

APPENDIX 4

Risk Tables

Preliminary Risk Assessment

Qualitative Risk Assessment Criteria

The qualitative risk assessment criteria have been developed to identify key risks to the environment, society, heritage and business reputation. The criteria are based on a risk assessment matrix consistent with *Australian Standard AS4360 on Risk Management (AS4360)*. The qualitative assessments of risk severity and likelihood (refer to **Tables 1.1 to 1.3**) were used to help provide a general assessment of the risks to the environment and community. The overall risk level was determined by using the matrix in **Table 1.3**.

Table 1.1 - Qualitative Measures of Environmental Consequence

Severity Level	Natural Environment	Legal/Government	Heritage	Community / Reputation/Media
(1) Insignificant	Limited damage to minimal area of low significance.	Low-level legal issue. On the spot fine. Technical non-compliance prosecution unlikely. Ongoing scrutiny/attention from regulator.	Low-level repairable damage to commonplace structures.	Low level social impacts. Public concern restricted to local complaints. Could not cause injury or disease to people.
(2) Minor	Minor effects on biological or physical environment. Minor short-medium term damage to small area of limited significance.	Minor legal issues, non-compliances and breaches of regulation. Minor prosecution or litigation possible. Significant hardship from regulator.	Minor damage to items of low cultural or heritage significance. Mostly repairable. Minor infringement of cultural heritage values.	Minor medium-term social impacts on local population. Could cause first aid injury to people. Minor, adverse local public or media attention and complaints.
(3) Moderate	Moderate effects on biological or physical environment (air, water) but not affecting ecosystem function. Moderate short-medium term widespread impacts (e.g. significant spills).	Serious breach of regulation with investigation or report to authority with prosecution or moderate fine possible. Significant difficulties in gaining future approvals.	Substantial damage to items of moderate cultural or heritage significance. Infringement of cultural heritage/scared locations.	Ongoing 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 (NGO). Environmental credentials moderately affected.

Table 1.1 - Qualitative Measures of Environmental Consequence (cont)

Severity Level	Natural Environment	Legal/Government	Heritage	Community / Reputation/Media
(4) Major	Serious environmental effects with some impairment of ecosystem function. Relatively widespread medium-long term impacts.	Major breach of regulation with potential major fine and/or investigation and prosecution by authority. Major litigation. Future project approval seriously affected.	Major permanent damage to items of high cultural or heritage significance. Significant infringement and disregard of cultural heritage values.	On-going serious social issues. Could cause serious injury or disease to people. Significant adverse national media/public or NGO attention. Environment/management credentials significantly tarnished.
(5) Catastrophic	Very serious environmental effects with impairment of ecosystem function. Long term, widespread effects on significant environment (e.g. national park).	Investigation by authority with significant prosecution and fines. Very serious litigation, including class actions. Licence to operate threatened.	Total destruction of items of high cultural or heritage significance. Highly offensive infringements of cultural heritage.	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. Share price may be affected.

Table 1.2 - Qualitative Measure 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 once every 1 year - 10 years.
D	Unlikely	Consequence could occur at some time.	Occurs once every 10 years – 100 years.
E	Rare	Consequence may only occur in exceptional circumstances.	Occurs less than once every 100 years.

Source: AS/NZS 4360:2004 Risk Management

Table 1.3 - Qualitative Risk Matrix

Likelihood of the Consequence	Maximum Reasonable Consequence				
	(1) Insignificant	(2) Minor	(3) Moderate	(4) Major	(5) Catastrophic
(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

Source: AS/NZS 4360:2004 Risk Management

Orica Ammonium Nitrate Emulsion Production Facility Qualitative Preliminary Environmental Risk Analysis

Activity	Aspect	Potential Impact	Status and Proposed Control	Preliminary Risk Rating			Further Assessment Requirements	Further Assessment in EA?
				Consequence	Likelihood	Risk		
CONSTRUCTION PHASE								
Clearing and topsoil removal.	Clearing of Vegetation.	Significant loss of Flora and Fauna.	Clearing of vegetation will be required within the proposed ANE production facility disturbance area. An ecological assessment is currently being completed for the proposed ANE production facility. The field survey identified 2 threatened fauna species and 1 threatened flora species as well as the threatened ecological community (TEC) - Lower Hunter Spotted Gum – Ironbark Forest. The assessment has concluded that the proposed ANE production facility will not result in a significant impact on threatened species or the TEC should the relevant management controls be implemented during the clearing of vegetation.	2	D	L	A full assessment of the potential impacts of the proposed ANE production facility on ecological values has been undertaken and will be included in the EA.	Yes

Orica Ammonium Nitrate Emulsion Production Facility Qualitative Preliminary Environmental Risk Analysis (cont)

Activity	Aspect	Potential Impact	Status and Proposed Control	Preliminary Risk Rating			Further Assessment Requirements	Further Assessment in EA?
				Consequence	Likelihood	Risk		
Construction of proposed ANE production facility	Clearing of Vegetation	Disturbance of Aboriginal places or objects without permission.	The removal of topsoil has the potential to impact on Aboriginal places or objects. A full Aboriginal Archaeology Assessment is currently being undertaken for the proposed ANE production facility. The field survey did not identify any Aboriginal objects or places within the proposed ANE production facility.	2	D	L	An Aboriginal Cultural Heritage Assessment of potential impacts of the proposed ANE production facility on Aboriginal archaeology is currently in preparation and will be included in the EA. The assessment will be completed in consultation with the local Aboriginal community.	Yes
		Disturbance to sites of European Heritage Significance.	There are no state or locally listed heritage items located within the Technology Park. The Project will not impact on European heritage.	2	E	L	No further assessment will be required.	No
		Soil erosion and sedimentation.	Appropriate erosion and sediment controls will be designed for all construction areas in accordance with <i>Soils & Construction</i> (Landcom, 2004).	1	D	L	Due to effective mitigation of this potential impact further assessment is not required.	No
		Water Pollution.	Relevant surface water controls will be included as part of the construction design to divert clean waters away from surface facility areas during construction. Dirty water will be separated from clean water and the drains will be designed and constructed in accordance with <i>Soils and Construction</i> (Landcom, 2004).	1	D	L	Due to effective mitigation of this potential impact further assessment is not required.	No

Orica Ammonium Nitrate Emulsion Production Facility Qualitative Preliminary Environmental Risk Analysis (cont)

Activity	Aspect	Potential Impact	Status and Proposed Control	Preliminary Risk Rating			Further Assessment Requirements	Further Assessment in EA?
				Consequence	Likelihood	Risk		
Construction of proposed ANE production facility	Clearing of Vegetation	Noise pollution from machinery.	<p>Construction of the proposed ANE production facility may be undertaken 24 hours a day, 7 days a week. Clearing of vegetation would be scheduled during the daytime hours.</p> <p>The nearest sensitive receptor is located approximately 1.8 kilometres from the proposed ANE production facility.</p> <p>Based on the distance to the nearest sensitive receptor it is unlikely that the Project will result a significant impact, however, a detailed noise impact assessment is required.</p>	2	C	M	Construction noise impacts will be included in the Noise Impact Assessment currently being undertaken for the EA.	Yes
		Air Pollution from dust generation.	<p>The construction of the proposed ANE production facility will not involve significant ground disturbance The nearest sensitive receptor is located approximately 1.8 kilometres from the proposed ANE production facility.</p> <p>Given the level of impact and the distance to receivers, potential impact from construction of the proposed ANE production facility is expected to be minimal.</p>	1	D	L	A qualitative assessment of potential impact on air quality will be undertaken for the EA.	Yes

Orica Ammonium Nitrate Emulsion Production Facility Qualitative Preliminary Environmental Risk Analysis (cont)

Activity	Aspect	Potential Impact	Status and Proposed Control	Preliminary Risk Rating			Further Assessment Requirements	Further Assessment in EA?
				Consequence	Likelihood	Risk		
Construction of proposed ANE production facility.	Cut and Fill for construction.	Water Pollution from uncontrolled surface run-off.	Erosion and sediment controls will be implemented in accordance with <i>Soils & Construction</i> (Landcom, 2004).	2	D	L	Due to effective mitigation of this potential impact, further assessment is not required.	No
		Land degradation	The 1991 EIS identified the Technology Park as being of low agricultural fertility. The use of the site for the purposes of the Project, will not result in land degradation as the land is not suitable for agricultural purposes.	1	E	L	No further assessment will be required.	No
		Noise Pollution from machinery.	Construction of the proposed ANE production facility may be undertaken 24 hours a day, 7 days a week. Noisy construction activities would be scheduled during the daytime hours. The nearest sensitive receptor is located approximately 1.8 kilometres from the proposed ANE production facility. Based on the distance to the nearest sensitive receptor it is unlikely that the construction of the proposed ANE production facility will result a significant impact, however, a detailed noise impact assessment is required.	2	C	M	Construction noise impacts will be included in the Noise Impact Assessment currently being undertaken for the EA.	Yes

Orica Ammonium Nitrate Emulsion Production Facility Qualitative Preliminary Environmental Risk Analysis (cont)

Activity	Aspect	Potential Impact	Status and Proposed Control	Preliminary Risk Rating			Further Assessment Requirements	Further Assessment in EA?
				Consequence	Likelihood	Risk		
Construction of proposed ANE production facility	Traffic	Supply of materials for construction project resulting in increased traffic.	Construction activities of the proposed ANE production facility will result in increased traffic movements during the construction phase of the Project. This has the potential to impact upon traffic on surrounding roads during peak traffic periods.	2	B	H	An assessment of traffic generation due to the proposal and the likely impacts of this traffic on the existing traffic network will be undertaken.	Yes
		Degradation of Noise Amenity.	The construction traffic from the proposed ANE production facility has the potential to impact on noise amenity. A number of residential properties are located along George Booth Drive, the transport route for materials. George Booth Drive is an approved heavy vehicle route and as a result residences are already exposed to heavy vehicle noise. Primary vehicle movements will occur during daytime hours. The noise impact assessment will include an assessment of the potential impact of traffic noise related to the Project as well as potential cumulative impacts.	2	B	H	Construction traffic will be assessed in the noise impact assessment currently being undertaken for the EA.	Yes
	Waste Disposal (including sewage).	Pollution and/or contamination due to incorrect disposal. Inefficient use of resources.	All wastes generated as part of the construction process will be managed in accordance with a Waste Management Plan to be developed for the proposed ANE production facility.	2	D	L	No further assessment will be required.	No

Orica Ammonium Nitrate Emulsion Production Facility Qualitative Preliminary Environmental Risk Analysis (cont)

Activity	Aspect	Potential Impact	Status and Proposed Control	Preliminary Risk Rating			Further Assessment Requirements	Further Assessment in EA?
				Consequence	Likelihood	Risk		
OPERATION								
Ongoing operation of existing operations and the proposed ANE production facility	European Heritage	Disturbance of sites of European heritage significance.	There are no state or locally listed heritage items located within the Technology Park. The Project will not impact on European heritage.	1	E	L	No further assessment will be required.	No
	Ecology	Loss of native flora and fauna.	There will be no loss of flora and fauna associated with the ongoing operation of the proposed ANE production facility	1	E	L	An ecological impact assessment will be included in the EA.	Yes
	Cultural Heritage	Disturbance of Aboriginal places or objects.	No Aboriginal objects or places were identified during the survey conducted for the Aboriginal archaeology assessment currently being completed for the Project. The ongoing operation of the proposed ANE production facility should not result in any impact on Aboriginal Heritage. Should any Aboriginal sites be identified during operations recommended management controls will be implemented.	1	E	L	Proposed controls for the management of any newly identified Aboriginal heritage sites will be included in the EA.	Yes

Orica Ammonium Nitrate Emulsion Production Facility Qualitative Preliminary Environmental Risk Analysis (cont)

Activity	Aspect	Potential Impact	Status and Proposed Control	Preliminary Risk Rating			Further Assessment Requirements	Further Assessment in EA?
				Consequence	Likelihood	Risk		
Ongoing operation of the proposed ANE production facility	Noise Generation	Degradation of noise amenity (cumulative).	The existing operations and proposed operation of the proposed ANE production facility has the potential to impact on noise amenity. The nearest sensitive receptor is located approximately 1.8 kilometres to the west of the proposed ANE production facility. Based on the distance to the nearest sensitive receptors, the Project is unlikely to have a significant impact on noise amenity. A detailed noise impact will be undertaken as part of the EA.	2	C	M	A detailed assessment of noise impacts associated with the Project will be undertaken.	Yes
	Dust Generation	Degradation of air quality environment (cumulative).	The Project is not likely to result in impacts on air quality during operation. A qualitative assessment of potential air quality impacts will be undertaken as part of the EA.	1	E	L	A qualitative assessment will be undertaken.	No
	Fuel and Electricity Usage.	Greenhouse Gas emissions from diesel and electricity use.	The operation of the proposed ANE production facility and existing operations will require the use of diesel and electricity. The greenhouse gas emissions resulting from this energy consumption will be assessed.	1	B	M	An assessment of energy use and greenhouse gas emissions will be undertaken.	Yes

Orica Ammonium Nitrate Emulsion Production Facility Qualitative Preliminary Environmental Risk Analysis (cont)

Activity	Aspect	Potential Impact	Status and Proposed Control	Preliminary Risk Rating			Further Assessment Requirements	Further Assessment in EA?
				Consequence	Likelihood	Risk		
Ongoing operation of the proposed ANE production facility	Fugitive Emissions from Production.	Greenhouse Gas emissions from the manufacturing process.	The operation of the proposed ANE production facility and existing operations have the potential to generate fugitive greenhouse gas emissions. The greenhouse gas and energy assessment will consider the potential for fugitive emissions.	2	D	L	The greenhouse gas and energy assessment will consider the potential for fugitive emissions.	Yes
	Use of hazardous materials, spillage or release into the environment or atmosphere.	Risk to people and property.	The existing operations and the proposed ANE production facility will involve continuous use of hazardous substances. The design of the proposed ANE production facility and the existing operations has been completed in accordance with Orica's risk management standards which determine the appropriate spacing between substance storage areas and operations with the aim of minimising risk. Relevant controls for the management of hazardous substances will be outlined in the EA.	3	D	M	A preliminary hazard and risk assessment will be required.	Yes
	Clean water management.	Contamination of clean water.	Diversion drains will be constructed to divert clean waters away from surface facility areas. Clean water captured on roofs will be stored in rainwater tanks for reuse onsite. Dirty water will be captured and treated appropriately for re-use or disposal.	2	D	L	Due to effective mitigation of this potential impact further assessment is not required.	No

Orica Ammonium Nitrate Emulsion Production Facility Qualitative Preliminary Environmental Risk Analysis (cont)

Activity	Aspect	Potential Impact	Status and Proposed Control	Preliminary Risk Rating			Further Assessment Requirements	Further Assessment in EA?
				Consequence	Likelihood	Risk		
Ongoing operation of the proposed ANE production facility	Erosion and sediment runoff.	Sedimentation of local waterways	Appropriate erosion and sediment controls will be designed and constructed for all surface facility areas in accordance with the relevant Australian Standards.	2	D	L	Due to effective mitigation of this potential impact further assessment is not required.	No
	Process water and wash down water, pipeline or storage failures.	Water Pollution	Dirty water will be separated from clean water by diversion or bunding. Drains will be designed and constructed in accordance with the relevant Australian Standards. Regular maintenance will be carried out.	2	D	L	Due to effective mitigation of this potential impact further assessment is not required.	No
		Land Contamination	Dirty water will be separated from clean water and the drains will be designed and constructed in accordance with the relevant Australian Standards. Regular maintenance will be carried out on pipelines and storage structures.	1	D	L	Due to effective mitigation of this potential impact further assessment is not required.	No
	Water Usage	Inefficient water usage.	The Project will require water for use in the manufacturing process at the proposed ANE production facility and potable water use such as drinking water. Where possible, captured rainwater will be recycled for use in the manufacturing process. The EA will provide an outline of the water sources to be utilised and will provide a water balance for the project.	1	D	L	The EA will provide an outline of the expected water use of the proposed ANE production facility and will detail how these needs will be met.	No

Orica Ammonium Nitrate Emulsion Production Facility Qualitative Preliminary Environmental Risk Analysis (cont)

Activity	Aspect	Potential Impact	Status and Proposed Control	Preliminary Risk Rating			Further Assessment Requirements	Further Assessment in EA?
				Consequence	Likelihood	Risk		
Ongoing operation of the proposed ANE production facility	Hazardous goods supply and storage.	Explosion hazard. Soil and/or water contamination from spills or leaks.	All hazardous goods will be handled using systems designed and operated in accordance with relevant legislation and Australian standards. The position of the proposed ANE production facility and existing operations has been determined based on Orica's risk management standards. It is expected that the preliminary hazard analysis will determine that the safety zones for hazardous substances will fall inside the boundary of the Technology Park.	3	D	M	A Preliminary Hazard Analysis will be undertaken for the Project.	Yes
	Hazardous goods transport.	Risk of contamination from a spill during transportation.	The transport of hazardous goods from Sydney and Kooragang Island has the potential to impact on people and the environment should a vehicle accident occur. Relevant controls will be implemented for the management of hazardous goods during transport. The preliminary hazard analysis will include an assessment of the potential transport risk and will provide appropriate recommendations.	3	D	M	Transport of hazardous goods will be considered in the preliminary hazard and risk assessment to be undertaken for the project.	Yes
	Oil, fuel and grease supply and storage.	Soil and/or water contamination from spills or leaks.	All fuels, oils, grease etc will be handled using systems designed and operated in accordance with relevant legislation and Australian Standards.	2	D	L	Due to effective mitigation of this potential impact, no further assessment is required.	No

Orica Ammonium Nitrate Emulsion Production Facility Qualitative Preliminary Environmental Risk Analysis (cont)

Activity	Aspect	Potential Impact	Status and Proposed Control	Preliminary Risk Rating			Further Assessment Requirements	Further Assessment in EA?
				Consequence	Likelihood	Risk		
Ongoing operation of the proposed ANE production facility	Bushfire	Loss of life or injury to personnel or community.	Orica has existing fire management systems as part of the existing operations to reduce the threat of fire. The design of the proposed ANE production facility will incorporate relevant fire management controls in order to minimise the risk to personnel and the community in the event of a bushfire.	3	D	M	Further assessment of bushfire risk is required.	Yes
		Damage to infrastructure / property.	Orica has existing fire management systems to reduce the threat of bushfire to the existing operations, The design of the proposed ANE production facility will include relevant fire management controls in order minimise the risk to infrastructure and property. Controls will include buffer zones, fire fighting access and fire fighting equipment.	3	D	M	Further assessment of bushfire risk is required.	Yes
		Loss of threatened native flora and fauna.	Orica has existing fire management systems to reduce the threat of fire as part of the existing operations. The proposed ANE production facility will include relevant fire management controls in order to minimise the risk to threatened flora and fauna.	3	D	M	Further assessment of bushfire risk is required.	Yes

Orica Ammonium Nitrate Emulsion Production Facility Qualitative Preliminary Environmental Risk Analysis (cont)

Activity	Aspect	Potential Impact	Status and Proposed Control	Preliminary Risk Rating			Further Assessment Requirements	Further Assessment in EA?
				Consequence	Likelihood	Risk		
Ongoing operation of the proposed ANE production facility		Air Pollution	Orica has existing fire management systems to reduce the threat of fire as part of the existing operations. The proposed ANE production facility will include relevant fire management controls in order to minimise the risk of air pollution in the instance of a fire.	2	D	L	Further assessment of bushfire risk is required.	Yes
	Waste: scrap metal and parts, office waste, putrescible.	Inefficient use of resources.	Waste materials will be recycled and reuse where possible. If a material is not suitable for reuse or recycling it will be disposed of by a contractor at a licensed facility.	1	D	L	Due to effective mitigation of this potential impact further assessment is not required.	No
	Waste oil and grease storage	Soil and/or water contamination from spills or leaks.	All fuels, oils, grease etc will be collected and handled using systems designed and operated in accordance with relevant legislation and Australian Standards.	2	D	L	Due to effective mitigation of this potential impact further assessment is not required.	No
	Transport and access of vehicles.	Increase in traffic	The Project will result in an increase of 10 light vehicles and up to 58 heavy vehicles accessing the site each day. An assessment of the potential traffic impact of the Project will be undertaken.	2	B	H	An assessment of traffic impacts will be undertaken.	Yes
	Increased local population.	Impact on services/local infrastructure.	The additional 10 employees will not result in any impact on services or local infrastructure.	1	E	L	Increase in employee numbers is minimal, no additional assessment is required.	No

Orica Ammonium Nitrate Emulsion Production Facility Qualitative Preliminary Environmental Risk Analysis (cont)

Activity	Aspect	Potential Impact	Status and Proposed Control	Preliminary Risk Rating			Further Assessment Requirements	Further Assessment in EA?
				Consequence	Likelihood	Risk		
Ongoing operation of the proposed ANE production facility	Unauthorised access to the site from the general public.	Vandalism	The Technology Park facilities will be appropriately fenced and boundary inspections conducted. The Technology Park does not have a history of problems with vandalism.	1	E	L	No further assessment will be required.	No
		Illegal disposal of waste.	The Technology Park boundary is not completely fenced as this would restrict access to easements and bushfire response. The Technology Park does not have a history of problems with the illegal disposal of waste.	2	E	L	No further assessment will be required.	No