Part 4, Division 4.1 of the EP&A Act applies. Director General's Requirements (DGRs) were issued on 16 February 2012 and are presented in *Table 1.3*.

Table 1.3 Director General Requirements

Description	Relevant Section in EIS
General Requirements:	
The Environmental Assessment Report must include: • An executive summary;	Start of report.
• A detailed description of the project including the:	*Section 1.5.*
• Need for the proposed development;	*Section 1.7.*
• Justification for the proposed development	*Section 1.7.1; Chapter 7.*
• Likely staging of the development	*Section 1.10.1.*
• Likely interactions between the development and existing and proposed operations in the vicinity of the site ;	*Sections 1.4; Section 5.14.*
• Plans of any proposed building works;	*Section 1.10.1*
• Consideration of all relevant environmental planning instruments, including identification and justification of any inconsistencies with the instruments;	*Chapter 3.*
• A risk assessment of the potential environmental impacts of the development, identifying the key issues for further assessment;	*Section 4.2*
• A detailed assessment of the key issues specified below, and any other significant issues identified in this risk assessment, which includes:	*Chapter 5*
• A description of the existing environment using sufficient baseline data;	*Chapter 5.*
• An assessment of the potential impacts of all stages of the development, including any cumulative impacts, taking into consideration any relevant guidelines, policies, plans and statutes; and	*Chapter 5.*
• A description of the measures that would be implemented to avoid, minimise and if necessary offset the potential impacts of the development, including proposals for adaptive management and/or contingency plans to manage any significant risks to the environment; and	*Chapter 5.*
• Consolidated summary of all the proposed environmental management and monitoring measures, highlighting commitments included in the EIS.	*Chapter 6.*
Key Issues:	
• **Hazards and Risks –** including an assessment of the hazards and risks associated with the existing and proposed operation on site (and the potential for off-site impacts) including details of hazardous materials use or kept on the premises. The EIS shall also include a screening of potential hazards on and off site to determine the potential for offsite impacts and any requirement for a Preliminary Hazard Analysis (PHA). Should potential off-site impacts be identified, a PHA must be prepared in accordance with the Department's *Hazardous Industry Planning Advisory Paper (HIPAP) No. 6 – Hazard Analysis and Multi-Level Risk Assessment*. The PHA should:: • Consider the risks form the facility; and • Demonstrate that the proposal would comply with the criteria set out in HIPAP No.4 - *Risk Criteria for Land Use Safety Planning*.	*Chapter 4.*

Description	Relevant Section in EIS
• **Strategic and Statutory Context** - including: • A detailed justification of the proposal and suitability of the site to be developed; and • Demonstration that the proposal is generally consistent with all relevant environmental planning instruments, development control plans (DCPs), and justification for any inconsistencies.	*Section 1.7.1, Chapter 3; Chapter 7.*
• **Infrastructure** – demonstrating that suitable arrangements are in place to provide the necessary local and regional infrastructure for the proposal.	*Section 1.7.1; Section 5.1.*
• **Soil and Water** – including: • An assessment of soil contamination including acid sulphate soils (ASS) and their management; • Measures to minimise the potential for leakage of AN and other chemicals stored on-site; • Details of proposed erosion and sedimentation controls; • A detailed assessment of potential soil, surface and groundwater impacts, particularly on nearby sensitive water sources/bodies; and • Details of water supply, wastewater management and disposal (if any), stormwater management and flooding impacts.	*Section 4.2.3; Section 5.1; Section 5.2; Section 5.3 Section 5.4; Section 5.9; Section 6.1.*
• **Air** - including odour during construction and operation and measures to reduce greenhouse gas (GHG) emissions on-site.	*Section 5.6: Section 6.1.*
• **Noise** – during construction and operational including traffic noise.	*Section 5.8.*
• **Waste** – including: • Identification of the quantity and type of waste that would be handled, stored, processed or disposed of at the facility; and • a description of how this waste would be stored or handled on site in accordance with the relevant guidelines and standards, and transported to and from the site.	*Section 5.9.*
• **Transport, Access and Parking** – including • details of all traffic types and volumes likely to be generated during construction and operation; • assessment of predicted impacts on road safety and the capacity of the road network to accommodate the facility including traffic counts, details of truck routes and modelling of key intersections; • assessment of where off-site infrastructure works are required as a result of traffic impacts including detailed plans of any proposed road upgrades; • access, including detailed consideration of various access options and justification for the proposed location of the main access points; and • parking.	*Section 5.10.*
• **Heritage** – including Aboriginal cultural heritage.	*Section 5.12.*
• **Design** – including details of building design and fit-out for handling chemicals and spill containment (e.g. bunding and vehicle loading/unloading areas).	*Section 1.1.1; Section 1.5.2; Section 1.5.3.*
• **Fire and Incident Management** – including technical information on the environmental protection equipment to be installed on the premises such as air, water and noise controls, spill clean-up equipment and fire management and containment measures.	*Section 4.3.2; Section 4.3.5, Section 4.4; Chapter 6.*
• **Cumulative Impacts** – particularly in relation to air, noise and traffic associated with other nearby industrial operations.	*Section 5.15*

Description	Relevant Section in EIS
During the Preparation of the EIS, you must consult relevant local, State, or Commonwealth Government authorities, service providers, community groups or affected landowners. In particular you should consult with the: • Newcastle City Council (NCC); • Environment Protection Authority (EPA); • NSW Office of Water (NOW); • Roads and Maritime Services (RMS); • Hunter Water Corporation (HWC); • WorkCover NSW; and • Newcastle Ports Authority. The EIS must describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.	*Chapter 2*

1.7 NEED FOR THE PROJECT

This proposal is requires approval to ensure the continuation of the operations on site. Crawfords service the mining, agricultural and manufacturing industries, specialising in heavy machinery and Dangerous Goods (including Class 1) transportation and is an integral link in the supply chain for these businesses.

The proposal will have significant positive environmental, social and economic benefits including:

- improved environmental efficiency through stormwater management systems upgrades and better management of noise and air quality at the Sandgate site by an improved focus on monitoring, operating procedures and upgraded infrastructure;
- provision of diverse employment and training options for the local workforce;
- economic benefits to various communities throughout the Hunter via value added spending (both direct and indirect);
- local assistance to local industries and businesses to ensure their continued success; and
- facilitation of an indirect benefit to employment of approximately 130 positions through supply and demand and contracts.

1.7.1 Alternatives and Justification

The Sandgate site is ideally situated given the type of operation proposed. Crawfords are significantly limited in terms of potential alternative sites for the storage and distribution of AN due to locational and safety criteria which must be satisfied. The criteria listed in *Table 1.4* were considered when alternative sites were researched.

The following alternative sites were considered as alternatives to the Sandgate site:

- Site No.1 – Sandgate – Preferred option;
- Site No.2 – Mayfield area – congested urban area with many conflicting land uses; and
- Site No.3 – Belford area – Greenfield land, significant start-up costs, inappropriately zoned for proposed use and ability to fragment compatible land uses.

Table 1.4 Project Locations Options and Alternatives

Criteria	*Site No.1 - Sandgate*	*Site No 2 - Mayfield*	*Site No.3 - Belford*
Land Availability and Zoning	The site is zoned IN3 – Heavy Industry Zone in the Newcastle Local Environmental Plan (LEP) 2012. This zone applies to heavy industrial land, predominantly around Hexham and Sandgate. It is land where the type of industrial development is of high impact and is generally located away from other land uses. The proposal to store and distribute AN, aligns to the objectives of the zone.	Industrial zoning with multiple conflicting neighbouring facilities. Multiple fragmented sites were required due to size limitations and separation distances of existing sites.	Rural 1(a) Zoned land. Use incompatible with zone objectives therefore prohibited in the zone.
Road Network and Traffic Safety	Traffic safety - proximity to Pacific Highway for direct and safe route to businesses and operations at the Port of Newcastle, Kooragang Island and Upper Hunter locations (avoiding unnecessary vehicle movements through residential, city centre and/ or congested areas);	A large number of truck movements would be required to traverse through densely populated residential areas with high traffic congestion, therefore increasing the transportation risk.	Significant additional travel from ports to site having an unfavourable impact on travel times. Additional vehicles required to maintain vessel discharge rates having an adverse effect on traffic flow and increased exposure to traffic related incidents. Concentrated movements of heavy and/or oversized vehicles traversing school, hospital, and residential zones.
Site Access and Traffic Safety	Traffic Safety - dedicated traffic signals on the Pacific Highway for ingress and egress for heavy vehicles entering and exiting the site travelling from both north and south along the Pacific Highway.	Restricted site access points due to smaller sites leading to congestion of local roads, school zones and visibility risks of motorists.	Requires construction of access roads and possible right of entry through privately owned land
Effective Transportation logistics	Rail Proximity and effective logistics – The site offers a dedicated company owned and run rail siding. This siding facilitates transportation of AN and other goods from Sydney to the site. It also enables Crawfords to utilise an empty carriages to return goods to Sydney at the customer's request thereby reducing heavy and sometime oversize	Due to no dedicated rail access, additional heavy and oversize vehicle movements would be required through local area leading to congestion and disruption to traffic flows.	No dedicated rail siding. Would rely on additional road movements.

Criteria	Site No.1 - Sandgate	Site No 2 - Mayfield	Site No.3 - Belford
	vehicle movements on roads which impact on traffic flows and lead to congestion.		
Sensitive Land Uses	Proximity to sensitive receivers – the nearest sensitive receiver is St Joseph's Home (residential aged care) and St Joseph's Village (independent living) together with a handful of residential properties fronting the Pacific Highway. The sites are at an acceptable distance having regard to the Hazard Analysis undertaken in accordance with HIPAP No. 4 and No. 6. Vehicle movements generated are not significantly different to typical traffic flows on the Pacific Highway.	Limited available fragmented sites have increased risk of proximity to residential areas and sensitive land uses such as schools, aged care facilities and hospitals.	The site is affected by bushfire prone land, and proximity to sensitive land uses being Singleton ARMY training camp.
Conflicting Land Uses	Conflicting site uses – the storage of AN as a dangerous good is sensitive to surrounding land uses. The neighbouring industrial land uses are of a nature that are out of the conflict zone or are compatible with storage requirements in accordance with AS 4326.	There is a greater risk of incompatible land uses of the fragmented sites, for example, mechanical workshops, fuel stations,	While there is a potential for greater separation to reduce risk, the introduction of a MHF in an incompatible zoning would fragment surrounding acceptable land uses.
Site Safety and Product Handling	Site Characteristics - warehousing facilities which are compatible with AS 4326 and WorkCover NSW requirements with regard to separation distances, stacking requirements and hazard mitigation.	Site and warehousing facilities were incompatible with AS 4326 with regard to separation distances and hazard mitigation.	No warehousing available, significant start-up costs would apply.
Site Safety and Security	Security - the purity of the AN stored and distributed poses a security risk, therefore the location and nature of the site facilitates enables a level of control over the product storage and transportation routes that is acceptable to WorkCover NSW.	Sites were in close proximity to built up urban areas, therefore greater risk on site safety and security.	Isolated site, longer incident response window, difficult to achieve effective random patrol staggered visits, no information sharing with neighbouring facilities. Distance from closest fully manned Police and Fire stations.

Criteria	*Site No.1 - Sandgate*	*Site No 2 - Mayfield*	*Site No.3 - Belford*
Access to skilled labour	The site is situated in a centralised location which has good access to skilled labour from the Newcastle area and Hunter Region.	The sites are situated in a centralised location which has good access to skilled labour from the Newcastle area and Hunter Region.	Minimal local labour available due to proximity of mining, possible high turnover of staff due to travel requirement
Access to infrastructure and services	Access to telecommunications, water and electricity have already been secured and are sufficient for the proposal.	Access to telecommunications, water and electricity are sufficient.	Access to telecommunications, water and electricity are limited and would require new connections.

Crawfords are aware of the sensitivity of the adjacent wetlands and the location of the site in the Hunter River Floodplain. Alternative sites have been considered by Crawfords, but these options were discounted for a variety of reasons including proximity to sensitive receivers and potential explosion risks, transporting product through congested and sensitive areas, noise impacts and incompatible land uses with regard to the consideration of AS 4326 and the policies of WorkCover NSW.

1.8 PURPOSE OF THE EIS

This assessment has been prepared to:

- provide relevant background information and describe the key components of the proposal;
- outline the legislative framework under which the proposal will be assessed;
- detail the consultation process undertaken for the proposal and demonstrate how issues raised have been addressed in the assessment;
- assess the potential environmental impacts of the proposal;
- identify measures to mitigate or negate potential adverse impacts;
- provide justification for the proposal; and
- provide sufficient information for the relevant agencies to make an informed decision on the matters raised by the DGRs.

1.9 STRUCTURE AND CONTENT OF THE EIS

This EIS has been prepared in accordance with the requirements of the EP&A Act and the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation). The EIS contains two volumes with the main environmental assessment being contained within Volume 1 and the supporting technical assessments in Volumes 2 and 3.

1.9.1 Volume 1: Environmental Assessment

Volume 1 has been prepared to ensure that the existing environment is described adequately, the potential environmental impacts are comprehensively assessed and existing mitigation measures as well as proposed additional mitigation measures are set out in detail.

This volume contains the following chapters:

Chapter 1 – Background: provides an overview of the development and a brief description of the history of development on the site; detailed description of the development discusses the need for the development and alternative options;

Chapter 2 – Consultation: describes the consultation process undertaken for the development;

Chapter 3 – Statutory Considerations: details the statutory context within which the development must be considered and the various other approvals required;

Chapter 4 – Hazards and Risks Assessment: investigates human, societal, land use and environmental hazards and risks associated with the proposal (and the potential for off-site impacts);

Chapter 5 – Environmental Assessment: details the existing environment of the site and surrounding areas, including land use, soils and geology, hydrology and water quality, climate and air quality, noise, flora and fauna, indigenous and non-indigenous heritage, and social and economic considerations. The potential impacts of these issues are also assessed;

Chapter 6 – Management and Mitigation Measures;

Chapter 7 – Proposal Evaluation and Justification;

Chapter 8 – Ecologically Sustainable Development; and

Chapter 9 – Conclusion.

1.9.2 Volumes 2 and 3: Technical Studies

Volume 2 contains 4 annexes as follows:

Annex A DGRs;

Annex B Hazard Analysis;

Annex C HAZMAT Reporting and Asbestos Management Plan;

Annex D Phase I and II Environmental Site Investigation and Assessment;

Volume 3 contains 10 annexes as follows:

Annex E Water/Flooding Impact Assessment;

Annex F Flora and Fauna (Ecology);

Annex G Air Quality Impact Assessment;

Annex H Greenhouse Gas Assessment;

Annex I Noise and Vibration Impact Assessment;

Annex J Traffic Impact Assessment;

Annex K Bushfire Hazard Assessment;

Annex L AHIMS search tool;

Annex M EPBC search tool; and

Annex N MSDS.

1.10 PROPOSAL SUMMARY

Crawfords seek approval to store and distribute 13,500 t of bagged AN at its Sandgate facility. Project components are described in *Section 1.4* and *Section 1.5*; a summary is provided in *Table 1.5* and *Table 1.6*; and project infrastructure components and proposed construction illustrated in *Figure 1.4*.

1.10.1 Staging of the Proposal

Construction

Minor building modification is proposed for Shed A, B and C to improve product storage and building material compatibility in accordance with AS 4326. A description of this is given in *Section 1.1.1.*

The construction of Water Sensitive Urban Design (WSUD) onsite stormwater treatment measures proposed include combinations of measures that retain and/or filter stormwater runoff. Coarse sediments will be captured in pre-treatment sediment basins, whilst finer pollutants would be intercepted within biofiltration basins. Bypass, overflow or filtered flow from these systems is proposed to then be discharged into the existing drainage system.

In addition, non-structural source controls including improved housekeeping, minor site regrading, surface stabilisation, roof water capture/storage and a wheel wash bay are proposed to reduce the loads of potential stormwater pollutants closer to the sources. A full description of stormwater works is included in *Section 5.3.*

Operational

Prior to the commence of any construction or operational activities Crawfords will undertake the necessary works to ensure that management plans and

mitigation measures have been developed and approved to the satisfaction of relative statutory agencies and all approvals and licences have been obtained.

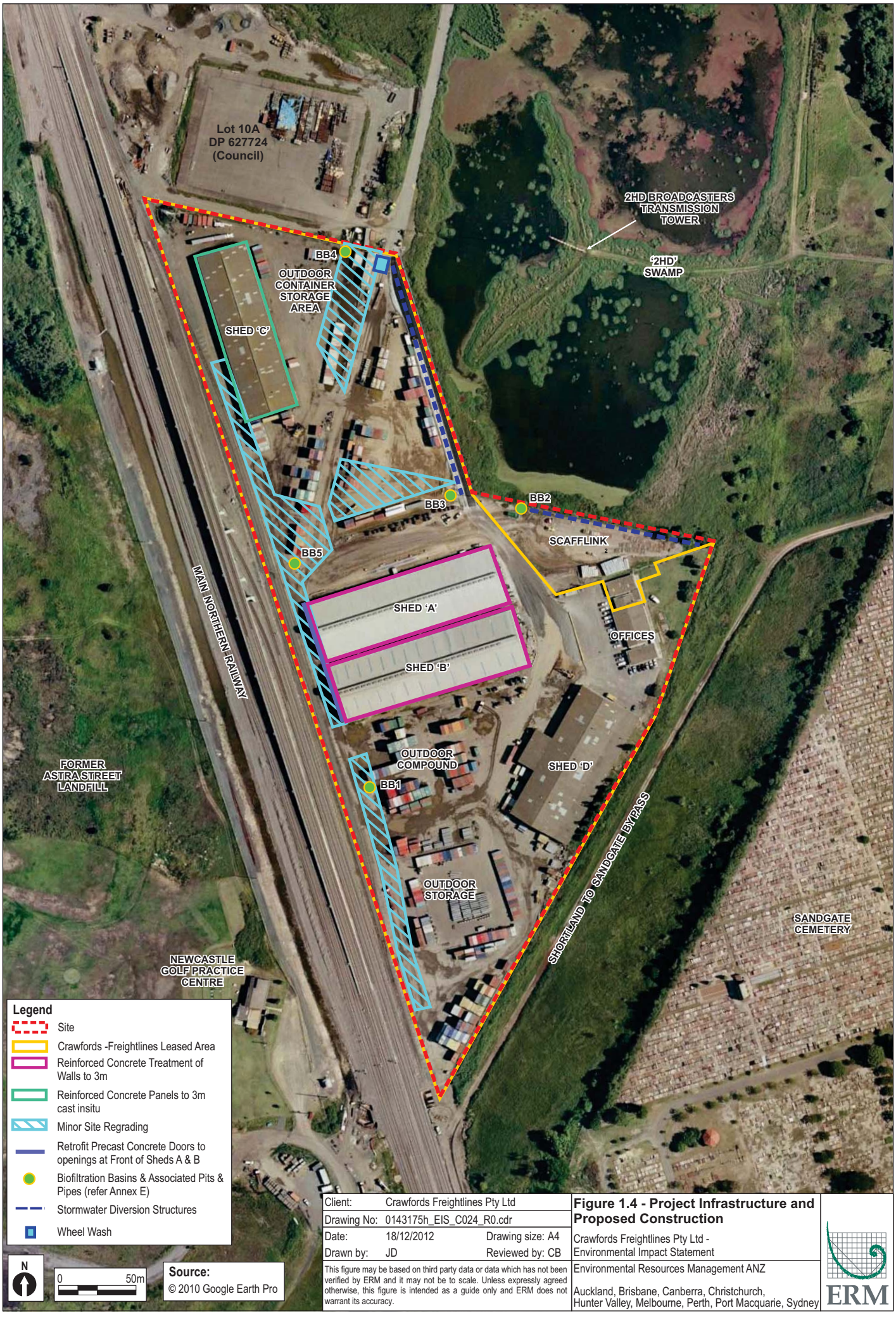
Table 1.5 Project Summary

Project Aspect	Proposal
Project Summary	• The project involves the storage and distribution of AN from existing warehouses at the Sandgate facility, minor building modifications and construction of stormwater management devices.
Capacity	• 13,500 tonnes of bagged AN, incorporating: • Shed A - 4,500t (indoor only); • Shed B – 4,500t (3,500t indoor and 1,000t outdoor); and • Shed C – 4,500t (3,500t indoor and 1,000t outdoor). General storage in Shed D
Land	• Lot 12 DP 625053, being 8.77ha
Construction	• Minor building modifications to existing Sheds A and B, including: • retrofitting precast concrete doors to the two openings at the front of Sheds A and B as a flood emergency response; • treatment of existing timber panelling to a height of 3 metres on the inside and outside of the buildings with reinforced concrete; • Within Shed C, reinforcing concrete panels to a height of three metres cast in situ and secured to new footings inside the existing steel sheeted walls.
Hours of Operation	• Monday to Saturday, 06:00am to 22:00pm; and • Saturdays and Sundays, 06:00am to 22:00pm if required
Capital Investment Value	• $600,000
Employment	• 65 FTE (30 drivers; 15 office and 20 yard) staff • 0.1 FTE construction staff
Equipment / Vehicles	• 47 trucks and five light vehicles; • two conveyors; • 11 forklifts;
Stormwater and Flooding Management	• Existing drainage system to be maintained and enhanced by: • minor site regrading and surface stabilisation; • roof water capture / storage; • layering of aggregate; • installation of a wheel wash; and • construction of Water Sensitive Urban Design onsite stormwater treatment measures, including pre-treatment sediment basins and biofiltration basins. •
Hazard Management	• In response to a 2% AEP, encasement of store perimeters with 250 micron four metre wide polythene construction membrane; and • supply of pre filled sandbags sufficient to construct 2m x 8m x 1m high internal seepage dam and additional supply of 250 micron four metre wide polythene construction membrane sufficient to line the seepage dam • In response to a 1% AEP, construction of an internal seepage dam adjacent to each vehicular access door.

Table 1.6 Existing and Proposed Site Infrastructure

Infrastructure	Existing	Proposed
Shed A	• recently leased by Crawfords; • until late 2011, occupied by Impact Fertilisers for storage and distribution of bulk fertilisers	• Storage of 4,500t AN indoors only; • Minor building modifications to existing Shed A, including: • retrofitting precast concrete doors to the two openings at the front of Sheds A and B as a flood emergency response; • treatment of existing timber panelling to a height of 3 metres on the inside and outside of the buildings with reinforced concrete; •
Shed B	• recently leased by Crawfords; • until late 2011, occupied by Impact Fertilisers for storage and distribution of bulk fertilisers; • licenced to store 3,500t AN (outdoor storage area only)	• Storage of 4,500t AN: 3,500t indoor, 1,000t outdoor; • Minor building modifications to existing Shed B, including: • retrofitting precast concrete doors to the two openings at the front of Sheds A and B as a flood emergency response; • treatment of existing timber panelling to a height of 3 metres on the inside and outside of the buildings with reinforced concrete;
Shed C	• Licenced to store 5,000t AN (3,500t indoors and 1,500t outdoors)	• Storage of 4,500t AN: 3,500t indoor and 1,000t outdoor • Minor building modifications to Shed C involving reinforcing concrete panels to a height of three metres cast in situ and secured to new footings inside the existing steel sheeted walls.
Shed D	• Licenced to store 5,000t AN (indoor) • Storage of general freight • Small office and amenities (western end) • Quarantine inspection area (eastern end)	• No AN storage; • General storage; • Small office and amenities (western end) • Quarantine inspection area (eastern end)
Administration Buildings	• Central administration building (caretakers office, men's amenities, private shift workers quarters) • Southern administration building (offices, amenities)	• No change
Drainage	• Underground pipe drainage discharging stormwater underneath the Main Northern Railway	• Existing drainage system to be maintained and enhanced by: • minor site regrading and surface stabilisation; • roof water capture / storage; • layering of aggregate;

Infrastructure	Existing	Proposed
		• installation of a wheel wash; and • construction of Water Sensitive Urban Design onsite stormwater treatment measures, including pre-treatment sediment basins and biofiltration basins.
Access	Rail: dedicated rail siding adjacent to the Main Northern Railway line Road: access off Old Maitland Road, Sandgate	• No change
Other	Outdoor storage areas Outdoor compound Wash Bay Workshop Southern storage facility Storage yard Rail sliding	• No change to existing • Wheel wash to be installed



Client:	Crawfords Freightlines Pty Ltd		
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Figure 1.4 - Project Infrastructure and Proposed Construction

Crawfords Freightlines Pty Ltd - Environmental Impact Statement

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney

ERM

2 CONSULTATION

Chapter 2 describes the consultation undertaken with key stakeholders including government authorities and the local community, so as to identify relevant issues associated with the proposed future use of the site.

2.1 GOVERNMENT AND AGENCY CONSULTATION

The DGRs listed the key government agencies to be consulted. The key agencies listed were:

- Newcastle City Council (NCC);
- Environmental Protection Authority (EPA);
- NSW Office of Water (NOW);
- Roads and Maritime Services (RMS);
- Hunter Water Corporation (HWC);
- WorkCover NSW; and
- Newcastle Ports Authority.

Consultation was undertaken with State government departments and agencies throughout the environmental assessment process. Consultation included formal briefings, presentations and ongoing information sharing to ensure that the EIS met key agency requirements. A chronology of the consultation undertaken is provided in *Table 2.1*.

Table 2.1 Summary of State Government Agency Consultation

Date	Agency	Method of Contact	Issues	Comments/Response/Actions
28 September 2011	NCC	Letter	ERM sent correspondence to NCC regarding the current situation at Crawfords Sandgate operations. The contents of the letter gave the background of current operations and sought Council's advice regarding the submission of a future development application to store and distribute AN.	Council responded on 10 January 2012 outlining the development procedures and stating that the proposal triggered SSD for which an EIS should be prepared.
2 December 2011	NCC and EPA	Site Inspection	Officers from Council and the EPA undertook an inspection at the premises occupied by Crawfords.	
6 December 2011	NCC and WorkCover NSW	Site Inspection	Officers from Council and WorkCover NSW undertook a further inspection of the premises.	WorkCover NSW advised that Crawfords held the appropriate licences required by WorkCover NSW and that the premise is identified as a '*Provisionally registered major hazard facility*'.
13 December 2011	NCC	Notice	Council issued the owners and occupiers of the premises a Notice of Intention to Give an Order. The terms of the proposed order are to "*cease use of the premises as a chemical storage facility, including but not limited to the storage of Ammonium Nitrate*".	
13 December 2011	EPA	Notice	The EPA issued a Notice of Preventative Action to Crawfords.	
14 December 2011	EPA and NCC	Meeting	Paul McGrath (Crawfords) met with a representative from the EPA regarding site operations and Environmental Protection Licence (EPL) requirements. Later the same day a meeting	

Date	Agency	Method of Contact	Issues	Comments/Response/Actions
			was convened between NCC, Crawfords and ERM to discuss Councils intention to serve a notice under Section 212 of the EP&A Act.	
16 December 2011	EPA	Letter	Crawfords provided the EPA with a letter detailing their plan to reduce the amount of AN stored on site to below 2000 tonnes, as required by the POEO Act.	
20 December 2011	EPA	Notice Variation	The EPA responded to Crawfords' letter with a Variation of Prevention Notice. The Variation of Preventative Action directs Crawfords to take the following actions: • from 6 January 2012, maintain an accurate, up to date record of all chemical substances stored at the premises; • between 6 January 2012 and 31 January 2012, Crawfords must not receive any AN products for the purposes of storage while the quantity of AN stored at the premises exceeds 2000 tonnes or if the receipt of AN would cause the quantity stored at the site to exceed 2000 tonnes; • by 1 February 2012, reduce in the quantity of AN products stored at the premises to below 2000 tonnes; and • from 1 February 2012, maintain the total quantity of all chemical substances stored at the premises to below the quantities specified under Schedule 1 of the POEO Act under 'Chemical Storage'.	Crawfords have undertaken all necessary measures in accordance with the Notice and are currently managing operations on-site to ensure that the quantities of AN on-site do not exceed 2,000 tonnes at any one time.

Date	Agency	Method of Contact	Issues	Comments/Response/Actions
22 December 2011	NCC	Letter	ERM prepared a submission to Council detailing a response to the concerns raised by Council and the EPA.	It provides a succinct summary of the current status of actions being taken to address the various concerns raised by the two agencies.
12 January 2012	DPI	Letter	ERM Prepared a submission to DPI requesting the DGRs for the Proposal.	
17 February 2012	DPI	Letter	Crawfords received notification of the DGRs.	
23 May 2012	NCC, EPA, RMS, NOW, DPI, WorkCover NSW, Hunter Water and Newcastle Port Corporation.	Letter	Formal consultation was undertaken in accordance with the DGRs. A letter was provided to each agency addressing their submission to the Director General in the preparation of the DGRs and requesting any feedback on the assessment approach proposed.	
31May 2012: 13:50pm	RMS	Telephone Enquiry	RMS enquired whether a traffic study was being conducted as part of the EIS and could the person undertaking the study make contact with the RMS? Has ERM seen the letter sent to DPI dated 06/02/2012 regarding the issues to be addressed as part of the EIS?	ERM advised that a traffic study will be undertaken by a sub-consultant as part of the EIS. ERM is aware of the letter and will address the issues raised.
13 June 2012	NCC	Meeting	Meeting held at NCC with Council's flooding engineers to discuss site design requirements and flood levels. Council informally discussed the Flood Planning Level (FPL) being the 1% AEP (1 in 100 year) plus 500 mm freeboard. Council reiterated that a Flood Information Certificate should be requested to confirm levels.	Flood Information Certificate requested and confirms site design levels.

Date	Agency	Method of Contact	Issues	Comments/Response/Actions
20 June 2012	EPA	Letter	EPA notes information provided in correspondence dated 23 May 2012 and confirms that the EPA's requirements were outlined in correspondence to the DPI dated 03 February 2012.	EPA requirements dated 03 February 2012 were provided as attachment 2 to the DGRS.
26 June 2012	NCC	Letter	Flood information Certificate received as requested	
19 July 2012	EPA	Letter	Following detailed discussions with DPI, EPA and OEH to try and resolve who was responsible for water quality associated with a flood event, a letter was received from the EPA detailing that their regulatory role is limited to that under the POEO Act 1997. Further the letter states that the "EPA has no specific requirements relating to the management of flood events."	Further liaison with agencies resulted in the meeting on the 1 August 2012.
1 August 2012	NCC, EPA, OEH, NOW	Meeting	• ERM briefed all agencies on the Proposal and requested feedback on specific issues such as the flood impact assessment methodology and modelling scenarios. • OEH stated that a risk analysis of likelihood v consequence is to be undertaken; • OEH and EPA stated that best defence is flood and emergency management and is the key to reducing risks and that a plan is to be developed; • NOW advised that they defer to OEH for assessment of flood risks; • Crawfords consultant advised that it is not normal practice to deal with water quality when looking at flood issues but due to the	Crawfords and their consultants have taken into account the advice received.

Date	Agency	Method of Contact	Issues	Comments/Response/Actions
			nature of the site and proximity of sensitive receivers, the assessment will demonstrate risk and consequence; • The EPA's role is to look at pollution and licencing aspects and therefore EPA will be looking at water quality standards being maintained for a 1:20yr event; • EPA and OEH further discussed that risk to likelihood of AN being release in an event would be the prime consideration and that the 1% flood event over the life of the proposal is small, therefore there is a focus on the consequences; • EPA would be looking at results within the 95 th percentile of the ANZECC guidelines and the need to document current conditions of recovering waters, in addition to acute values which are key in a major flood event; and • EPA, NOW and OEH agreed that the 1% flood event is the key concern for the proposal. However the PMF must still be considered and a discussion provided regarding the direction of flow over-topping the Pacific Highway at Sandgate.	
12 November 2012	DPI, EPA, OEH, RMS, NoW, NCC, NSW Workcover	Letters	• Comments from agencies relating to their review of the draft EIS.	The EIS has been amended to address comments from agencies on the draft EIS.
21 November 2012	DPI	Meeting	• Meeting to discuss agency feedback following a review of the draft EIS. A key issue	The hazard analysis and Chapter 4.3 of the EIS have been amended to incorporate the methodology

Date	Agency	Method of Contact	Issues	Comments/Response/Actions
			discussed was the methodology of the hazard analysis and DPI requirements.	requirements of the DPI and address other comments from DPI.
11 December 2012	RMS	Meeting	• RMS adequacy comments requested additional modelling of traffic impacts and other issues to be addressed.	RMS were satisfied that their concerns had been addressed in the Traffic Report. RMS agreed that additional modelling was not required. The Traffic Impact Assessment (*Annex J*) has been modified to include the correct Intersection Summary data.

2.2 COMMUNITY

A selection of sensitive receptor locations were identified as part of the Noise and Vibration Impact Assessment (NVIA) (refer *Annex I*) (ERM, 2012e), and are detailed in *Table 2.2*. The locations were selected as they are considered to be representative of the closest and/or potentially most affected receptor locations near the site, where operational, construction and road traffic noise and vibration levels may be assessed. With the owner's consent, ERM deployed noise loggers at selected receptor locations, generally within the front boundary setback of selected residential properties. Calling cards were left at the property detailing ERM's contact details if any questions arose regarding the equipment or proposal in general. No calls or correspondence were received.

Table 2.2 Sensitive Receptor Locations

	Description	Direction from site	Distance from Site (m)	Contact/ Communication
1	Residential receptor located on Blanch Street[1]	South-west	907	Calling card left. No contact received.
2	Residential receptor located on Astra Street[1]	South	574	Calling card left. No contact received.
R6	Residential receptor located on the eastern side of the Pacific Highway[1]	East	523	Calling card left. No contact received.

1. Refer NVIA (ERM, 2012e) Annex I

In accordance with Section 112(2) of the EP&A Act, the EIS will be placed on exhibition to facilitate public comment. The EIS will be exhibited for a minimum of 30 days, with members of the public, stakeholders and government agencies invited to make a submission.

Crawfords will have the opportunity to respond and address issues raised during the public exhibition period. The DoPI will consider all submissions and responses prior to determining the development application.

3 STATUTORY CONSIDERATIONS

This Chapter details the approvals required and the statutory context in which the project must be considered. The details of existing permits and approvals are also covered.

3.1 COMMONWEALTH LEGISLATION

3.1.1 Environmental Protection Biodiversity Conservation (EPBC) Act 1999

The EPBC Act requires approval of the Commonwealth Minister for the Environment for actions that may have a significant impact on matters of national environmental significance (NES). The EPBC Act also requires Commonwealth approval for certain actions on Commonwealth land. Matters of national environmental significance under the Act include the following:

- World Heritage properties;
- National heritage places;
- Ramsar wetlands;
- Threatened species or ecological communities listed in the *EPBC Act*;
- Migratory species listed in the *EPBC Act*;
- Commonwealth marine environment; and
- Nuclear actions.

Relevance to Proposal

A search of the EPBC protected matters tool was undertaken on 4 May 2012. The search included a 5 km buffer around the proposed storage facility. A summary of results is located in *Table 3.1*.

Table 3.1 Assessment of potential impacts from the proposed works to Matters of National Significance

Factor	Impact
World Heritage Properties There are no World Heritage Properties located at the development site or within the surrounding 5km buffer.	Nil
National Heritage Places There are no National Heritage Places located at the development site or within the surrounding 5 km buffer	Nil
Ramsar Wetland The development is located within a 5km buffer of the Ramsar listed Hunter Estuary Wetlands (the Hunter Wetlands Centre Australia and the Hunter Wetland National Park - Kooragang).	**Refer to *Chapter 5***
Threatened Species or Ecological Communities listed in the EPBC Act There is one threatened endangered ecological community and 24 identified threatened species located within a 5 km surrounding buffer of the development site.	**Refer to *Section 5.5***
Migratory Species listed in the EPBC Act There has been 40 identified migratory species within a 5 km buffer zone of the development site.	**Refer to *Section 5.5***
Commonwealth Marine Environment There are no Commonwealth marine areas located at the development site or within the surrounding 5km buffer.	Nil
Nuclear Actions The development does not involve nuclear actions and is not located within a 5 km buffer of an area of nuclear action.	Nil
Great Barrier Reef Marine Park The development is not located within the Great Barrier Reef Marine Park or within a 5 km buffer.	Nil

The site is not listed as or located on or adjacent to a World Heritage property or a National Heritage place. The land is not designated as Commonwealth land and nuclear actions are not listed within 10 km of the site. There is a Ramsar listed Wetland in the local area. Potential impacts to the wetland are discussed in *Chapter 5*. Database searches indicate there are a number of threatened ecological communities, and a number of Commonwealth listed threatened species and migratory species recorded within a 10 km radius of the site. An assessment of whether the development will have or is likely to have a significant impact on these matters of national environmental significance is provided in the ecological assessment as outlined in *Section 5.5*.

3.1.2 Work Health and Safety Act 2011

It is noted that the *Occupational Health and Safety Regulation 2001* has been repealed and was replaced with the national *Work Health and Safety Act 2011* (WHS Act). The WHS Act states the legal obligations that must be complied with to provide for the health and safety of workers.

Relevance to Proposal

The definitions listed in Chapter 6B of the OH&S Regulations states that a Major Hazard Facility (MHF) is "*a facility at which Schedule 8 materials are present or likely to be present in a quantity that exceeds their threshold quantity.*" Schedule 8 lists Ammonium Nitrate with a threshold quantity of 2,500 t, therefore Crawfords site, induction and operational procedures have been prepared and are consistent with this Act, Regulations and the special considerations for a MHF.

3.1.3 National Greenhouse and Energy Reporting Act 2007

The *National Greenhouse and Energy Reporting Act 2007* ('NGER Act') establishes a national framework for Australian corporations to report greenhouse gas emissions, reductions, removals and offsets, and energy consumption and production, from 1 July 2008. The NGER Act requires corporations that control facilities emitting 25 Kilotonnes (25,000t) or more of greenhouse gas (CO_2 equivalent) per year to register and report their greenhouse gas emissions.

Relevance to Proposal

A Greenhouse Gas Emissions Assessment (GHG Assessment) (ERM, 2012d) (refer *Annex H*) has been completed for the proposal and the total annual emissions have been calculated as being 7,606 t CO_2–e / annum which is under the reporting trigger threshold of 25 Kilotonnes. Crawfords will not be required to register the company or operations under the NGER Act.

3.1.4 Australian Heritage Council Act 2003

The Australian Heritage Council Act (2003) establishes the Australian Heritage Council as an independent advisory body regarding National/Commonwealth heritage places and mandates the Council to maintain the Register of the National Estate to promote the assessment and conservation of heritage items.

Relevance to Proposal

The Hunter Estuary Wetlands are located to the west and south-west of the site and are listed under the Register of the National Estate. Impacts to the Hunter Estuary Wetlands are discussed in *Section 5.5.*

3.2 NEW SOUTH WALES LEGISLATION – ACTS AND REGULATIONS

3.2.1 *Environmental Planning and Assessment Act 1979 and Environmental Planning and Assessment Regulations 2000*

The relevant planning legislation for NSW is the *Environmental Planning and Assessment Act 1979* (EP&A Act). The EP&A Act instituted a system of environmental planning and assessment in NSW and is administered by the Department of Planning and Infrastructure.

The provisions of the EP&A Act and the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) enable the preparation of local environmental plans, development control plans, regional environmental plans and State environmental planning policies to control development at the local, regional and State level.

Relevance to Proposal

The proposal is classified as 'State Significant Development (SSD)' by the Minister under Part 4, Division 4.1 of the EP&A Act. This requires the preparation of an EIS under Schedule 2 of the EP&A Regulations. Division 4.1, clause 89C (2), details that *"A State Environmental Planning Policy (SEPP) may declare any development, or any class or description of development, to be State significant development."*

Clause 8(1b) of the SEPP - State and Regional Development 2011 (SEPP S&RD) declares development to be SSD if the development is specified in Schedule 1 or 2. Clause 10(3) of Schedule 1 states:

*"Development for the purpose of the manufacture, storage or use of dangerous goods in such quantities that constitute the development as a major hazard facility within the meaning of Chapter 6B of the Occupational Health and Safety Regulation 2001"(*OH&S Regulations). Ammonium Nitrate is classified as a Class 5 dangerous good.

The definitions listed in Chapter 6B of the OH&S Regulations states that a Major Hazard Facility (MHF) is "*a facility at which Schedule 8 materials are present or likely to be present in a quantity that exceeds their threshold quantity.*" Schedule 8 lists Ammonium Nitrate with a threshold quantity of 2500 t.

The Crawfords Proposal is to store and distribute 13,500t of AN. Therefore the operation is defined as a MHF, which is considered to be SSD.

It is noted that the OH&S Regulations referred to above has been repealed and is replaced with the WHS Act discussed in *Section 3.1.2*. Notwithstanding this, the OH&S Regulations are still applicable until those provisions in the State and Regional Development SEPP are amended.

3.3 STATE ENVIRONMENTAL PLANNING POLICIES

State Environmental Planning Policies (SEPPs) support the EP&A Act and detail policies for regions and development types within NSW. The SEPPs that are relevant to this proposal are outlined in the following sections.

3.3.1 State Environmental Planning Policy - State and Regional Development 2011

Clause 8(1b) of the SEPP S&RD declares development to be 'State Significant' requiring assessment by the Minister of Planning under Part 4 of the EP&A Act. The proposal relates to a Schedule 1 activity being for the storage of a dangerous good in such quantities that constitutes a MHF.

The SEPP S&RD notes that development control plans (DCPs) do not apply to SSD. This is because development control plans are generally concerned with local or specific issues and do not provide appropriate planning controls for large, complex developments of importance to the State or region.

3.3.2 State Environmental Planning Policy 33 – Hazardous and Offensive Development (SEPP 33).

SEPP 33 aims to ensure that in considering any application to carry out potentially hazardous or offensive development, the consent authority has sufficient information to assess whether the development is hazardous or offensive and to impose conditions to reduce or minimise any adverse impact. SEPP 33 applies to any development which falls under the policy's definitions of 'potentially hazardous industry' or 'potentially offensive industry'. The following documents assist Councils and proponents to determine whether SEPP 33 applies to a development:

- *Applying SEPP 33 - Hazardous and Offensive Development Application Guidelines'* (SEPP 33 guidelines) (DUAP, 1994); and
- the NSW Department of Planning and Infrastructure (DP&I) guidelines (Hazardous Industry Planning Advisory Papers (HIPAPs).

Sub clause 3 of SEPP 33 provides the following definition for *"potentially hazardous industry":*

potentially hazardous industry *means a development for the purposes of any industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality:*

(a) to human health, life or property, or

(b) to the biophysical environment,

and includes a hazardous industry and a hazardous storage establishment

Sub clause 2 of SEPP 33 states that in determining whether a development is:

(a) a hazardous storage establishment, hazardous industry or other potentially hazardous industry, or

(b) an offensive storage establishment, offensive industry or other potentially offensive industry,

consideration must be given to current circulars or guidelines published by the Department of Planning relating to hazardous or offensive development.

Applying SEPP 33

One of the relevant guidelines published by DP&I referred to above is "Applying SEPP 33". In defining the development, Table 1 in the section on "Risk Screening" refers to Class 5 (ammonium nitrate), the table then refers to Table 3 "General Screening Threshold Quantities" in which Class 5.1 has a screening threshold of 5 tonne for AN – 'elsewhere'.

In the notes below Table 1 it states that "Table 1 indicates that Table 3 is to be used: If the quantity is in excess of the quantity listed in Table 3, the development is potentially hazardous.

In addition, the last paragraph on page 21 of the guideline states:

"If any of the above tests result in a screening threshold being exceeded, the proposed development should be considered potentially hazardous and SEPP 33 will apply. In such cases, a preliminary hazard analysis (PHA) is required to be submitted with the development application. The PHA should be prepared in accordance with Hazardous Industry Planning Advisory Paper (HIPAP) No. 6 – Guidelines for Hazard Analysis."

In reviewing Table 2 – *"Transport Screening Thresholds" of the guideline "Applying SEPP 33"*, the threshold for the transportation of Class 5 - AN may also be exceeded. Table 2 refers to cumulative or annual number of vehicle movements greater than 500; or peak weekly movements greater than 30. If these values are exceeded a route evaluation study would be required to be undertaken.

Relevance to Proposal

Crawfords was previously licensed and is proposing to store up to 13,500t of AN, which is well in excess of the threshold quantity of five tonnes stated in Table 3 of the guideline, the land use is considered to be "potentially hazardous". In addition based on proposed traffic movements the thresholds for traffic movements would also be exceeded.

An assessment of the degree of hazard or offence has been undertaken in accordance with the SEPP 33 guidelines by Health and Safety Essentials (HSE) (HSE, 2012) (see *Chapter 4* and *Annex B*). The guidelines state that the degree of hazard or offence should still be considered as a matter under Section 79(c) of the EP&A Act.

Offensive Development

A development is potentially offensive if, in the absence of safeguards, it would emit a polluting discharge resulting in significant offence. Applying SEPP 33 recommends that the following be considered when assessing whether a development is potentially offensive:

- *Does the proposal require a licence under any pollution control legislation administered by the EPA? If so, the proposal should be considered potentially offensive;*
- *Does the proposal require any pollution control approval pursuant to any legislation or by-law administered by the Council?; and*
- *If a pollution control licence or approval is not required, does the proposal cause offence having regards to the sensitivity of the receiving environment?*

In assessing the potential offence of a development, the consent authority should use information on the quantity and nature of any discharges capable of causing significant offence. In the assessment, the nature of surrounding land use and proposed safeguards should also be considered.

The Proposal is defined as a "Scheduled Activity" under Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act) and therefore requires an Environment Protection Licence (EPL). Therefore the proposal is considered to be potentially offensive. *Section 6.1* details safeguards and measures to be implemented to ensure that the proposal would not emit a polluting discharge resulting in a significant offence.

3.3.3 State Environmental Planning Policy 14 – Costal Wetlands (SEPP 14)

The aim of SEPP 14 is to ensure that coastal wetlands are preserved and protected in the environmental and economic interests of the State.

Relevance to Proposal

The site is within close proximity of a SEPP 14 - Coastal Wetland (840). The boundary of the wetland is on the western side of the Main Northern Railway, outside the footprint of the development proposal area however there is potential for site run off and stormwater to be discharged to this wetland. Consideration of the likely impacts on the wetland is detailed in *Section 5.5*.

3.3.4 State Environmental Planning Policy – Infrastructure 2007 (ISEPP)

The aim of ISEPP is to facilitate the effective delivery of infrastructure across the State. In doing so the ISEPP identifies matters to be considered in the assessment of development adjacent to particular types of infrastructure development, and provides for consultation with relevant public authorities about certain development during the assessment process or prior to development commencing.

Relevance to Proposal

Clause 104 (3) of the ISEPP states that before determining a development application for development identified in Schedule 3 - 'traffic generating development,' the development must be referred to the Roads and Traffic Authority (RTA) (now known as the RMS). Schedule 3 states that 'freight intermodal facilities and freight facilities' of any size or capacity must be referred to the RMS for comment. Referral of the proposal was initially undertaken by the DPI and a letter was also sent to RMS to identify any potential issues. A Traffic Impact Assessment (TIA) has been completed by Better Transport Futures (BTF, 2012) (*Annex J*) and is further detailed in *Chapter 5*.

3.3.5 State Environmental Planning Policy 55 – Remediation of Land (SEPP 55)

SEPP 55 requires a consent authority to consider, at the development application stage, the potential for contamination to adversely affect the suitability of a site for its proposed use. The policy states that land must not be developed if it is unsuitable for a proposed use because it is contaminated. If the land is unsuitable, remediation must take place before the land is developed.

Relevance to Proposal

A Phase I Environmental Site Investigation (ERM, 2012h) and a Phase II Environmental Site Assessment (ERM, 2012i) (refer *Annex D*) have been undertaken over the site as contamination of soil and water was raised as a key issue by government authorities.

The site is located in, and surrounded by, areas of historical industrial land use with a number of current and potentially contaminating processes identified both on and off site. Contamination sources were found to be generally associated with the historical storage of AN, historic storage and handling of hydrocarbon based fuels, historic storage and handling of general fertiliser and possible impacts related to historic filling processes on and adjacent to the site.

Further discussion and results of the Phase I and Phase II assessments is provided in *Chapter 5*.

3.3.6 Other Planning Policies and Guidelines

NSW 2012, A Plan To Make NSW Number One (NSW 2012)

NSW 2021 is a ten year plan that replaces the State Plan as the NSW Government's strategic business plan. It is based around five strategies:

- rebuild the economy;
- return quality services;
- renovate infrastructure;
- strengthen the local environment and communities; and
- restore accountability to Government.

The Proposal would meet the goals of NSW 2021 by providing critical materials to the State's mining operations to support the growth of the NSW mining sector and create ongoing jobs in regional communities.

The proponent has considered all other relevant local planning instruments relevant to the Proposal including the Lower Hunter Regional Strategy 2006, Hunter Rivers Catchment Plan 2007 and Newcastle 2030.

3.4 OTHER STATE LEGISLATION

3.4.1 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) is the key piece of environment protection legislation administered by OEH. The POEO Act provides for a system of EPLs for scheduled development work and activities, as well as the ability to issue environmental protection notices for pollution and waste management. Environmental offences are also described under the POEO Act.

Relevance to Proposal

The Proposal is defined as 'general chemical storage' which has the capacity to store more than 2,000 t of chemicals. It is therefore classified under Schedule 1 as a "Scheduled Activity" and requires an EPL.

3.4.2 Contaminated Lands Management Act 1997

The general objective of the *Contaminated Lands Management Act 1997* (CLM Act), is to establish a process for investigating and (where appropriate) remediating land that the EPA considers to be contaminated significantly enough to require regulation under Division 2 of Part 3 of the Act.

Under Section 60 a person whose activities have contaminated land or a landowner whose land has been contaminated is required to notify EPA when they become aware of the contamination.

Part 3 (a) states a person is required to notify the EPA under subsection (1) or (2) only if:

*(i) the substance contaminating the land (the **contaminant**) or any by-product of the contaminant has entered or will foreseeably enter neighbouring land, the atmosphere, groundwater or surface water,*

(ii) the regulations prescribe for the purposes of this subparagraph, or the guidelines specify, a level of the contaminant or by-product in the neighbouring land, atmosphere, groundwater or surface water,

(iii) the level of the contaminant or by-product after that entry is, or will foreseeably be, above the level prescribed or specified and will foreseeably continue to remain above that level

Relevance to Proposal

The results of the Phase 2 ESA (ERM, 2012i) require the site to be notified to the EPA. Elevated concentrations of Ammonia in groundwater are considered to be significant and warrant notification of the site under Section 60 of the CLM Act. Results, improvements and management practices are further discussed in *Chapter 5*.

It is noted that the Section 149 Planning Certificate obtained from Newcastle City Council advises that the parcel of land immediately north of the site, Lot 10A DP627724, is currently subject to an ongoing maintenance order issued by the EPA: Maintenance of remediation notice under Section 28 of the CLM Act Notice Number:28026.

3.4.3 Water Management Act 2000

The *Water Management Act 2000* (WM Act) and *Water Management (General) Regulation 2011* incorporates the provisions of various Acts relating to the management of surface and groundwater in NSW, and provides a single statute for the regulation of water use and works that affect surface and groundwater, both marine and fresh. The WM Act is administered by the NSW Office of Water (NOW).

Areas of the state where water sharing plans have commenced are subject to the WM Act. Where water sharing plans have not commenced, the provisions of the *Water Act 1912* apply.

Relevance to Proposal

The site is located within the Newcastle Water Source under the *Water Sharing Plan (WSP) for the Hunter Unregulated and Alluvial Water Sources* and thus the provisions of the WM Act apply One of the main strategies in the WSP is to establish environmental water rules. In 2009 the Department of Water and Energy (DWE) published Water Sharing Rules for the Hunter Unregulated and Alluvial WSP. These rules apply to all surface water in the water source, as well as the alluvial groundwater that is highly connected to the surface waters.

As detailed in *Section 3.4.2*, the site is required to be notified to the EPA as a contaminated site. To understand the level of potential contamination ERM undertook the installation of monitoring bores over the site (refer to *Annex D).* The Water Sharing Rules published by DWE states that the rules do not apply to works for monitoring, environmental management purposes or remedial work. The bores installed by ERM are not for the purposes of extracting or taking water and the proposal does not require the extraction of water for operations. Potential impacts to the regional and local surface and groundwater systems have been addressed in detail in *Chapter 5* and in the Stormwater, Flooding and Receiving Water Quality Assessment in *Annex D*. It is noted that under Section 89(J) of the EP&A Act, SSD does not require a water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the WM Act.

3.4.4 Environmentally Hazardous Chemicals Act 1985

The Environmentally Hazardous Chemicals Act 1985 (EHC Act) provides the legal framework to allow the regulation of a hazardous chemicals throughout its entire life cycle.

Section 20 of the EHC Act states that an authority may make a chemical control order (CCO) after assessing a chemical or a prescribed activity in relation to an environmentally hazardous chemical or a declared chemical waste. The CCO sets the requirements for various activities including manufacturing , processing, distribution, use, sale, transportation, storage and disposal of chemicals and chemical wastes. This can include the requirement for a person to hold a licence for a prescribed activity.

3.4.5 Water Act 1912

With regard to water sources (rivers, lakes and groundwater aquifers) in NSW where water sharing plans have not been gazetted and commenced, the *Water Act 1912* (Water Act) still regulates new water licences and the trade of water licences and allocations.

Once the water sharing plan (WSP) commences, the licensing provisions of the WM Act will come into effect in the water sharing plan area. This means that existing Water Act licences are converted to WM Act water access licences and water supply works and use approvals.

The site is located within the Newcastle Water Source under the *Water Sharing Plan (WSP) for the Hunter Unregulated and Alluvial Water Sources 2009*, see *Section 3.4.3.* The WM Act regulates licences and approvals in this area.

However, some provisions of the *Water Act 1912* remain applicable and groundwater monitoring bores are required to be authorised by a Part 5 licence under the *Water Act 1912*.

3.4.6 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NP&W Act) guides the management of conservation areas as well as the protection of native vegetation, native fauna and Aboriginal objects across the State. Under the NP&W Act it is illegal to move, damage, deface or destroy a relic without written permission from the OEH.

Relevance to Project

Notwithstanding Section 89(J) of the EP&A Act where SSD does not require an Aboriginal heritage impact permit (AHIP) under section 90 of the NP&W Act, a search of the Aboriginal Heritage Information Management System (AHIMS) was undertaken on 12 July 2012. The search was undertaken for the subject site and surrounding 50 m buffer. Results indicated that no Aboriginal sites or places have been recorded or declared in the searched area. A copy of the search is located in *Annex L.*

3.4.7 Heritage Act 1977

Cultural, natural and built heritage is protected in NSW under the *Heritage Act 1977*. The Act, under Section 22(1) allows for heritage items or places to be listed on the State Heritage Register, and for interim heritage orders to be made to protect heritage items or places. Under Section 139(1) of the Act, a person must not disturb or excavate land if they know, or have reasonable cause to suspect, that they might discover, expose, move or damage a relic, unless they have an excavation permit.

Relevance to Project

Notwithstanding Section 89(J) of the EP&A Act where SSD does not require an approval under Part 4 or an excavation permit under section 139 of the Heritage Act, a review of the state heritage register and database has been undertaken and results of the search are listed in Section 5.12.

The Proposal does not involve any construction or excavation work that would impact a heritage item.

3.4.8 Threatened Species Conservation Act 1995

Projects determined by a statutory authority of the NSW Government are required to be assessed in accordance with the EP&A Act as amended by the *Threatened Species Conservation Act 1995* (TSC Act). The TSC Act lists threatened species, populations and ecological communities under Schedules 1 and 2 of the Act, that are priorities for conservation within NSW. The potential impacts on threatened species have been considered in accordance with the requirements of the TSC Act and the EP&A Act.

Section 5A of the EP&A Act, outlines seven points which must be considered in order to determine the significance of the impact of the development on the habitat of threatened species, populations and ecological communities. This assessment is commonly referred to as an 'assessment of significance'. Where the proposed development is likely to significantly affect critical habitat of a threatened species, population or ecological community, or is in critical habitat, as defined by Part 3 of the TSC Act, a species impact statement must be prepared to accompany the development application.

The proposed storage site of AN is located on highly disturbed land that has previously been developed for a storage facility. The proposed development will not result in the removal of native vegetation on site. An assessment of the study areas flora and fauna is provided in *Section 5.5.*

3.4.9 Fisheries Management Act 1994

The objectives of this Act are to conserve, develop and share the fishery resources for the benefit of present and future generations. The Act looks:

a) to conserve fish stocks and key fish habitats, and

b) to conserve threatened species, populations and ecological communities of fish and marine vegetation, and

c) to promote ecologically sustainable development, including the conservation of biological diversity.

The development is located adjacent to a catchment that contains a variety of different fish habitats. The proposal would not include any works that would impose on these habitats. However there is the potential for impacts to occur during a flooding event. Potential impacts are discussed in *Section 5.5.*

It is noted that under Section 89(J) of the EP&A Act, SSD does not require an approval under section 201 (approval to dredge), 205 (regulation of harm on marine vegetation) or 219 (passage of fish not to be blocked) of the Fisheries Management Act.

3.4.10 Roads Act 1993

The *Roads Act 1993* deals with the use of public roads in New South Wales. The development does not involve any alterations to the existing public road network. The proposal would involve truck movements using public roads and a TIA (BTF, 2012) has been undertaken to review potential impacts caused to the network refer to *Section 5.10* and *Annex J.*

3.4.11 Dangerous Goods (Road and Rail Transport) Act 2008.

The *Dangerous Goods (Road and Rail Transport) Act 2008* makes provision for safety in the transport of dangerous goods by road and rail as part of the system of nationally consistent road and rail transport laws.

Part 2 of the *Dangerous Goods (Road and Rail Transport) Act 2008* stipulates that both vehicles and the drivers of trucks holding Dangerous Goods are sufficiently licenced. Crawfords have ensured that all vehicles in the company fleet and drivers employed by the company have valid licences for the transportation of Dangerous Goods.

3.4.12 Explosives Act 2003

The Council of Australian Governments introduced the Australian Standard for the storage and handling of oxidising agents (AS 4326-2008) principles for the storage of AN which have been adopted by states and territories. Given differences in regulatory requirements between states, the Standard refers to State regulators for advice on operation, location and security of AN.

In NSW the licencing of AN facilities is conducted by WorkCover NSW under the *Explosives Act 2003*. WorkCover NSW applies the requirements of the AS 4326-2008 when considering licences. A licence would be required prior to the use commencing. The design of the AN storage and facilities have been designed in accordance with AS 4326.

3.4.13 Rural Fires Act 1997

The main objectives of the *Rural Fires Act 1997* are to:

- prevent, mitigate and suppress bush and other fires in NSW;
- co-ordinate bushfire fighting and bushfire prevention throughout the State;
- protect people from injury or death and property from damage and as a result of bushfires; and,
- protect the environment.

The south eastern and western perimeters of the site are identified as bush fire prone land on the Newcastle LGA Bush Fire Prone Land Map. It should be noted that these areas are mapped as Vegetation Buffer, as opposed to Vegetation Category 1 or 2. Nonetheless, consideration must be given to the overall aims and objectives of *Planning for Bushfire Protection (as amended)* (NSW Rural Fire Service (RFS) 2006) when assessing the proposed development. A Bush Fire Hazard Analysis (BFHA) (ERM, 2012b) has been undertaken (refer *Annex K*) and is further discussed in *Section 5.11.*

It is noted that under Section 89(J) of the EP&A Act, SSD does not require a bush fire safety authority under section 100B of the Rural Fires Act.

3.5 OTHER STATUTORY CONSIDERATIONS

3.5.1 Newcastle City Council Local Environmental Plan (LEP) 2012

The Newcastle LEP 2012 combines the Newcastle LEP 2003 and Newcastle City Centre LEP 2008 into a single document. LEP 2012 applies to all the land within the Newcastle local government area, except for Newcastle Port lands which are covered by the Major Development SEPP.

Under LEP 2012 the subject site is zoned IN3 – Heavy Industry Zone. This zone applies to heavy industrial land, predominantly around Hexham and Sandgate. It is land where the type of industrial development is of high impact and is generally located away from other land uses. The development, storing and distributing AN, aligns to the objective of the zone.

3.5.2 Newcastle Development Control Plan (DCP) 2012

The area falls within the requirements of Newcastle DCP 2012, however the DCP does not apply to the project given the provisions of the SEPP State and Regional Development. Notwithstanding this, the Stormwater, Flooding and Receiving Water Quality Assessment (*Annex D*) and Traffic Impact

Assessment (*Annex J*) have had regard to the relevant requirements of the DCP.

3.6 RELEVANT STANDARDS AND CODES OF PRACTICE

3.6.1 AS 4326 – 2008 Storage and Handling of Oxidizing Agents

This standard was prepared by the Standards Committee CH-009, Safe Handling of Chemicals, and approved by the Council of Standards Australia. This is an update of the version produced in 1995 to reflect changes in regulatory requirements and controls. The standard states requirements covering, but not limited to access, floor plan, construction materials, lighting, ventilation, electrical installation, security, surrounding land use, fire prevention, capacity and vehicle access.

AS 4326 refers users to State regulators for the specification of separation distances to protected places and boundaries. Specific publications specifying requirements for the storage of AN does not occur in NSW. Where the current version of AS 4326 (2008) do not specify detail, reference to the 1995 version of the standard is made for guidance.

In NSW the WorkCover Authority of NSW conduct the licencing of AN under the *Explosive Act 2003*. The requirements of AS 4326 must be met when licences for AN are granted. Crawfords currently hold a WorkCover licence for the storage of AN and therefore meets the requirements of AS 4326.

3.6.2 UN 1942

The United Nations (UN) has numbers that identify hazardous substances and articles for international transport. These numbers are assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods. The Committee provide recommendations on the responsible transport of each substance to be adopted by regulatory organisations.

The AN to be stored and distributed as part of the proposal is classified as UN 1942. This is due to the AN having ≤0.2% combustible substance. The handling of AN is discussed in *Section 1.5.2*

3.6.3 ADG Code

The Australian Dangerous Goods Code (ADG Code) is undertaken by the Advisory Committee on Transport of Dangerous Goods. The ADG Code establishes standardisation for the transportation of dangerous goods within Australia. AN has a Dangerous Goods Class of 5.1 Oxidising Agent. AN would be transported in accordance to the ADG Code. AN classification and its handling under the ADG Code is discussed in *Section 1.5.*

4 HAZARDS AND RISKS ASSESSMENT

This Chapter provides an assessment of the hazards and risks associated with the proposed operation on site (and the potential for off site impacts).

4.1 INTRODUCTION

Hazards and risks were identified in the DGRs as one of the key issues to be addressed in the EIS. Health and Safety Essentials Pty Ltd were engaged to undertake a Hazard Analysis of the proposal and ERM were engaged to undertake a Hazardous Materials (HAZMAT) assessment of the facility.

The DGRs specifically required:

- *"A risk assessment of the potential environmental impacts of the development, identifying the key issues for further assessment;"*
- *"an assessment of the hazards and risks associated with the existing and proposed operation on site (and the potential for off-site impacts) including details of hazardous materials use or kept on the premises. The EIS shall also include a screening of potential hazards on and off site to determine the potential for offsite impacts and any requirement for a Preliminary Hazard Analysis (PHA). Should potential off-site impacts be identified, a PHA must be prepared in accordance with the Department's Hazardous Industry Planning Advisory Paper (HIPAP) No. 6 – Hazard Analysis and Multi-Level Risk Assessment. The PHA should::*
    - *Consider the risks form the facility; and*
    - *Demonstrate that the proposal would comply with the criteria set out in HIPAP No.4 - Risk Criteria for Land Use Safety Planning."*

In accordance with the DGRs, HIPAP No.4 and No. 6, an assessment of the hazards and risks associated with the existing and proposed operation has been undertaken. Firstly, an environmental risk assessment was undertaken to identify the potential risks associated with the proposal which have informed the level of assessment and preparation of technical studies and mitigation measures. In addition to the risk assessment the following technical studies have been prepared to investigate the level of risk and identify mitigation measures and protocols to manage impacts:

- AN Hazard Analysis;
- Environmental Hazard Assessment; and
- HAZMAT Assessment.

4.2 ENVIRONMENTAL RISK ASSESSMENT

4.2.1 Introduction

As required by the DGRs, a risk assessment was undertaken to identify key environmental and community issues that would require assessment in the EIS. Hazardous and offensive development, together with the risk of Hunter River flooding, were recognised as hazards that could potentially impact the proposal, the site and surrounds. In addition to these hazards, site contamination and bushfire influence were also considered.

The level of assessment for each issue was determined based on the anticipated level of risk generated by the proposal without mitigation or management measures.

4.2.2 Methodology

Qualitative Risk Assessment Criteria

An environmental risk assessment is based on a risk assessment matrix consistent with AS/NZS 4360:2004 on Risk Management. The qualitative assessments of risk severity and likelihood (refer *Table 4.1* to *Table 4.3*) were used to provide a general assessment of the risk to the environment and community. The overall risk level was determined using the matrix in *Table 4.4*.

Table 4.1 Qualitative Measures of Environmental Consequence

	CONSEQUENCE				
Severity Level	**Insignificant (1)**	**Minor (2)**	**Moderate (3)**	**Major (4)**	**Catastrophic (5)**
Natural Environment	*Limited damage to minimal area of low significance*	*Minor effects on biological or physical environment. Minor short-Medium term damage to small area of limited significance*	*Moderate effects on biological or physical environment (air, water) but not affecting ecosystem function. Moderate short-medium term wide spread impacts (e.g. significant spills).*	*Serious environmental effects with some impairment of ecosystem function. Relatively widespread medium-long term impacts.*	*Very serious environmental effects with impairment of ecosystem function. Long term, widespread effects on significant environment (e.g. SEPP 14 Wetland)*
Community/ Reputation/ Media	*Low level social impacts. Public concern restricted to local complaints. Could not cause injury or disease to people.*	*Minor medium-term social impacts on local population. Could cause first aid injury to people. Minor, adverse local public or media attention and/or complaints.*	*On-going social issues. Could cause injury to people, which requires medical treatment. Attention from regional media and/or heightened concern by local community. Criticism by Non-Government Organisations (NGOs). Environmental credentials moderately affected.*	*On-going serious social issues. Could cause serious injury or disease to people. Significant adverse national media/public or NGO attention. Environmental management credentials significantly affected.*	*Very serious widespread social impacts with potential to significantly affect the well-being of the local community. Could kill or permanently disable people. Serious public or media outcry (international coverage). Damaging NGO campaign. Reputation severely tarnished.*
Legal Government	*Low-level legal issue. On the spot fine. Technical non-compliance prosecution unlikely. Ongoing scrutiny/attention from regulator*	*Minor legal issues, non-compliances and breaches of regulation. Minor prosecution or litigation possible. Significant hardship from regulator.*	*Serious breach of regulation with investigation or report to authority with prosecution and moderate fine possible. Significant difficulties in gaining future project approvals.*	*Major breach of regulation with potential major fine and/or investigation and prosecution by authority. Major litigation. Future project approvals seriously affected.*	*Investigation by authority with significant prosecution and fines. Very serious litigation, including class actions. Licence to operate threatened.*
Operational Delays	*Less than one (1) day*	*One (1) day delay*	*Two (2) days delay*	*Less than one (1) week greater than (2) days delay*	*Greater than one (1) weeks delay*

Table 4.2 Qualitative Measures of Likelihood

Level	Descriptor	*Description*	Guideline
A	**Almost Certain**	Consequence is expected to occur in most circumstances.	Occurs more than once per month
B	**Likely**	Consequence will probably occur in most circumstances.	Occurs once every 1 month-1 year
C	**Occasionally**	Consequence should occur at some time.	Occurs every 1 year- 10 years
D	**Unlikely**	Consequence could occur at some time.	Occurs once every 10 years-100 years
E	**Rare**	Consequence may occur only in exceptional circumstances.	Occurs less than once every 100 years

1. AN/NZS 4360:2004 Risk Management

Table 4.3 Qualitative Risk Matrix

Likelihood of the Consequence	Maximum Reasonable Consequence				
	Insignificant (1)	**Minor (2)**	**Moderate (3)**	**Major (4)**	**Catastrophic (5)**
(A) Almost Certain	*11 High*	*16 High*	*20 Extreme*	*23 Extreme*	*25 Extreme*
(B) Likely	*7 Moderate*	*12 High*	*17 High*	*21 Extreme*	*24 Extreme*
(C) Occasionally	*4 Low*	*8 Moderate*	*13 High*	*18 Extreme*	*22 Extreme*
(D) Unlikely	*2 Low*	*5 Low*	*9 Moderate*	*14 High*	*19 Extreme*
(E) Rare	*1 Low*	*3 Low*	*6 Moderate*	*10 High*	*15 High*

1. AN/NZS 4360:2004 Risk Management

Table 4.4 summarises the predicted consequences from the proposal on natural and built landscape features, and cross-references these with the likelihood of any impacts occurring on a particular feature. This results in a ranking which is indicative of the associated risk that the proposal may present to a given feature.

This risk assessment was conducted based on pre-mitigation scenarios. Identification of these high-risk features was a key preliminary step in the assessment process. Assessments and management measures presented throughout this report have, where appropriate, been tailored according to the level of risk.

4.2.3 Results

The likelihood ratings, risk consequence descriptors and the level of risk matrix adopted for this proposal are in accordance with AS/NZS 4360:2004 (refer to *Table 4.4*). Potential temporary and long term impacts of the proposal and the results of the systematic risk assessment are presented in *Table 4.4*.

Table 4.4 Environmental, Social and Economic Risk Assessment

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
Construction											
Stormwater control device construction	Soils and Contamination	Soil erosion and Sedimentation	Clearing of areas for the construction on stormwater control devices will disturb surface sediments.	2	A	16H	Appropriate erosion and sediment controls will be designed for all construction areas in accordance with *Soils and Construction* (Landcom, 2004).	1	C	4L	Refer to *Section 5.4* soil assessment and *Section 6.1* for mitigation measures
		Water Pollution	Clearing of areas for the construction on stormwater control devices will disturb surface sediments.	3	B	7M	A Phase I and II ESA has been completed for the site and identifies areas of contamination. Relevant surface water controls will be included as part of the construction design to divert clean waters away from disturbed areas during construction. The type of detentions system designed for the facility represents best practice in managing the level and type of pollutants which are	1	D	2L	Refer to *Section 5.4* and *Annex D for* full Phase I and II ESAs and *Section 5.3, 5.4* and *5.5* for surface water assessment and mitigation measures.

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
							present at the site.				
	Noise Generation	Noise impacts from Machinery	Construction of the proposed storm water control devices will result in low level noise impacts.	1	A	11H	Earthworks will occur in daytime hours only, noise and vibration as a result of construction activities would not be dissimilar to operational noise. It is unlikely that activities will result in significant impact.	1	D	2L	Refer to *Section 5.8* and *Annex I* for full Noise and Vibration Assessment.
	Dust Generation	Air pollution from dust generation	Construction activities will not involve significant ground disturbance. The nearest sensitive receiver is approximately 213m from the facility.	1	B	7M	It is not expected earthworks will create significant dust generation, therefore with dust suppression techniques the impact should be minimal.	1	D	2L	An Air Quality Impact assessment has been completed and is discussed in *Section 5.6* and *Annex G*

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
	Cultural heritage	Disturbance to Aboriginal places or objects	The site has been disturbed by imported fill material, refer to Phase I Site Investigation (ERM h, 2012). A search of the AHIMS database has revealed no sites within a 5km radius of the site.	1	E	1L	It would be rare to disturb objects or places of Aboriginal Heritage. Site disturbance is limited to shallow depths within imported fill material. Should any objects or sites be identified during construction, works are to cease and reported to the Environmental Manager and to the NPWS.	1	E	1L	Refer to *Section 5.4, 5.12* and *Annex D and L* for full Aboriginal Heritage and Phase I Site Investigation.
Operation.											
Storage of AN	Noise Generation	Noise impacts from Machinery	Proposed operational activities related to the movement and storage of AN within the site has the potential to impact on noise amenity. The nearest sensitive receiver is approximately 213m to the north and north-east of the site.	2	B	8 M	With the use of site noise management procedures it is unlikely that activities will result in significant impact on the amenities of nearby residents. Vehicle movements will not be excessive compared to normal traffic flows on the Pacific Highway.	1	D	2L	A NVIA has been undertaken and discussed in *Section 5.8* with the full assessment included in *Annex I*

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
	Dust Generation	Air pollution from dust generation	Proposed operational activities related to the movement and storage of AN within the site has the potential to impact on air quality. The nearest sensitive receiver is approximately 213m to the north and north-east of the site.	1	B	7M	With improved dust suppression, for example, the use of water carts and covering unsealed areas with aggregate, it is unlikely that activities will result in significant impact on the amenities of nearby residents.	1	D	2L	An Air Quality Impact assessment has been completed and is discussed in *Section 5.6* and the report is in *Annex G*
	Fuel and Electricity Usage	GHG emissions from diesel and electricity use.	The proposal is not likely to result in impacts on air quality during operation.	1	E	1L	The use of fuel and electricity for the proposal represents approximately 0.0044% of the total annual NSW emissions (Scope 1 and 2).	1	E	2L	A Greenhouse Gas Emissions (GHG) Assessment has been completed and is discussed in *Section 5.7* and the full report is included in *Annex H*

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
	Spillage of Dangerous goods into the environment or atmosphere	Risk to people, property and environment.	The proposal involves the handling of dangerous goods.	3	D	9 M	The design and location of the storage sheds is in accordance with Crawfords risk management standards and dangerous goods codes for MHFs. These standards and codes determine the appropriate spacing between substance storage areas and operations with the aim of minimising risk.	1	B	7 M	A Hazard analysis has been completed and is discussed in *Chapter 4* and the full report is included in *Annex B*

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
	Dangerous goods storage	Explosion Hazard	The proposal involves the handling of dangerous goods.	3	B	17H	All dangerous goods will be handled using systems designed in accordance with relevant legislation, codes and Australian standards. A Hazard Analysis has been completed and includes risk, safety zones and contours.	1	C	4L	A Hazard analysis has been completed and is discussed in *Chapter 4* and the full report is included in *Annex B*
	Erosion and sediment runoff	Siltation of local waterways.	Movement of machinery around the site will disturb surface material.	2	A	16 H	Appropriate erosion and sediment controls will be designed for all construction areas in accordance with *Soils and Construction* (Landcom, 2004).	1	C	4L	Refer to *Section 5.4* soil assessment and *Section 6.1* for details of proposed mitigation measures.

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
		Contamination of local water bodies.	Movement of machinery around the site will disturb surface material.	2	A	16 H					Refer to *Section 5.4* and *Annex D* for full Phase I and II ESAs and *Section 6.1* on surface water assessment and proposed mitigation measures.

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
							A Phase I and II ESA have been completed for the site and identifies areas of contamination. Relevant surface water controls will be included as part of the construction design to divert clean waters away from disturbed areas during construction. The Type of detentions system designed for the facility represents best practice in managing the level and type of pollutants which are present at the site.	1	C	4L	

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
	Oil, fuel and grease supply and storage	Soil and/or water contamination from spills and leaks.	Some machinery such as forklifts and conveyors are maintained on site, therefore a limited supply of oil fuel and grease is stored on site.	1	A	11H	All fuels, oils, grease etc will be handled using systems designed and operated in accordance with relevant legislation and Australian Standards.	1	C	4L	Refer to *Section 5.4* and *Annex D* for full Phase I and II ESAs and *Section 6.1* on soils assessment and proposed mitigation measures.
	Flooding	Loss of life or injury to site personnel or community.	The site is located in the low velocity -flood storage area of the Hunter River Flood Plain. Therefore rising flood water will be over an extended period of time which allows for adequate flood warnings and evacuation notification.	4	D	14H	A flood risk management and response plan has been prepared for the site which outlines evacuation protocols in the event of a flood.	3	D	9 M	A Site Management System and Site Emergency Plan has been completed.

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
		Damage to Infrastructure / property.	The site is located in the low velocity -flood storage area of the Hunter River Flood Plain. Therefore rising flood water will be over an extended period of time which allows for adequate flood warnings to secure buildings and product.	5	D	19E	A flood risk management and response plan has been prepared for the site which outlines evacuation and building preparation protocols in the event of a flood. The operational delay due to receding waters and clean-up response will result in delays greater than one week.	5	D	19 E	A flood risk management and response plan has been completed and is discussed in *Section 4.4.3* and the full report is included in Annex E

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
		Loss of threatened native flora and fauna.	The site is located in the low velocity -flood storage area of the Hunter River Flood Plain. Therefore rising flood water will be over an extended period of time which allows for adequate flood warnings to secure buildings and product to limit the potential release of contaminants.	5	D	19E	A flood risk management and response plan has been prepared for the site which outlines evacuation and building preparation protocols in the event of a flood. The impact on the surrounding environment due to siltation suffocation and receding waters will result in a catastrophic impact with very serious impairment of ecosystem function.	5	D	19 E	A flood risk management and response plan has been completed and is discussed in *Section 4.4.3* and the full report is included in *Annex E*
		Contamination of water bodies.	The site is located in the low velocity -flood storage area of the Hunter River Flood Plain. Therefore rising flood water will be over an extended period of time which allows for adequate flood warnings to secure buildings and product to limit the potential release of	5	E	15 H	A flood risk management plan has been prepared for the site which outlines evacuation and building preparation protocols in the event of a flood.	5	H	15 H	A flood risk management and response plan has been completed and is discussed in *Section 4.4.3* and the full report is included in *Annex E*

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
			contaminants.								
	Bushfire	Loss of life or injury to personnel or community	The western boundary of the site is mapped as bushfire prone land	3	C	13H	It is identified in the BFHA that there is significant defendable space between a potential bushfire hazard that the storage sheds. Bushfire risk is addressed in the site management plan which has been prepared for the site. It outlines response, evacuation and building preparation protocols in the event of a fire.	2	C	8 M	A BFHA has been completed and is discussed in *Section 4.4* and the full report in included in *Annex K.*

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
		Damage to Infrastructure / property.	The western boundary of the site is mapped as bushfire prone land.	5	C	22E	It is identified in the BFHA that there is significant defendable space between a potential bushfire hazard and the storage sheds. Bushfire risk is addressed in the site management plan which has been prepared for the site. It outlines response, evacuation and building preparation protocols in the event of a fire.	2	C	8 M	A BFHA has been completed and is discussed in *Section 5.11* and the full report is included in *Annex K*

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
		Loss of threatened native flora and fauna.	The western boundary of the site is mapped as bushfire prone land	3	C	13H	It is identified in the BFHA that there is significant defendable space between a potential bushfire hazard and the storage sheds. All significant flora and fauna populations are located outside the site boundary. In the event of a bush fire, it is likely that it would originate to the north west within the SEPP 14 wetland and surrounding floodplains. As a bushfire would originate to the north west of the site, ecosystem function would be already impaired prior to the risk reaching the storage sheds.	3	C	13 H	A BFHA has been completed and is discussed in *Section 5.11* and the full report is included in *Annex K*

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
	Waste: scrap metal and parts, office waste putrescible.	Inefficient use of resources	The proposal accumulates varying types of waste that have the potential to be inefficiently disposed of, reused or recycle.	1	A	11 H	A waste management plan has been developed for the site which identifies waste streams and opportunities for appropriate disposal, reuse or recycle.	1	B	7 M	Waste management is discussed in *Section 5.9*.
	Unauthorised access to the site from the general public	Vandalism and theft.	Due to multiple tenancy of the site, security fencing during out of hours is not practical.	3	A	20E	Due to the sensitive nature of the product stored on site, a security plan has been developed and is required for WorkCover NSW accreditation and registration as a MHF. The site operates a 24 hour security service and a caretaker resides at the property. There have been limited accounts of theft and vandalism.	1	B	7 M	Refer to *Section 4.3.5* for Site security and accreditation.

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
Transportation	Noise Generation	Degradation of noise amenity (cumulative)	Proposed operational activities related to the transportation of AN to and from the site has the potential to impact on noise amenity. The nearest sensitive receiver is approximately 213m to the north and north-east of the site.	2	A	16H	If noise mitigation measures are implemented it is unlikely that activities will result in significant impact on the amenities of nearby residents. Vehicle movements will not be excessive compared to normal traffic flows on the Pacific Highway.	1	B	7 M	A full NVIA has been undertaken and discussed in *Section 5.8* with the full assessment included in *Annex I*
	Dust Generation	Degradation of air quality environment (cumulative)	Proposed operational activities related to the transportation of AN to and from the site has the potential to impact on air quality. The nearest sensitive receiver is approximately 213m to the north and north-east of the site.	1	B	7M	Provided dust repression measures are implemented on site , there will not be significant impact on nearby residents.	1	C	4L	An Air Quality Impact assessment has been completed and is discussed in *Section 5.6* and *Annex G*

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
	Oil, fuel and grease application to vehicles	Soil and/or water contamination from spills.	A risk may present if the Crawfords fleet have not been maintained in accordance with relevant standards and could result in a potential contamination risk.	3	B	17H	The Crawfords fleet undergo a maintenance regime in accordance with their occupational health and safety requirements. Vehicle Safety checks are completed at the commencement of every shift. All fuels, oils, grease etc, will be handled using systems designed and operated in accordance with relevant legislation and Australian Standards.	1	B	7 M	Refer to *Section 5.4* and *Annex D* for full Phase I and II ESAs. Refer to *Section 6.1* for site management, mitigation measures and protocols.

Activity	Aspect	Potential Impact	Status	Pre-Mitigation Risk Ranking			Proposed Control	Post Mitigation Control			Section in EIS where Discussed
				Consequence	Likelihood	Risk		Consequence	Likelihood	Risk	
	Dangerous goods transport	Risk of contamination from a spill during transportation.	During the transportation of AN, there is a risk that product may be spilled and contamination may occur.	3	B	17H	All dangerous goods will be handled and transported using systems designed in accordance with relevant legislation, codes and Australian standards. In accordance with dangerous goods legislation, a transportation plan has been developed for all routes of travel. It is therefore considered that a spill and contamination arising from inappropriate handling is unlikely.	1	C	4L	A transportation assessment and plan has been completed and is discussed in *Section 5.10* and Annex J

4.3 AMMONIUM NITRATE HAZARD ANALYSIS

An AN Hazard Analysis was undertaken by Health & Safety Essentials (HSE, 2012) to identify the hazards involved in the storage and distribution of AN at the site.

This Hazard Analysis considered the risks associated with the storage and handling of ammonium nitrate. Based on a review of the product hazards and past incidents, it considered the risks of explosions and decomposition and release of toxic gases.

Consequences and impacts have been determined for a range of accident scenarios. These results have been combined with the likelihood of occurrence for each event based on the approach required by DPI. The resulting contours for individual fatality risk, injury risk (explosion overpressure and toxic exposure) and risk of property damage and accident propagation have been determined.

In determining safe storage conditions, and in conducting the consequence analysis and frequency analysis, consideration has been given to the approaches adopted in Australia by different states, and also international practice. However, in the final revision of the Hazard Analysis, the methodology applied is that required by DPI. It is believed that this approach is conservative and, as a result, the risk levels calculated represent a significant over-estimation.

The Hazard Analysis demonstrates compliance with the qualitative principles for land use safety outlined in HIPAP 4.I Information is provided on the controls to be implemented, the safety management system, emergency plan and security plan; providing a demonstration that risk has been reduced to 'As Low As Reasonably Practicable'.

The quantitative criteria specified in HIPAP 4 are met, except for sporting complexes and active open space areas in relation to the adjacent Golf Driving Range. The usage of this facility is relatively low and it is unlikely that any single individual would be present for more than several hours at a time, with typical attendance being no more than several times per week. The risk to an individual based on the time they are present is likely to be lower than most risks experienced by the general community, and therefore should be considered as tolerable.

Under the Newcastle Local Environment Plan 2012, hazardous storage establishments are permitted with consent in the Heavy Industry Zone in which the Crawford facility is located. The objectives of this Heavy Industry Zone are to:

- provide suitable areas for those industries that need to be separated from other land uses;
- encourage employment opportunities;

- minimise any adverse effect of heavy industry on other land uses; and
- support and protect industrial land for industrial uses.

It is therefore considered that the proposed operation of the Crawford facility as storage and distribution centre for ammonium nitrate is an appropriate use for this land.

Further details on the hazards of ammonium nitrate and the outcomes of the Hazard Analysis are provided in the following sections. A copy of the Hazard Analysis is reproduced in *Annex B*.

4.3.1 Background

The three main hazards associated with AN are fire, due to its oxidising properties, decomposition and the release of NO_x gases, and explosion.

Hazardous conditions can occur during the following:

- temperatures approaching the melting point of pure AN (169 deg C) represent a significant hazard due to increased shock sensitivity of molten AN and potential for self-sustained decomposition reaction;
- confinement, in combination with high temperatures, increases the risk of explosion due to a build-up of pressure caused by the gases produced by the decomposition reaction; and
- contamination, particularly with catalysts such as chlorides or other oxidising agents such as sodium nitrate, sodium nitrite and sodium perchlorate, increases the risk of heat generation and the potential for self-sustaining decomposition, with the possibility of detonation.

Various risk assessments have been completed by Crawfords to meet the operational requirements of the site. These risk assessments, together with the hazards of AN, have been reviewed in order to identify those events which have the potential for significant consequences.

4.3.2 Ammonium Nitrate, Properties and Requirements

AN is a salt of ammonium and nitric acid. It will start to decompose into gases such as oxygen and nitrogen oxides when heated. The nature of such gases depends on both the temperature and the conditions in which heating occurs. As mentioned in *Section 1.5*, AN is used as an explosive precursor and is classified under the ADG Code. Recommendations for store construction and storage requirements are provided in AS 4326.

Licences and approvals issued by regulatory authorities require compliance with the following:

- floors of storage areas shall have immediate access from outside the building and should be single storey only;
- be constructed or treated by non-combustible materials that are resistant to attack by oxidizing agents;
- provide adequate lighting;
- provide adequate ventilation;
- in areas where there is a risk of corrosion, electrical installation should have a higher corrosion rating;
- stores with a floor area greater than 250 m² should have at least two means of egress;
- stores should have an area clear of vegetation or combustible material of at least five metres around the building;
- standing trees should be cleared for at least 15 m;
- security fencing, meeting the specified requirements;
- stores should be dry and free of water seepage through the roof, walls or floor;
- kerbing or grading should be provided so that, in the event of a fire, molten AN will flow clear of all other storage areas, building and combustible materials, and be retained on the premises;
- vehicles operated within the store (e.g. forklifts) should be diesel-powered, fitted with a battery isolation switch and insulated cover over the battery, and be fitted with a spark arrestor and dry-powder fire extinguisher. Vehicles should be kept outside the store when not in use and garaged at least 10 m from the store;
- maximum store capacity is less than 5,000t;
- maximum stack size of 500t;
- separation between stacks of at least three metres;
- separation between outer wall of the building and the nearest stack of at least 1.2 metres; and
- stores separated from the site boundary by at least 8 metres as required by WorkCover NSW.

Photograph 1.2 illustrates stacking design and separation requirements in accordance with AS 4326.

4.3.3 Hazards of Ammonium Nitrate

The three main hazards associated with AN are fire; decomposition and explosion. Key factors that govern the hazards associated with AN are particle size, bulk density or porosity, presence of contaminants, nitrogen content, and confinement.

Fire

AN is an oxidising agent and will support fires involving combustible material by providing oxygen, but will not burn itself. In its pure form, AN melts at 169°C and in a fire can result in a flow in molten form away from the fire source.

Decomposition

AN can undergo thermal decomposition if it receives enough energy. At moderate temperature, the exothermic decomposition is balanced by endothermic dissociation. Provided the gases produced can escape freely and no heat is being added to the system (eg through a fire) a steady state is reached.

The decomposition can also become self-sustaining in the presence of contaminants which catalyse the reaction (eg chlorides); in the presence of combustible materials which generate heat as they are oxidised; or if the initial temperature is high enough.

Explosion

An explosion of AN can occur by three different mechanisms:

- ***Heating and confinement:*** If there is insufficient ventilation, decomposition due to heating can result in a build-up in pressure and a subsequent explosion. Molten AN is more sensitive to initiation than solid AN.

- ***Run-away reaction:*** This occurs when the heat generated by the decomposition reaction exceeds the heat loss. For pure AN, this is difficult to achieve when unconfined.

- ***Detonation:*** Neither flame, nor spark, nor friction can cause detonation of uncontaminated AN. Detonation by shock wave requires large amounts of energy, and is strongly dependent on the presence of voids (ie the bulk density). Contamination by organic matter or fuel increases the risk of detonation. Another important factor is the critical charge diameter – which is very high for high density AN.

As discussed in the Hazard Analysis (*Annex B*), ammonium nitrate typically used by the mining industry is low density. While, at times, medium density product may be sourced by Crawfords customers (Downer, Dyno, Orica), a conservative approach has been adopted in the Hazard Analysis by assuming the product is all low density.

4.3.4 Consequences and Impacts

Consequences and impacts have been determined for a range of accident scenarios. The results have been combined with the likelihood of occurrence for each event. The methodology adopted is based on the requirements of DPI. The resulting contours represented in *FiguresFigure* 4.1*, Figure* 4.2*, Figure* 4.3*, Figure* 4.4 and *Figure* 4.5 for individual fatality risk, injury risk (explosion overpressure and toxic exposure) and risk of property damage and accident propagation have been determined. Provided below is a discussion of the risk contours in relation to the relevant risk criteria specified by HIPAP No. 4 (DoP, 2011). A full discussion is provided in Section 11 of the Hazard Analysis (HSE, 2012) (refer *Annex B)*.

Individual Fatality Risk

- The individual fatality risk level contour for industrial sites is contained within the boundaries of the site and is localised to those areas where auger / conveyor operation and truck loading and unloading activities are conducted (North of Shed A and East of Shed C).

- The individual fatality risk level contour for sporting complexes and active open space areas extends over the Golf Driving Range to the west of the site. This contour is dominated by incidents involving storage operations in Sheds A, B and C. The maximum risk level in areas used by the Golf Driving Range is 20 x 10^{-6} per year, while the maximum risk at the property boundary is 30 x 10^{-6} per year.

- The individual fatality risk level contour at a level of five million in a million per year (5 x 10^{-6} per year) does not extend to the nearest commercial development.

- The individual fatality risk contour at a level of one in a million per year (1 x 10^{-6} per year) does not extend to the nearest residence.

- The individual fatality risk level contour at a level of half in one million per year (0.5 x 10^{-6} per year) does not extend to the nearest sensitive land use.

Injury Risk

- The individual fatality risk criterion for incident explosion overpressure at residential and sensitive use areas is met, whereby it should not exceed 7 kPa at frequencies of more than 50 chances in a million per year;

- Criteria for toxic concentrations in residential and sensitive use areas have been met; whereby they should not:

  - exceed a level which would be seriously injurious to sensitive members of the community following a relatively short period of exposure at a maximum frequency of 10 in a million per year; or

  - cause irritation to eyes or throat, coughing or other acute physiological responses in sensitive members of the community over a maximum frequency of 50 in a million per year.

Risk of Property Damage and Accident Propagation

- The risk criteria for incident explosion overpressure at neighbouring potentially hazardous installation, at land zoned to accommodate such installations, or at nearest public buildings has been met, whereby it should not exceed a risk of 50 in a million per year for the 14 kPa explosion overpressure level.

Societal Risk and Biophysical Environment

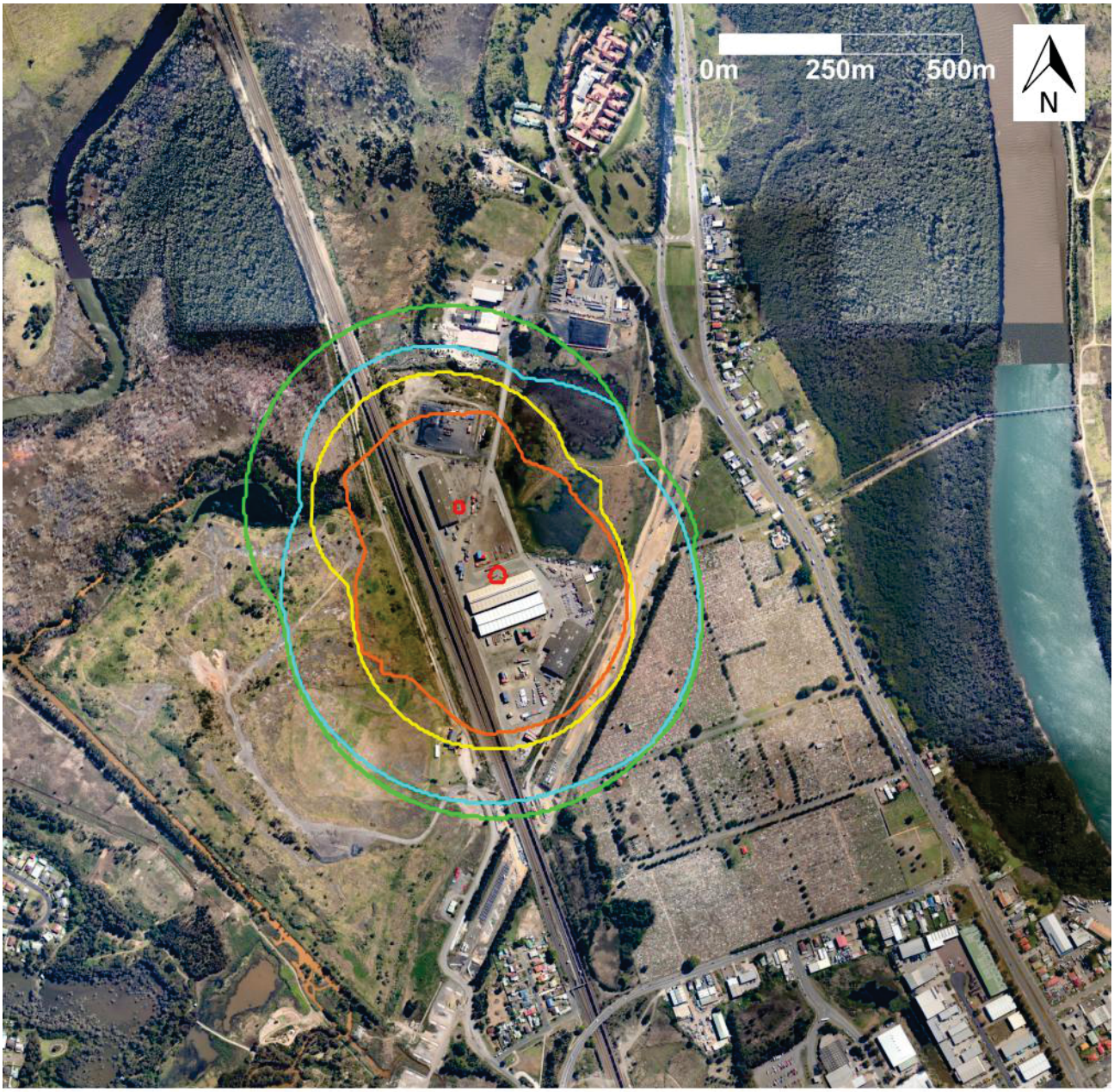
The concept of societal risk is used when there is a risk of multiple fatalities occurring in one event.

The Hazard Analysis calculated societal risk based on the consequence and frequency analysis conducted using the methodology required by DPI. The Societal Risk graph shows that the calculated societal risk lies within the ALARP (As Low As Reasonably Practicable) region.

The analysis demonstrates that the proposal meets the following criteria for the biophysical environment:

- Industrial developments should not be sited in proximity to sensitive natural environmental areas where the effects (consequences) of the more likely accidental emissions may threaten the long-term viability of the ecosystem or any species within it; and

- Industrial developments should not be sited in proximity to sensitive natural environmental areas where the likelihood (probability) of impacts that may threaten the long-term viability of the ecosystem or any species within it is not substantially lower than the background level of threat to the ecosystem.



0.5×10^{-6}

1×10^{-6}

5×10^{-6}

10×10^{-6}

50×10^{-6}

Source:
Health & Safety Essentials Pty Ltd Hazard Analysis Rev4 - 12 December 2012.

Client:	Crawfords Freightlines Pty Ltd	
Drawing No:	0143175h_EIS_C004_R1.cdr	
Date:	17/12/2012	Drawing size: A4
Drawn by:	JD	Reviewed by: CB

Figure 4.1 - Individual Fatality Risk Contours

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Environmental Resources Management ANZ

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ERM

50×10^{-6}

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Figure 4.2 - Explosion Overpressure Risk Contours

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Figure 4.3 - Toxic Gas Risk Contour (Irritation)

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50×10^{-6}

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Figure 4.4 - Overpressure Risk Contour 14 kPa (accident propagation)

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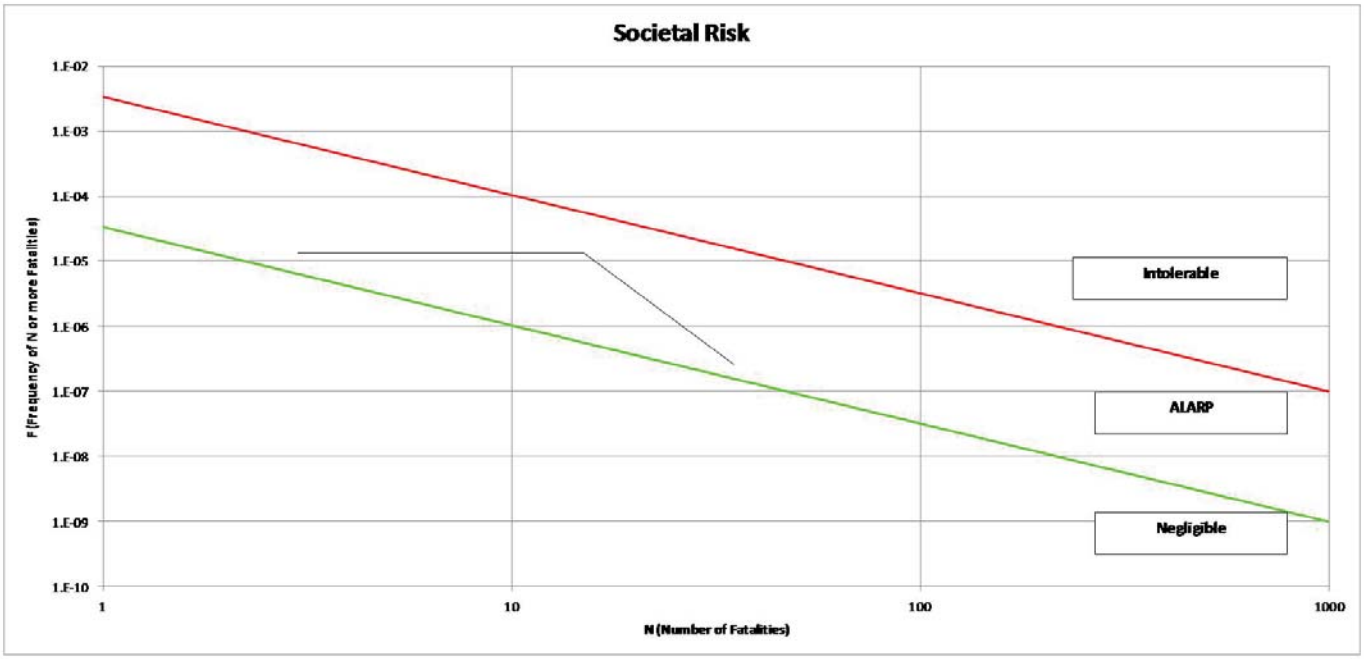


In analysing this graph the following comments are made:

• Above the intolerable level, an activity is considered undesirable, even if individual risk criteria are met. For this site, no incidents result in any point being located in the Intolerable region.

• Within the Negligible region, societal risk is not considered significant.

• Within the ALARP region, the emphasis is on reducing risks as far as possible towards the negligible line. Provided all other qualitative and quantitative criteria are met, Societal Risk is considered tolerable if within the ALARP region.

For this site, quantitative risk criteria have been considered in the preceding sections and qualitative principles are considered in ***Section 14 Qualitative Risk Criteria*** (page 59). Controls have been implemented to reduce risk as far as reasonably practicable, as presented in ***Section 15 Achieving ALARP*** (page 61).

Therefore, it is the considered that the risk is tolerable.

Source:
Health & Safety Essentials Pty Ltd Hazard Analysis Rev4 - 12 December 2012.

Client:	Crawfords Freightlines Pty Ltd		**Figure 4.5 - Societal Risk**
Drawing No:	0143175h_EIS_C008_R1.cdr		
Date:	17/12/2012	Drawing size: A4	Crawfords Freightlines Pty Ltd - Environmental Impact Statement
Drawn by:	JD	Reviewed by: CB	
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.			Environmental Resources Management ANZ Auckland, Brisbane, Canberra, Christchurch, Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney

ERM

Mitigation Measures

Controls, mitigation and management measures as well as site protocols have been designed to demonstrate that the risks have been reduced to 'As Low As Reasonably Practicable' (ALARP) (refer Sections 14 and 15 of *Annex B*).

Safety Management System

One aspect of hazard mitigation required under the MHF site classification has been to develop a Safety Management System (SMS) in accordance with HIPAP No. 9 (DoP, 2011). Crawfords have developed an SMS and the basic framework includes:

1. Management of the SMS	10. Incident reporting and investigation
2. Hazard Identification and Risk Assessment	11. Employee Selection, training and education
3. Standard Operating Procedures	12. Procurement
4. Process Safety Information	13. Emergency Planning (*Site Emergency Plan)*
5. Contractor Management	14. Security
6. Pre-commissioning reviews	15. Auditing
7. Equipment integrity	16. Drug and Alcohol Testing
8. Safe Work Practices	17. Rail Work Fatigue Management
9. Management of Change	18. Appendices

Emergency Planning

Crawfords have developed a Site Emergency Plan in accordance with the requirements of HIPAP No. 1 (DoP, 2011). The Site Emergency Plan (Crawfords, 2011) has been reviewed by NSW Fire and Rescue. It defines an emergency; identifies the types and levels of emergencies likely on site; provides procedures aimed at minimising the escalation and impact of likely emergencies; outlines requirements for familiarisation and training for personnel on and adjacent to the site; and outlines testing and review procedures. In addition, a Site Security Plan (Crawfords, 2012) has been prepared and reviewed by the NSW Police. Both plans form part of the MHF site classification process.

General Site Mitigation Measures

The following mitigation measures have been identified as part of the hazard analysis to ensure the proposal minimises risk to workers, contractors, the community and the environment:

- AN shall be stored in accordance with AS 4326-2008;
- all engineering and procedural control measures listed in the Site Management System should be followed at all times;
- in the event of an emergency the Site Emergency Plan should be followed;

- ensure measures listed in the site Security Plan are followed at all times;
- an inspection, testing and preventative maintenance program would be developed, implemented and maintained to ensure the reliability and availability of key operational and safety critical equipment; and
- no incompatible materials would be stored on site.

4.4 ENVIRONMENTAL HAZARD ASSESSMENT

4.4.1 Background

The environmental risk assessment identifies flooding and bushfire as environmental hazards which pose a risk to workers, contractors, the community and the surrounding environment. The site is located within a flood prone area of the Hunter River Flood Plain as mapped by Newcastle City Council under the City Wide Flood Management Study (NCC).

The south eastern and western perimeters of the site are identified as bush fire prone land on the Newcastle LGA Bush Fire Prone Land Map. It should be noted that these areas are mapped as Vegetation Buffer, as opposed to Vegetation Category 1 or 2. ERM were engaged to undertake a BFHA (ERMb, 2012) (refer *Section 5.11* and *Annex K*) to determine the risk of bushfire on the proposal.

4.4.2 Potential Impacts - Flood

The Flooding Risk Assessment (BMTWMB, 2012) identified that the site was at risk of inundation in a 1 in 100 year (1% AEP (Annual Exceedance Probability)) event and less extensively a 1 in 50 year (2% AEP). In a 1% event flood depths across the site measure 1.0 m-1.8 m and in a 2% event flood depths across the site measure 0.1 m-0.4 m.

The FRA (BMTWBM, 2012) describes the nature of flooding across the site which is similar for a range of design events. This risk principally originates from floodwaters spilling over the New England Highway from the Hunter River into Hexham Swamp and wetlands. Hexham Swamp and wetlands would also be filled at its southern extents by flow backing up along Ironbark Creek from the Hunter River South Arm.

The general flood extents and behaviour is similar for each event, albeit with the severity of flood depths and velocities increasing with event magnitude. During the 1% AEP event the Hexham Swamp floodplain becomes fully connected, with flood waters overtopping the New England Highway and flowing back to the Hunter River between Hexham Bridge and Ironbark Creek.

The Australian Government's Bureau of Meteorology (BoM) provides a flood warning service for the Hunter River at Raymond Terrace. Flood warnings are published on the BoM website and distributed to the State Emergency Service (SES) who in turn may provide these warnings to appropriate media outlets. The SES is responsible for the coordination of evacuations during flood conditions and provides flood warnings for Hexham Bridge located just upstream of the site.

The major flood classification level for Raymond Terrace is 3.5 m AHD which is slightly below the 2% AEP flood level. The NSW State Flood Sub Plan (SES, 2008) indicates that for floods above 3.5 m AHD at Raymond Terrace, a typical minimum flood warning of 18 hours would be available. As the site is estimated to be only partially flooded during the 2% AEP flood, it is likely that a flood warning based on a BoM warning at Raymond Terrace would provide a minimum of 18 hours to prepare for a significant flood at the site (BMTWBM, 2012). Given the availability of warning time for evacuation, and in accordance with the City of Newcastle hazard classification, the site has the lowest (L1) grading for Risk to Life Hazard.

4.4.3 Mitigation Measures - Flood

The Site Management System and Site Emergency Plan developed by Crawfords details protocols in the event of a flooding emergency. It is considered that rainfall events would be significant leading up to the classification of a 2% or 1% AEP and Crawfords would have the opportunity to restrict receiving and storage of product. In advance of any flood warning received from the BoM for a 2% or 1% AEP Crawfords would employ the following measures to minimise the risk of flood waters:

- advise stakeholders and customers in the 48 hours leading up to a 2% AEP that no additional product will be received or stored on site;
- each AN store shall have as a component of the emergency response equipment:
  - a supply of 250 micron four metre wide polythene construction membrane sufficient to encase the entire internal perimeter of the stores leaving no gaps and allowing two metre overlap at joins;
  - one diesel powered sump pump;
  - a supply of pre filled sandbags sufficient to construct a 2 m x 8 m x1 m high internal seepage dam;
  - an additional supply of 250 micron 4m wide polythene construction membrane sufficient to line the 2 m x 8 m x1 m high seepage dam;

  In response to a 1% AEP the AN stacks shall be reconfigured by placing the outer rows of flexible IBCs against store walls. Stacks shall also be

reconfigured to remove segregation gaps between stacks and ensure no voids between individual flexible IBCs or bag stacks and walls.

During the repositioning of the flexible IBCs, the 250 micron polythene membrane shall be placed against the store walls allowing one metre of membrane under the outer row of bags and three metres of membrane in vertical contact with the internal surface of store walls;

In response to a 1% AEP, pedestrian access and vehicular access doors shall be sandbagged and polythene sheeted externally to eliminate flood water ingress. This should involve:

- an internal seepage dam shall be constructed immediately adjacent to each vehicular access door using prefilled sandbags. The seepage dam shall be 8 m in length x 2 m deep x 1 m high, lined with 250 micron polythene sheeting;
- diesel powered sump pumps shall be positioned internally and operated to pump pooled water out of the seepage dams to external yard areas, thereby preventing water pooling in the bag storage area;
- Pump exhaust fume venting shall be achieved using the installed store roof ventilation.

- The site shall not be used for emergency refuge during flood events. Persons on site shall be limited to emergency response crews only;
- flooding emergency events shall be reported in accordance with the Site Emergency Plan; and
- termination of a flooding emergency will be undertaken in accordance with the Site Emergency Plan.

Engineering certification of the structural integrity of the sheds under a flood event (2% and 1% AEP) will be undertaken by Crawfords prior to building modification works to ensure proposed flood mitigation measures are adequate. Relevant recommendations as a result of the engineering assessment will be implemented, as required, to ensure shed structural stability.

4.4.4 Potential Impacts – Bushfire

Under Section 63 of the RF Act, owners and occupiers of land have a duty to take practicable steps to prevent the occurrence of bush fires on, and to minimise the danger of the spread of bush fires on or from, that land. The BFHA undertaken by ERM considers the risk of spread of bush fires from the site to the surrounds and measures to minimise the risk of bush fires.

The main bush fire hazard for the site is expected to be from the north-west forested wetland formation class, as classified in the system used in *Planning for Bushfire Protection* (NSW RFS 2006). The wetland to the north, north-east of the site is classified as a freshwater wetland formation class.

Correctly managed Asset Protection Zones (APZs) should reduce the potential hazard at the site for fire-fighting personnel. Required APZs, based on the forested wetland hazard to the north-east and the freshwater wetland hazard to the east, range from 10 to 50 m and in most cases these requirements are met. The location of shed A, shed B, shed C and the administration office affords an APZ to the north-east freshwater wetland hazard that meets the requirements for residential/rural residential subdivision. It is noted that the site, being a commercial and industrial facility, does not categorically fit into performance criteria within the guidelines, therefore the requirements for residential/rural residential subdivision is considered adequate for the APZs within the site.

The property access road provides for safe access and egress of fire fighting personnel and site staff. Services to the site are located to provide adequate water supply to all structures. Electricity supply is located so as not to contribute to the risk of fire or so that it impedes fire-fighting. If required, gas services and fuel storage shall be installed to minimise risk of ignition of surrounding bushland or the buildings.

4.4.5 Mitigation Measures - Bush Fire

The development does not fall under the category of SFPP and thus an Emergency and Evacuation Plan consistent with RFS Guidelines *Planning for Bush Fire Protection* and *Preparation of Emergency/Evacuation Plan* is not a requirement for the site. However, the site does have a Site Emergency Plan that is consistent with Fire and Rescue NSW and Safe Work Australia Guidelines that embodies a risk assessment and the majority of the procedures prescribed in the RFS Guidelines *Preparation of Emergency/Evacuation Plan.*

Currently, the site has no vegetation or landscaping and APZs are made up of the site grounds (asphalt and cement stabilised road base). If landscaping is to be established in the APZs in the future, it should consider the aims and principles of landscaping for bush fire protection as outlined in *Planning for Bushfire Protection* (NSW RFS 2006). Property maintenance such as maintaining unobstructed access along the western property boundary and checking that water supplies are available should also be undertaken in accordance with these guidelines.

Additional mitigation measures include:

- check hydrants are available and in working order;

- ensure hoses and hose reels are not perished and fittings are tight and in good order;
- ensure the access road is in good condition with trees not forming an obstacle during smoky conditions;
- ensure perimeter roads are free of obstacles to provide access for firefighting appliances and personnel;
- check roof lines for dislodged roofing materials;
- ensure screens on windows and doors are in good condition without breaks or holes in fly screen material and frames are well fitted into sills and window frames;
- ensure that where fitted drenching or spray systems are regularly tested before the commencement of the fire season;
- ensure doors are fitted with draught seals and well maintained (if applicable);
- ensure mats are of non-combustible material or in areas of low potential exposure;
- ensure combustible materials are located down slope and well away from the buildings;
- combustible materials are to be located well away from buildings that store AN. The Hazard Analysis for the site (HSE 2012) prescribes that stores will be kept clear of vegetation and any other combustible materials for a distance of a least 5 m around the external perimeter of the store; and
- the Hazard Analysis for the site (HSE 2012) prescribes that vehicles powered by internal combustion engines operated within the stores should be diesel-powered, fitted with a battery isolation switch and insulated cover over the battery, and be fitted with a spark arrestor and dry-powder extinguisher. Vehicles should be kept outside the store when not in use, be started outside the store and be garaged at least 10 m from the store.

4.5 HAZARDOUS MATERIALS

4.5.1 Background

ERM were engaged to undertake a HAZMAT survey (refer *Annex C*) for the site. Hazardous materials that were targeted in the survey included asbestos containing materials (ACM), synthetic mineral fibres (SMF), lead paint, polychlorinated biphenyls (PCBs) and ozone-depleting substances (ODSs).

The survey included the following tasks:

- visual inspection and sampling of suspected hazardous materials within the subject site buildings and structures from floor to ceiling, or as necessary, to provide an assessment of hazardous materials at the site;
- analysis of selected materials to confirm the presence and/or absence of hazardous materials; and
- preparation of a hazardous materials register.

In addition to the HAZMAT survey undertaken by ERM, *Table 4.5* details hazardous materials and dangerous goods that are proposed to be stored and used on site include:

Table 4.5 Hazardous Materials

Chemical or Common Name	Class	UN No.	HAZCHEM Code	Maximum Inventory	Storage Type	Location Reference
Ammonium Nitrate	5.1	1942	1Z	5000 t	Enclosed warehouse	D Shed
Diesel Fuel	3	1202	3Y	5200L	Above ground bunded tank	Container storage area
Lubricating Oil	None	None	None	400L	Consumables container	Container storage area
Hydraulic Fluid	None	None	None	400L	Consumables container	Container storage area

1. Site Emergency Plan (Crawfords, 2012)

4.5.2 Potential impacts

The audit of hazardous materials on site identified ACM, SMF, potential PCBs and ozone depleting substances.

ERM was able to identify from laboratory results, ACM within 47 specific areas within the three buildings. ACM was located in fibrous cement sheeting – walls and ceilings, corrugated fibrous cement sheets, moulded fibrous cement facia boards, gutters and end capping, compressed fibrous cement sheets shower screen partitions and vinyl flooring tiles.

The survey identified ACM roofing products on the three buildings at the site were a high risk and therefore a high priority for action. This was due to the current condition and risk of disturbance during extreme weather events.

SMF materials were identified at the site in the following material types: insulation batts to the ceilings void of the Administration Building and to the amenities area of shed D, insulation sarking to the roof lining of the Administration Building, insulation within the water heaters within shed D and suspected SMF insulation to the water heaters located within the

Administration Building. The water heater within shed D was identified to be in a degraded state with SMF being released from the piece of equipment.

Old style fluorescent lighting was observed during the survey within both the administration building and shed C and D. The Australian and New Zealand Environment Conservation Council (ANZECC) Identification of PCB-Containing Capacitors database (1997) did not state either way whether the lights contain PCB. These were unable to be assessed due to height restrictions however, due to their age are considered to be likely to contain PCBs.

Three items that contained ODS were located within the administration building. One air conditioner was presumed to have R22, an ODS. One fridge was found to contain R12 while another fridge constructed in the 1960s was seen to have a high likelihood of containing ODS. An air conditioner located in shed D was found to contain R22.

With regard to fuels, oils and lubricants these are stored and placarded in accordance with AS 4326 as they are organic compounds which increase the risk of detonation and may become a contributing factor in an emergency event.

4.5.3 Mitigation Measures

The following measures would be undertaken to reduce impacts associated with hazardous materials onsite:

- implement management and control measures within the Asbestos Management Plan (refer to *Annex C*);
- the water heater with SMF would be removed and disposed to a licensed landfill. Other SMF identified has been recorded in the SMF register;
- when disposing of the potential PCB lighting products listed above, until confirmed otherwise, should be treated to contain PCB containing capacitors;
- the refrigerants will be recovered from the listed items to minimise potential losses of ODSs to the environment. In accordance with national regulations persons who handle ODSs within equipment are required to hold a Refrigerant Handling Licence. In addition companies or persons who acquire, possess or dispose of these substances are required to hold a Refrigerant Trading Authorisation; and
- storage of fuels, oils and lubricants shall be in accordance with AS 4326.

5 ENVIRONMENTAL ASSESSMENT

This Chapter details the existing environment of the site and surrounding areas, including land use, soils and geology, hydrology and water quality, climate and air quality, noise, flora and fauna, indigenous and European heritage, and social and economic considerations. The potential impacts of these issues are also assessed.

5.1 INFRASTRUCTURE AND SERVICES

5.1.1 Existing Facilities and Services

The site comprises four large storage sheds, a site office and four outdoor storage areas. Internal access roads are located within the site, including a staff car park. A private access road leads to the site which is located off Old Maitland Road (refer to *Figure 1.1*).

Crawfords currently sources its electrical needs for the Sandgate facility from the State electrical grid, which would continue with the proposed increase in AN storage. This electricity is sourced from a single overhead power line accessing the site.

Water used on the site is supplied by HWC's reticulated water supply system. A septic system of sanitary wastewater is located to the east of the administration building. Telecommunication services to the site currently exist. The telecommunication lines generally follow the access road to the site.

5.1.2 Potential Impacts

Crawfords Sandgate facility has been operating as a storage and distribution site for AN since December 2008. During this time, volumes of AN in similar quantities to that which is proposed, have been stored and distributed at the site. The re-establishment to these levels at the site require minor environmental infrastructure works. Storage sheds, road networks, as well as other related plant and equipment are already in existence.

Given site operations involve the storage and transport of AN, demand for electricity is not significant and would not place pressure on the State's power supply network. The main electrical demands from site include the operation of the administration building and the lighting for the storage area. The demand for electricity is not expected to change as a result of the increased storage of AN.

Operational water demand is limited to the use of water for dust suppression, domestic and sanitary purposes, cleaning and fire protection. Minor increased demand may occur due to additional dust suppression associated with truck movements, which can be sourced from the existing reticulated water supply and would not place additional pressure on the region's water supply.

The site's telecommunication service would not be impacted upon by the proposal. No additional infrastructure in terms of water, power, wastewater disposal and telecommunications will be required.

5.2 GEOLOGY AND HYDROGEOLOGY

5.2.1 Existing Environment

The site is noted on both the Newcastle 1:100 000 Geological Sheet 9232 (1995) as Hexham Swamp and Disturbed Terrain soil landscapes of primarily fill material underlain by quaternary estuarine/lacustrine sediments, silts and clays. A digital elevation map based on LiDAR data collected in August 2005 indicates that ground levels vary between 1.6 m and 2.2 m AHD across the site (BMT WBM 2012).

Hexham Swamp soil landscape comprises of quaternary sediments derived largely from the Hunter River catchment. This has occurred over several hundred thousand years, however deposition of these sediments increased rapidly with the formation of the swamp itself approximately 3,000 to 4,000 years ago after the formation of the Holocene sand barrier at the mouth of the Hunter River (Dominic Steel 2005). Gravels consisting of sandstone, mudstones and minor quartz and silcrete are also present within Quaternary alluvial deposits along creek lines and in the Hexham Swamp (Engel 1966). The Phase 2 Environmental Site Assessment (ESA) conducted by ERM (2012i) found a relatively consistent soil profile across the investigation area, consisting of up to two metres of fill material underlain by sands and clay. The fill material was found to be directly related to blast furnace slag (ERM 2012i).

Given the broad estuarine plain of the site and surrounds, site hydrogeology is considered complex as the wetland maintains a permanent water table which is generally less than one metre below the ground surface and rises to the surface during wet seasons (Soil Landscapes of the Newcastle 1:100 000 Geological Sheet 9232 (1995)). For the site in general, the surface has been reshaped over time with the use of fill material to provide a relatively level and trafficable area.

5.2.2 Potential Impacts

Groundwater is understood to exist as a shallow unconfined water zone within the fill material and estuarine sediments. The groundwater levels were measured on site during the Phase 2 ESA investigation. During drilling, groundwater was encountered between 0.5 m – 2.2 m below ground surface (bgs), however it was difficult to obtain an accurate water strike. Generally, it was noted to have been between sandy lenses within the fill and estuarine units. Once wells were installed, the water levels across the site stabilised to between 1.0 m to 2.3 m bgs.

It was found that the groundwater flows generally according to the site's topography, toward the west in the direction of the adjacent standing water body and Ironbark Creek 400 m to the northwest. The Phase 1 ESA (ERM, 2012h) did not identify any registered bores within a one kilometre radius of the site. Future bores are unlikely given the natural background quality having brackish, high Total Dissolved Solids (TDS) concentrations and likely low yields.

The Hexham Swamp soil type has a high Potential for Acid Sulphate Soils (PASS). The Phase 2 ESA investigation indicated that PASS exist in-situ. To avoid exposure of the PASS (which may or may not be acidic), excavation of the natural estuarine sediments is typically avoided. Since the existing fill within the Site has depths exceeding one metre at most locations, it is considered unlikely that additional drainage works will require excavation of natural sediments. However, further investigation is warranted before any major excavations are commenced.

A flood certificate was issued for the site by NCC on the 26 June 2012, which identified the site as being located within a flood prone area. The certificate indicated that the estimated 1% annual exceedance probability event (AEP) level was 3.8 m AHD, with an estimated probable maximum flood level of 6.6 m AHD.

5.3 WATER

A Stormwater, Flooding and Receiving Water Quality Assessment was undertaken BMT WBM Pty Ltd for the proposed AN storage and distribution facility. The report is located in *Annex D*.

The report was prepared having regard to the Natural Resources Commission Objectives, Hunter River Water Quality and Flow Objectives, Newcastle City Council's Development Control Plan Objectives and Targets and Stormwater and Water Efficiency Technical Manual, and the management objectives of *Managing Urban Stormwater* (Landcom 2004).

5.3.1 Existing Environment

The existing site comprises 8.77 ha of previously developed industrial land. The existing surfaces broadly include roof areas, unsealed road/storage areas, sealed roads/storage areas and grassed landscaping areas. The existing drainage for the site involves guttering and downpipes connected to underground pipe drainage and an underground piped system on the western boundary of the site discharging stormwater underneath the Main Northern Railway. The site discharges stormwater directly to adjacent lands, including the adjacent wetlands to the north-east and west and the SEPP 14 listed Hexham Swamp. The existing configuration of stormwater discharge is detailed in *Figure 5.1*.

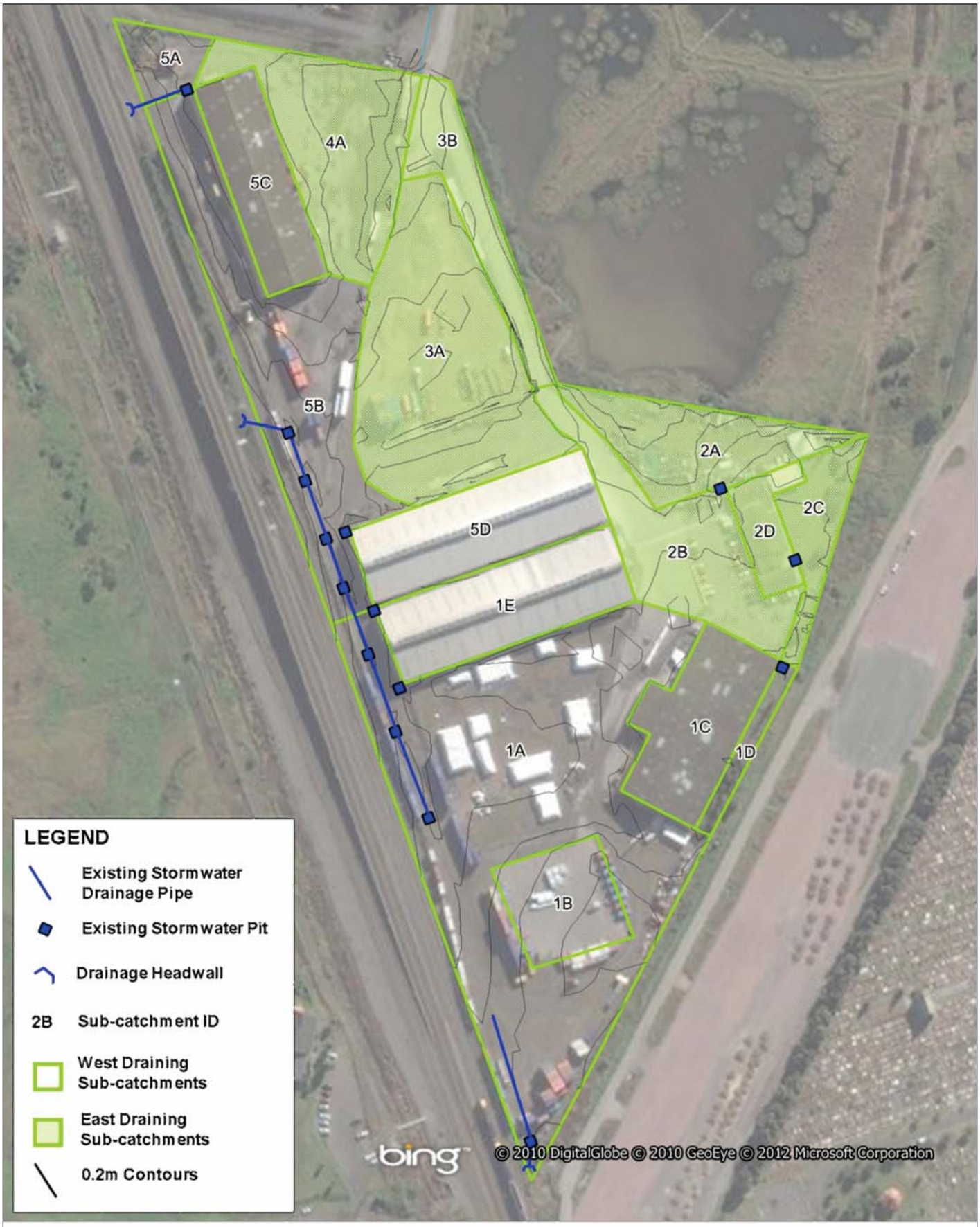
The existing site topography is relatively level with typical surface gradients being less than 1%. The site has been extensively filled to elevate the building slabs and adjacent trafficable areas above the surrounding floodplain and wetlands. It is considered that the existing stormwater drainage system would be inadequate for the purpose of capturing and conveying stormwater from the site to Newcastle City Council's standards as there is currently insufficient inlet capacity within the site to capture the design minor flows. These deficiencies have been inherited from historical developments within the site and would be cost prohibitive to fully resolve as a component of this development. The development proposal aims to improve the existing drainage system wherever practicable, however, the primary focus is on improving stormwater quality from the site.

Available geotechnical data indicates the existing site soils typically comprise a surface layer (asphalt, gravel or topsoil) underlain by fill material to an approximate depth of two metres below ground level (ERM, 2012). Potential Acid Sulphate Soils (PASS) exist in-situ below the fill. The site is located in an estuarine floodplain where groundwater exists as a shallow unconfined water zone within the fill material and estuarine sediments (ERM, 2012). During drilling, groundwater was encountered at depths of 0.5 m to 2.2 m below ground level across the site.

No historical surface water quality data is available for sampling locations within the site. Limited groundwater sampling undertaken as part of the Environment Site Assessment (ERM, 2012, refer to *Annex D*), identified:

- elevated concentrations of ammonia and nitrogen in soils in areas of current and historic AN handling and storage. PAH's and metals were encountered in the fill material on site and are considered likely to be related to filling activities and not current or historic operations on the site; and

- elevated concentrations of ammonia and nitrogen in groundwater in areas of current and historic AN handling and storage. Minor dissolved metal exceedances were reported in three monitoring wells across the site, the source of which is thought to be associated with leachate derived from the imported fill material or potentially representative of regional background conditions.



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Source:
BMT WBM Fg2-5 Rev A

Client:	Crawfords Freightlines Pty Ltd		
Drawing No:	0143175h_EIS_C009_R0.cdr		
Date:	15/10/2012	Drawing size:	A4
Drawn by:	JD	Reviewed by:	JC

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Figure 5.1 - Existing Stormwater Drainage Configuration

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ERM

5.3.2 *Methodology*

Stormwater Modelling

Annual average flow and pollutant loads from the site were estimated for existing and developed (with treatment) scenarios. Numerical modelling using the industry standard MUSIC software was undertaken to assess the performance of the proposed stormwater management strategy. The scenario modelled for the site was the existing site configuration (which is the same as the proposed site configuration) with all proposed stormwater management measures installed and functional. The site was divided into 16 sub-catchments based on topography and surface characteristics for the MUSIC modelling.

The site consists primarily of unsealed gravel surfaces, roofs and some paved areas. To allow for an appropriate pollutant generation and hydrologic assessment of the site, each sub-catchment was assigned source nodes representing the type of land surface (roof, sealed road, unsealed road or landscaped area), the size of the area and proportion impervious (estimated from aerial photography and a site visit).

A range of Water Sensitive Urban Design (WSUD) measures are proposed within the site to retain and filter stormwater runoff to reduce the concentrations and loads of stormwater pollutants discharging from the site. The performance of the treatment measures was assessed using the industry standard MUSIC software. The treatment measures incorporated into the model included:

- prevention of AN exposure to rainfall;
- improved drainage systems, including provision of sediment basins and connection of roof water drainage to drainage system;
- installation of a wheel wash to pick up loose AN and other stormwater pollutants from vehicle movements;
- rainwater tank to capture water runoff from existing sheds and office building, to function as both detention and retention measures, with harvested water to be used primarily for dust suppression;
- minor regrading to maximise sub-catchment areas draining to the sediment basins;
- five sediment basins to intercept and filter sediment laden water; and
- biofiltration basins with above ground storage and below ground filter media, located adjacent to the sediment basins to further improve runoff stormwater quality.

Estimated sizing and volume of the proposed sediment and biofiltration basins which will require excavation are detailed in Tables 2-11 and 2-12 of *Annex E*, and are summarised in *Table 5.3*.

Table 5.1 Sediment and Biofiltration Basin Sizing and Volumes of Material requiring Excavation

Basin ID	Nominal Depth (m)	Average Area / Estimated Footprint (m^2)	Estimated Volume (m^3)
SB1	0.6	410	246
SB2	0.6	95	57
SB3	0.6	195	117
SB4	0.6	150	90
SB5	0.6	215	129
BB1	0.7	300	210
BB2	0.7	100	70
BB3	0.7	150	105
BB4	0.7	80	56
BB5	0.7	140	98
Total Volume of basins to be excavated			**1178**

Potential impacts associated with disturbance of soil and groundwater (including PASS) during construction, including proposed mitigation and management measures is detailed in *Section 5.4.2.*

Flood Modelling

Hunter River flooding behaviour has been assessed using an existing TUFLOW flood model of the Hunter and Williams Rivers. The flood model was calibrated to the March 1978, February 1990, and May 2001 flood events. In terms of the Lower Hunter flood events relevant to the site, the February 1990 flood event was the principal event used to calibrate the lower section of the Williams River model and the lower Hunter River model. Flood depths and flood level contours for the 20 year (5%), 50 year (2%) and 100 Year (1%) Annual Exceedance Probability (AEP) and Probable Maximum Flood (PMF) flood events were modelled (refer *Figure 5.2* to *Figure 5.4*). The flood levels generated by the model are consistent with the levels generated by the flood model developed on behalf of Newcastle City Council for flood planning purposes.

Receiving Water Quality Modelling

BMT WBM investigated the potential impacts on water quality in the receiving environment that could result from the release of AN from the site under flood conditions. Specifically, BMT WBM:

- undertook numerical modelling of the advection and dispersion of AN released from the site under 1% AEP flood conditions; and

- assessed the potential water quality impacts associated with the potential release of AN from the site during the 1% AEP flood.

The study used an existing TUFLOW model of the Hunter River floodplain. This model has been developed by BMT WBM over a number of years and deployed in a wide range of flood studies. The TUFLOW Advection-Dispersion (AD) module within the TUFLOW suite was used to simulate the fate and transport of dissolved AN during and following flood conditions.

Two scenarios of AN release during a 1% AEP flood were considered using the TUFLOW AD module:

- Scenario 1: 1% of solid AN product on site is dissolved and released during the flood falling limb. Under this scenario, it was assumed:

  - floodwater would flow into the storage sheds during the 1% AEP design flood event;

  - 1% of the maximum total AN would be dissolved into the volume of floodwater present in each of the storage sheds at flood peak;

  - No releases of AN would occur on the flood rising limb;

  - Dissolved AN would be released into the immediate environment during the falling limb of the flood, as water drained from each of the storage sheds; and

  - The release would cover a period of 51 hours following the flood peak, which is approximately the time taken for floodwaters to recede from the flood peak to the slab level of the storage sheds.

- Scenario 2: 1% of solid AN product onsite is dissolved and released in a single 'slug'. This scenario was designed to investigate the impact of a shed failure, which would allow for 1% of the maximum stored AN to be dissolved and released in a short period of time. It was assumed that in the event of all three of the sheds failing, 1% of the AN in each of the three sheds would be exposed to the floodwaters and instantaneously released into the surrounding environment. Under this scenario, it was considered that the release would occur at flood peak (45 hours). The model was then run for the full 163 hours to examine the distribution of AN throughout the region. The mass of AN released was as follows:

  - Shed A – 45 tonnes;

  - Shed B – 35 tonnes; and

  - Shed C – 35 tonnes.

5.3.3 *Modelling Results*

Stormwater Modelling

The MUSIC modelling results indicate that the stormwater management measures proposed for the site would achieve the NCC stormwater pollutant load reduction targets for Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Nitrogen (TN) when considering the full site. Predicted annual pollutant loads are detailed in *Table 5.3*.

Table 5.2 Predicted Annual Pollutant Loads

Parameter	Existing Load	Post Treatment Load	Reduction	Target
Flow (ML/yr)	43.2	36.7	15%	-
Total Suspended Solids (t/yr)	23.9	1.6	93%	85%
Total Phosphorus (kg/yr)	15.9	5.5	65%	65%
	319	150	53%	45%

Source: BMT WBM, 2012

Based on the modelling results, it is considered that the primary treatment series comprising rainwater tanks, sediment basins and biofiltration basins within the site would significantly improve stormwater quality when compared to the existing conditions on-site. In addition, it is considered that provision of a secondary series of source controls including improved housekeeping, site regrading, surface protection, improved drainage and a wheel wash bay would further substantially reduce the exposure of pollutants to stormwater.

Flood Modelling

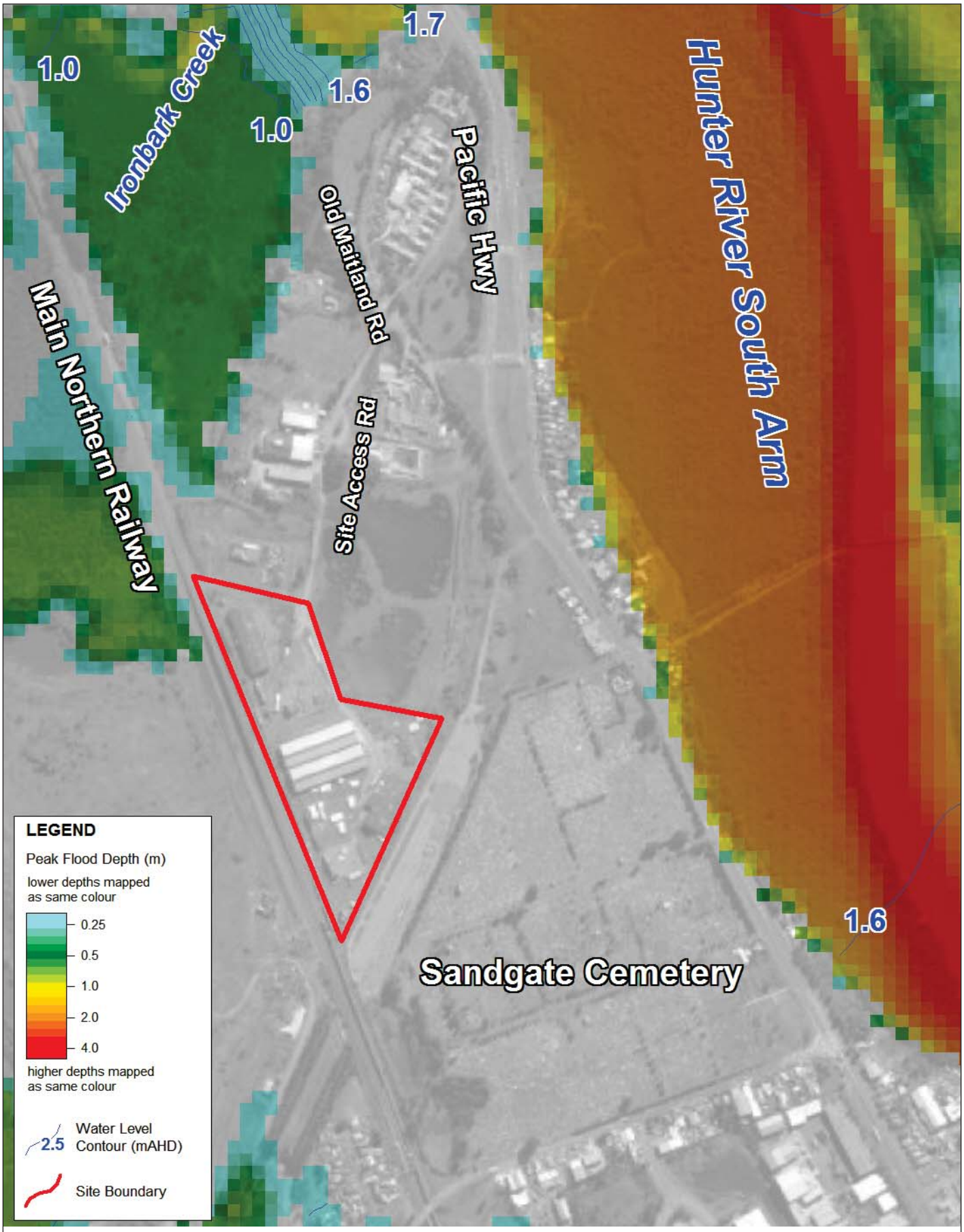
Flood depths and flood level contours across the site for the 5%, 2% and 1% AEP and PMF flood events are detailed in *Figure 5.2* to *Figure 5.4* and summarised in *Table 5.3*.

Table 5.3 Design Site Flood Levels and Depths

AEP	Flood Level (m AHD)	Flood Depth Range within the site (m)
5%	1.0	0
2%	2.0	0.1 – 0.4
1%	3.5	1.0 – 1.8
PMF	7.6	5.1 – 5.9

Source: BMT WBM, 2012

AHD: Australian Height Datum



N

0 375m

Source:
BMT WBM Fg3-1 Rev A

Client:	Crawfords Freightlines Pty Ltd		
Drawing No:	0143175h_EIS_C010_R0.cdr		
Date:	15/10/2012	Drawing size: A4	
Drawn by:	JD	Reviewed by: JC	

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Figure 5.2 - 20 Year (5%) Flood Model

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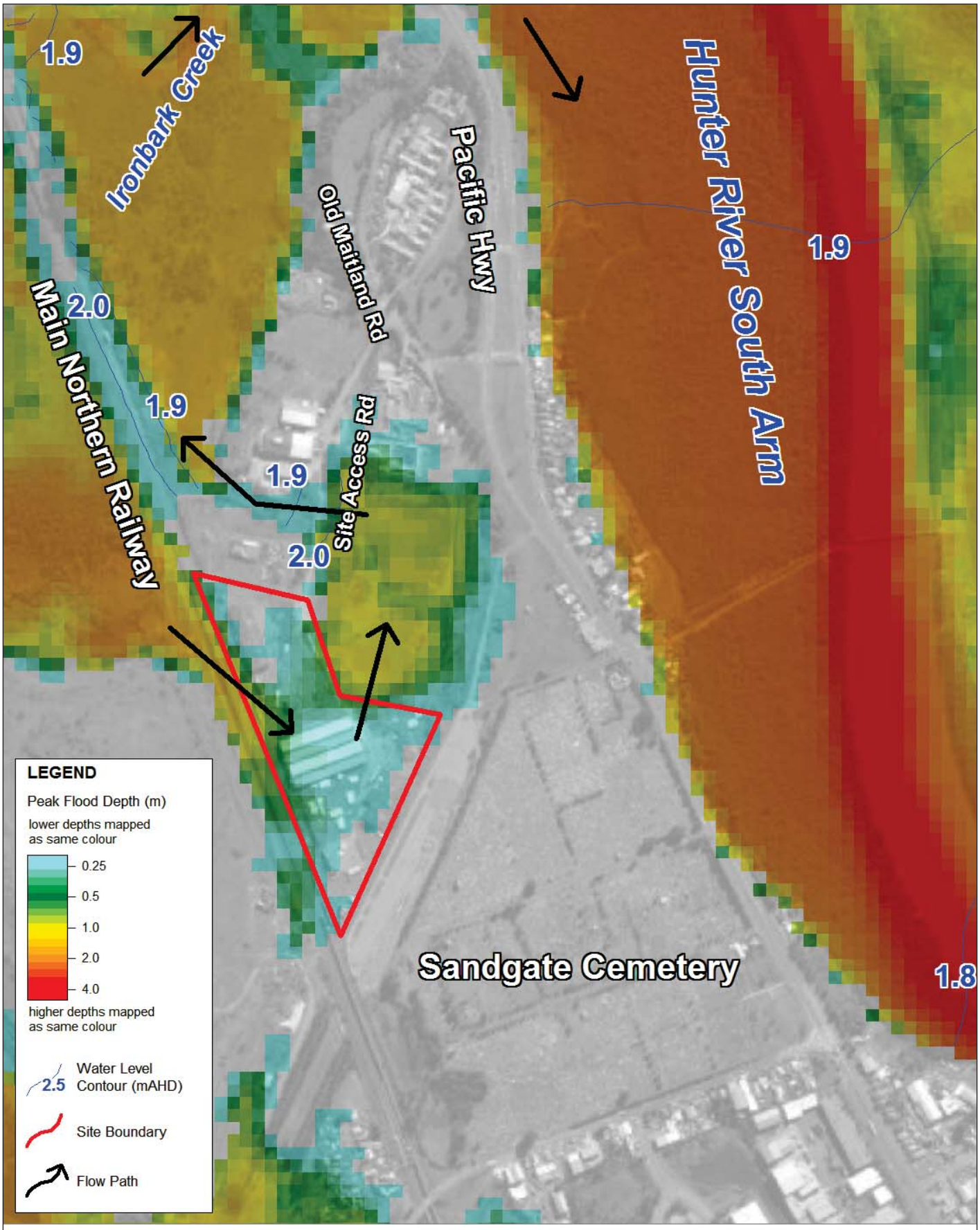

N

0 375m

Source:
BMT WBM Fg3-2 Rev A

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Drawing No:	0143175h_EIS_C011_R0.cdr		
Date:	15/10/2012	Drawing size: A4	
Drawn by:	JD	Reviewed by: JC	

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Figure 5.3 - 50 Year (2%) Flood Model

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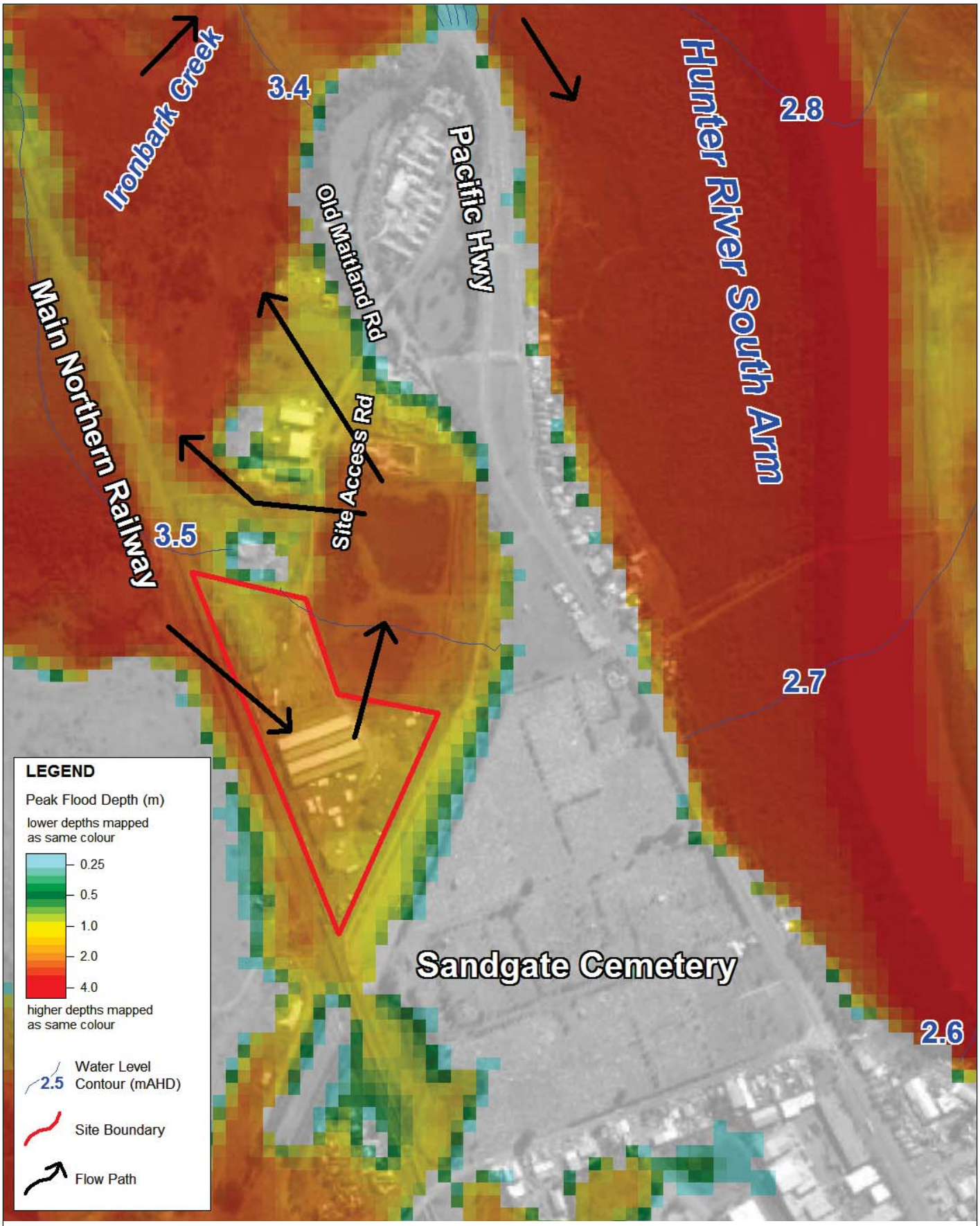

N

0 375m

Source:
BMT WBM Fg3-3 Rev A

Client:	Crawfords Freightlines Pty Ltd		
Drawing No:	0143175h_EIS_C012_R0.cdr		
Date:	15/10/2012	Drawing size: A4	
Drawn by:	JD	Reviewed by: JC	

Figure 5.4 - 100 Year (1%) Flood Model

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In summary, the results of the assessment were:

- during the 5% AEP design flood event ground levels are typically higher than 5% AEP flood levels in the Hunter River;

- during a 2% AEP event, the Ironbark Creek floodgates, along with some low sections of the New England Highway at Hexham, would be overtopped allowing inundation of the Hexham Swamp floodplain, including the site, located on the fringe of this floodplain. Flooding would be limited to less than approximately 0.4 m on the site and would essentially involve backwater inundation from Ironbark Creek. If local rainfall coincided with this flood event, there may be potential for a small conveyance of floodwaters through the site;

- during a 1% AEP event, the site would be inundated primarily from backwater inundation, with Hunter River floodwaters routed through the adjacent Hexham Swamp, as an overbank flow path. The site would still be regarded as Flood Fringe (as per City of Newcastle Flood Mapping) for the 1% AEP event, but with flood depths of 1.0 – 1.8 metres. There may be a small through-flow across the site associated with local rainfall and drainage of Hexham Swamp post-flood peak, although flood velocities are expected to be very low; and

- the PMF event in the Hunter River is approximated by use of a standard multiplier to the 1% AEP flood conditions. The PMF event results in very deep floodwaters at the site. At the peak of the PMF event, there is also a possibility of overtopping of the New England Highway adjacent to the Sandgate Cemetery back into the Hunter River, however, the overtopping rate would be very small compared to conveyance through the main flow path to Ironbark Creek and further north. As per the Council mapping, the site would still be considered Flood Fringe in the PMF event.

Local Catchment Flooding

The local catchment of the site is essentially restricted to the site boundaries, with multiple discharge points from the site. There is little, if any, external runoff entering the site. Rainfall-runoff on the site is directed to the north, into the 2HD ponds (and associated downstream drainage channel), and to the west, where it drains via a series of pits adjacent to the rail siding and then into a newly constructed open channel on the eastern side of the rail-line, before discharging into a natural channel to the north of the site. Overflow from the pits would result in local ponding and then overtopping of the railway siding into the new formal drainage channel on the eastern side of the rail lines.

Given the small local catchment, flooding due to local rainfall would be minor, and generally less than 50 – 100 mm. It is considered that the design conditions for flooding on the site would be driven by backwater flooding from the Hunter River.

The proposed development does not involve any additional construction of buildings or significant site regrading that would affect the local flood behaviour. As such, it is considered that this proposal will have no measurable impact on local flood conditions. Management of local flooding issues could be achieved through good site maintenance, including preservation of inflow capacity of the pits along the western boundary and maintaining sufficient grade on ground surfaces to prevent localised ponding. It is considered that local flooding issues could be mitigated to some degree by good practice stormwater management measures.

The proposed development does not involve any additional construction of buildings or significant site regrading that would affect the local flood behaviour. As such, it is considered that this proposal will have no measurable impact on local flood conditions.

Receiving Water Quality

BMT WBM has used numerical modelling tools to assess the likely fate and transport of the release of AN from three storage sheds in question. Under the two scenarios, AN release from storage Sheds A, B and C would result in AN concentrations in the local area in excess of the relevant toxicity trigger value (TTV) provided by the ANZECC guidelines. In all scenarios, this area of TTV exceedance extended to approximately 2,200 m downstream along the south arm of the Hunter River. *Figure 5.6* to *Figure 5.9* visually present the modelling results.

5.3.4 Potential Impacts

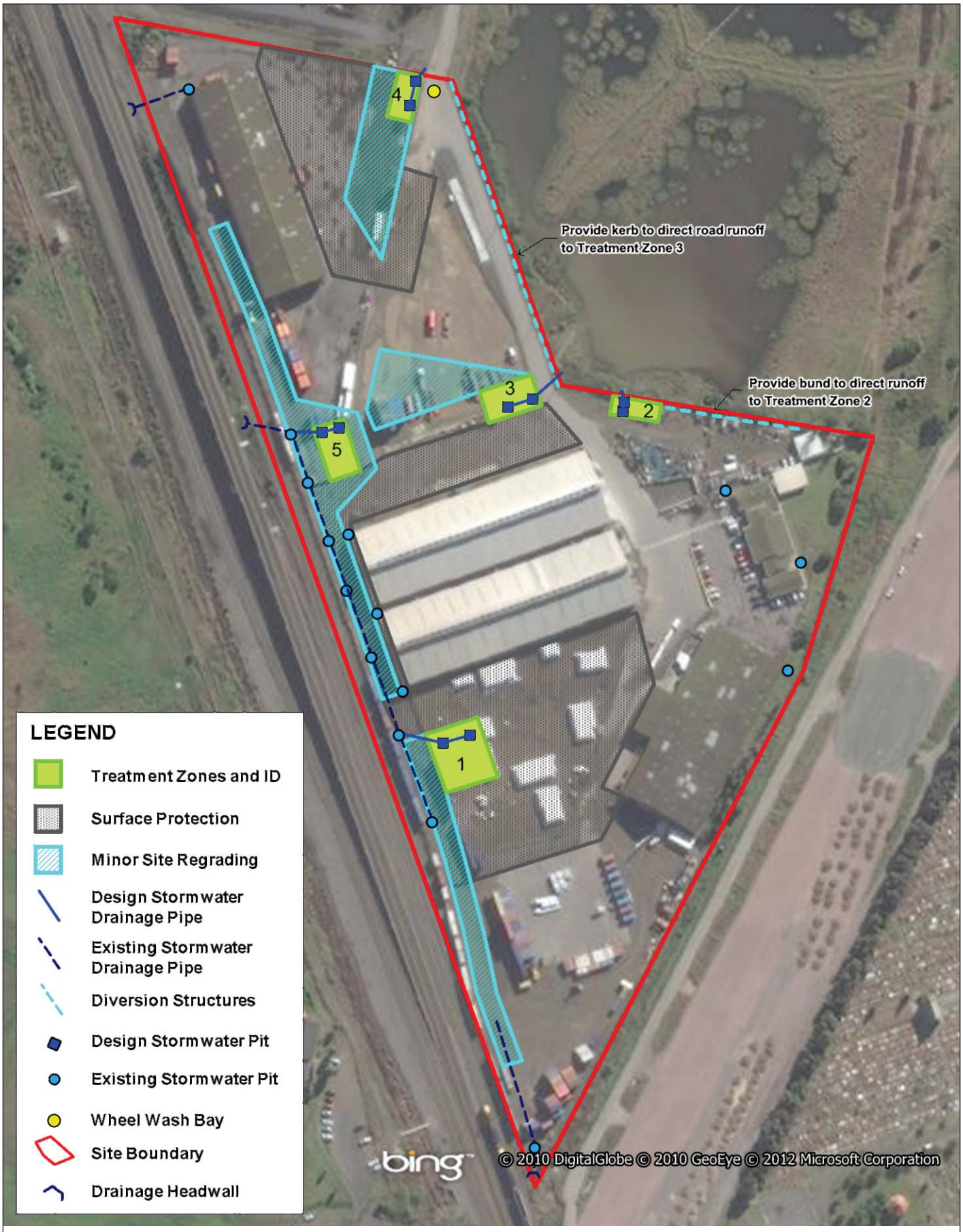
Stormwater

No additional development is proposed that would result in surface runoff from the site being increased above existing conditions. Although no additional surface runoff will be generated by the development, the development provides an opportunity to improve the way that stormwater is currently managed within the site (refer *Figure 5.5*).

Flooding Impacts and Risk

The site is subject to flooding from the Hunter River. It is anticipated that there would be up to 18 hours warning provided by the Bureau of Meteorology (BoM) before the site would be inundated or access roads to and from the site would be cut. The NSW State Flood Sub Plan (SES, 2008) indicates that for floods above 3.5 m AHD at Raymond Terrace, a typical minimum flood warning of 18 hours would be available for areas around Hexham.

As the perimeter of the site is estimated to be only partially flooded during the 2% AEP flood, it is likely that a flood warning based on a BoM warning at Raymond Terrace would provide a minimum of 18 hours to prepare for inundation at the site. Given the availability of warning time for evacuation, and in accordance with the City of Newcastle hazard classification, the site has the lowest (L1) grading for Risk to Life Hazard.



N

0 50m

Source:
BMT WBM Fg2-7 Rev B

Client:	Crawfords Freightlines Pty Ltd		
Drawing No:	0143175h_EIS_C013_R0.cdr		
Date:	15/10/2012	Drawing size: A4	
Drawn by:	JD	Reviewed by: JC	

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Figure 5.5 - The Proposed Stormwater Management Measures

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With respect to risk to property, it is recognised that flooding at or above the 2% AEP level will result in inundation of the site and thus potential for property damage. For example, the 1% AEP will lead to inundation of the site by 1 – 1.8 metres. It is expected that flooding of this depth has the potential for significant damage of fixed property and infrastructure as well as stored goods and materials. The actual risk of property damage due to inundation is not atypical of many industrial developments that fringe the Hunter River floodplain. Modelling results indicate that the 1% AEP event would potentially inundate the site for greater than 72 hours.

The site is in a Flood Fringe area. This means that the flooding behaviour is driven primarily by backwater flows. By definition, further infill of the property within Flood Fringe areas is unlikely to have significant impacts on adjacent sites.

The development will not affect the behaviour of a Hunter River flood, including affecting the local flood levels, depths or velocities. As such, the development is not expected to cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks.

Receiving Water Quality Impacts

AN is highly toxic to a wide range of aquatic fauna (ANZECC, 2000), and if it were to be released from the site as per the scenarios simulated, the consequences for downstream ecosystems are likely to be significant (refer *Figures 5.6* to *5.9*). This is because, even under a 1% release scenario (Scenario 1), the simulations predict that the ammonia TTV would be exceeded for more than two kilometres downstream of the site. Scenario 2 predicts even larger zones of confluence where the TTV is likely to be exceeded, including all the way to the mouth of the Hunter River .

The duration of TTV exceedences for the modelled flood vary from approximately 10 to 20 hours, depending on the scenario and location. Notably, the highest concentrations observed (ie the shed failure scenario) persist for approximately 4 to 6 hours at any given point, whereas the 1% dissolution of AN typically shows longer exceedence times, but at lower AN concentrations.

Social and economic costs to the community as a consequence of flooding would only be tangible if the stored AN material was leached from the site during a flood and was subsequently spread across parts of the Hunter River catchment.

NCC's DCP requirements relate to new development. The project involves the use of existing site infrastructure for the storage and handling of AN and therefore no new development is proposed. Minor building modifications and site works associated with stormwater management are proposed. The proposed stormwater management system, including pre-treatment sediment basins, biofiltration basins and site regrading will retain and filter stormwater

runoff. Estimations of annual average flow and pollutant loads from the site indicate that the stormwater management measures proposed for the site would achieve the NCC stormwater pollution load reduction targets for TSS, TP, TN when considering the full site. Based on the MUSIC modelling results, it is considered that the primary treatment series comprising rainwater tanks, sediment basins and biofiltration basins within the site would significantly improve stormwater quality when compared to the existing site. No additional surface runoff will be generated by the development. The development provides an opportunity to improve the way that stormwater is currently managed within the site (refer *Figure 5.5*).

N

0 1km

Source:
BMT WBM Fg4-2 Rev A

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Drawing No:	0143175h_EIS_C014_R0.cdr		
Date:	15/10/2012	Drawing size:	A4
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Figure 5.6 - Maximum Ammonia Concentration: 1% Leak Scenario

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N

0 1km

Source:
BMT WBM Fg4-3 Rev A

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Drawing No:	0143175h_EIS_C015_R0.cdr	
Date:	15/10/2012	Drawing size: A4
Drawn by:	JD	Reviewed by: JC

Figure 5.7 - Maximum Ammonia Concentration, Relative to TTV: 1% Leak Scenario

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N

0 1km

Source:
BMT WBM Fg4-4 Rev A

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Date:	15/10/2012	Drawing size: A4
Drawn by:	JD	Reviewed by: JC

Figure 5.8 - Maximum Ammonia Concentration: Shed Failure Scenario (1% Leak)
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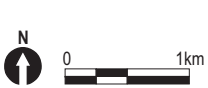

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Drawn by:	JD	Reviewed by: JC	

Figure 5.9 - Maximum Ammonia Concentration, Relative to TTV: Shed Failure Scenario (1% Leak)

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5.3.5 Mitigation Measures

Stormwater Management

Estimated annual average flow and pollutant loads from the site were estimated for existing and developed (with treatment) scenarios. The results indicate that the stormwater management measures proposed for the site would achieve the Council's stormwater pollutant load reduction targets for TSS, TP and TN when considering the total site. Based on the MUSIC modelling results, it is considered that the primary treatment series comprising rainwater tanks, sediment basins and biofiltration basins within the site, would significantly improve stormwater quality when compared to the existing site conditions. In addition, it is considered that provision of a secondary series of source controls including improved housekeeping, site regrading, surface protection, improved drainage and a wheel wash bay would further substantially reduce the exposure of pollutants to stormwater. The configuration of the proposed stormwater management measures is detailed in *Figure 5.5.*

The ability to regrade existing surfaces within the site to ensure they are free draining is highly constrained by the location of existing fixed infrastructure. Any significant modifications to the existing site grading, fixed infrastructure and piped drainage systems is expected to be costly and potentially result in additional unforeseen impacts. The approach taken for this proposed development is to augment the existing drainage system; undertake minor site regrading; and optimise the interception of coarse pollutants wherever possible to prevent pipe blockage due to sedimentation.

Review of the existing surveyed ground levels indicates that the shed slab levels are elevated above the adjacent external paved areas in most cases. Where adjacent ground levels are within 150 mm of the floor slab level, it is proposed that minor regrading in these areas will be undertaken to ensure that local runoff is unable to enter the sheds. Minor regrading of the existing ground surface levels away from the sheds will also be undertaken to increase the proportion of the site directed to mitigation measures for filtering and treatment. Additional drainage inlets will be provided at strategic locations to reduce overland flows during frequent runoff events, and piped drainage systems will be extended to connect these drainage inlets to the existing drainage system.

It is proposed to initially connect roof drainage systems to rainwater tanks within the site to reduce the volume of clean runoff discharged directly into the stormwater drainage system and onto ground surfaces. Provision of rainwater tanks would also provide retention/detention storage to mitigate the impacts of increased connections to the drainage system on peak discharges in the existing pipes.

Flooding

Management of local flooding issues could be achieved through good site maintenance, including preservation of inflow capacity of the pits along the western boundary and maintaining sufficient grade on ground surfaces to prevent localised ponding.

Measures to manage risk to life at the site would be based on evacuation when the site and/or the access road (including the New England Highway) are expected to be impacted by inundation. It is anticipated that there would be several hours warning of this occurrence, which would be sufficient for evacuation of the site.

It is noted that the high land at St Joseph's Convalescent Home is flood-free. Thus, in a worst case scenario where evacuation of the site is delayed or sufficient warning time is not provided, all people on the site could take refuge at the St Joseph's flood-free land once inundation of the site commences or is imminent. However, LiDAR survey suggests that a sag point in the private access road to the site is about 0.6 m lower than the site ground levels. Thus, access from the site may be difficult if evacuation is delayed until the site starts to become physically inundated. Under no circumstances should people take refuge on the site. It is recommended that the site based emergency response plan be modified to include evacuation due to flooding.

5.4 SITE CONTAMINATION

The surrounding environmental setting is an indicator that the site is located upon a shallow unconfined water zone within the fill material and estuarine sediments, therefore groundwater vulnerability (the likelihood of contaminants reaching a receptor) is likely to be high. However, given the long term industrial land use, groundwater sensitivity (the potential significance of any impact) is likely to be low. To investigate the current site conditions of the groundwater and soil, a Phase 1 Environmental Site Assessment (ESA), and subsequent Phase 2 ESA was undertaken by ERM (2012). Findings from the assessments are detailed herein.

5.4.1 Phase 1 ESA

A Phase 1 ESA was undertaken by ERM in April 2012 (refer to *Annex D*). The overall objective of the Phase 1 ESA was to identify and provide an assessment of potential liabilities in relation to key environmental issues resulting from current and historic on-site operations. The ESA included a site reconnaissance, interviews with site personnel, review of publicly available information and a review of documentation stored on site.

Existing Environment

The report considered potential sources of current and historical on-site soil and groundwater contamination to represent a potential environmental liability including:

- significant historical infilling to allow the reshaping and development of the site;

- historical storage of AN within shed C, shed D and storage area south of shed B resulting in probable leaks and spills potentially contributing to excessive levels of Ammoniacal Nitrogen and Nitrate;

- potential leaks and spills from the storage within shed A and shed B of historical operations potentially contributing to excessive levels of Ammoniacal Nitrogen and Nitrate;

- two disused diesel underground storage tanks are present on site within the vicinity of the north western corner of shed D;

- the presence of the rail siding along approximately 600 m of the western boundary which are traditionally associated with contamination from ash ballast material (metals, phenols, sulphates, and polycyclic aromatic hydrocarbons), localised oil, fuel and grease deposits, herbicides and spillage of cargoes;

- one former disused aboveground storage tank used for diesel storage located in the northwest corner of the site, originally located within the bunded area adjacent shed D; and

- the workshop area south of shed D and the wash bay may be associated with contamination resulting from localised oil, fuel and grease deposits and the temporary storage and application of chemicals (degreaser and chlorine).

Potential Impacts

The Phase 1 ESA found that potential sources of current and historical off-site soil and groundwater contamination are generally related to the surrounding industrial operations including:

- the parcel of land directly to the north of site (formerly Lot 22 in DP 627724), owned by Sierra Sun Pty Ltd currently exists on the Contaminated Land Register as a remediation site. A review of a report prepared by ERA Environmental Services Pty. Ltd. *Plan of Management for the Toll Bulk Services Site Sandgate, prepared for North Mining Ltd*. (1994) identifies this portion of land to be contaminated with oils and grease, and some base metals;

- the former Astra Street Landfill, Shortland is located immediately to the west of site beyond the Main Northern Railway is currently on the Contaminated Land Register. Identified impacts include non-metallic inorganics, metals and metalloids and total petroleum hydrocarbons;

- the Main Northern Railway immediately to the west of site. Rail sidings are traditionally associated with contamination resulting from ash ballast material (metals, phenols, sulphates, and polycyclic aromatic hydrocarbons), localised oil, fuel and grease deposits where locomotives may have stood for significant periods of time, accumulation of herbicides and spillage of cargoes; and

- the Caltex service station located on the Pacific Highway, Sandgate approximately 320 m southeast of site exists on the list of contaminated sites in NSW that have been notified to OEH under the duty to report obligations (CLM Act 1997). This represents a potential source of contamination related to leaks, releases and/or seepage from above and underground storage tanks.

From the assessment of information available for review during the Phase 1 ESA, the following conclusions were made with respect to key environmental issues and potential liabilities resulting from current and historic on and off site operations:

- the site is located in an area of historical industrial land use with a number of current and historical, potentially contaminating processes identified both on and off site;

- the overall environmental sensitivity of the site setting is considered to be low to moderate; and

- contamination sources are generally associated with the storage of AN, historic storage and handling of hydrocarbon based fuels, historic storage and handling of general fertiliser as a result of previous operations, and possible impacts related to historic land filling processes.

5.4.2 Phase 2 ESA

Methodology

Based on the results of the Phase 1 ESA, a targeted Phase 2 ESA was conducted (refer to *Annex D*). The specific objectives of the targeted Phase 2 ESA were to:

- assess the current nature of contaminants in soils and groundwater beneath the site that maybe potentially associated with current and historic activities on the site only; and

- provide an understanding as to the suitability of the site for its current land use and provide a baseline for future comparison of environmental issues. From these findings, recommendations on any follow-up investigation or remedial works can be made.

The works included a soil bore investigation, groundwater monitoring well investigation and groundwater sampling. Fourteen soil bores were advanced, five of which were specifically drilled for the installation of monitoring wells. Twenty-three soil samples were taken from the 14 bore locations. *Figure 5.10* identifies the soil and water sampling locations.

Samples were analysed at Australian Laboratory Services (ALS). Soil samples were analysed for the following Chemicals Of Potential Concern (COPCs):

- Ammonia;
- Nitrogen (total oxidised) including nitrate and nitrite;
- TRH (total recoverable hydrocarbons);
- BTEX (Benzene, Toluene, Ethylbenzene and Xylenes);
- Metals – Arsenic (As), Mercury (Hg), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Nickel (Ni) and Zinc (Zn);
- PAHs (Polycyclic Aromatic Hydrocarbon);
- Phenols;
- Polychlorinated biphenyls (PCBs), organo-phosphate pestices (OPPs) and organo-chlorine(OCPs);
- Acid Sulphate Soil Screen; and
- Asbestos.

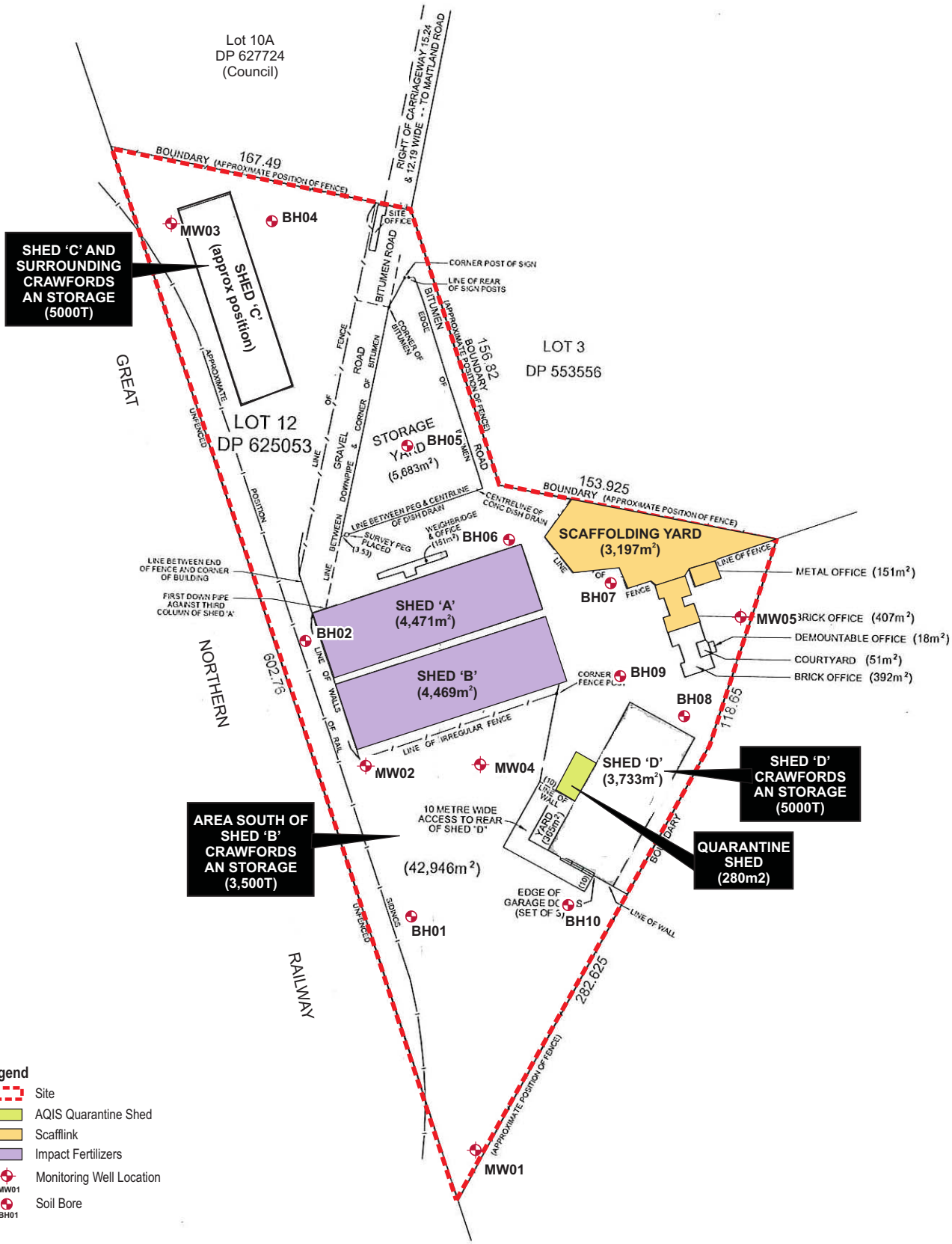
Groundwater samples were analysed for:

- Ammonia;
- Nitrogen (total oxidised) including nitrate and nitrite;
- TRH (total recoverable hydrocarbons);
- BTEX (Benzene, Toluene, Ethylbenzene and Xylenes);
- Dissolved metals - Arsenic (As), Mercury (Hg), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Nickel (Ni) and Zinc (Zn);

- PAHs (Polycyclic Aromatic Hydrocarbon); and

- Polychlorinated biphenyls (PCBs), organo-phosphate pestices (OPPs) and organo-chlorine(OCPs).

To ensure that soil and groundwater analytical results were representative of actual field conditions, the accuracy and precision of laboratory quality control results were measured by percentage recovery and relative percentage difference (RPD), respectively. Procedures involved in the sampling included equipment blanks, duplicates, trip blanks and trip spikes. These procedures are listed in *Annex D*.



Notes:

1. This plan should not be used for critical design dimensions.

N

0 50m

Source:
Harper Somers O'Sullivan
Ref 24353

Client:	Crawfords Freightlines Pty Ltd		
Drawing No:	0143175h_EIS_C018_R0.cdr		
Date:	15/10/2012	Drawing size: A4	
Drawn by:	JD	Reviewed by: JC	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 5.10 - Soil and Water Sampling Locations
Crawfords Freightlines Pty Ltd - Environmental Impact Statement

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney

ERM

Screening Assessment

The screening assessment criteria applied to soil data included:

- Cooperative Research Centre for Contaminant Assessment and Remediation of the Environment (CRC CARE) Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater (Friebel and Nadebaum 2011);

- Assessment of Site Contamination, Schedule B (1) - Guideline on the Investigation Levels for Soil and Groundwater, Soil Health Investigation Levels for commercial/industrial land (HIL F) (National Environment Protection Council, 1999); and

- Contaminated Sites Guidelines for Assessing Service Station Sites – Threshold Concentrations for Sensitive Land Use (Protection of Human Health) (NSW EPA, 1994).

The screening assessment criteria applied to groundwater data included:

- CRC CARE Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater (Friebel and Nadebaum 2011); and

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australia and New Zealand Environmental and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (ANZECC/ARMCANZ), 2000.

Existing Environment

Table 5.4 shows a generalised summary of the soil and geology of the subsurface based on the field work completed. Detailed borelogs are included in *Annex D*.

Table 5.4 Lithology Encountered On Site

Lithological Unit	Description	Depth (mbgl)
Asphalt		~0 – 0.1
Fill	Sandy Silty Gravel, grey, dry – damp, loose, fine grained – coarse gravel, poorly sorted, sub-rounded – sub-angular. Highly compacted fill material.	~0.1 – 2.0
Clay	Dark grey – black, moist, very soft, non-plastic, homogenous.	~2.0 – 2.5
Clayey Sand	Grey, moist – saturated, dense, fine grained, well sorted.	~2.5 – 5.0

Annex D provides the complete findings of the Phase 2 ESA. A summary of the results is provided in the following pages.

Ammonia (as N) and Nitrogen (Total Oxidised)

There are currently no published guidelines for ammonia and nitrogen in soils however, maximum reported concentrations of ammonia (as N) were reported within the fill material of BH10 (130 mg/kg), located within the area of the mechanic workshop and MW02 (110 mg/kg), located within the area of a reported historical release as a result of historical operations not associated with Crawfords lease tenure.

Concentrations of Nitrogen (Total Oxidised) was reported above the laboratory limit of reporting in all sampling locations on site with the exception of one isolated location (BH05), located within the timber storage yard adjacent to the outdoor storage compound of Shed C. The highest reported concentrations were noted to be within the current outdoor AN storage compound south of Shed B, being MW02 (510 mg/kg) and MW04 (108mg/kg).

Analytical groundwater concentrations for Ammonia (as N) were consistently encountered at all locations across the site above the level of reporting. Elevated concentrations of ammonia were reported for MW02 (16,400µg/L) and MW04 (4,620µg/L) located within areas of current and historic AN storage areas. Following findings from the Phase 1 ERM report (2012), MW02 was installed to target reported historical spills associated with the former historical operations in Shed B.

Petroleum Hydrocarbons and Polycyclic Aromatic Hydrocarbons (PAH)

The analytical data indicates that soil contamination relating to petroleum hydrocarbon sources, as defined by concentrations exceeding commercial screening criteria are limited to the fill materials likely used to raise the site above standing water level during construction.

Exceedances of the adopted commercial screening criteria were reported for benzo(a)pyrene, benzo(a)anthracene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene and sum of PAHs in MW03 and BH04, and chrysene in BH04, both investigation locations are located in the north of the site. Interpretation of field observations and laboratory data, indicated that the fill material used to raise the site in the north during construction is indicative of blast furnace slag material.

When sampling groundwater it was found that exceedances of the adopted human health screening criteria were reported for benzo(a)pyrene in MW04 with a concentration of 0.5µg/L which is at the laboratory limit of reporting. Analytical results for TRH, BTEX and PAHs (sum of) have been reported below the adopted human health or ecological screening criteria in all monitoring wells sampled on site.

Metals

Exceedances of the adopted commercial screening criteria were reported for lead (1970 mg/kg) in MW01 at a depth of 0.5 m bgs. Concentrations exceeding the adopted ecological screening criteria were reported for lead, arsenic, cadmium, copper, mercury, nickel and zinc in isolated locations within the imported fill materials on site. Dissolved concentrations of either arsenic, cadmium, copper or zinc above the adopted screening criteria have been reported in monitoring wells, MW01, MW03 and MW05 across the site. Due to distribution of heavy metals, the source is thought to be associated with leachate derived from the imported fill material or potentially representative of regional background conditions.

Other COPCS

Concentrations of PCBs, OPPs and OCPs were reported below the laboratory limit of reporting in all samples analysed. Asbestos was suspected within boreholes of two locations during field works however laboratory analysis reported a non-detect.

Concentrations of PCBs, OPPs and OCPs were reported below the laboratory limit of reporting in all groundwater samples analysed. A summary of exceedances is detailed in *Table 5.5*.

Table 5.5 Summary of Exceedances

Sample Matrix	Sample Location	Type of Exceedance	Criteria exceeded
Soil	BH07_0.4	arsenic	Ecological screening criteria
Soil	BH10_0.4	lead and zinc	Ecological screening criteria
Soil	MW01_0.5	lead	HIL F
Soil	MW01_0.5	lead, arsenic, cadmium, copper, mercury, nickel and zinc	Ecological screening criteria
Soil	BH08_1.2	arsenic	Ecological screening criteria
Soil	BH04_0.1	benzo(a)pyrene, benzo(a)anthracene, chrysene, dizenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene and sum of PAHs	HIL F
Soil	MW03_0.15	benzo(a)pyrene, benzo(a)anthracene, dizenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene and sum of PAHs	HIL F
Water	MW01	cadmium	Human health screening criteria
Water	MW01	copper and zinc	Ecological screening criteria
Water	MW03	zinc	Ecological screening criteria
Water	MW05	arsenic	Human Health screening criteria
Water	MW05	copper and zinc	Ecological screening criteria
Water	MW04	benzo(a)pyrene	Human Health screening criteria

Elevated concentrations of ammonia (as N) were reported in monitoring wells, MW02, MW03 and MW04, however there are no published guidelines for investigation levels for this constituent.

Potential Impacts

The results of the investigation indicated that:

- elevated concentrations of ammonia and nitrogen in soil were encountered in areas of current and historic AN handling and storage. PAHs and metals were encountered in the fill material on site and are considered likely to be related to filling activities and not current or historic operations on the site; and
- elevated concentrations of ammonia and nitrogen were encountered in groundwater in areas of current and historic AN handling and storage. Minor dissolved metal exceedances were reported in three monitoring wells across the site. The source is thought to be associated with leachate derived from the imported fill material or potentially representative of regional background conditions.

Soil contamination appears to be limited to fill materials on the site and is likely to be directly related to blast furnace slag. This is not considered to represent a significant issue in isolation nor is it considered to affect the site's continued industrial use.

Elevated concentrations of ammonia (as N) in groundwater are considered to be significant and warrant notification of the site under Section 60 of the CLM Act 1997. At this stage it is not considered that these elevated concentrations pose a risk to human health as it is highly unlikely that the groundwater is impacting on a drinking water source, however given the close proximity to surface water it is recommended that site practices are reviewed to minimise spillage of AN on the site and a programme of yearly groundwater monitoring be implemented across the site to assess ammonia and nitrogen concentrations and the effect of improvements on the management of AN on the site.

Groundwater beneath the site was observed to be present as a shallow unconfined water zone within the fill material and estuarine sediments at depths between 1.0 – 2.3 metres below ground surface (m bgs). There is the potential for construction activities associated with regrading and construction of the sediment and biofiltration basins and associated pits to disturb soil and groundwater.

Mitigation Measures

The following measures would be undertaken to reduce impacts associated with contaminated material onsite:

- the site should be notified under Section 60 of the CLM Act 1999;

- given PASS were identified onsite, further analysis and management of soils at the site is required if excavation of natural estuarine sediments is to occur;
- implementation of groundwater management plan within the construction and operations environmental management plans to manage potential risks associated with potential acid sulphate soils (PASS) and elevated concentrations of ammonia, nitrogen, PAHs and metals as reported in *Targeted Phase II Environmental Site Assessment, Lot 12 Old Maitland Road Sandgate* (2012);
- the implementation of a groundwater monitoring program across the site to assess ammonia and nitrogen concentrations; and
- a review of site practices to minimise the spillage of AN on the site.

5.5 FLORA AND FAUNA (ECOLOGY)

An ecological assessment was undertaken by ERM (2012) (refer to *Annex F)*. The assessment focussed on the survey and assessment of species and communities within the adjacent wetland that could potentially be adversely affected by hazardous chemicals introduced via flood and surface water run-off from the site.

The site is within close proximity to a SEPP 14 - Coastal Wetland (840) known as Hexham Swamp. This is a state significant wetland. The Hunter Estuary, comprising Kooragang Nature Reserve and the Shortland Wetlands are approximately 2.5 km apart and are connected by a wildlife corridor consisting of Ironbark Creek, the Hunter River and Ash Island. These sites are situated on opposite sides of the study area.

5.5.1 Methodology

The assessment targeted the Green and Golden Bell Frog (*Litoria aurea),* threatened and migratory birds, groundwater dependent ecosystems (GDEs) and aquatic ecology. These matters were specifically targeted due to a number of factors: the DGRs, previous records of the Green and Golden Bell Frog and threatened bird species and the surrounding habitats with potential to be impacted.

Database Searches

Database searches were undertaken to collect records of threatened and migratory species listed under the TSC Act and EPBC Act previously recorded within a 10 km radius of the Study Area. The following databases were searched in June 2012:

- the NSW Department of Environment, Climate Change and Water (DECCW) Atlas of NSW Wildlife database;

- the Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA) on-line search tool for Matters of National Environmental Significance (MNES); and

- Hunter Wetland Centre bird survey results 2011.

Literature Review

Literature relevant to the ecology of the Study Area was collected from online databases using web-based search tools, and from public and in-house libraries. Background literature specific to the project included:

- HWR Ecological (2005) Proposed Upgrades of SH23 Shortland to Sandgate Ecological Assessment;

- HWR Ecological (2006) Proposed Upgrade of SH23 Shortland to Sandgate Green & Golden Bell Frog Assessment;

- RTA (2006) Newcastle Inner City Bypass Sandgate to Shortland Review of Environmental Factors;

- Department of Environment and Climate Change NSW (DECC) (2007) Draft Management Plan for the Green and Golden Bell Frog Key Population in the Lower Hunter; and

- Department of Land and Water Conservation (DLWC) (2002) NSW State Groundwater Dependent Ecosystems Policy.

A literature review on the biology and ecology of the Green and Golden Bell Frog was undertaken and reports for nearby developments were also consulted to obtain information and records of the species in the locality and the historically recorded population at the 2HD swamp in particular. Literature review on the types of GDEs likely to occur in the study area and potential impacts of the activities occurring on the development site were investigated.

Existing Vegetation Mapping

Existing vegetation mapping datasets for the study area were obtained from the Hunter & Central Coast Regional Environmental Management Strategy (HCCREMS) (March 2003). The datasets were applied to the study area using a GIS and inspected for their spatial accuracy against current aerial imagery of the study area. This data was used as the basis for further field investigations to assess floristic composition of vegetation communities in the study area.

Field Investigations

Field investigations were undertaken in two survey periods by two ecologists between 14-19 March and 12-14 June 2012 and included:

- Green and Golden Bell Frog: habitat identification, dip netting, spotlighting and active searches, call detection, call playback, reference site surveys;
- birds: opportunistic surveys;
- GDEs: vegetation mapping, identification of species vegetation communities, and condition assessment; and
- aquatic surveys: a total of five sites were sampled with the following sampling techniques: real time *in-situ* water quality; laboratory analysis of water samples, macroinvertebrates and macrophytes.

5.5.2 Results

Database Searches

A total of 118 species listed under the TSC Act and/or EPBC Act were reported to have previously been recorded within 10 km of the study area. This includes 20 flora species and 98 fauna species. The Atlas of NSW Wildlife reported previous records of 18 flora species and 68 fauna species listed under the TSC Act in the search area. The Hunter Wetlands Centre reported records of seven bird species listed under the TSC Act in the search area, all of which were also report in the Atlas of NSW Wildlife.

A full list of threatened and migratory species known or with the potential to occur within 10 km of the study area is provided in *Table 5.6* and *Table 5.7*. The locations of existing threatened species records reported by the NSW Wildlife Data Unit within 10 km of the Study Area are shown in *Figure 5.11* (flora) and *Figure 5.12* (fauna). The EPBC Protected Matters Search Tool reported the following Matters of NES that may occur in or may relate to the 10 km search radius surrounding the study area:

- one wetland of international significance (Hunter Estuary Wetlands);
- one threatened ecological community (White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland);
- 18 threatened species; and
- 32 migratory species.

The full report from the EPBC Protected Matters Search Tool database for the search area is provided in *Annex M*.