CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

REVISION CONTROL PAGE

MAIN DOCUMENT

REV.	DATE	DESCRIPTION	COMMENTS
00	24-JUL-2012	Issue for Approval	
01	10-SEP-2012	Final Issue	COMPANY's comments included
02	14-NOV-2012	Final Issue	SEWPaC's comments included
03	04-DEC-2012	Final Issue	Typo mistakes corrected

ATTACHMENTS

DOCUMENT CODE	DESCRIPTION	REV.
2-250-329-PRO-TRE-0111-att01	Construction Air Quality Management Plan	01
2-250-329-PRO-TRE-0111-att02	Construction Water Quality Management Plan	01
2-250-329-PRO-TRE-0111-att03	Construction Erosion Control & Stormwater	01
2-250-329-PRO-TRE-0111-att04	Construction Waste Management Plan	01
2-250-329-PRO-TRE-0111-att05	Construction Traffic Management Plan	01
2-250-329-PRO-TRE-0111-att06	Blasting Management Plan	01
2-250-329-PRO-TRE-0111-att07	Construction Noise Management Plan	01
2-250-329-PRO-TRE-0111-att08	Construction Terrestrial Fauna Management Plan	01
2-250-329-PRO-TRE-0111-att09	Construction Terrestrial Vegetation and Flora	01
2-250-329-PRO-TRE-0111-att10	Construction Weed Management Plan	01
2-250-329-PRO-TRE-0111-att11	Integrated Pest Management Plan	01
2-250-329-PRO-TRE-0111-att12	Construction Site HSE Management Plan	01
2-250-329-PRO-TRE-0111-att13	Construction Planning and Milestones	01

TEMPLATES

DOCUMENT CODE	DESCRIPTION	REV.
2-250-329-PRO-TRE-0111-tmp01	Weekly HSE Inspection Sheet	00
2-250-329-PRO-TRE-0111-tmp02	Incident/Accident Report	00

Doc. Category: 1

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1. PURPOSE

The purpose of this document is to outline the main mitigation measures to be put in place during the Construction phase of the TAN Burrup Project so as to minimize the risk of potential environmental and heritage adverse impact derived from the construction works and, therefore, to reduce the effects of the Project execution on the environment to ALARP level.

This document is issued following the commitments set forth in the Public Environmental Review and further COMPANY letter in response to SEWPaC request for additional information, and in compliance with the requirements included in the WA State and Commonwealth Approval (condition 7a), Works Approval and all applicable statutory laws and regulations, COMPANY Corporate and PROJECT requirements and CONTRACTOR requirements.

Moreover, this Construction Environmental Management Plan (CEMP) consists of the present document and three additional specific Management Plans issued to comply with condition 7c of the Commonwealth Approval.

2. SCOPE

This CEMP shall be applied to any activity carried out by CONTRACTOR or any of its SUBCONTRACTORS during the execution of the TAN Burrup Project as part of its scope of work. It applies to all workers, management personnel, third parties or visitors entering the site.

This PROJECT will be performed by means of modular construction and therefore, this Construction Environmental Management Plan is applicable to all activities to be performed by CONTRACTOR and any of its SUBCONTRACTORS as part of the Construction phase of the TAN Burrup Project in the construction site where the modules are going to be hooked up, installed and erected. Therefore, all the activities to be performed in the yard shall be subject to yard existing Environmental Management System as well as CONTRACTOR Environmental requirements and standards but will only where applicable satisfy Australian requirements.

Note. PER commitments and approval conditions refer to H&S Plan and CEMPs as independent documents. Despite this and in addition to this general CEMP and complementary specific CEMPS referred to under section 4.5 of the present document, the independent Construction Site HSE Management Plan includes, not only health and safety issues, but also environmental aspects because the site team responsible for ensuring compliance with all applicable requirements is an HSE Team, involving all three

disciplines (health, safety and environment). Furthermore, site organization deals together with health, safety and environment during training sessions, meetings, toolbox talks, inspections, reports and any other issue. Notwithstanding this, specific and independent training sessions, toolbox talks topics, inspections or reports can address only environmental aspects or health or safety issues.

3. DEFINITIONS AND ACRONYMS

3.1 DEFINITIONS

COMPANY	Yara Pilbara Nitrates Pty Ltd.
CONTRACTOR	Técnicas Reunidas S.A. (TR).
PROJECT	TAN Burrup Project.
SUBCONTRACTOR	Organizations which, under the co-ordination of CONTRACTOR, perform construction and erection activities for the project

3.2 ACRONYMS

ALARP	As Low As Reasonably Practicable
YPNPL	Yara Pilbara Nitrates Proprietary Limited
CEMP	Construction Environmental Management Plan
CESMP	Construction Erosion and Stormwater Plan
CTFMP	Construction Terrestrial Fauna Management Plan
CTFVMP	Construction Terrestrial Flora and Vegetation Management Plan
CWMP	Construction Waste Management Plan
CWQMP	Construction Water Quality Management Plan

DEC	Department of Environment and Conservation
HO	Home Office (central CONTRACTOR offices in Madrid)
HSE	Health, Safety and Environment
OEPA	Office of Environment Protection Authority
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
TAN	Technical Ammonium Nitrate
WA	Western Australia

4. PROCEDURE

This document has to be understood as the environmental specific development of the PROJECT HSE policy and principles as well as the documentary response to all legal requirements and conditions to allow the PROJECT execution to proceed. Its main objective is to prevent, monitor, manage and minimize the environmental impact associated with the Construction of the TAN Burrup Project in compliance with commitments adopted by COMPANY towards affected environment, sensitive population and stakeholders, ensuring continuous environmental performance improvement.

4.1 ENVIRONMENTAL ROLES AND RESPONSIBILITIES

The appropriate implementation of these principles and, therefore, achieving the execution of the TAN Burrup project with minimum environmental and heritage impact is CONTRACTOR responsibility by means of its Site Management Team and, in particular, of its Site HSE Team.

In addition to those roles and responsibilities outlined in the Construction HSE Plan (2-250-329-PRO-TRE-0111-att12), main environmental specific roles and responsibilities of key personnel are described below.

4.1.1 Responsibilities of CONTRACTOR Site Manager

As top management of CONTRACTOR personnel the Site Manager is responsible for ensuring that the commitment to environment protection is evident in the workplace and amongst the

workforce. He has overall responsibility and accountability for the effective implementation and administration of this Construction Environmental Management Plan by means of:

- Promoting all environmental friendly practices implementation;
- Ensuring environmental and aboriginal issues of the PROJECT HSE Policy are taken into consideration at all times;
- Providing all necessary human and material resources.

4.1.2 Responsibilities of CONTRACTOR Construction Manager

Construction Manager will support HSE Manager while implementing the Construction Environmental Management Plan on the site and will ensure he and his supervisors aim for its appropriate application. This includes:

- Actively support the HSE Team and enforce environmental issues.
- Allocate responsibilities for all personnel employed in his staff.
- Ensure SUBCONTRACTOR provides evidence of the experience, training and proficiency of employees on environmental matters prior to starting work on site.
- Maintain the HSE training programs ensuring environmental issues are included therein.
- Promote environmental friendly practices and working methods.
- Provide all necessary resources and facilities to ensure an appropriate waste management can be carried out.

4.1.3 Responsibilities of CONTRACTOR HSE Manager

His main responsibilities regarding environmental protection are:

- Assert overall responsibility and accountability for the correct implementation of the Construction Environmental Management Plan and all its attachments.
- Request the proper installation of waste storage areas and adequate number and type of waste containers.
- Distribute to SUBCONTRACTOR standards, procedures or any other document that may be required to organize works reducing to a minimum negative environmental impact.

4.1.4 Responsibilities of CONTRACTOR Environmental Coordinator

An experienced skilled environmental coordinator will be appointed to ensure compliance with all environmental requirements and commitments and, in particular, to:

- Promote environmental awareness at all levels (amongst CONTRACTOR and its SUBCONTRACTORS).
- Prepare induction talks and organize specific environmental training programs whenever deemed necessary.
- Carry out inspections to ensure compliance with all environmental requirements.
- Ensure SUBCONTRACTOR understands and implements correctly the Construction Environmental Management Plan and any other environmental documents.
- Monitor site activities to ensure continuous improvement on environmental performance.
- Follow up of all established corrective actions.

All other CONTRACTOR and SUBCONTRACTORS workers shall comply with the environmental requirements outlined in this document. CONTRACTOR supervisors shall ensure such requirements are complied with at all times.

4.2 AWARENESS AND TRAINING PROGRAM

COMPANY and CONTRACTOR commitment to environmental protection shall be passed on to all workers, visitors, delivery personnel and every person involved in the Project execution in order to ensure Project completion with no significant environmental impact. Awareness and training on environmental importance and requirements is therefore of the utmost importance and shall be understood as a priority while performing the works. It is mandatory for all construction and erection employees to attend CONTRACTOR HSE Induction Session which shall include specific environmental induction issues derived from permits approval process requirements and commitments. This training session shall include, but not be limited to the following:

- Project approvals' process and requirements.
- Key legal obligations.
- Regulatory penalties and impacts of non-compliance.
- Land access restrictions (due to National Heritage place protection)
- Aboriginal heritage sites, incidents and cultural awareness.
- Air quality and dust management.
- Identification of weeds and reporting requirements.
- Identification of protected fauna and reporting requirements (sightings & injuries).
- Identification of fauna species and reporting requirements.
- Identification of Heritage findings and reporting
- Water management and water use efficiency.

- Fire risk, impacts, management and response.
- Significant erosion events.
- Hazardous materials storage and use.
- Emergency response procedures, available resources, evacuation routes, assembly areas and contact numbers.
- Waste management procedure.
- Incident and hazard reporting.
- Any relevant special requirements.

In addition to this, Environmental Coordinator will prepare and schedule more specific environmental training sessions regarding hazardous materials, waste management, aboriginal issues and heritage as far as necessary. This training program will be modified as required in order to ensure all workers are familiar with environmental protection and mitigation measures.

For all training activities a written record will be kept including information of the time, place, attendance and topics discussed for review by COMPANY upon request. This record will be signed by all attendants and kept as an attendance register at HSE department.

All environmental training and meetings shall be carried out as per the Construction HSE Plan (2-250-329-PRO-TRE-0111-att12).

4.3 ENVIRONMENTAL MONITORING, INSPECTION AND AUDITING

CONTRACTOR shall be responsible for ensuring its SUBCONTRACTORS follow the instructions described in this document as well as all applicable laws and regulations. Therefore, CONTRACTOR shall monitor how SUBCONTRACTORS implement this Construction Environmental Management Plan on a periodic basis and shall inspect their performance in order to immediately correct identified non-compliance situations.

Periodic inspections will be carried out by CONTRACTOR HSE Team as per Construction HSE Plan (2-250-329-PRO-TRE-0111-att12) using the HSE Inspection Sheet attached to this document (2-250-329-PRO-TRE-0111-tmp 01). Records shall be kept accordingly.

Specific environmental issues which shall be monitored during Construction, Pre-Commissioning and Commissioning activities are, as a minimum:

- Vehicles and machinery condition.

- Adequate housekeeping.
- Hazardous material storing and handling areas.
- Proper waste segregation and management.
- Waste storing area conditions.
- Noisy equipment and noisy activities.
- Rock art protection and impact monitoring being performed.
- Heritage and archaeological issues are being complied with.
- Deterioration, leaks or accumulation of materials in containment areas.
- Flora, fauna and vegetation disturbance.

Specific monitoring measures and commitments are summarized in the table below and explained in detail in each Management Plan included as attachments 01–12 of the present document.

CONTRACTOR Management will provide feedback to all employees on environmental issues through toolbox talks and HSE or progress meetings. Hazards identified, incident reports and alert bulletins shall be discussed at these forums to ensure continuous environmental improvement.

Formal audits on general HSE performance including specific environmental issues will be carried out on a periodic basis (quarterly) by CONTRACTOR HO HSE Team. As a result of such audits, an Audit Report will be issued detailing all findings and deviations as well as corrective actions to be implemented.

4.3.1 Summary of monitoring and commitments

Monitoring Action Reference	Monitoring Action Description	Frequency	Comments
AIR QUALITY MANAGEMENT			
CAQMP-1	Set up exact location of monitoring equipment	Prior to construction	To be agreed with SEWPaC
CAQMP-2	Monitoring of PM10 at 3 established locations (CSIRO rock art sensitive receptors)	Ongoing	Starting 1/12/2012
CAQMP-3	Monitoring on dust deposition	Monthly	Starting 1/12/2012
CAQMP-4	Weather measurement (wind speed / direction, temperature and rainfall)	Ongoing	
CAQMP-5	Internal CONTRACTOR Audit to performance on site (independent chapter for air quality monitoring program)	Quarterly	
WATER QUALITY MANAGEMENT			
CWMP-1	Wastewater disposal tracking forms	Ongoing	Monitoring and control of appropriate waste management after removing it from the site
CWMP-2	Water level gauging and water quality monitoring at existing wells	Every 6 months	
CWMP-3	Surface water sampling according to standard procedure	Ongoing	

Monitoring Action Reference	Monitoring Action Description	Frequency	Comments
EROSION CONTROL AND STORMWATER			
CECSMP-1	Stormwater quality monitoring	Cyclone season	
CECSMP-2	Internal CONTRACTOR Audit to performance on site (compliance with requirements)	Quarterly	
WASTE MANAGEMENT			
WMP-1	Routine inspections to ensure appropriate waste segregation	Ongoing	
WMP-2	Internal CONTRACTOR Audit to performance on site (compliance with requirements)	Quarterly	
TRAFFIC MANAGEMENT			
TMP-1	Routine inspections to ensure compliance with applicable requirements and mitigation measures	Ongoing	
TMP-2	Internal CONTRACTOR Audit to performance on site (compliance with requirements)	Quarterly	
BLASTING MANAGEMENT			
BMP-1	Noise monitoring during explosive firing	When shot is fired	
BMP-2	Vibration monitoring during explosive firing	When shot is fired	

Monitoring Action Reference	Monitoring Action Description	Frequency	Comments
BMP-3	Internal CONTRACTOR Audit to performance on site (compliance with requirements)	Quarterly	
NOISE MANAGEMENT			
NMP-1	Sound level measurements at site boundary	Periodic depending on activities	
NMP-2	Airblast noise level while firing	During firing shot	
NMP-3	Additional monitoring measurements should results exceed established levels	Upon event	
NMP-4	Internal CONTRACTOR Audit to performance on site (compliance with requirements)	Quarterly	
TERRESTRIAL FAUNA MANAGEMENT			
TFMP-1	Excavations and trenching inspections and monitoring for fauna protection	Ongoing	
TFMP-2	Internal CONTRACTOR Audit to performance on site (compliance with requirements)	Quarterly	
TERRESTRIAL FLORA AND VEGETATION MANAGEMENT			
TFVMP-1	Routine site inspections	Ongoing	

Monitoring Action Reference	Monitoring Action Description	Frequency	Comments
TFVMP-2	Internal CONTRACTOR Audit to performance on site (compliance with requirements)	Quarterly	
WEED MANAGEMENT			
WDMP-1	Routine site inspections	Ongoing	
WDMP-2	Internal CONTRACTOR Audit to performance on site (compliance with requirements)	Quarterly	
INTEGRATED PEST MANAGEMENT			
IPMP-1	Bunds and containers around site (visual inspection)	Weekly	
IPMP-2	Ponds and basins (visual inspection & sampling of larvae)	Weekly & monthly (sampling)	
IPMP-3	Stormwater drainage systems (visual inspection & sampling of larvae)	Weekly & as required (sampling)	
IPMP-4	Low lying areas (visual inspection & sampling of larvae)	Weekly & as required (sampling)	
IPMP-5	Intertidal wetlands/saltmarshes (sampling of larvae)	As required following heavy rain	
IPMP-6	Routine inspection for other pests (visual)	Weekly	

4.4 ENVIRONMENTAL REPORTS

Environmental information shall be included in general HSE reports on a monthly basis. Minimum issues to be covered in these reports will be:

- Monthly environmental main activities description and highlights: specific meetings, campaigns or training sessions, among others.
- Non conformances identified and actions follow-up.
- Incidents or accidents occurred.
- All other relevant information regarding the contents of this CEMP.
- Specific monitoring results from monitoring activities as per different CEMPs.

SUBCONTRACTOR shall provide all necessary information for CONTRACTOR to complete the Monthly reports. An environmental section shall also be included as part of the Final HSE Report to be issued at the end of the Construction, Pre-Commissioning and Commissioning activities.

4.4.1 Incident Procedure and Report

In case an environmental incident takes place it shall be immediately reported to CONTRACTOR so that he can start necessary action and so as to report it to COMPANY. A specific Incident Report shall be prepared and issued including, as a minimum, the following information:

- Date/ Time
- Incident description
- Location on site
- Causes that led to the incident
- Corrective actions
- Measures to prevent recurrence

CONTRACTOR shall be responsible for analyzing the causes of the incident and implementing adequate measures to prevent it from happening again. The written Incident Report (as per template 2-250-329-PRO-TRE-0111-tmp02) shall be prepared and submitted to COMPANY for information in order to explain clearly the details of the incident.

Below is the summary of all official environmental reports that shall be issued and submitted to SEWPaC and/or DEC in order to follow up and demonstrate compliance with all applicable requirements and commitments, along with the Compliance Assessment Report (2-250-329-REP-TRE-8001)

4.4.2 Reporting Commitment Summary

Reporting Reference	Reporting Commitment Description	Frequency	Send to	Comments
CEMP-1	Annual Compliance Report including all relevant environmental issues as applicable	Annual	SEWPaC, & DEC/OEPA	Within 3 months of construction commencement anniversary.
CEMP-2	Incident report regarding any incident which impacts in matters of environmental national significance	Upon event	SEWPaC, & DEC/OEPA	Notification to within 24 hours of incident happening and report to follow within 1 month.
AIR QUALITY MANAGEMENT				
CAQMP-1	Incident Report (exceedance of a trigger threshold)	Upon event	SEWPaC, & DEC/OEPA	
CAQMP-2	Compliance Monitoring Report	Every 6 months	SEWPaC, & DEC/OEPA	
CAQMP-3	Internal CONTRACTOR Audit Report (independent chapter for air quality monitoring program)	Annual	SEWPaC, & DEC/OEPA	

Reporting Reference	Reporting Commitment Description	Frequency	Send to	Comments
WATER QUALITY MANAGEMENT				
CWQMP-1	Incident Report (exceedance of a trigger level)	Upon event	SEWPaC, & DEC/OEPA	
CWQMP-2	Results of monitoring according to condition 8-4	Every 6 months	SEWPaC, & DEC/OEPA	
CWQMP-3	Annual site compliance report	Annual	SEWPaC, & DEC/OEPA	
EROSION CONTROL AND STORMWATER				
CECSMP-1	Stormwater quality monitoring results	Cyclone season	SEWPaC, & DEC/OEPA	
CECSMP-2	Incident Report	Upon event	SEWPaC, & DEC/OEPA	
CECSMP-3	Compliance Monitoring Report	Every 6 months	SEWPaC, & DEC/OEPA	
TRAFFIC MANAGEMENT				
TMP-1	Traffic serious incident	Upon event	SEWPaC, & DEC/OEPA	
TMP-2	Compliance Monitoring Report	Every 6 months	SEWPaC, & DEC/OEPA	

Reporting Reference	Reporting Commitment Description	Frequency	Send to	Comments
BLASTING MANAGEMENT				
BMP-1	Noise and vibration monitoring results	At the end of blasting operations	SEWPaC, & DEC/OEPA	
BMP-2	Compliance Monitoring Report	Every 6 months	SEWPaC, & DEC/OEPA	
NOISE MANAGEMENT				
NMP-1	Compliance Monitoring Report	Every 6 months	SEWPaC, & DEC/OEPA	
NMP-2	Incident Report	Upon event	SEWPaC, & DEC/OEPA	
TERRESTRIAL FAUNA MANAGEMENT				
TFMP-1	Finding of any threatened species	Upon event	SEWPaC, & DEC/OEPA	
TFMP-2	Incident Report	Upon event	SEWPaC, & DEC/OEPA	
TFMP-3	Compliance Monitoring Report	Every 6 months	SEWPaC, & DEC/OEPA	

TERRESTRIAL FLORA AND VEGETATION MANAGEMENT				
TFVMP-1	Discovery of any rare or threatened flora	Upon event	SEWPaC, & DEC/OEPA	
TFVMP-2	Compliance Monitoring Report	Every 6 months	SEWPaC, & DEC/OEPA	
WEED MANAGEMENT				
WDMP-1	Incident Report	Upon event	SEWPaC, & DEC/OEPA	
WDMP-2	Compliance Monitoring Report	Every 6 months	SEWPaC, & DEC/OEPA	
INTEGRATED PEST MANAGEMENT				
IPMP-1	Incident Report	Upon event	SEWPaC, & DEC/OEPA	
IPMP-2	Compliance Monitoring Report	Every 6 months	SEWPaC, & DEC/OEPA	

In addition to the above summarized reporting commitments, SEWPaC and/or DEC may request any further existing internal report for its review and/or information (such as CONTRACTOR internal periodic reports, checklists, internal monitoring results, etc).

4.5 SPECIFIC CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLANS

This general CEMP is developed in different attachments as specific Management Plans which address particular requirements to ensure environmental protection along all phases of the TAN Burrup project execution. In addition to these, separate and independent Management Plans are issued and complement the general CEMP.

4.5.1 Construction Air Quality Management Plan

The purpose of the Construction Air Quality Management Plan is to outline how air emissions are going to be managed and monitored during Construction, Pre-Commissioning and Commissioning phases of the PROJECT in order to ensure environmental protection at all times. Environmental practices focused on air quality preservation include minimizing the potential fugitive dust and gaseous emissions at source to ALARP level and, wherever required, additional mitigation measures shall be implemented.

See attachment 2-250-329-PRO-TRE-0111-att01.

4.5.2 Construction Water Quality Management Plan

Construction Water Quality Management Plan (CWQMP) will determine appropriate strategies to manage all forms of water taking into account site location and groundwater conditions so as to ensure environment protection and project environmental impacts minimization. It defines the measures and water quality monitoring regime required to reduce this impact on the groundwater, surface water and marine water affected environment.

See attachment 2-250-329-PRO-TRE-0111-att02.

4.5.3 Construction Erosion Control and Stormwater Management Plan

This Erosion Control and Stormwater Mangement Plan (CESMP) outlines the required surface water and soil conservation management requirements for the construction phase of the PROJECT to ensure environment protection and compliance with all conditions, commitments and requirements. The CESMP describes therefore the controls and measures required to minimize erosion and sedimentation within the disturbed area by proposing and establishing methods to manage stormwater within, and entering the YPNPL lease, and the immediate surrounding land.C

See attachment 2-250-329-PRO-TRE-0111-att03.

4.5.4 Construction Waste Management Plan

The Construction Waste Management Plan's purpose is to identify and take all necessary measures, especially preventive measures, to achieve an appropriate waste disposal during the execution of the TAN Burrup Project on behalf of YPNPL.

This Plan describes in detail how solid and liquid waste generated during Construction, Pre-Commissioning and Commissioning shall be handled, treated and disposed of according with environmental provisions stated in the Construction HSE Plan.

See attachment 2-250-329-PRO-TRE-0111-att04.

4.5.5 Construction Traffic Management Plan

Traffic Management for the TAN Burrup Project execution is dealt with in several Project documents according to different areas of impact. General issues regarding traffic operations and planning OSBL are addressed to in the Traffic and Logistics Plan (2-400-329-PRO-TRE-0001) where all relevant matters are included (ports to be used, packing requirements, equipment identification, compliance with AS and AQUIS requirements, etc). Furthermore, the Heavy Lift Plan (2-500-329-PRO-TRE-0006) issued by Construction team describes in detail all vehicle, machinery and equipment movement ISBL regarding planning, circulation routes, timing, organization and responsibilities, but no environmental impacts are dealt with herein.

The purpose of the Construction Traffic Management Plan is to identify and analyse all traffic movements foreseen during TAN Burrup Project execution so as to prevent adverse environmental impact due to traffic operations. The main aim of this Plan is to ensure traffic is managed in an adequate manner so that all vehicle movements are performed in safe conditions and so that no impact is generated on the surrounding community, road users, sensitive habitants, terrestrial fauna and rock art.

See attachment 2-250-329-PRO-TRE-0111-att05.

4.5.6 Blasting Management Plan

The Blasting Management Plan aims to describe how blasting operations are going to be performed in order to minimize environmental impact due to noise and vibration. Handling of hazardous materials such as detonants and explosives is also dealt with in this Plan.

See attachment 2-250-329-PRO-TRE-0111-att06.

4.5.7 Construction Noise Management Plan

The Construction Noise Management Plan (CNMP) lays down the measures to be adopted to minimise noise generation during the construction of the TAN Burrup Project so as to ensure that noise impact does not affect workers, the nearby public and/or amenities and that it complies with

applicable statutory regulations. Therefore, this CNMP is focused on the noisy activities of the Project and the main receptors of this noise.

Because noise control is implemented so as to ensure workers health, some preventive measures to control noise emissions are already described in the Construction HSE Plan. Further detailed information regarding noise protection and prevention is included in the Construction Noise Environmental Management Plan.

See attachment 2-250-329-PRO-TRE-0111-att07.

4.5.8 Construction Terrestrial Fauna Management Plan

This Construction Terrestrial Fauna Management Plan (CTFMP) describes in detail the management strategies to be implemented to ensure fauna (including terrestrial and subterranean) are managed in an appropriate manner during Construction, Pre-Commissioning and Commissioning phases of the TAN Burrup Project, to provide guidance on rehabilitation of fauna habitat areas, if required, and to outline monitoring programs and reporting that shall be performed as part of this Management Plan.

See attachment 2-250-329-PRO-TRE-0111-att08.

4.5.9 Construction Terrestrial Flora and Vegetation Management Plan

Construction Terrestrial Flora and Vegetation Management Plan (CTFVMP) details the required vegetation and flora conservation management requirements for the construction phase of the PROJECT. The CTFVMP outlines the controls and measures required to minimize adverse impacts to terrestrial vegetation and flora within the affected area.

See attachment 2-250-329-PRO-TRE-0111-att09.

4.5.10 Construction Weed Management Plan

The purpose of this Plan is to manage weeds so as to meet weed management obligation by weed control, prevention and rehabilitation actions such as: prevention of weed introduction, control or reduction of existing weed populations in order to protect WA natural ecosystems and agricultural industries. The CWMP describes all controls and measures required to minimize adverse impacts to terrestrial vegetation, flora and fauna habitat as a product of weeds within the affected area.

See attachment 2-250-329-PRO-TRE-0111-att10.

4.5.11 Construction Integrated Pest Management Plan

An Integrated Pest Management Plan is required to set thresholds for pest populations, monitoring for pests, prevention of pest establishment and control of pests choosing the safest and most effective tools to prevent damage and impact from pest species. It also addresses all mosquito and other nuisance insects outlining how to achieve an acceptable level of mosquito control based on an integrated approach that combines various methods to minimize interaction between mosquitoes and the public and to reduce the risk of mosquito-borne disease.

The Plan therefore aims to establish an appropriate environmental friendly and economic strategy to meet pest and mosquito management objectives by keeping track of insects and damage and preventing the development of insecticide resistance, defining different management measures and controls along the year seasons.

See attachment 2-250-329-PRO-TRE-0111-att11.

4.5.12 Construction HSE Management Plan

The purpose of this HSE Management Plan is to describe the Health, Safety & Environmental Management System to be implemented on site and therefore, to outline the main measures to be implemented by CONTRACTOR in order to prevent human injuries, property and environmental damage during Construction, Pre-Commissioning and Commissioning of the TAN Burrup Project.

See attachment 2-250-329-PRO-TRE-0111-att12.

4.5.13 Aboriginal Heritage Management Plan

This Plan will ensure the PROJECT execution respects and protects aboriginal heritage sites by complying with all state and ministerial conditions. It shall prevent archeological and ethnographic site disturbance and where disturbance is unavoidable, minimize the impacts on archaeological and ethnographic sites as well as comply with the recommendations of heritage reports that detail the proposed disturbance areas.

4.5.14 Construction Hazardous Materials Management Plan

The main aim of this Plan is to ensure hazardous materials are handled, used, stored, transported and removed from the site in an appropriate manner that minimizes environmental impact generated on workers and, especially, on the surrounding community, sensitive habitants, terrestrial fauna and vegetation and rock art.

4.5.15 Construction Emergency Response Management Plan

The Construction Emergency Response Management Plan addresses all measures necessary to manage unplanned events and emergencies in an appropriate manner so as to ensure potential impact due to any emergency that may arise during Construction, Pre-Commissioning and

Commissioning of the TAN BURRUP Project is reduced to ALARP level. The purpose is therefore to outline the responsibilities and appropriate actions aiming to protect the people, asset and environment, to limit the consequences of and recover from an emergency should it occur.

4.5.16 Acid Sulfate Management Plan

Based on Acid Sulfate Solis survey results, no Acid Sulfate Management Plan will be required.

4.5.17 Green House Gas Management Plan

Construction activities do not have a significant impact on green house effect and therefore a specific Management Plan will not be required for Construction phase. Despite this, measures to reduce the emissions from engines and equipment during construction such as an adequate inspection and maintenance program implemented on site is described in detail in the PROJECT Construction Site HSE Management Plan.

5. REFERENCES

5.1 COMPANY SPECIFICATIONS AND PROCEDURES

- Public Environmental Review for Yara Pilbara Nitrates Pty Ltd. (PER)
- YPNPL Works approval (15/07/2011)
- State of WA Statement No. 870 (07/07/2011)
- Commonwealth Approval letter from SEWPaC (14/09/2011)
- Appendix D-6 - HES Requirements during Construction & Fabrication

5.2 LEGISLATION

- Environmental Protection Act 1986
- Environmental Protection and Biodiversity Conservation Act 1986

5.3 PROJECT RELEVANT HSE DOCUMENTATION

2-250-329-PRO-TRE-0113	Construction Emergency Response Management Plan
2-250-329-PRO-TRE-0122	Construction Hazardous Materials Management Plan
250-200-PLN-BNP-0001	Aboriginal Heritage Management Plan

6. ATTACHMENTS AND TEMPLATES

6.1 Attachments

2-250-329-PRO-TRE-0111-att01	Construction Air Quality Management Plan
2-250-329-PRO-TRE-0111-att02	Construction Water Quality Management Plan
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2-250-329-PRO-TRE-0111-att09	Construction Terrestrial Vegetation and Flora
2-250-329-PRO-TRE-0111-att10	Construction Weed Management Plan
2-250-329-PRO-TRE-0111-att11	Integrated Pest Management Plan
2-250-329-PRO-TRE-0111-att12	Construction Site HSE Management Plan
2-250-329-PRO-TRE-0111-att13	Construction Planning and Milestones

6.2 Templates

2-250-329-PRO-TRE-0111-tmp01 HSE Inspection Sheet.
2-250-329-PRO-TRE-0111-tmp02 Incident Report.

ATTACHMENT 01:

Construction Air Quality Management Plan

(CAQMP)

Contents

1. INTRODUCTION

1.1 CONTEXT AND PURPOSE

Yara Pilbara Nitrates Pty Ltd (YPNPL) was granted environmental approval for the Burrup Technical Ammonium Nitrate (TAN) Plant (Burrup TAN Plant) located in Burrup Peninsula, Shire of Roebourne, Western Australia (WA) under Part IV of the State of WA *Environmental Protection Act 1986* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.* As part of these approvals, YPNPL received conditions from both the Commonwealth of Australia (the Commonwealth) and the State of Western Australia (the State) relating to the management and monitoring of air emissions during construction activities and plant operation.

As part of these commitments, YPNPL is required to demonstrate to the Commonwealth that appropriate management and monitoring of air quality is being undertaken, including preparation of management plans for the construction and operation of the Burrup TAN Plant.

This Construction Air Quality Management Plan (CAQMP) outlines how air emissions will be managed and monitored for the construction phase of the Burrup TAN Plant. This CAQMP has been prepared in line with the requirements of the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (here after "SEWPaC"). This document also takes into account local state requirements as per the expectations of the WA Department of Environment and Conservation (DEC) discussed during a meeting held on 22 May, 2012.

Baseline monitoring of air quality at selected off-site receptor sites will be undertaken prior to operation, and its methodology has been outlined separately in the Operational Air Quality Management Plan (OAQMP).

The scope of the CAQMP will apply to the following phases of construction:

- Site preparation and earth works;
- Civil works;
- Plant installation; and
- Commissioning.

This CAQMP includes:

- Listing of the types of activities that have the potential to cause air quality and dust nuisance impacts (as identified in the impact assessment process);
- Identifying existing mitigation and control measures to reduce/minimise such impacts, and recommending additional measures where applicable;
- Establishing an air quality and dust deposition monitoring plan;
- Recommending the means of ensuring compliance of proposed actions (reporting requirements); and
- Identifying suitably qualified personnel who are responsible for carrying out the proposed actions (roles and responsibilities).

1.2 PROJECT BACKGROUND

YPNPL is proposing to construct a Burrup TAN Plant with a production capacity of (circa) 350,000 tonnes per annum (TPA) or 915 metric tonnes per day (MTPD) of technical ammonium nitrate (TAN). TAN will be delivered principally to mining customers in the Pilbara to help make up the basic component of ANFO (ammonium nitrate- fuel oil) used for explosives.

The Burrup TAN Plant will be located within Site D, Lot 3017 in the King Bay/ Hearson Cove Industrial Precinct on the Burrup Peninsula. The Site is approximately 48.8 hectares (ha) in size and is located adjacent to the existing Yara Pilbara Fertilisers Pty Ltd (YPFPL) ammonia plant which will provide the main feedstock of liquid ammonia to the Burrup TAN Plant. The proximity of YPFPL will allow the sharing of services and utilities to reduce environmental impacts through a smaller project footprint for Burrup TAN Plant.

The Burrup TAN Plant is scheduled to begin operations by last quarter 2015. Construction is expected to start in the last quarter of 2012 and will take approximately 31 months for completion, with commissioning of the plant expected in June 2015.

1.3 COMMONWEALTH APPROVAL REQUIREMENTS FOR AIR QUALITY MANAGEMENT

1.3.1 Overview

The CAQMP has been developed to fulfil the requirements of the Commonwealth Approval – Conditions 7a and 9 (EPBC 2008/4546).

The CAQMP provides a framework for management of emissions to air for the construction phase. It serves as part of the requirement for a Construction Environmental Management Plan (CEMP) to be submitted to the SEWPaC prior to construction.

1.3.2 Commonwealth Approval

Condition 7a of the Commonwealth Approval states the following:

"To ensure the protection of the listed threatened species; listed migratory species and the values of the Dampier Archipelago (including Burrup Peninsula) National Heritage Place, the person taking the action must submit to the Department of Sustainability, Environment, Water, Population and Communities ("Department") those management plans containing management actions aimed at reducing impacts upon these relevant matters of national environmental significance, including:

a) Construction Environmental Management Plan (CEMP), which must be submitted to the Department at least two (2) months prior to construction and must include, but not be limited to, management measures for the following:

- *Air Quality and Dust;*
- *Water Quality;*
- *Erosion Control and Storm Water;*
- *Waste;*
- *Traffic; and*
- *Blasting (if required)."*

Condition 9 of the Commonwealth Approval states the following:

"To protect the values of the Dampier Archipelago (including Burrup Peninsula) National Heritage Place, particularly the rock art sites, the person taking the action must undertake an air quality monitoring program. The air quality monitoring program must:

a) Undertake air quality monitoring at three (3) sites as shown in Attachment 2. These sites being sites previously selected, designed, fenced off and used in the original Western Australian Department of Environment and Conservation (WA DEC)/ CSIRO air quality monitoring program.

- *Site 5 – Burrup Road site;*
- *Site 6 – Water tanks site; and*
- *Site 7 – Deep Gorge site.*

The air quality monitoring must be undertaken for a period of not less than 24 months beginning from the commencement of construction. The results of this monitoring will be used to establish baseline data on levels of:

- *Ammonia (NH_3);*
- *Nitrogen Oxides (NO_X);*
- *Sulphur Oxides (SO_X); and*
- *Total suspended particulates (TSP), including dust at those rock art sites.*

b) Ensure that the monitoring of air quality at rock art sites is undertaken by a suitably qualified person (Air Quality).

c) Ensure air quality readings during the twenty four (24) months of baseline monitoring are taken at least four (4) times in every 12 months.

d) Ensure that the baseline data established from the air quality monitoring is reported to the Department in writing within 12 months of the completion of construction or following twenty four (24) months of baseline monitoring (whichever finishes last). The report must include a map clearly showing the location of each rock art site being monitored.

e) Ensure air quality monitoring of the rock art monitoring sites (sites 5, 6 and 7) is continued for an additional period of five (5) years, following the establishment of baseline data and once operation has commenced, to record levels of NH_3, NO_X, SO_X and TSP, including dust.

f) Report the results of the five (5) years of monitoring following the establishment of baseline, as per condition 9(e) above, to the Department, in writing, within two (2) months of that year's monitoring having been completed."

2. IMPACT ASSESSMENT

2.1 EMISSIONS SOURCES

The most significant potential sources of air emissions for the Burrup TAN Plant during the construction phase are the result of the following:

- Traffic movement on unmade roads;
- Movement of materials; and
- Wind erosion from stockpiles.

Primary air emissions from these sources include:

- Total Suspended Particulate (TSP) matter (as dust); and
- Particulate matter of less than 10 microns in diameter (PM_{10}).

Dust and PM_{10} emissions will vary according to the type and duration of construction activities and the prevailing wind conditions.

2.2 MITIGATION OF DUST GENERATION

2.2.1 Objectives

Management of dust impacts from construction activities will be undertaken through the use of on-site management together with boundary measurements.

On-site management will form the basis for control and reduction of dust generation from site activities to ensure off-site impacts are minimised. Continuous control of dust generation at source will assist with compliance with the applicable standards at off-site locations and ensure, as far as possible, that construction activities may continue unimpeded.

The boundary measurements will be used to provide site management with continuous air quality information and through the use of a trigger threshold, inform site management when there is potential for exceedance of the standards to occur. As dust dispersion and settling reduces in magnitude as a function of distance, the implication is that compliance at the site boundary will ensure compliance at receptor sites.

2.2.2 Mitigation Protocols

The potential for dust generation will be minimised through the use of the following protocols:

- Sealed roads that are part of the final design will be constructed first and used, as far as practical, for construction traffic.
- Site traffic speeds will be kept below 20 kilometres per hour (kph), which will be indicated by means of speed limit signs along the routes and will be explained to all drivers during training and motivation campaigns (and other equivalent).
- Where rainfall is less than 0.25 mm in a 24 hour period, unsealed site roads will be watered at a rate of 2 litres/m^2/hour during operational hours when construction traffic is active. The water will be transported to site by tankers for this purpose.
- Stockpiles of earth that are to be unused for a period of greater than two weeks will be covered with tarpaulin or equivalent, and greater than six weeks will be hydroseeded.
- Movement of materials that generates visible dust will use water sprays as a suppressant.
- Drop distances will be minimised for material transport to prevent dust dispersal.
- Trucks delivering friable material to site will be sheeted until arrival on site.
- Trucks removing friable material from the site will be sheeted subsequent to leaving the site gate.
- During wet conditions, trucks will pass through a wheel wash to remove mud from the wheels prior to use of the sealed road network. If thorough washing can be achieved, wheel washing may be carried out without a specific device, e.g. washing using a tide/hose.
- A roadsweeper will be used to remove mud from the sealed road network both on site and within 300 m of the site gate at a frequency of twice daily during operational hours.

2.2.3 Construction Site Records

The site management (construction manager) will maintain a site record of each of these following items throughout the construction period that will detail:

- Dust sources;
- Dust management measures applied;
- Date and time of dust management measures;
- Complaints of dust emissions/deposition;

- Any other visual observations of incidents likely to cause impacts to air quality, including weather conditions (dust storms) and non-YPNPL activities; and
- Exceedances of monitoring trigger thresholds.

These records will ensure that dust management is undertaken throughout the construction period, and will assist in identification of sources not mitigated in the event of exceedance of a trigger threshold.

3. AMBIENT AIR MONITORING AND REPORTING

3.1 MONITORING OBJECTIVES

The specific objectives for monitoring are to:

- Identify triggers for implementation of construction management response measures;
- Assess the effectiveness of dust control measures during construction;
- Ensure the construction activities' contributions for dust concentrations and deposition remain below relevant air quality criteria at the receptors;
- Provide data suitable to demonstrate compliance with the SEWPaC/WA Environmental Protection Authority (EPA); and
- Provide baseline measurements at the sensitive rock art sites for species to be emitted during operation of the facility.

3.2 AMBIENT AIR QUALITY STANDARDS

Commonly used ambient air quality standards have been set under the National Environmental Protection Measure (NEPM) for the protection of human health rather than the protection of rock art or flora and fauna. Whilst there are no residential sensitive receptors located close to the project boundary, it is considered that use of the NEPM standards will provide adequate protection of the sensitive uses identified by the Commonwealth. The trigger thresholds for PM_{10} will therefore be established to be protective of the 24 hour standard. The trigger values will be established in agreement with the SEWPAC as part of the Works Approval process (see *Section 3.4.2)*.

Boundary monitoring for dust deposition will be undertaken to ensure compliance with the criteria outlined in *Table 3.1*. These criteria have been adopted from the New South Wales (NSW) *"Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales" (revised 2005).* The trigger threshold for dust deposition at the site boundary monitoring locations has been set at no more than 2 mg/m^2/month above baseline levels, as per NSW regulations. The baseline levels of dust deposition will be defined by the baseline monitoring (see OAQMP for baseline monitoring methodology, which includes dust monitoring using dust deposition gauges and air pollutants monitoring in close proximity to the known rock art sites).

Table 3.1 Adopted Ambient Air Quality Criteria[1]

Species	Averaging Period	Air Quality Criteria	Maximum Allowable Exceedences
PM_{10}	24 hours	50 µg/m^3	Nil
	1 year	30 µg/m^3	Nil
Dust deposition	1 year (total)	4 g/m^2/month	Nil
	1 year (increase)	No more than 2 g/m^2/month above baseline	Nil
1. Source: "Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales" (Revised 2005)			

3.3 MONITORING SPECIES AND LOCATIONS

The following species will be monitored during construction for compliance monitoring and management of air quality impacts at the site boundary:

- PM_{10} concentration; and
- Dust deposition.

Construction compliance will be monitored through continuous daily measurement of PM_{10} concentration and monthly dust deposition. The locations for site boundary monitoring will be at the eastern and western site boundaries in line with the main area of works and predominant wind direction. The monitoring locations are provided in *Annex A*, with a monitoring zone proposed for the eastern and western boundary locations. The specification of monitoring zones instead of specific monitoring points provides operational flexibility during set-up, as the monitoring equipment can be located anywhere within the monitoring zone without affecting the representativeness of the monitoring results. Once set-up, however, the location of the monitoring equipment may not be changed without consultation with the SEWPaC.

3.4 MONITORING EQUIPMENT AND MONITORING FREQUENCY

3.4.1 Overview

Several methods are available for the measurement of ambient concentrations of PM_{10}. The NEPM specifies that monitoring should be carried out using an Australian Standard, or an

appropriate internationally recognised method/ standard that provide equivalent information for assessment where an Australian Standard has not been developed/ is not available. In Australia, there are three Australian Standards that allow the measurement of ambient PM_{10} concentrations:

- High volumetric sampling (HiVol);
- Beta Ray Attenuation Monitor (BAM); and
- Tapered Elemental Oscillating Microbalance (TEOM).

HiVol sampling is typically employed to collect a 24 hour sample on a one in six day rotation. This approach allows the gathering of long term data in a background location, and is not considered appropriate for real-time management of dust close to a construction site.

In contrast, BAM and TEOM offer real-time measurement methods with a measurement reported typically every 15 minutes. The NEPM standards have been set and measured by responsible Authorities across Australia through the use of the TEOM, with the BAM only more recently (2008) acquiring an Australian Standard.

Both the TEOM and BAM methods require a 240 volt power supply together with air conditioned housing. During the construction period, power supply will be available at the construction site on a continuous basis; however, such power supply will not be available at the remote CSIRO rock art monitoring sites 5, 6 and 7.

The availability of power supply at the construction site means that an Australian Standard method may be employed at the site boundary for construction compliance monitoring, whilst a non-standard method needs to be used at the CSIRO rock art monitoring locations

Only one Australian Standard method exists for the collection of data on dust deposition (*AS 3580.10.1:2003*). This method will be employed for boundary monitoring and at the CSIRO rock art receptor locations.

3.4.2 PM_{10} Ambient Concentration at Site Boundary

TEOM is the selected measurement method for real-time PM_{10} concentrations at the site boundary. TEOM has been selected as a result of the use of this measurement method by responsible Authorities across Australia against the NEPM standards.

The TEOM draws air through a hollow tapered tube, and as particles are collected on the filter, the mass changes, resulting in a change of the oscillating frequency.

Two TEOMs will be needed in total for monitoring at the eastern and western boundaries. The major advantage of using TEOM samplers is that they are capable of reporting real-time concentrations on an automated continuous basis compared to the HiVol samplers, thus requiring much less labour for maintenance and data processing.

The TEOM sampling method and the operating conditions are described in Australian Standard, *AS 3580.9.8:2008 Methods for Sampling and Analysis of Ambient Air, Method 9.8: Determination of Suspended Particulate Matter – PM_{10} Continuous Direct Mass Method Using a Tapered Element Oscillating Microbalance Analyser*. To minimise the contribution of liquid water to measured particle mass, the TEOM analyser conditions the incoming sample aerosol to 50 ºC prior to and during its measurement.

Since the TEOM is sensitive to operating and environmental conditions, an air conditioned enclosure should be prepared to house the equipment.

In the event that two TEOMs cannot be used for monitoring (for instance due to logistical issues of power provision on both sides of the site), at a minimum, one TEOM should be co-located with a portable and compact monitoring equipment, such as the DustTrak (or similar) particulate monitor at one of the monitoring boundaries, with another DustTrak located at the other boundary. The DustTrak is a continuous, portable and compact real time light-scattering laser photometer that simultaneously measure size-segregated mass fraction concentration corresponding to different particulate size fractions (PM_1, $PM_{2.5}$, PM_{10} and total PM). The DustTrak may be powered either by battery or solar panels.

Since the DustTrak is not an Australian Standard method of monitoring, a bias adjustment factor needs to be established against an Australian Standard (the TEOM in this case) to determine equivalent monitoring results. This is the reason why the DustTrak and TEOM are co-located at one location, where comparison of the results of the two methods will determine a bias adjustment factor. Once the bias adjustment factor is established with a minimum of three months' worth of data, the results from the DustTrak on the other boundary may be adjusted. The adjustment factor should be re-evaluated on a quarterly basis.

It should be noted that the OAQMP requires ongoing monitoring at the three CSIRO rock art site identified as sensitive receptors. To minimise impact to these sites, it is recommended in the OAQMP that ambient dust concentrations are measured using DustTraks due to the power supply issues with Australian Standard methods. Consequently, it is recommended that a DustTrak be co-located with a TEOM in any case to provide a bias adjustment factor for use at the rock art sensitive receptor locations.

As the site is located in an area of high humidity, the TEOM and/ or DustTrak will be equipped with a heating manifold at the sampling inlet to evaporate water droplets in the inlet stream. This prevents over-prediction of ambient air concentrations by the monitors through erroneous readings of water droplets as particulates.

For construction compliance monitoring at the site boundary locations, trigger thresholds need to be established for PM_{10} ambient concentrations to ensure that construction activities do not create unacceptable impacts to the rock art sites. A trigger threshold acts as a limit where its exceedance will precipitate actions to reduce PM_{10} emissions which may include additional mitigation, or in extreme cases, temporary cessation of construction activities. Whilst the final trigger levels for construction need to be agreed with the SEWPAC as part of the works approval process, the following alert standards are recommended and have been designed to protect the overall 24-hour standard (50 µg/m^3):

- **Alert Level** – 15 minute mean PM_{10} concentration is greater than 150 µg/m^3, and/ or 1-hour mean PM_{10} concentration is greater than 50 µg/m^3. Actions would include:
  - Checking the weather forecast for that day;
  - Comparison of the concentration at the upwind monitor to the downwind monitor to determine the site contribution; and
  - Identifying risk areas and notifying operations managers to be alert to dust generation to employ additional damping down where required.
- **Remedial Action Level** – 1 hour mean PM_{10} concentrations are greater than 50 µg/m^3 for three consecutive hours. Actions would include:
  - Comparison of the concentration at the upwind monitor to the downwind monitor to determine the site contribution;
  - Increased watering; and
  - Decreasing and/ or relocating dust generating activities identified to be a source of the impact.
- **Extreme Action Level** – Rolling 24-hour mean PM_{10} concentration is above 50 µg/m^3 for twelve consecutive hours and 1 hour mean PM_{10} concentrations are above 150 µg/m^3 for three consecutive hours. Actions to include:
  - Comparison of the concentration at the upwind monitor to the downwind monitor to determine the site contribution;

- Cessation of dust generating activity at all or parts of the site when the elevated PM_{10} concentrations are not caused by an external regional event such as a bushfire or dust storm.

In the event that a TEOM/DustTrak configuration is used, the trigger levels will take into account the bias adjustment factor which will need to be agreed with the SEWPaC prior to implementation.

Exceedance of the alert, remedial or extreme action levels will require documentation of the actions taken to be provided to SEWPaC..

3.4.3 Dust Deposition at Site Boundary

Dust deposition gauges will be used for dust deposition measurement as they are the most effective means of measuring dust deposition at minimal cost without the need for a source of power, and also have an associated Australian Standard (*AS 3580.10.1:2003*).

A deposition gauge consists of a stand (or stake) and a bottle assembly which includes a glass funnel attached to a glass bottle with a rubber stopper.

Dust deposition will be measured on a monthly basis at each monitoring location. At the end of each monitoring duration, the gauge will be sent to the laboratory whereby the deposited dust will be analysed to obtain the total (wet plus dry) deposition rate.

The monitoring deposition for dust at the site boundary locations for construction compliance monitoring will be set to be protective of the long-term exposure of 4 g/m^2/month, with the trigger threshold set at no more than 2 g/m^2/month above baseline levels, as provided in *Table 3.1*. Since the dust deposition gauge does not provide real-time readings, additional mitigation actions are applied retrospectively if the trigger threshold is found to be exceeded at the site boundary monitoring locations. Construction records, as described in *Section 2.2.3* will help in identification of sources not mitigated and/or inadequate mitigation measures.

3.4.4 Weather Station

YPNPL will set up a weather station on-site throughout the construction and operation phases to measure the wind speed/direction, temperature and rainfall, as a minimum. These weather parameters have been selected for monitoring in support of dust control:

- Measurement of wind direction will allow knowledge of which monitoring equipment is upwind (recording background levels) and downwind of dust emissions (recording site contribution);

- Measurement of wind speed will provide an indication of the risk of dust re-entrainment; and
- Measurement of rainfall will enable knowledge of the extent of natural dust attenuation through watering and if additional watering is needed.

To maintain consistency, weather monitoring equipment should be similar during construction monitoring and baseline monitoring as presented in the OAQMP.

It is noted that the measurement of rainfall will be as per CSIRO's 2008 report. Model 200 rainwater samplers (Ecotech Pty Ltd, Blackburn, Australia) will be installed. The wet only samplers open after 0.25 mm of rain has fallen in the tipping rain gauge, and close again once no rain has fallen for a full 30 minute period. Samples will be collected in polyethylene bottles that have thymol added to preserve the chemical species in the rain against degradation by bacteria. Bulk wet-only rainwater samples will be collected over the usual sampling period of 30 days. After collection, the total rainwater volume of each sample will be determined.

3.5 MONITORING DURATION

Construction compliance monitoring will be carried out upon commencement of construction and will end when construction is completed. This is anticipated to take 31 months.

In the case that there any changes to the construction schedule, as a minimum, air quality monitoring must be undertaken for a period of not less than 24 months beginning from the commencement of construction.

3.6 REPORTING PROTOCOL

3.6.1 Data Reporting

The report for the construction compliance monitoring will be compiled every six months and sent to the Commonwealth until the completion of construction (31 months). Completion of construction is defined as the completion of plant commissioning, prior to actual plant start-up. All construction compliance monitoring reports are to be submitted to SEWPaC no later than two months from the end of each six-month reporting interval.

Presentation of results will record the data recovery rate and history including exception reports and maintenance notes, and statistical representation of captured data. Statistics

presented for the collected data will include maximum, 99th, 95th and 90th percentiles, median, averages, and a comparison of recorded data to standards outlined in *Table 3.1*.

All reports will include a map clearly showing the location of each rock art site being monitored.

3.6.2 Exceedance/ Incident Reporting

Any detection of an exceedance of a trigger threshold, or identifying an incident relating to a trigger threshold exceedance, YPNPL will report the exceedance to SEWPaC/EPA, within the compliance report. The report will include the following details:

- For PM_{10} concentration, the date, time, magnitude and nature of the exceedance/ incident;
- For dust deposition, the month, magnitude and nature of the exceedance/incident;
- Identify the likely cause(s) of the exceedance/incident;
- Describe the mitigation measures in place during the exceedance/incident;
- Describe the response action that has been undertaken to date; and
- Describe the proposed additional mitigation measures to address the exceedance/incident.

3.7 SUMMARY OF AIR MONITORING PROTOCOL

Table 3.2 summarises the air monitoring protocol for the CAQMP. The following protocol will be applicable during the whole monitoring duration.

Table 3.2 Air Quality Monitoring Protocol

Type of Monitoring	Monitoring Location	Monitoring Frequency	Monitoring Equipment	Trigger Threshold for Additional Mitigation
Construction Compliance Monitoring (During Construction for a Period of 31 months)				
PM_{10} ambient concentration	E1 - Eastern site boundary	Continuous	Two TEOMs (*AS 3580.9.8:2008)* or One co-located TEOM and DustTrak (or similar) and one standalone DustTrak	The trigger level is proposed to be set at three levels (Alert Level, Remedial Action Level and Extreme Action Level) to be protective of the overall 24-hour average PM_{10} criterion (50 µg/m^3). In the event of the TEOM-DustTrak monitoring configuration, the proposed trigger values will be agreed with the SEWPaC, prior to implementation, based upon the bias adjustment factor
	W1 – Western site boundary	Continuous		
Dust deposition	E1 - Eastern site boundary	Monthly	Deposition gauge (*AS 3580.10.1: 2003*)	Total of 4 g/m^2/month, with no more than 2 g/m^2/month above baseline levels. Baseline levels are defined through baseline monitoring (detailed in OAQMP).
	W1 – Western site boundary	Monthly		
Weather Monitoring (Continuous During Construction Compliance Monitoring)				
Wind speed and direction	On-site	Continuous	Anemometer	-
Temperature	On-site	Continuous	Temperature sensor	-
Rainfall rate	On-site	Monthly	Tipping rain gauge	-

Note – Air quality monitoring is expected to be starting on December the 1st, 2012 matching site preparation activities commencement.

4. PLAN ADMINISTRATION

4.1 ROLES AND RESPONSIBILITIES

Relevant roles and responsibilities associated with this CAQMP are presented in *Table 4.1*.

Table 4.1 Roles and Responsibilities

Role	Responsibilities
Construction Manager (construction contractor)	• Ensure that sufficient resources are allocated for the implementation of this CAQMP; • Ensure that Construction Environmental Management Plan covers the management and mitigation measures presented in this Construction Air Quality Management Plan; • Ensure that the outcomes of the compliance construction monitoring are systematically evaluated as part of ongoing management of construction activities; • Ensure all dust mitigation measures are implemented; and • Ensure construction site records are kept and maintained on-site (as per *Section 2.2.3*).
Environment Manager (YPNPL)	• Ensure all relevant personnel have and understand the most up-to-date copy of this CAQMP; • Ensure that all requirements of this CAQMP are effectively implemented; • Ensure that any required actions arising from incident investigation processes during compliance construction monitoring are reported to the relevant personnel for further action and ensure that the actions are effectively implemented; • Coordinate the implementation of monitoring requirements and corrective actions; • Ensure that qualified personnel conduct the air quality monitoring and laboratory analysis; • Ensure all monitoring reporting requirements are met and maintained on site; and • Authorise all monitoring reports and any revisions to this CAQMP.
Construction contractors/ subcontractors/workers	• Understand and implement mitigation protocols as required in the CAQMP (as per *Section 2.2.2*) and any other required measures during construction.
Air Monitoring Personnel (YPNPL/ contractors)	• Undertake all monitoring activities in accordance with this CAQMP; • Ensure regular maintenance of monitoring equipment; • Ensure all relevant monitoring quality control/ assurance procedures are effectively implemented; and • Review laboratory results and write monitoring reports.

4.2 TRAINING NEEDS

All YPNPL staff, contractors and subcontractors associated with the implementation of this CAQMP will be given training.

YPNPL staff training will be undertaken as detailed in the YPNPL Environmental Management System (EMS). As a minimum, all staff will be given basic environmental awareness for the construction phase. Management and operational staff will be given training according to the roles and responsibilities required for the implementation of mitigation measures during construction, as well as the implementation of the CAQMP.

All contractors and associated subcontractors will be required to participate in a site induction prior to the commencement of work. As a minimum, the induction is to include:

- YPNPL's Environmental Policy and EMS requirements;
- The requirements of this CAQMP, including environment incident reporting; and
- Environmental emergency contact details.

In the event that there are specific environmental management requirements relating to a contractor's work activities, details of these requirements are to be issued to the contractor in writing as a part of the induction.

Records, which detail the attendees, content of the induction/training as well as any additional information provided, will be maintained.

In addition to the induction program, training will be provided as deemed necessary to contractors to provide them with the knowledge, skills and awareness to minimise environmental impact during construction. At a minimum this should include:

- Contractors whose activities are not directly supervised by YPNPL personnel; and
- Contractors whose activities are ongoing throughout the construction period and have the potential to result in an environmental incident (e.g. stockpile contractors).

4.3 PLAN REVIEW

The CAQMP will be reviewed at least every quarterly or earlier if changes to the CAQMP are required. The review of the AQMP will reflect changes in operational procedures, management protocols and environmental requirements.

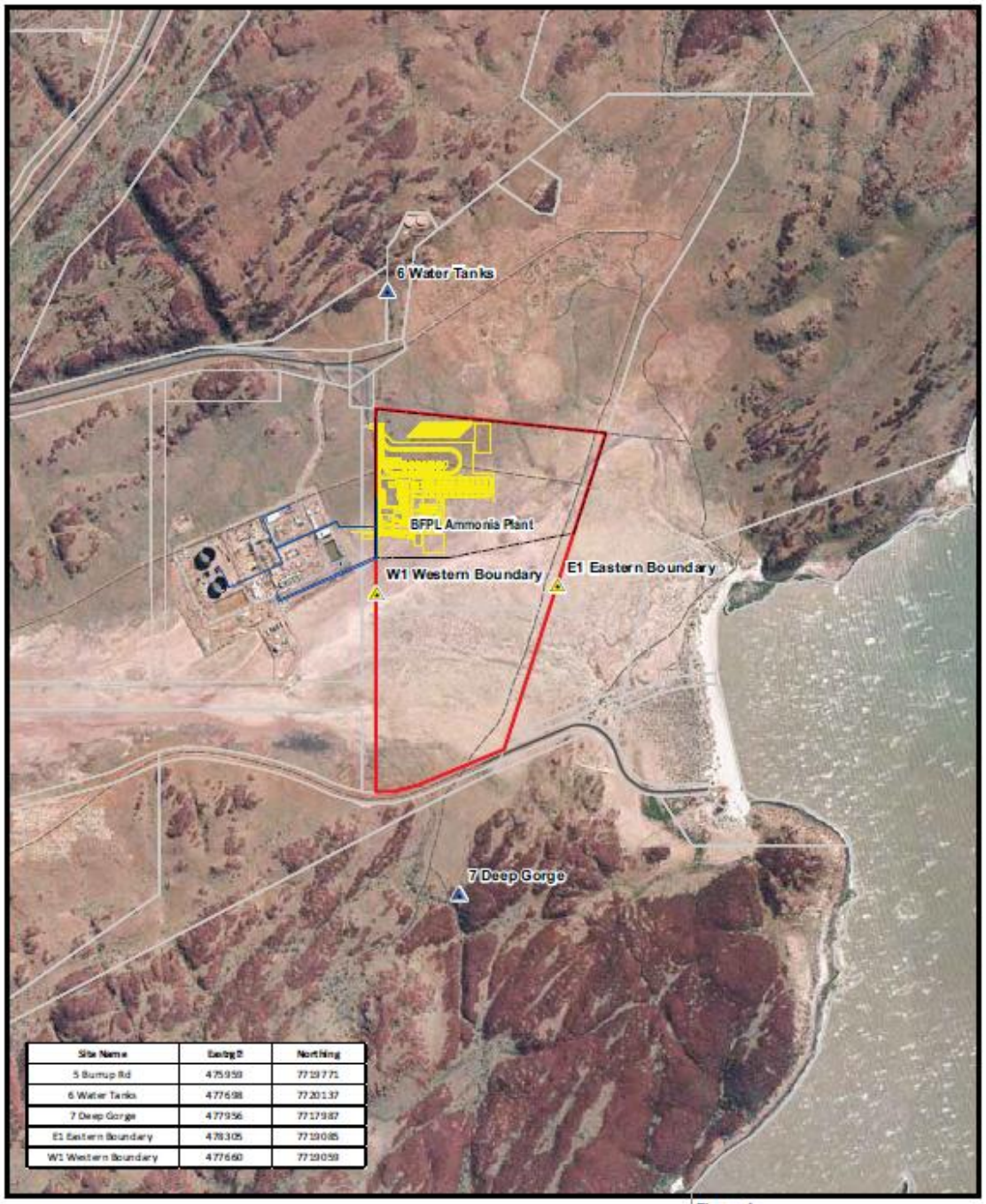
Upon final approval of the revised CAQMP, the document will be circulated to relevant personnel.

5. REFERENCES

CSIRO (2008). *Burrup Peninsula Air Pollution Study: Report for 2004/2005 and 2007/2008.* Melbourne: CSIRO Marine and Atmospheric Research.

NSW DEC (2005). *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW*. Sydney: DEC.

6. ANNEX A



ATTACHMENT 02:

Construction Water Quality Management Plan

(CWQMP)

TABLE OF CONTENTS

1. PURPOSE

The purpose of this Construction Water Quality Management Plan (CWQMP) is to detail the measures and water quality monitoring regime required to manage potential environmental impacts on surface water and groundwater resources during the construction of the TAN Burrup Project located on the Burrup Peninsula, Western Australia (WA). The area to be disturbed during construction is approximately 35 hectares (Ha) (the Site) (**Figures 1** and **2***).*

This Plan needs to be read together with the Construction Environmental Management Plan (2-250-329-PRO-TRE-0111), in which general issues such as roles, responsibilities, environmental monitoring, inspection, auditing and reporting are described.

2. SCOPE

This CWQMP describes the measures to be implemented to manage and mitigate the potential impacts associated with the construction of the TANPF on:

- surface water; and
- groundwater.

The CWQMP also describes:

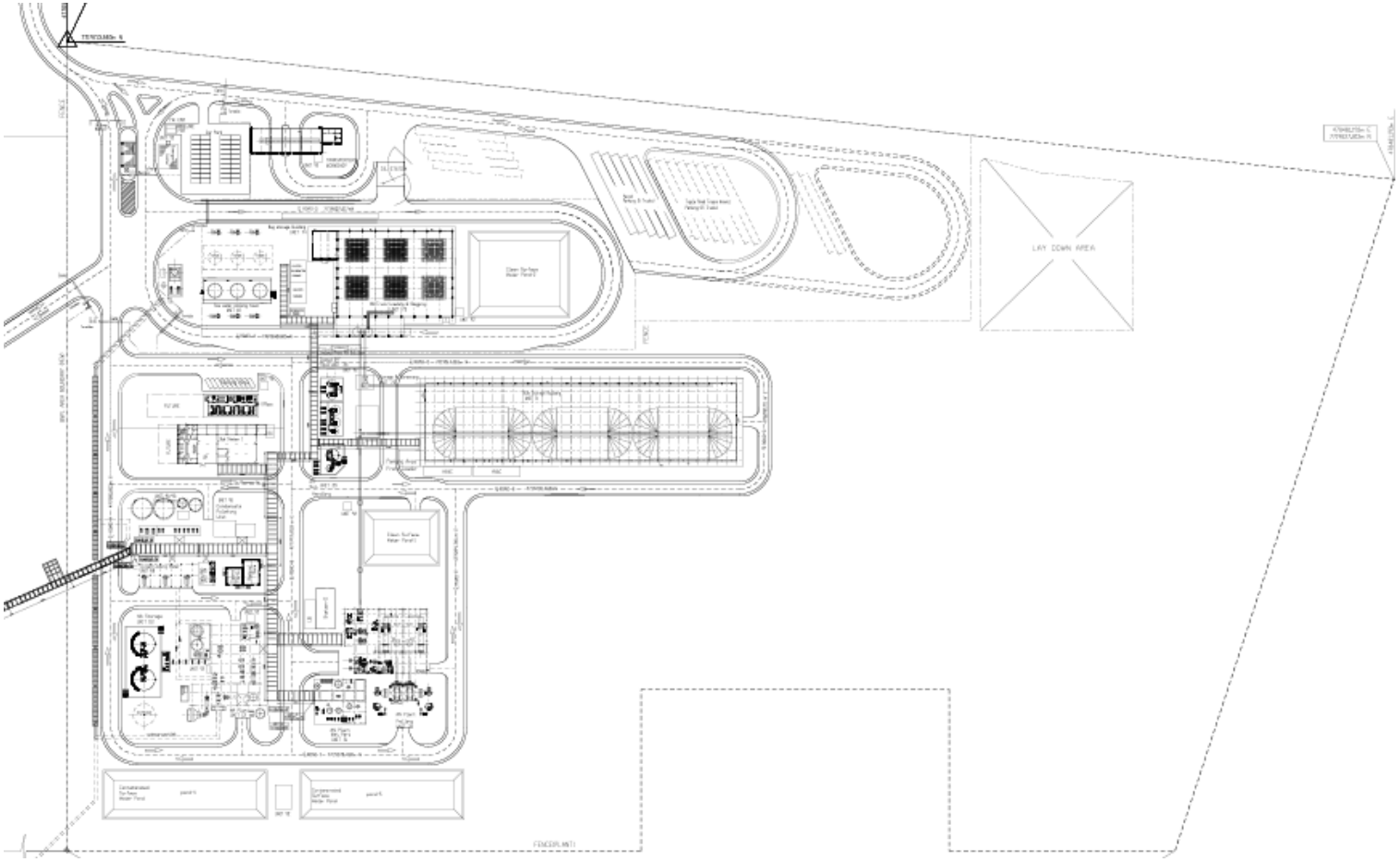
- the management procedures relevant to hazardous substances storage and use and any wastewater including sanitary and construction generated wastewater; and
- monitoring methods used to ensure that discharged wastewater meets appropriate water quality criteria.

The procedures and protocols contained within this CWQMP are for the construction phase only.

This Project will be performed by means of modular construction and therefore, this Construction Water Quality Management Plan is applicable to all water and groundwater existing in the TAN Burrup Project Site areas at the Burrup Peninsula where the modules are going to be installed, erected and hooked up. Any issue related to yard(s) where modules are being constructed is not subject to this document's requirements.

Figure 1 Site Location

Figure 2 Site Layout



3. DEFINITIONS AND ACRONYMS

3.1 DEFINITIONS

COMPANY	Yara Pilbara Nitrates Pty Ltd
CONTRACTOR	Técnicas Reunidas S.A. (TR)
CONSTRUCTION	Includes any preparatory works required to be undertaken including clearing vegetation, cut and fill activities, the erection of any on-site temporary structures and the use of equipment for the purpose of breaking the ground for buildings or infrastructure.
PROJECT	TAN Burrup Project.
SITE	35 Ha area where construction works are going to be performed.
TEMPORARY SEDIMENT BASIN	Includes sediment basins established as required during construction only, to manage sediment laden run-off.

3.2 ACRONYMS

ANZECC	Australia and New Zealand Environmental and Conservation Council
AS	Australian Standard
ASS	Acid Sulphate Soils
YPNPL	Yara Pilbara Nitrates Proprietary Limited
CEMP	Construction Environmental Management Plan
CEO	Chief Executive Officer of the Office of the Environmental Protection Authority
CRS	Chromium Reducible Sulphur
CWQMP	Construction Water Quality Management Plan
DO	Dissolved Oxygen
DoH	Western Australia Department of Health
DoW	Western Australia Department of Water
EC	Electrical Conductivity
EO	Environmental Officer
EP Act	WA *Environmental Protection Act 1986*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
m	Metres
m AHD	Metres in Australian Height Datum
m bgl	Metres Below Ground Level
mg/L	Milligrams per litre
MUBRL	Multi-User Brine Return Line
µs/cm	Micrograms per centimetre
NATA	National Association of Testing Authorities
OEPA	Western Australia Office of Environmental Protection Authority
PASS	Potential Acid Sulphate Soil
RiWI Act	WA *Rights in Water and Irrigation Act 1914*
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
Site	35 Ha area to be disturbed during construction (refer *Figure 1*)
SLC Act	WA *Soil and Land Conservation Act 1945*

SOP	Standard Operating Procedure
TR	Técnicas Reunidas (construction contractor)
WC Act	WA *Waterways Conservation Act 1976*
WA	Western Australia
WAPC	Western Australian Planning Commission
WQPN	Water Quality Protection Notes
YPFPL	Yara Pilbara Fertilizers Pty Ltd

4. LEGISLATIVE FRAMEWORK

This document has been prepared to address relevant legislative requirements in addition to environmental approval conditions relevant to water quality management. A summary of relevant legislation and environmental approval conditions is outlined below.

4.1 RELEVANT LEGISLATION

Legislation relevant to water quality management is outlined in **Table 1.**

Table 1: Water Quality Management Legislation

Legislation	Application
Environmental Protection Act 1986 (WA)	State environmental impact assessment and Ministerial approval process.
Rights in Water and Irrigation Act 1914 (WA)	Governs the management of water in Western Australia.
Waterways Conservations Act 1976 (WA)	Primary piece of legislation that controls activities impacting on watercourses in WA.
Soil and Land Conservation Act 1945 (WA)	Includes provisions relating to the conservation of soil and land resources, and to the mitigation of the effects of erosion, salinity and flooding.
Environment Protection and Biodiversity Conservation Act 1999 (Cwth)	The Commonwealth Government's central piece of environmental legislation

4.2 ENVIRONMENTAL APPROVAL CONDITIONS

This document also addresses the Ministerial Conditions outlined by the Commonwealth (EPBC 2008/4546) and WA (Statement No. 870) governments. For this CWQMP particular reference has been made to:

Commonwealth Approval (EPBC Approval 2008/4546)

Condition 4

The person taking the action must ensure that wastewater from the facility meets the requirements set out in Statement 594 for discharges into the Multi User Brine Return Line.

Condition 7

To ensure the protection of the listed threatened species; listed migratory species and the values of the Dampier Archipelago national Heritage Place, the person taking the action must submit to the Department those management plans containing management actions aimed at reducing impacts upon these relevant matters of national environmental significance including:

a) CEMP which must be submitted to the Department at least 2 months prior to construction and must include but not be limited to management measures for the following:

- *Water Quality*

WA Approval (Statement No. 870)

Condition 6

6.1 *The proponent shall undertake rehabilitation to achieve the following outcomes:*

1. *The project area shall be non-polluting and shall be constructed so that its final shape, stability, surface drainage, resistance to erosion and ability to support local native vegetation are comparable to natural landforms within the local area, as demonstrated by a methodology acceptable to the CEO.*

Condition 8

8.1 *The proponent shall undertake detailed hydrogeological studies commencing at least 12 months prior to the commencement of construction to quantify groundwater quality, groundwater flow directions, and the depth to groundwater beneath the TANPF site and in surrounding areas.*

8-2 *The proponent shall develop appropriate management measures for dewatering to the satisfaction of the CEO on advice of the DEC and the Department of Water in the event that the information gathered from the hydrogeological studies required by condition 8-1 indicates that dewatering would be required during construction.*

8-3 *The proponent shall design, construct, and locate groundwater monitoring bores to the satisfaction of the CEO on advice of the DEC and the Department of Water, having regard for the outcomes of the hydrogeological studies required by condition 8-1 and the Department of Water's Water Quality Protection Note 30 on Groundwater Monitoring Bores.*

8-4 *The proponent shall sample/monitor all groundwater bores required by Condition 8-3 every six months and shall set groundwater monitoring trigger values at a value of 10% above the baseline contaminant concentrations obtained from the hydrogeological studies required by condition 8-1.*

8-5 *In the event that monitoring required by condition 8-4 indicates an exceedance of trigger levels:*

1. *The proponent shall report such findings to the CEO within 7 days of the exceedance being identified;*
2. *The proponent shall provide evidence which allows determination of the cause of the exceedance;*
3. *If determined by the CEO to be project attributable, the proponent shall submit actions to be taken to address the exceedance within 7 days of the determination being made to the CEO;*
4. *The proponent shall implement actions to address the exceedance and shall continue until such time as the CEO determines that the remedial actions may cease; and*
5. *The proponent shall submit bi-annually, or at a frequency defined to the satisfaction of the CEO, the results of monitoring required by condition 8-4 to the CEO, until such time as the CEO determines that reporting may cease.*

In addition to the Ministerial Conditions set by the Commonwealth and WA Governments, COMPANY are committed to the preparation of a Construction Environmental Management Plan (CEMP) as outlined within the Public Environmental Review (PER) (ERM, 2010). This CEMP will incorporate all specific construction management plans.

5. DEVELOPMENT

5.1 OBJECTIVES AND PERFORMANCE

Objectives for the construction phase of the PROJECT with regard to water quality management are to:

- maintain the quality of surface water and groundwater by minimising the potential for contamination; and
- maintain the existing quality of water resources within and surrounding the Site (including the surrounding supra-tidal flats).

These objectives will be achieved through:

- applying appropriate mitigation and management measures to prevent, and minimise impacts to surface water and groundwater quality;
- implementing corrective actions if impacts to water quality are identified;
- providing ongoing monitoring of surface water quality, where possible following significant rainfall events, in the vicinity of the Site, to allow prompt identification of any changes that can be attributed to construction activities;
- collecting ongoing baseline information on groundwater levels and groundwater quality in the vicinity of the Site;
- providing ongoing monitoring of groundwater levels and groundwater quality in the vicinity of the site during construction, to allow prompt identification of any changes that can be attributed to construction activities; and
- monitoring any discharge water from the Site as a result of construction activities, including, from temporary sediment basins and any dewatering, to ensure it meets the relevant criteria.

Detailed performance indicators for potential impacts to surface water and groundwater are presented in **Table 2.**

Surface water (where posible) and groundwater monitoring will be undertaken against performance measures and indicators during construction activities. If monitoring and assessment indicates that a performance indicator has been exceeded, or is likely to be exceeded, CONTRACTOR will implement the contingency measures outlined in Section 6.7.

Table 2: Performance Measures

Performance Measure	Indicator of Success	Key Assessment Considerations
Divert, capture and treat surface water where necessary during construction to ensure no impacts to surrounding environment.	• Establishment of upslope diversion drain • Establishment of on-site detention basins • No discharge of untested water to the environment	1. Does the monitoring indicate that a performance measure or development consent condition has been exceeded, or likely to be exceeded? 2. What are the ramifications of the exceedance to the down gradient environment / users. 3. What is the nature of the exceedance: • surface water; or • groundwater; or • both. 4. What are the potential factors that may have contributed to the risk i.e. construction activities or natural climatic event? 5. What actions, if any are required to mitigate and/or minimise the potential for future impacts?
Minimise the direct impact on surface waters from construction activities	• Immediate investigation of any potential leaks or spills if elevated concentrations are identified in surface water	
Minimise the direct impact on groundwater from construction activities	• No discharge of water failing to meet groundwater quality criteria provided in **Table 4**. • Immediate investigation of any potential leaks or spills if elevated concentrations are identified in groundwater No discharge of water	

5.2 BACKGROUND INFORMATION

5.2.1 Baseline Studies

Hydrogeological and hydrological investigations (ERM, 2011 & 2012) have been undertaken to provide baseline data groundwater conditions at the Site and specifically to address the WA Office of the Environmental Protection (OEPA) *Statement 870 Condition 8 Groundwater.* A field investigation was completed in January 2011, with follow-up groundwater monitoring and analysis in April and September 2011 and February 2012 (ERM 2012) to inform the hydrological and hydrogeological characterisation of the site. Baseline studies were undertaken to provide initial characterisation of hydraulic conditions, groundwater flow directions and background groundwater chemistry. The key findings of this study are summarised below.

Where relevant, this baseline data has been used to form the management measures and monitoring programs outlined in Sections 6.5 and 6.6 of this CWQMP.

5.2.1.1 Hydrology

Freshwater flows in the Burrup region are highly variable, characterised by short periods of very high flow that coincide with major rainfall events usually associated with tropical cyclone activity. These periods of high flow are followed by dry period's sometimes lasting years.

Natural drainage at the Site flows toward the supra-tidal flat between King Bay and Hearson Cove. During periods of extreme spring tides and storm surge the supra-tidal flats are periodically inundated with seawater for up to several hours. This tidal action supports the King Bay mangrove community west of Burrup Road (approximately 1km from the Site) by providing sedimentation, seawater recharge to maintain prevailing salinity fields, nutrient delivery and recruitment of benthos. Evaporation of seawater over the tidal mudflats east of Burrup Road results in surface salinities ranging from 90,000 ppm to 300,000 ppm (ERM, 2012).

5.2.1.2 Hydrogeology

The groundwater assessment involved the installation of groundwater monitoring bores at the Site, which were monitored over approximately an 18 month period to evaluate baseline groundwater conditions. The average groundwater elevations across the site were 3.6 m AHD in late April 2011, and 3.4 m AHD in September 2011 and February 2012 . Depth to groundwater ranged from over 3 metres below ground level (m bgl) in the northern, more elevated part of the site to approximately 0.5 m bgl in the supratidal flat area in the southern part of the site. Groundwater elevations generally reflect surface topograpgy. The investigations also indicated that groundwater elevation showed a strong response to the significant rainfall events associated with Cyclone Bianca. The inferred groundwater flow direction at the site was to the south-east.

Tidal monitoring completed as part of the geotechnical assessment (Golder Associates 2012) indicated that groundwater in bedrock beneath the central and western portion of the Site is unlikely to be tidally influenced.

The inferred groundwater flow direction at the site was to the south-east.

Geochemistry results from recent groundwater monitoring (ERM, 2012) indicates the groundwater chemistry at the Site is dominated by sodium and chloride. However, the water quality in the wells located on the up hydraulic gradient portion of the Site showed decreased sodium and chloride when compared to those located further down hydraulic gradient. This observed variation in geochemistry is consistent with the presence of the supra-tidal flats in the south of the Site. Seawater inundation and groundwater discharge by evaporation and evapotranspiration in the supra-tidal flat area would concentrate chloride in groundwater in the south of the Site, while groundwater in the northern area is recharged by precipitation and therefore has lower salinities. However, this variation in geochemistry does not indicate the presence of two distinct and unconnected aquifer systems as the watertable intersects the different hydrogeological settings.

Other geochemical results indicated groundwater quality was generally neutral (pH between 6.55 and 7.64), with moderate to high electrical conductivity (EC) values (between 2,510 μS/cm and 16,000 μS/cm) and low dissolved oxygen (DO) values (between 1.8 mg/L and 4.7 mg/L). Redox potential (Eh) ranged between -100 mV, which is indicative of reducing conditions and 289 mV, which is indicative of oxidising conditions. Some metals, including chromium (hexavalent) and zinc, along with other analytes such as sulphate, chloride and nitrate were present in background concentrations that exceded relevant guidelines including ANZECC (2000) Water Quality Guidelines, NHMRC (2004) Drinking Water Quality Guidelines and DoH (2006) Domestic Non-potable Groundwater Guidelines (ERM, 2012).

There is little readily accessible groundwater on the Burrup Peninsula and it is not used as a potable source in the area. Recent groundwater investigations indicate that the water quality is not suitable for drinking water purposes due to the high salt content (ERM, 2012).

5.3 POTENTIAL IMPACTS

The following sections define those construction activities which may result in impacts to surface water and/or groundwater.

5.3.1 Surface Water Quality

Specifically, the following construction activities have the potential to result in impacts to surface water quality:

- **Pad Site Establishment** – The TANPF will have a disturbance footprint of approximately 35ha, of which 23 ha will be required for the plant footprint. Clearing of land has the potential to expose soils to erosive forces and sediments can become entrained in stormwater flows, resulting in degradation of downstream water quality.
- **Earthworks** - Cut and fill earthworks will be required to bring the Site to RL 5.5 m AHD. A soil embankment up to 3.5 m thick will be required to be constructed of structural fill in the southern portion of the Site to accommodate the plant area. The soil embankment will be exposed to erosive forces such us surface water runoff, inundation of the supra-tidal flat and groundwater flows. Filling of the Site will reduce the flood storage capacity of the supratidal flats to the south. This could affect flood levels both onsite and in adjacent areas during flood events, and may be particularly pronounced during extreme rain events and high catchment runoff. The earthworks will also result in a change in drainage patterns at the Site and will include the construction of an upslope diversion drain. Further details of the change in drainage patterns are provided in the Construction Erosion Control and Stormwater Management Plan *(CECSMP) (2-250-329-PRO-TRE-0111-att03).*
- **Stockpiling –** Some of the material generated during cutting will be required to be stockpiled and reused as fill material. Stockpiles provide a source of disturbed soil that can be entrained in stormwater flows and as such can potentially result in a degradation of downstream water quality.
- **Excavations and Dewatering –** Construction of the Site will require several excavations for foundations and to allow for the installation of infrastructure. Excavations have the potential to hold water following a rainfall event, or through interception of groundwater, and as such may need to be dewatered. Water can collect in the excavations and has the potential to contain suspended sediment. Therefore, this water requires management so that discharge does not occur directly to any waterways, but rather discharge be directed to land and natural infiltration allowed to occur, or if water contains a high sediment load it be directed to drainage channel or sediment basin.
- **Spills from Plant and Machinery** – A number of plant, heavy vehicles and other machinery that require fuel, lubricants and oils will be present during the construction phase. Spills or leaks from this plant and machinery has the potential to cause downstream water quality impacts.
- **Construction of Roads / Access Tracks** – During construction establishment of roads and access tracks will be required to enable access to the Site by construction staff, plant, vehicles and machinery. Establishment of these roads and access tracks has the potential to cause disturbance to surrounding soils and create sediment laden runoff if the appropriate erosion and sediment controls are not put in place.

- **Water Use** - Water will be used during construction for a number of purposes, including use as dust control, washing of plant and equipment, for drinking water and for amenities and landscaping. Due to limited freshwater and highly variable stream flows use of naturally occurring freshwater, including groundwater, during construction is not considered feasible and as such potable water will be used. All water used on-site during construction will be captured in on-site temporary sediment basins. These basins will be managed in accordance with the *CECSMP (2-250-329-PRO-TRE-0111-att03).*
- **Wastewater** – The estimated amount of sanitary waste is expected to be a maximum 50 lts/person/day. During the construction an average of 300 persons will be on site with a peak of 500 persons. All sanitary wastewater will be collected in water septic tanks and disposed of in an appropriate manner as described in **Section 5.4.8** of this Plan.

5.3.2 Groundwater Quality

The construction activities with the potential to impact surface water quality also have the potential to impact groundwater quality, with the addition of water seepage, potentially impacted by construction activities (i.e. as a result of accidental spills or leaks on pervious areas of the Site) resulting in potential groundwater impacts within the site and down hydraulic gradient (i.e. supra-tidal flats).

To fully understand the potential impacts of construction on groundwater, ongoing detailed information on groundwater levels and quality is required (as recommended in **Section 5.5.2** of this CWQMP).

5.4 MANAGEMENT ACTIONS AND RESPONSIBILITIES

The following provides a detailed description of the management measures required to minimise impacts on the local surface water and groundwater environments during construction of the TANPF.

A summary of the management measures and those responsible for implementing the measures is provided in **Table 3.**

5.4.1 Upslope Diversion Drain

An upslope diversion drain will be constructed after clearing and grooving and prior to any blasting operation. The diversion drain designs are provided in the *CECSMP (2-250-329-PRO-TRE-0111-att03).*

5.4.2 Drainage and Stormwater Management

Given the large area of disturbance involving cut and fill earthworks to establish the Site, the perimetral drainage channel at the north and west side of the site will manage stormwater run on from upslope the site. During site preparation and at an early stage of the construction phase, all site areas will be sloped, as much as possible, towards those drainage channels.Should an additional measure shall appear to be necessary, stormwater basins at the southwest end of the plot plan may be used for this purpose, as soon as they are finished (according to constructon planning, they will be constructed as part of the first works to be performed).

Designers are to use peak flow calculations to develop a drain of sufficient capacity such that upslope flows are contained in the drain and are safely discharged to adjacent areas using scour protection.

5.4.3 Erosion Control

Erosion control measures will be implemented during construction activities to minimise the potential for degradation of downstream water quality. Relevant erosion control measures are detailed in the *CECSMP (2-250-329-PRO-TRE-0111-att03),* but generally include:

- where possible limit disturbance to two metres beyond the edge of any essential construction activity;
- plan construction works to limit the amount of affected area at any one time;
- coordinate work schedules, if more than one contractor is working, so that there are no delays in construction activities which would cause affected land to remain unstabilised for longer than two weeks;
- progressively install stabilisation measures; such as sealing of access ways, to minimise exposed areas; and
- during windy weather unsealed roads and the earthworks pads will be kept moist (not wet) by sprinkling with water to reduce wind erosion.

5.4.4 Stockpile Management

Drainage diversions will be installed upslope of the Site, and hence the stockpile area, thus limiting the volume of clean run-on interacting with the stockpile. Alternative options include, applying protective covers (i.e. tarps), applying hydromulch, and / or surface roughening. The likelihood of strong winds during the cyclone and storm season highlight the importance of stabilising stockpiles to prevent erosion of the stockpile and deposition of sediment off-site.

Should any unusual visual or irregularities be identified at stockpiles then soil/water sampling and testing should commence. Sampling and testing will identify appropriate handling/disposal techniques should the soils be contaminated.

A more detailed description of stockpile management measures is provided in the *CECSMP (2-250-329-PRO-TRE-0111-att03*).

5.4.5 Dewatering Excavations

Cut and fill earthworks will be required at the Site to create a pad for the plant at approximately 5.5 m AHD. The hydrogeological and hydrological investigation (ERM 2012) indicated the requirement for dewatering is likely to be dependent on the frequency and volume of rainfall prior to and during ground works and construction.

The geotechnical study conducted by Golder Associates (2012) indicated that minimal to no active dewatering should generally be required during construction, other than after cyclonic rainfall events when groundwater elevations may rise above the base of excavation which is understood to be 2.0 m AHD. The time period for groundwater to return to pre-cyclone levels is unknown, however groundwater levels observed in April 2011 were noted to be generally elevated when compared to January 2011 data.

5.4.5.1 Management of Water in Excavations

In some cases it may not be possible to prevent water from entering excavations, (i.e. groundwater infiltration associated with an increased groundwater elevations in response to cyclonic rainfall event). In such circumstances, should dewatering of excavtions be required, it will be undertaken in accordance with the WA Department of Water (2006) *Water Quality Protection Note: Dewatering of soils at construction sites.*

The following measures will be implemented to prevent impacts to water quality during dewatering activities:

- when pumping dirty water out of excavation areas the pump intake will be kept as close to the surface of pools as possible to avoid sucking sediments off the bottom;
- during dewatering, water with a high sediment load will be directed to drainage chanel and/or on-site temporary sediment basins within the construction area;
- water with a low sediment load may be used on-site for dust suppression purposes;
- discharge to land away from a natural waterway allowing for infiltration may be an alternative option.

5.4.6 Acid Sulphate Soil Management

Field investigations undertaken as part of the baseline studies (ERM, 2011) did not indicate the presence of AASS/PASS within or adjacent to the proposed construction area and as such there was no requirement to develop a ASSMP in support of construction of the TANPF. Notwithstanding, in the event that acid sulphate soils being disturbed during construction, management will be in accordance with the requirements of the DEC's guideline *Treatment and management of soils and water in acid sulfate soil landscapes* (DEC, 2011).

5.4.7 Flood Management

The final Site level will be a minimum of 5.5 m AHD. It is noted that the flood modelling undertaken by Golder Associates (2012) indicates that a 1:100 year event, including storm surge, may result in flooding impacts up to 5.6 m AHD. Protection to sensitive areas, such as impervious containment including 1 metre high bunding around all, will provide additional protection against flooding and storm surge events. Rock protection placed on the embankments will also provide protection against erosion during times of flood.

5.4.8 Wastewater Management

During construction sanitary wastewater will be collected by authorised personnel using water septic tanks and disposed of in an appropriate manner. Sanitary waste storage, collection and disposal will be organised sufficiently for the number of personnel on-site in accordance with all relevant legislative requirements, including those of the WA Department of Health (DoH).

5.4.9 Leaks and Spill Management

It is important that all potentially contaminating materials used or stored on the Site (e.g. fuel, oils) be prevented from entering the groundwater or surface water systems. This will be achieved through storage in designated secondary containment areas (e.g. internally bunded shipping containers or purpose built structures).

Provision of spill kits and training of Site personnel in their use will ensure that in the event of any spills appropriate action can be taken rapidly to prevent and minimise impacts to surface waters or groundwater. Wherever possible, activities that have potential for spills will be located in areas that drain to sediment basins; otherwise appropriate safeguards and spill containment facilities will be installed.

Table 3: Summary of Management Actions and Responsibilities

Management Action Reference	Management Action Description	Reference or Related Plan	Timing	Responsibility
Drainage and Stormwater Management				
CWQMP-1	Construct upslope diversion drain after clearing and graving and prior to any blasting operation. The diversion drain designs are provided in the CECSMP (*2-250-329-PRO-TRE-0111-att03*).	*Section 5.4.1 & CECSMP.*	During construction	Construction Manager
CWQMP-2	If drainage channel not enough, use sediment basins in accordance with CECSMP (*2-250-329-PRO-TRE-0111-att03*) to collect drainage from the exposed catchments.	*Section 5.4.1 & CECSMP.*	During construction	Construction Manager
Erosion Control				
CWQMP-3	Where possible limit disturbance to two metres beyond the edge of any essential construction activity.	*Section 5.4.3 & CECSMP.*	During construction	All staff
CWQMP-4	Coordinate work schedules, if more than one contractor is working, so that there are no delays in construction activities which would cause disturbed land to remain unstabilised.	*Section 5.4.3 & CECSMP.*	During construction	Construction Manager
CWQMP-5	Progressively install stabilisation measures; such as sealing of access ways, to minimise exposed areas.	*Section 5.4.3 & CECSMP.*	During construction	All staff

Management Action Reference	Management Action Description	Reference or Related Plan	Timing	Responsibility
CWQMP-6	During windy weather unsealed roads and the earthworks pads will be kept moist (not wet) by sprinkling with water to reduce wind erosion.	*Section 5.4.3 & CECSMP.*	During construction	All staff
Dewatering Excavations				
CWQMP-7	When pumping potentially sediment laden water out of excavation areas the pump intake will be kept as close to the surface of pools as possible to avoid sucking sediments off the bottom.	*Section 5.4.5.*	During construction	All staff
CWQMP-8	During dewatering, water with a high sediment load will be directed to drainage channel and sediment basins within the construction area.	*Section 5.4.5.*	During construction	All staff
CWQMP-9	Discharge to land away from a natural waterway allowing for infiltration may be an alternative option should water quality monitoring.	*Section 5.4.5,*	During construction	All staff
Acid Sulphate Soil Management				
CWQMP-10	Should acid sulphate soils be disturbed during construction, management will be in accordance with the requirements of the DEC's guideline Treatment and management of soils and water in acid sulfate soil landscapes (DEC, 2011).	*Section 5.4.6.*	During construction	Environmental Officer, Construction Manager
Flooding				
CWQMP-11	Final Site level will be constructed to a minimum of 5.5 m AHD.	*Section 5.4.7*	During construction	Construction Manager

Management Action Reference	Management Action Description	Reference or Related Plan	Timing	Responsibility
CWQMP-12	Additional flood protection might be placed around sensitive areas, i.e. bunding around storage areas.	*Section 5.4.7*	During construction	Construction Manager
CWQMP-13	Rock protection will be placed on the embankments to provide protection against erosion during times of flood.	*Section 5.4.7*	During construction	Construction Manager
Wastewater Management				
CWQMP-14	Sanitary wastewater will be collected by authorised personnel using trucks and disposed of in an appropriate manner.	*Section 5.4.8.*	During construction.	Construction Manager.
CWQMP-15	Sanitary waste storage, collection and disposal will be organised sufficiently for the number of personnel on-site in accordance with all relevant legislative requirements, including those of the WA Department of Health (DoH).	*Section 5.4.8.*	During construction.	Construction Manager.
Leaks & Spill Management				
CWQMP-16	All potentially contaminating materials used or stored on the Site (e.g. fuel, oils) will be stored in designated secondary containment areas (e.g. internally bunded shipping containers or purpose built structures). (More detail described in Construction Hazardous Material Management Plan).	*Section 5.4.9.*	During construction.	All staff.
CWQMP-17	Provision of spill kits and training of Site personnel in their use will be provided to ensure that in the event of any spills appropriate action can be taken rapidly, as per Construction Emergency Response Management Plan.	*Section 5.4.9.*	During construction.	Construction Manager, All staff.

Management Action Reference	Management Action Description	Reference or Related Plan	Timing	Responsibility
CWQMP-18	Wherever possible, activities that have potential for spills will be located in areas that drain to drainage channel and/or to sediment basins if available; otherwise appropriate safeguards and spill containment facilities will be installed.	*Section 5.4.9.*	During construction.	Construction Manager, All staff.

5.5 MONITORING PROGRAM

The following provides a detailed description of the monitoring program to be implemented to ensure minimal impacts on the local surface water and groundwater environments during construction of the TANPF.

A summary of the monitoring measures and those responsible for implementing the measures is provided in **Table 5.**

5.5.1 Wastewater Monitoring

During construction sanitary wastewater will be collected by authorised personnel using trucks and transported to an off-site treatment plant. As such no on-site wastewater monitoring will be required during construction because water from flushing and pressure testing will be managed and disposed by specific Subcontractors. Copies of the relevant wastewater disposal tracking forms will be requested and closely monitored to ensure all wastewater is disposed of at appropriately licenced facilities.

5.5.2 Groundwater Monitoring

5.5.2.1 Existing Monitoring Network

Five groundwater monitoring wells (MW1-MW5) have been installed across the Site during a recent hydrogeological and hydrological investigation undertaken by ERM (2012) to satisfy EPA *Condition 8.1*. All five wells are currently located within the Site. Existing groundwater monitoring well locations shall be retained where possible, however, it is noted that several locations are present within the building footprint. Groundwater monitoring wells present within the building footprint will not be used for further monitoring. If required, they will be decommissioned in accordance with relevant WA guidelines and internationally recognised industry standards.

5.5.2.2 Monitoring Schedule

Routine six monthly water level gauging and water quality monitoring should continue to be undertaken at the existing monitoring wells (as per EPA *Condition 8-4*), to compliment existing baseline data, until such time as these wells are decommissioned due to construction activities.

Following completion of construction, the frequency of groundwater monitoring can be reviewed and depending on the results may be able to be refined to during the operational phase of the Plant.

5.5.2.3 Groundwater Sampling Methodology

Following completion of the water level gauging, groundwater purging and sampling will be completed in accordance with the SOP for Groundwater Sampling, which has been provided in **Attachment 01**. During sample collection and equipment decontamination, disposable

nitrile gloves will be used to reduce the likelihood of dermal contact with groundwater. Samples will be collected in the correct sample bottles following advice of the NATA-registered laboratory undertaking the analysis.

Low-flow sampling, where possible, will be performed using either a peristaltic or submersible pump to obtain representative samples. Alternatively a disposable bailer can be used to purge the wells as described below.

5.5.2.4 Groundwater Monitoring Parameters and Trigger Levels

To monitor potential impacts to groundwater quality during construction the suite of parameters listed in **Table 4** are recommended. *EPA Condition 8.4* states the proponent shall *set groundwater monitoring trigger values at a value of 10% above the baseline contaminant concentrations obtained from the hydrogeological studies required by Condition 8-1*.

Three rounds of groundwater monitoring have been completed as part of the hydrogeological study completed by ERM (2012), the results of which are summarised in *Tables 1-3*, in **Attachment 03**.

The baseline data collected to date has been used to calculate the Site specific trigger levels. The methodology for calculating the Site specific trigger levels invloved using the maximum concentration of an analyte detected plus 10%. In the case where a range in concentration is applicable (i.e. pH), the maximum concentration plus 10% and minimum concentration minus 10% has been used to calculate the trigger levels during construction.

Table 4 shows the list of analytes to be collected during construction along with site specific trigger levels where applicable.

Table 4: Groundwater Monitoring Parameters and Trigger Levels During Construction

Analyte	Units	Trigger Level (construction only)
pH	pH Units	6 – 8.4
Total Dissolved Solids	mg/L	143,000
Total Suspended Solids	mg/L	2,090
Alkalinity (total) as CaCO3	mg/L	561
Ammonia	mg/L	0.04
Aluminium (filtered)	mg/L	0.021
Arsenic (filtered)	mg/L	NA
Cadmium (filtered)	mg/L	NA
Calcium (filtered)	mg/L	1210
Chloride	mg/L	95,700
Chromium (filtered)	mg/L	NA
Copper (filtered)	mg/L	NA
Iron (filtered)	mg/L	0.26
Iron (total)	mg/L	143
Lead (filtered)	mg/L	NA
Manganese (filtered)	mg/L	0.242
Magnesium (filtered)	mg/L	5,170
Mercury (filtered)	mg/L	0.0001
Nickel (filtered)	mg/L	NA
Nitrate (as NO3-)	mg/L	9.57
Nitrogen (total)	mg/L	5.6
Zinc (filtered)	mg/L	0.052
Oil and Grease	Visible	None visible[2]

1. NA – Not Available. There are a number of metals for which results have shown concentrations below the laboratory detection limits (Arsenic, Cadmium, Copper, Chromium, Lead and Nickel), and so a reliable trigger level has not been able to be determined at this stage.
2. Trigger Level based on IECA (2008)

Any negative impacts on groundwater quality that are identified through the monitoring program will be investigated and reported in accordance with the contingency respose measures shown on **Figure 4** and described in **Section 5.6** as well as COMPANY's Incident Investigation and Reporting Procedures.

Table 5: Summary of Monitoring Actions and Responsibilities

CWQMP Monitoring Action Reference	Management Action Description	CWQMP Reference or Related Plan	Timing	Responsible
Wastewater				
CWQMP-19	Copies of the relevant wastewater disposal tracking forms will be requested and closely monitored to ensure all wastewater is disposed of at appropriately licenced facilities.	*Section 5.5.1.*	During construction.	Environmental Officer, Construction Manager.
Groundwater Monitoring				
CWQMP-20	Routine six monthly water level gauging and water quality monitoring should continue to be undertaken at the existing monitoring wells (as per EPA Condition 8 - 4), to provide further baseline data, until such time as these wells are decommissioned due to construction activities.	*Section 5.5.2.2*	Prior to and during construction.	Environmental Officer, Construction Manager.
CWQMP-21	Sampling methodology will be undertaken in accordance with the Standard Operating Procedure (SOP) for Surface Water Sampling (**Attachment 01**).	*Sections, 5.5.2.3 & Attachment 01.*	During construction.	Environmental Officer, Construction Manager.
CWQMP-22	Monitoring results will be compared against the interim groundwater trigger levels listed in **Table 4.**	*Section 5.5.2.4 & Table 5.*	During construction.	Environmental Officer.
CWQMP-23	Any negative impacts on groundwater quality that are identified through the monitoring programs will be investigated and reported in accordance with the contingency respose measures shown on **Figure 4** and described in **Section 5.6** as well as COMPANY's Incident Investigation and Reporting Procedures.	*Figure 5, Section 5.6.*	During construction.	Environmental Officer, Construction Manager.

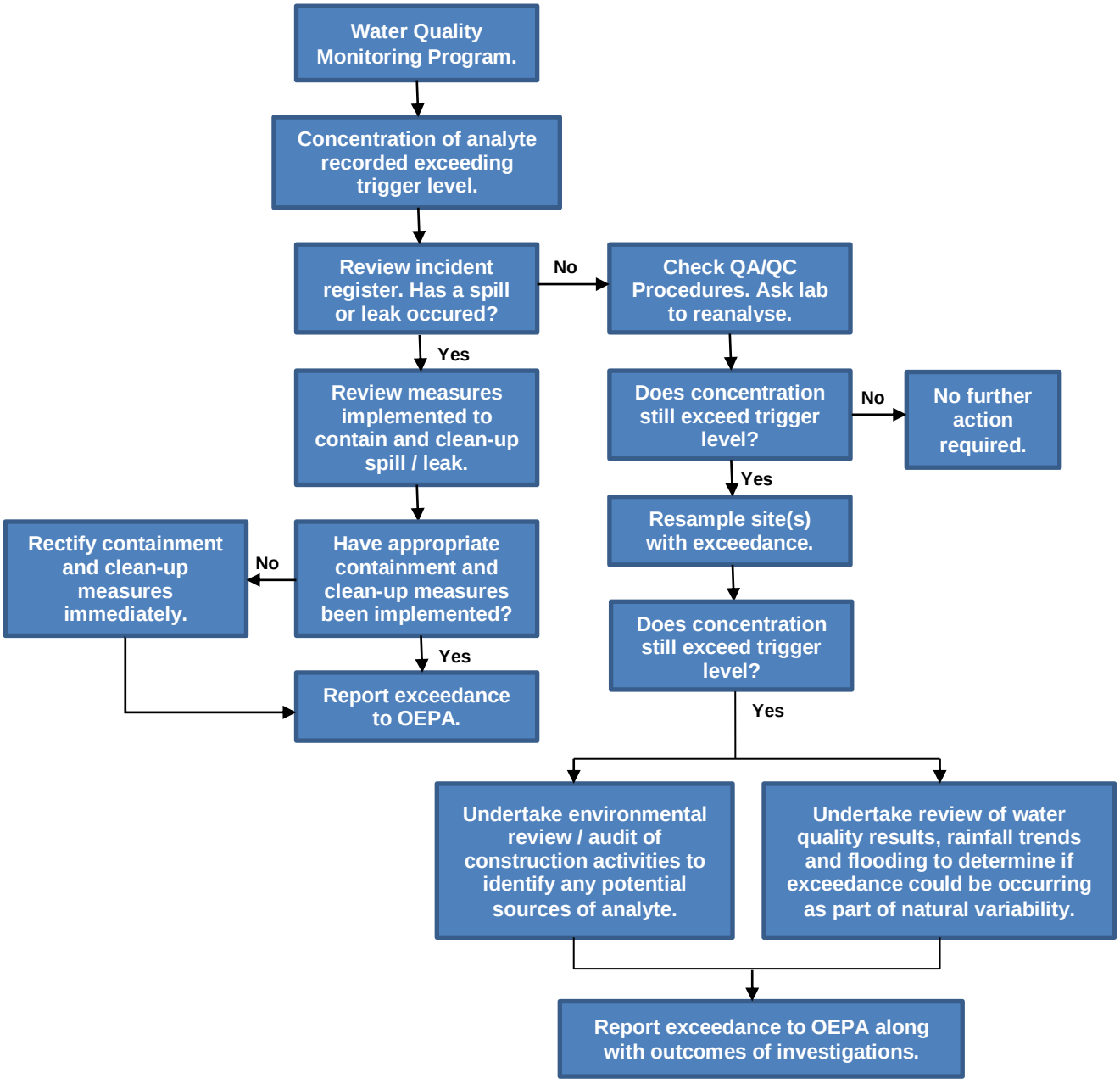
CWQMP Monitoring Action Reference	Management Action Description	CWQMP Reference or Related Plan	Timing	Responsible
CWQMP-24	Following completion of construction, the frequency of groundwater monitoring can be reviewed and depending on the results may be able to be refined to during the operational phase of the TANPF.	*Section 5.5.2 & OWQMP*	At completion of construction, but prior to operation.	Environmental Officer, Operations Manager.

5.6 IMPLEMENTATION

5.6.1 CONTINGENCY RESPONSE

The following contingency will be implemented by the EO in the event of water quality monitoring indicating an exceedance of a water quality trigger levels (Table 4) during construction. CONTRACTOR Site Manager will provide all necessary resources and all CONTRACTOR Site team will collaborate as required.

Figure 4: Water Quality Contingency Plan



5.6.2 MANAGEMENT RESPONSE

In the event the performance measures and actions provided in **Table 2** are considered to have been exceeded, or are likely to be exceeded, CONTRACTOR will undertake the following:

- The EO will report immediately HSE Manager and Site Manager for their information and action.
- the EO will report the likely exceedance of the performance indicator as soon as practicable to the relevant agencies as required under the development consent or legislation after becoming aware of the exceedance;
- the EO together with CONTRACTOR Site Management will identify an appropriate course of action with respect to the identified impact in consultation with appropriate specialists and relevant agencies; and
- review the effectiveness of this CWQMP and performance measures to adequately manage potential construction impacts on surface water and groundwater.

5.6.3 REPORTING

Water quality monitoring results are to be recorded on forms similar to those provided in **Attachment 02** detailing the following information:

- sampling date and location;
- brief summary of weather conditions (e.g. antecedent rain, wind, dry conditions);
- parameters and units to be detailed (to be confirmed); and
- reasons why any specified parameter could not be sampled.

In accordance with EPA *Condition 8-5* the event that monitoring indicates an exceedance of trigger levels:

- COMPANY will report such findings to the CEO within 7 days of the exceedance being identified;
- COMPANY will provide evidence which allows determination of the cause of the exceedance;
- If determined by the CEO to be project attributable, the proponent shall submit actions to be taken to address the exceedance within 7 days of the determination being made to the CEO;
- CONTRACTOR will implement actions to address the exceedance and shall continue until such time as the CEO determines that the remedial actions may cease; and
- COMPANY will submit bi-annually, or at a frequency defined to the satisfaction of the CEO, the results of monitoring required by condition 8-4 to the CEO, until such time as the CEO determines that reporting may cease.

Any negative impacts on groundwater quality that are identified through the monitoring programs will be investigated and reported in accordance with COMPANY's Incident Investigation and Reporting Procedures:

- *Yara-DIR-01-P02 Investigation and follow-up of accidents and near-miss incidents*; and
- *Yara-DIR-01-P01 Reporting of accidents, near-miss incidents, sickleave, environmental incidents, and security breaches*.

An incident report will be provided to the General Manager (Operations), who will have the responsibility of reporting the incident to the OEPA if it has caused, or has the potential to cause pollution.

In addition to the Incident Report, a report will be prepared providing feedback on the cause of the incident and the response; the steps that are necessary to prevent a similar incident from occurring again; and any other opportunities for continued improvement. This report will be provided to management and disseminated throughout the operational personnel.

All non-compliances, and corrective actions implemented, will be reported by the EO in the monthly Environment Report and summarised in the annual Site Compliance Report, submitted to the SEWPaC. A summary of all water quality monitoring will be provided in the annual Environmental Report, along with any identified opportunities for improvement.

The SEWPaC will be consulted on sources of wastewater to be discharged via the brine return through the Works Approval and Operation license process, where agreed parameters and frequency of monitoring will be finalised.

5.6.4 AUDITS AND REVIEWS

The correct implementation of all provisions described in this CW QMP will be monitored by the site HSE team as part of periodic HSE inspections. Periodic inspections will be carried out by CONTRACTOR HSE Team as per Construction HSE Plan (*2-250-329-PRO-TRE-0111-att12*) using the HSE Inspection Sheet attached to this document (2-250-329-PRO-TRE-0111-tmp 01). Records shall be kept accordingly.

Identified deviations will be reported to all affected and involved personnel and actions follow up will ensure appropriate corrective actions are implemented. Serious deviations or incidents will be reported in writing and included in the Monthly HSE Report.

As part of Project Environmental Management system, compliance of this Construction Water Quality Management Plan will be audited during internal HSE Audits performed on a periodic basis by CONTRACTOR HO HSE Team. HSE Internal Audits procedure is described in the Project Construction HSE Plan (*2-250-329-PRO-TRE-0111-att12*).

This CWQMP may also be audited by relevant government agencies under the scope of any external environmental compliance audits.

An internal review of this CWQMP will be conducted in response to:

- an incident recorded as a result of the construction operations that potentially affects threatened species or populations;

- a significant change in construction phase that may affect the implementation of this management plan;
- statutory requirements or directions/conditions of approvals requiring such action; or
- recommendations as a result of internal or external audits.

5.6.5 TRAINING AND AWARENESS

All construction personnel will undergo a general Site induction prior to commencing work at the TANPF. This will include a water quality management component to reinforce the importance of management and the measures that will be implemented to protect water quality at the Site.

Site inductions will include:

- basic ERSED control principles;
- 'clean' and 'sediment laden' water on the Site;
- procedures to follow if dewatering is required;
- outline of surface water and groundwater monitoring programs; and
- spill response.

Site inductions and toolbox talks will highlight the specific environmental requirements and activities being undertaken at each worksite. These will be based on the measures outlined in the CEMP and Construction Site HSE Plan.

Targeted training in the form of toolbox talks or specific training will also be provided to personnel with a key role in soil and water management. Examples of training topics include:

- sediment basin construction;
- sediment basin maintenance;
- working near or in drainage lines and creeks;
- emergency response measures in high rainfall events;
- spill response;
- ERSED control;
- stockpile location criteria;
- identification of potentially contaminated spoil and fill material; and
- the Site's waste minimisation hierarchy principles of avoid, reduce, reuse, recycle or dispose and how they will apply to all aspects of the Site.

6. REFERENCES

6.1 LEGISLATION

See section 4 of this Plan.

6.2 COMPANY SPECIFICATIONS AND PROCEDURES

- Public Environmental Review for Yara Pilbara Nitrates Pty Ltd. (PER)
- Appendix D-6 - HES Requirements during Construction & Fabrication
- YPNPL Works approval (15/07/2011)
- State of WA Statement No. 870 (07/07/2011)
- Commonwealth Approval letter from SEWPaC (14/09/2011)

6.3 PROJECT MANAGEMENT SYSTEM PROCEDURES

Code	Title
2-250-329-PRO-TRE-0113	Construction Emergency Response Management Plan

6.4 ALL OTHER REFERENCES

Australia and New Zealand Environmental and Conservation Council (ANZECC, 2000), *National Water Quality Management Strategy: Trigger values for the Australian and New Zealand Assessment and Management of Contaminated Sites,* Australia and New Zealand Environment Conservation Council and the National Health and Medical Research Council.

Australian Standard AS/NZS 5667.11:1998: *Water quality – Sampling – Guidance on sampling of groundwaters*.

Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWP&C) (2011) *Approval Proposed Technical Ammonium Nitrate Production Facility (EPBC 2008/4546),* September 2011.

Environmental Resources Management Australia Pty Ltd (ERM) (2010) *Technical Ammonium Nitrate Production Facility Public Environmental Review*, prepared on behalf of Yara Pilbara Nitrates Pty Ltd (YPNPL) YPNPL, January 2010.

ERM (2010) *Preliminary Water Quality Management Plan (PWQMP)*, prepared on behalf of YPNPL, January 2010.

ERM (2011) *Technical Ammonium Nitrate Production Facility Acid Sulfate Soils Investigation*, ERM, December 2011.

ERM (2012) *Technical Ammonium Nitrate Production Facility Hydrogeological and Hydrological Investigation,* Unpublished, ERM.

IECA (2008) *Best Practice Erosion and Sediment Control, Books 1, 2 and 3*, International Erosion Control Association Australasia, Picton NSW.

Golder Associates (2012) *Geotechnical Investigation – Proposed Technical Ammonium Nitrate Production Facility, Burrup Peninsula*, Golder Associates, Perth WA.

Western Australia (WA) Department of Environment (2004) *Introduction, Stormwater Management Manual for Western Australia*, Department of Environment, Perth, Western Australia.

WA Department of Environment and Conservation (DEC) (2009) *Identification and Investigation of acid sulfate soils and acidic landscapes*, DEC, Government of Western Australia, Acid Sulfate Soils Guideline Series, May 2009.

WA Department of Water (DoW) (2006) *Water Quality Protection Note 10: Contaminant Spills: Emergency Response*, DoW February 2006.

WA DoW (2006) *Water Quality Protection Note 13: Dewatering of Soils at Construction Sites,* DoW April 2006.

WA DoW (2006) *Water Quality Protection Note 30: Groundwater Monitoring Bores,* DoW, February 2006.

WA DoW (2006) *Water Quality Protection Note 52: Stormwater Management at Industrial Sites,* DoW, May 2010.

WA Office of the Environmental Protection Authority (2011) *Statement 870*, OEPA, July 2011.

7. ATTACHMENTS

- Attachment 01 – Standard Operating Procedure: Groundwater Sampling
- Attachment 02 – Water Quality Monitoring Forms
- Attachment 03 – Summary of Baseline Groundwater Monitoring Data

Attachment 01 – Standard Operating Procedure: Groundwater Sampling

1 OBJECTIVES

The objective of this document is to describe field procedures collecting groundwater samples from monitoring wells. The field procedures described herein present the general methodology sample collection, but formal field training by personnel experienced in groundwater sampling is required to supplement the procedures described. The preferred method for collection of samples is using low-flow devices and procedures, however, bailer methods may be used where necessary.

2 REFERENCES

The following references provide guidance for the operating procedures for the collection of groundwater samples undertaken in Australia:

- *AS/NZS 5667.11:1998: Water quality – Sampling - Guidance on sampling of groundwaters;*
- *Northern Territory Department of Regional Development, Primary Industry, Fisheries and Resources Advisory #AA7-024 (March 2009): Methodology for the Sampling of Ground Waters.*
- *EPA South Australia (June 2007): EPA Guidelines, Regulatory monitoring and testing, Groundwater sampling.*
- *ASTM D5903-96 (2006): Standard Guide for Planning and Preparing for a Groundwater Sampling Event;*
- *ASTM D6771-02 (2002): Standard Practice for Low-Flow Purging and Sampling for Wells and Devices Used for Ground-Water Quality Investigations;*
- *ISO 5667-18:2001: Water quality – Sampling – Part 18: Guidance on sampling of groundwater at contaminated sites; and*
- *US EPA (2006) Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures. (EPA/540/s-95/504).*

3 MATERIALS

The following are typically required for collection of groundwater samples from wells (depending upon the methodology adopted):

- Health and Safety Plan (HASP);
- Field Forms (Groundwater Monitoring Report);
- Borehole logs;
- Pens/pencils/texters;
- Dip meter or, if product is present or suspected, interface probe;

- Purging/sampling pump (may include peristaltic, submersible bladder pump, submersible centrifugal pump – pump type will be contingent on well diameter, depth to water level, permeability of formation, and purging/sampling methodology);
- Power source for pump (eg. car battery, generator, air compressor);
- Tubing (Teflon or polyethylene preferred, silicon for peristaltic pump head – check required tubing diameter for pump before ordering);
- Bailers and string;
- Multi-parameter water quality meter (minimum requirement: temperature, pH, electrical conductivity [EC], oxidation-reduction potential [ORP], dissolved oxygen [DO] – turbidity may be required at some sites);
- Flow-through cell (closed cell with probe ports preferred);
- Flow measuring equipment (eg. measuring cup and watch);
- Buckets to contain purge water at well head;
- Large volume vessel(s) (drums or IBC) to store purge water pending characterisation and disposal;
- Decontamination supplies;
- Laboratory-provided sample bottles;
- Field filtration equipment if required (several options are available including in-line disposable filter units, air-pressurised filter units, reusable filter holder cartridges for use with disposable filter papers and syringes);
- QA/QC samples (eg. trip spikes and blanks provided by the laboratory – make sure that the trip spike includes compounds relevant to the site);
- Sampling, Analytical and Quality Plan (SAQP) and previous monitoring results for reference; and
- PPE.

4 METHODOLOGY

Preparation for a Groundwater Sampling Event

The following tasks should be completed prior to undertaking a groundwater sampling event:

- Develop an SAQP, with Data Quality Objectives (DQOs) clearly defined to ensure that the required groundwater data are collected and that the laboratory detection limits are suitable for the adopted site assessment criteria.
- Contact site manager to confirm date of sampling event and arrange for clear access to wells (if required).
- Check equipment stock in storeroom and place order for rental and purchased equipment at least one week in advance to allow for shipping/stock delays.

- Ensure that you have keys for any locks on well boxes or well caps.
- Place bottle order with laboratory at least one week in advance – include enough bottle sets to cover all wells in the sampling program, all QA/QC samples, and a few 'contingency' bottles. If shipping bottles or samples via air freight, check with laboratory regarding special handling and shipping requirements.
- Prepare paperwork for the field event, including field forms, SAQP, site plan, and previous monitoring data (if available).
- Review previous groundwater monitoring results (if available), and plan to sample wells in order of lowest to highest concentrations. Note that water samples are not typically collected from wells with measurable separate phase product, unless a sample of the product is being collected for fingerprinting.

Pre-sampling Activities.

The following tasks should be completed prior to commencement of well purging or sampling:

- Check the condition of the well(s) upon arrival, and make a note in the field form of any observed damage, water in well box, potential surface-based contamination. If there is water in the well box, remove all water to below the top of well casing before removing the well cap to avoid potentially contaminated surface water entering the well (safety note: it is not uncommon to encounter spiders or other insects in well boxes; be careful when removing lids).
- Measure the depth to water (or product) and total depth of all wells before undertaking purging or sampling (note – if bailers have been left in the wells from previous sampling events, measure the water level before removing the bailer as the static water level will be in equilibrium with the submerged bailer).
- Establish work area at each well upon arrival – ensure safety precautions are considered (eg. traffic cones, barricades, positioning of vehicle).
- If bailers have been left in wells from previous monitoring events, remove the bailers and discard unless they are there for permanent use.
- Calibrate multi-parameter water quality meter using standard solutions in accordance with manufacturer's protocols.

Purging and Sampling Activities

Field procedures for both low flow and volume-based purging are described in this section. The method of sampling to be adopted will depend upon a range of factors (including the DQOs). Low flow sampling is increasingly becoming the preferred method for the collection of high quality groundwater samples under most circumstances and use of this method is encouraged. It is noted that a range of technologies are becoming increasing available in Australia (including passive diffusion samples and sleeve samplers etc) and use of these methods are not covered by this SOP.

Low Flow Methodology

1) Once the well cap is removed and the depth to water has been recorded, lower the pump (if using submersible pump) and tubing into the well. The pump intake (or end of tubing if using a peristaltic pump) should be placed in the middle of the well screen.
2) Measure the depth to water again with the pump/tubing in place, and use this measurement as your drawdown reference during purging. Leave the dip meter in the well to facilitate water level measurements during purging.
3) Connect the discharge tube from the pump to the inlet of the flow through cell (if using a closed cell), or place in the bottom of a cup with the water quality probes. If using a cup with probes placed within, care must be taken to minimise turbulence (which will affect DO and, to some extent, ORP values). Ensure that the purge water ultimately discharges into a bucket or other collection vessel.
4) Start the pump (noting the time on the field forms) and measure and record the flow rate using a measuring cup and stop watch (or similar). The ideal flow rate is less than 500 ml/min, and should be adjusted lower if excessive drawdown of the water level occurs (the US EPA guidelines indicate a maximum drawdown target of 10 cm, but one of the authors recently revised this guidance stating that the total drawdown isn't as critical as ensuring that the water level eventually stabilises above the top of the well screen).
5) Begin recording water quality parameters on the groundwater monitoring field form as soon as the probes are submerged. Each record should include: time of measurement, cumulative purge volume, depth to water and water quality parameters (note: be careful to indicate units for the parameters and whether the ORP reading is positive or negative). Also, it is important to note any changes to the visual clarity of the water during purging, as well as any unusual properties or odours. Plan to record this information every three to five minutes during purging, possibly more frequently at the beginning to record the larger changes that occur when purging is commenced (refer to project manager or technical specialist for specific guidance on interpreting groundwater field parameters, particularly recognising potentially erroneous readings).
6) Continue purging until the water quality parameters stabilises over three consecutive readings. The stabilisation criteria are as follows:

Table 1 Water quality parameter stabilisation criteria

Parameters	Stabilisation Criteria
pH	± 0.1 pH units
EC	± 3% (µS/cm or mS/cm)
Temperature	± 0.5ºC
ORP	± 10 mV
DO	± 0.3 mg/L
Turbidity	± 10% NTUs (if measured)

Note that both ORP and DO are typically slower to stabilise than the other parameters, and may be particularly unstable when not using a closed flow through cell. In this case, greater weight may be given to pH and EC as the 'stabilising' parameters.

These criteria should be considered as a guide and failure to strictly adhere to the stabilisation criteria for one or more parameters does not imply that a representative sample cannot be collected. The field investigator should use their judgement on a weight of evidence basis, in conjunction with the stabilisation criteria to determine when a representative sample can be collected.

Guidance for low flow sampling indicates that the water level should never drop below the top of the well screen for wells with completely submerged screened intervals. In extremely low permeability formations this may be impossible, and in these cases the well can be purged dry and a sample collected once the well has recovered. Note that this may affect the integrity of the sample collected as air is allowed to enter the well screen and filter pack, and every attempt to collect a sample using a very low flow rate (<100 ml/min) should be made before resorting to this technique;

Once the parameters have stabilised the sample(s) can be collected. Maintain or slightly reduce the pumping rate to minimise disturbance to the water column, put on fresh disposable gloves, and fill sample bottles directly from the discharge tube (note: if using a closed flow through cell, disconnect the pump discharge tube from the flow through cell to ensure that water samples are collected before water passes through the cell).

In general, vials for volatile organic compound (VOC) analysis should be collected first and filtered samples should be collected last. The pumping rate should be adjusted to provide a laminar (non-turbulent) flow into the sample bottles to minimise aeration of the sample, and the water should be allowed to run smoothly down the side of the bottle.

VOC vials must be filled with a positive meniscus (i.e., above the rim of the vial) to eliminate the formation of bubbles and headspace before capping (once the cap is screwed on, turn the vial upside down and gently tap the side of the bottle to see if any air bubbles are present. If they are, remove the cap, top off the vial and try again). Note that the quality of VOA vials has deteriorated in recent years, resulting in thinner vial walls. Accordingly, use appropriate care whilst screwing on the cap, tapping the vial, and general handling of the glassware. Do not tighten sample bottle lids too tight as the bottles may shatter under the pressure and become a cut hazard. Care must be taken not to let the water in acidified sample bottles overflow during sample collection as the acid preservative may be washed out.

Once all sample bottles have been filled, switch off the pump and remove the pump and tubing from the well. Take a final water level measurement once the pump has been removed.

The collected samples should be labelled with the appropriate information, and placed immediately in an ice-cooled esky pending dispatch to the laboratory. Bottles should be wrapped in bubble pack or other comparable packing material to prevent breakage. Also, be careful not to overfill cooler boxes with sample bottles as they will be at greater risk of breaking during transport, and may be very heavy to lift once full. Be aware that cooler boxes full of water samples and ice can be very heavy. Bring enough cooler boxes to spread the load into manageable portions, and always use proper manual handling techniques when lifting or moving cooler boxes.

Shipping samples (including shipping unfilled sample bottles containing preservative) requires the consideration of Australian Dangerous Goods legislation. Any non-disposable equipment should be decontaminated between each well. The purge water from each well should be stored in a drum or IBC on site pending characterisation and disposal. Ensure that the drum or IBC is properly sealed before leaving site. Drums and IBCs will become impossible to move without mechanical aid once full. Be sure to locate drums/IBCs in a safe and accessible location on site that is suitable for short-term storage pending characterisation and disposal of the waste water.

Volumetric Purging Methodology

The traditional method of purging wells was to remove three casing (or well) volumes of water prior to sample collection. The rationale was to ensure that all the potentially stagnant water sitting in the well was removed and replaced with fresh formation water. There is a range of conflicting and ambiguous guidance available in terms of how and why volumetric sampling should be undertaken. The method described below represents reasonable guidance although when adopting this methodology, considerations include; whether information is available regarding well diameter; screened interval; whether water is standing above the screened interval; whether it is appropriate to purge the casing volume or the casing volume plus the saturated volume of the annulus; and the potential to ‘over-purge’ the well which may result in heightened dilution or unnecessary alteration of the sample.

1) Before purging, the purge volume is calculated as three times the volume of standing water in the well and pore space of the filter pack, according to the following equation:

$$V_{tot} = V_{well} + V_{filter}$$

$$V_{well} = \pi \, r12 \, h1; \text{ and}$$

$$V_{filter} = \pi \, (r32 - r22) \, h2 \, n$$

Where:

Vtot = Total casing volume (L);

Vwell =Volume of water in well (L);

Vfilter = Volume of water in filter pack (L);

r1 = Inner radius of well casing and screen (m);

r2 = Outer radius of well casing and screen(m);

r3 = Radius of borehole(m);

h1 = Height of water column in well casing (calculated as the difference between the total well depth and the water level depth) (m);

h2 = Length of filter pack or height of water column in well (whichever is shorter) (m); and

n = porosity (use 0.25)

Table 2 Approximate water volume per metre of well casing and filter pack

Casing diameter	Water volume in well per metre (L)[a]	Water volume in filter pack per metre (L)[1]	Total water volume per metre (L)
50 mm[b]	2	1.5	3.5
100 mm[c]	8	6	14
150 mm[d]	18	13	31

a. Volumes rounded to nearest whole number
b. Assumes 100 mm borehole diameter
c. Assumes 200 mm borehole diameter
d. Assumes 300 mm borehole diameter

Proceed with set up and purging as per the low flow procedures described above, with the following exceptions:

- The pump intake should be set just below the water level so that the entire stagnant water column is purged and replaced with formation water drawn from the screened interval below (note: to avoid damaging the pump, the pump intake must remain underwater. As such, the pump may have to be lowered during purging to compensate for drawdown in the well).

- The pumping rate can be increased to whatever the formation can support, although care should be taken to avoid drawing down the water level above the top of the well screen (for wells with fully submerged screens).
- Bailers can also be used for this method of purging by carefully lowering the bailer repeatedly below the water level (just until it is submerged) and withdrawing water until the total volume is removed. Care should be taken to minimise disturbance of water in the well during the lowering and removal of the bailer.

Regardless of the volume extracted, purging should continue until water quality parameters are stabilised (pH and EC as a minimum). Dissolved oxygen (DO) measurements should not be taken (or should be treated with considerable caution) because they will be affected by aeration caused by the sampling method. For example, it may be necessary to purge more than three casing volumes if these water quality parameters have not stabilised.

Following purging, samples are collected in the same manner previously described (if using bailers, special care must be taken when decanting water into the samples bottles to minimise aeration of the sample during collection). The volume-based method of purging has the following disadvantages over other methods that should be taken into account when planning a groundwater sampling event:

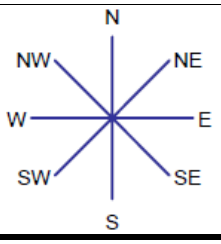
- it generates a large volume of purge water that must be managed;
- the higher pumping rates typically result in greater mobilisation of suspended fines in the water, which can increase the potential for an analytical bias;
- the higher pumping rate may result in a greater disturbance of the water column, and promote loss of VOCs or dissolved gases and changes in water quality; and
- the greater purge volume results in water being drawn to the well from further out in the formation, and may result in dilution of the specific analytes being targeted by the well.

Chain of Custody

A chain of custody (COC) form (similar to that provided in Appendix E) should be used as a means of documenting which samples are to be analysed and for which parameters.

Attachment 02 – Water quality monitoring forms

2.1 SURFACE WATER MONITORING FIELD SHEET

Date: …..……..	Wind Direction (please circle)	Weather Conditions (please circle)	Equipment
Time……..		☐ Raining ☐ Dry	☐ pH calibrated ☐ conductivity calibrated ☐ buckets ☐ sample containers

SITE CONDITIONS	What is the condition of the waterway? i.e. flowing, stagnant etc? _____ Is there any evidence of disturbance / contamination? i.e. turbid, oily sheen present? _____
FIELD PARAMTERS	
Turbidity	
pH	
Oil and Grease	
Total Suspended Solids	
Turbidity	
Additional Comments	

Signed_____

2.2 SURFACE WATER SAMPLE CHAIN OF CUSTODY AND ANALYSIS REQUEST SHEET

TO: (Laboratory) Quote no:	FROM:…… Yara Pilbara Nitrates Pty Ltd.

Job Description: TANPF

Sampler:…… **Phone**: (08)……..

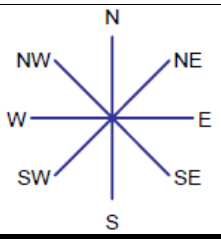
Date Collected:…… **Time Collected**:……

PARAMETER	**SURFACE WATER SAMPLING SITES:**
Turbidity (NTU) Total Suspended Solids	

Relinquished By:	**Date & Time**	**Received By:**	**Date & Time:**
…… Yara Pilbara Nitrates Pty Ltd.	……	……	……

Relinquished By:	**Date & Time**	**Received By:**	**Date & Time:**
		Name: Yara Pilbara Nitrates Pty Ltd..	……

2.3 GROUNDWATER MONITORING FIELD SHEET

Date: …..……..	**Wind Direction (please circle)**	**Weather Conditions (please circle)**	**Equipment**
Time…….		☐ Raining ☐ Dry	☐ pH calibrated ☐ conductivity calibrated ☐ Standing water level probe ☐ pumps and compressor ☐ buckets ☐ sample containers

SITE CONDITIONS	Was the cap on? Yes/No What is the condition of the bore?_____ Has the bore been disturbed since last monitoring event? Yes/No
STANDING WATER LEVEL	
Casing Height of Bore	……m
Standing Water Level	*(……..m)-(casing height_____)m = ……m
FIELD PARAMTERS	
pH	
Salinity (ppm)	
Dissolved Oxygen (% Saturation)	
Temperature (^{0}C)	
Additional Comments	

Signed_____

2.4 GROUNDWATER SAMPLE CHAIN OF CUSTODY AND ANALYSIS REQUEST SHEET

TO: (Laboratory)
Quote no:

FROM:……
Yara Pilbara Nitrates Pty Ltd.

Job Description: TANPF

Sampler:…… Phone: (08)……..
Date Collected:…… Time Collected:……

PARAMETER	MONITORING WELL NUMBERS: _____
pH Total Dissolved Solids Total Suspended Solids Alkalinity (total) as CaCO3 Ammonia Aluminium (filtered) Arsenic (filtered) Cadmium (filtered) Calcium (filtered) Chloride Chromium (filtered) Copper (filtered) Iron (filtered) Iron (total) Lead (filtered) Manganese (filtered) Magnesium (filtered) Mercury (filtered) Nickel (filtered) Nitrate (as NO3-) Nitrogen (total) Zinc (filtered) Oil and Grease	

Relinquished By:	Date & Time	Received By:	Date & Time:
…… Yara Pilbara Nitrates Pty Ltd	……	……	……

Relinquished By:	Date & Time	Received By: Name: Yara Pilbara Nitrates Pty Ltd	Date & Time: ……

Attachment 03 – Summary of Baseline Groundwater Monitoring Data

Table 1: Baseline Groundwater Gauging Data
0170738
Construction Water Quality Managemnt Plan

Monitoring Well	Date	Easting	Northing	TOC (mAHD)	Bore Depth (m ToC)	Depth to Groundwater (m ToC)	Groundwater Elevation (mAHD)
MW1	29-Apr-11	477750.267	7719618.897	9.236	8.735	2.774	6.462
MW1	20-Sep-11	477750.267	7719618.897	9.236	8.725	3.379	5.857
MW1	28-Feb-12	477750.267	7719618.897	9.236	8.725	3.400	5.836
MW2	29-Apr-11	477982.134	7719632.321	6.85	8.210	2.926	3.924
MW2	20-Sep-11	477982.134	7719632.321	6.85	8.195	3.096	3.754
MW2	28-Feb-12	477982.134	7719632.321	6.85	8.195	3.184	3.666
MW3	29-Apr-11	478228.561	7719614.98	4.832	8.200	2.007	2.825
MW3	20-Sep-11	478228.561	7719614.98	4.832	8.185	1.975	2.857
MW3	28-Feb-12	478228.561	7719614.98	4.832	8.185	1.948	2.884
MW4	29-Apr-11	477721.886	7719289.889	3.453	4.780	0.898	2.555
MW4	20-Sep-11	477721.886	7719289.889	3.453	4.675	1.095	2.358
MW4	28-Feb-12	477721.886	7719289.889	3.453	4.675	1.025	2.428
MW5	29-Apr-11	477976.901	7719306.205	2.732	5.100	0.566	2.166
MW5	20-Sep-11	477976.901	7719306.205	2.732	5.040	0.733	1.999
MW5	28-Feb-12	477976.901	7719306.205	2.732	5.04	0.544	2.188

Maximum				9.2360	8.7350	3.4000	6.4620
Maximum + 10%				10.1596	9.6085	3.74	7.1082
Minimum				2.732	4.675	0.544	1.999
Minimum - 10 %				2.4588	4.2075	0.4896	1.7991

Notes:
TOC - Top of Casing
mAHD - Metres Australian Height Datum

Monitoring Well	Date	Elecctrical Conductivity (uS/cm)	TDS (mg/L) Calculated)	Dissolved Oxygen (mg/L)	pH	Redox (mV)	Temp (oC)	Sample Comments
MW1	29/04/2011	3,100	2,000*	2.43	6.95	-74	31.51	Slightly turbid, no odour, very pale brown
MW1	20/09/2011	2,510	1600	3.30	6.86	146	28.9	Becoming slightly turbid/white at 27 litres
MW1	28/02/2012	2,750	1800	4.67	6.9	153	30.13	Becoming pale brown, slow recharge, dry purched at 33L
MW2	29/04/2011	3,540	2,000*	2.74	7.16	57	31.98	Turbid, pale brown, no odour, moderate recharge, good yield
MW2	20/09/2011	4,160	2400	2.93	6.78	125	29.23	Good yield
MW2	28/02/2012	4,450	2500	2.40	6.83	149	31.52	Clear, colourless, no odour, becomes slightly turbid, pale grey, good recharge
MW3	29/04/2011	16,000	9,800*	2.80	7.3	-100	30.6	Pungent odour (fishy), slightly turbid, grey becoming pale brown, moderate recharge, good yield
MW3	20/09/2011	11,200	6900	2.37	7.22	50	27.18	Good yield
MW3	28/02/2012	13,640	8400	2.68	7.18	83	30.3	Clear, colourless, no odour, becoming slightly turbid, pale brown, good recharge
MW4	29/04/2011	12,160	6,700*	2.23	7.64	125	30.59	Highly turbid, silty, orange, no odour, good recharge/ yield
MW4	21/09/2011	7,660	4200	4.40	7.58	104	27.00	Good yield
MW4	28/02/2012	10,610	5800	2.48	7.5	79	31.8	Clear, colourless, becoming turbid, red-brown. No odour. Becoming very turbid
MW5	29/04/2011	10,000*	130,000	2.12	6.73	237	31.62	Orange, turbid, no odour, moderate recharge
MW5	21/09/2011	10,000**	-	3.82	6.55	270	28.00	Slightly turbid, lightly brown in colour
MW5	28/02/2012	10,000**	-	1.86	6.62	289	32.58	Clear, colourless, becoming turbid, pale brown, no odour.
Maximum Concentration		16,000	130,000	4.67	7.64	289	31.52	
Maximum Conc + 10%		17,600	143,000	5.14	8.40	317.90	34.67	
Miniumum Concentration		2,510	1,600	1.86	6.55	-100	27.00	
Minimum Conc - 10%		2,259	1,440	1.67	5.90	-90.00	24.30	
Average Concentration		7,648	18,178	2.88	7.05	113	28.84	

Note:
* - Laboratory TDS (mg/L)
** - Considered to be erroneous data points based on major ion data. It is likely that the maximum measurable concentration of the probe was exceeded.

					Inorganics																				Lead		
					Alkalinity (Bicarbonate)	Alkalinity (total) as CaCO3	Ammonia	Ammonia as N	Chloride	Fluoride	Hydrogen sulfide	Ionic Balance	Kjeldahl Nitrogen Total	Nitrate (as N)	Nitrate (as NO3-)	Nitrite (as N)	Nitrite (as NO2-)	Nitrogen (Total Oxidised)	Nitrogen (Total)	Reactive Phosphorus as P	Silica (Filtered)	Sodium (Filtered)	Sulphate	Sulphide	TDS	Hardness as CaCO3 (Filtered)	TSS	Lead (Filtered)	Aluminium	Aluminium (Filtered)
					mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL					5	5	0.005	5	1	0.1	0.5	-100	0.05	0.005	0.05	0.005	0.05	0.05	50	0.002	50	0.5	1	0.5	10	5	5	0.001	0.005	0.001
ADW 2004										1.5					50		3						500					0.01		
ANZECC 2000 95%							0.9				0.001				0.7													0.0034		
ANZECC 2000 Marine 95%							0.91																					0.0044		
Field_ID	**LocCode**	**Sampled_Date-Time**	**SampleComments**	**Monitoring_Round**																									
MW1	MW1	30/04/2011			420	350	-	38	780	-	<0.5	-3	-	1.7	-	<0.005	-	1.7	2500	<0.002	30,000	350	170	-	2000	760	-	<0.001	-	0.01
MW1	MW1	20/09/2011			390	320	-	18	710	0.4	-	-6	0.28	-	-	-	-	3.1	3400	0.008	28000	300	150	<0.5	-	-	180	-	1.8	0.002
MW1	MW1	27/02/2012			370	300	<0.005	<5	670	0.5	-	-	0.17	2	8.7	<0.005	<0.05	2	2100	<0.002	29000	340	140	<0.5	-	-	220	-	3.6	0.002
MW2	MW2	30/04/2011			340	280	-	200	930	-	<0.5	1	-	3.3	-	<0.005	-	3.3	3900	0.004	26000	570	170	-	2000	520	-	<0.001	-	0.005
MW2	MW2	20/09/2011			350	290	-	<5	1200	0.6	-	-3	0.2	-	-	-	-	1.2	1400	0.004	24000	610	210	<0.5	-	-	190	-	4.2	0.002
MW2	MW2	27/02/2012			370	300	0.036	30	1400	0.7	-	-	0.26	0.62	2.7	<0.005	<0.05	0.62	880	<0.002	24000	1000	220	<0.5	-	-	84	-	3.6	0.005
MW3	MW3	30/04/2011			490	400	-	54	5400	-	<0.5	1	-	1.9	-	<0.005	-	1.9	2600	0.003	34000	3400	800	-	9800	1500	-	<0.005	-	0.013
MW3	MW3	20/09/2011			530	450	-	57	3700	1.4	-	2	0.18	-	-	-	-	0.033	220	0.006	32000	2500	810	<0.5	-	-	280	-	5.8	0.019
MW3	MW3	27/02/2012			560	460	<0.005	<5	4000	1.5	-	-	0.29	0.32	1.4	<0.005	<0.05	0.32	610	<0.002	33000	3200	940	<0.5	-	-	230	-	6.5	0.005
MW4	MW4	30/04/2011			630	510	-	740	3900	-	<0.5	0	-	0.82	-	<0.005	-	0.82	2100	0.008	19000	2700	350	-	6700	520	-	<0.005	-	<0.005
MW4	MW4	21/09/2011			420	370	-	18	2500	0.7	-	1	0.31	-	-	-	-	0.24	540	0.009	16000	1800	280	<0.5	-	-	670	-	21	<0.005
MW4	MW4	28/02/2012			480	390	<0.005	<5	3200	0.6	-	-	0.59	0.17	0.74	<0.005	<0.05	0.17	760	0.007	19000	2700	410	<0.5	-	-	1900	-	82	<0.005
MW5	MW5	30/04/2011			450	370	-	56	87000	-	<0.5	-1	-	1.1	-	<0.005	-	1.1	5100	0.007	10000	48000	5200	-	130000	19000	-	<0.05	-	<0.05
MW5	MW5	21/09/2011			250	210	-	47	87000	0.3	-	0	2.7	-	-	-	-	0.02	2700	0.01	9900	48000	4100	<0.5	-	-	1100	-	11	<0.1
MW5	MW5	28/02/2012			180	150	<0.005	<5	80000	0.4	-	-	2.2	1.2	5.5	<0.005	<0.05	1.2	3400	0.006	9800	57000	4400	<0.5	-	-	1400	-	18	<0.1
Statistical Summary																													
Number of Results					15	15	5	15	15	10	5	10	10	10	5	10	5	15	15	15	15	15	15	10	5	5	10	5	10	15
Number of Detects					15	15	1	10	15	10	0	10	10	10	5	0	0	15	15	11	15	15	15	0	5	5	10	0	10	9
Minimum Concentration					180	150	<0.005	<5	670	0.3	<0.5	-6	0.17	0.17	0.74	<0.005	<0.05	0.02	220	<0.002	9800	300	140	<0.5	2000	520	84	<0.001	1.8	0.002
Minimum Detect					180	150	0.036	18	670	0.3	ND	ND	0.17	0.17	0.74	ND	ND	0.02	220	0.003	9800	300	140	ND	2000	520	84	ND	1.8	0.002
Maximum Concentration					630	510	0.036	740	87,000	1.5	<0.5	2	2.7	3.3	8.7	<0.005	<0.05	3.3	5100	0.01	34,000	57,000	5200	<0.5	130,000	19,000	1900	<0.05	82	<0.1
Maximum Detect					630	510	0.036	740	87,000	1.5	ND	2	2.7	3.3	8.7	ND	ND	3.3	5100	0.01	34,000	57,000	5200	ND	130,000	19,000	1900	ND	82	0.019
Maximum Detect + 10%					693	561	0.0396	814	95,700	1.65	NA	2.2	2.97	3.63	9.57	NA	NA	3.63	5610	0.011	37,400	62,700	5720	NA	143,000	20,900	2090	NA	90.2	0.0209
Average Concentration					415	343	0.0092	85	18,826	0.71	0.25	-0.8	0.72	1.3	3.8	0.0025	0.025	1.2	2147	0.0051	22,913	11,498	1223	0.25	30,100	4460	625	0.0062	16	0.013
Median Concentration					420	350	0.0025	30	3200	0.6	0.25	0	0.285	1.15	2.7	0.0025	0.025	1.1	2100	0.006	24,000	2500	350	0.25	6700	760	255	0.0025	6.15	0.005
Standard Deviation					116	95	0.015	188	34,141	0.41	0	2.5	0.93	0.94	3.3	0	0	1	1422	0.0032	8530	20,567	1763	0	55,944	8138	630	0.011	24	0.017
Number of Guideline Exceedances					0	0	0	0	0	1	5	0	0	0	5	0	0	0	0	0	0	0	6	0	0	0	0	3	0	0
Number of Guideline Exceedances(Detects Only)					0	0	0	0	0	1	0	0	0	0	5	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0

Comments

#1 ESDAT Combined with Non-Detect Multiplier of 0.5.

#2 ESDAT Combined.

#3 NA - Not applicable as reported as non-detect

					Metals																Organic	TPH					
					Arsenic (Filtered)	Cadmium (Filtered)	Calcium (Filtered)	Chromium (hexavalent)	Chromium (III+VI) (Filtered)	Chromium (Trivalent)	Iron	Iron (Filtered)	Magnesium (Filtered)	Manganese (Filtered)	Mercury	Nickel (Filtered)	Phosphorus	Potassium (Filtered)	Selenium (Filtered)	Silicon (Filtered)	Zinc (Filtered)	Alkalinity (Carbonate)	C6 - C9	C10 - C14	C15 - C28	C28-C36	+C10 - C36 (Sum of total)
					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL					0.001	0.0001	0.2	0.002	0.001	0.005	0.005	0.005	0.1	0.001	0.00005	0.001	0.01	0.1	0.002	20	0.001	1	40	50	200	200	
ADW 2004					0.007	0.002		0.05						0.5	0.001	0.02			0.01								
ANZECC 2000 95%						0.0002		0.001						1.9	0.0006	0.011			0.011		0.008						
ANZECC 2000 Marine 95%						0.0055		0.0044		0.0274					0.0004	0.07					0.015						
Field_ID	**LocCode**	**Sampled_Date-Time**	**SampleComments**	**Monitoring_Round**																							
MW1	MW1	30/04/2011			<0.001	<0.0001	200	<0.002	<0.001	<0.005	-	0.008	63	0.17	<0.00005	-	0.06	10	<0.002	14,000	0.016	<1	<40	<50	<200	<200	<450[#2]
MW1	MW1	20/09/2011			<0.001	<0.0001	170	-	<0.001	-	1.8	<0.005	54	0.046	-	<0.001	0.05	7.9	<0.002	13000	0.027	<1	-	-	-	-	-
MW1	MW1	27/02/2012			<0.001	<0.0001	180	-	<0.001	-	4.2	<0.005	53	0.088	-	<0.001	0.08	7.7	<0.002	-	0.038	<1	-	-	-	-	-
MW2	MW2	30/04/2011			<0.001	<0.0001	99	<0.002	<0.001	<0.005	-	<0.005	66	<0.005 - 0.005	<0.00005	-	0.09	19	0.003	12000	0.013	<1	<40	<50	<200	<200	<450[#2]
MW2	MW2	20/09/2011			<0.001	<0.0001	150	-	<0.001	-	6	<0.005	98	0.001	-	<0.001	0.06	20	<0.002	11000	0.021	<1	-	-	-	-	-
MW2	MW2	27/02/2012			<0.001	<0.0001	240	-	<0.001	-	4.6	0.24	140	0.22	-	<0.001	0.03	24	<0.002	-	0.047	<1	-	-	-	-	-
MW3	MW3	30/04/2011			<0.005	<0.0005	120	<0.002	<0.005	<0.005	-	<0.025	300	0.02 - 0.022	<0.00005	-	0.16	130	<0.01	16000	0.02	<1	<40	<50	<200	<200	<450[#2]
MW3	MW3	20/09/2011			<0.005	<0.0005	85	-	<0.005	-	7.4	<0.025	210	0.014	-	<0.005	0.05	90	<0.01	15000	0.047	8	-	-	-	-	-
MW3	MW3	27/02/2012			<0.005	<0.0005	95	-	<0.005	-	6.8	<0.025	210	0.026	-	<0.005	0.05	120	<0.01	-	0.032	<1	-	-	-	-	-
MW4	MW4	30/04/2011			<0.005	<0.0005	39	<0.002	<0.005	<0.005	-	<0.025	100	0.013 - 0.014	<0.00005	-	0.79	110	<0.01	8700	0.01	<1	<40	<50	<200	<200	<450[#2]
MW4	MW4	21/09/2011			<0.005	<0.0005	28	-	<0.005	-	31	<0.025	68	0.011	-	<0.005	0.14	69	<0.01	7500	0.029	12	-	-	-	-	-
MW4	MW4	28/02/2012			<0.005	<0.0005	49	-	<0.005	-	130	<0.025	96	0.033	-	<0.005	0.48	110	<0.01	-	0.047	<1	-	-	-	-	-
MW5	MW5	30/04/2011			<0.05	<0.005	1000	0.01	<0.05	<0.005	-	<0.25	4100	0.2 - 0.22	0.00011	-	0.11	1900	<0.1	4900	<0.05	<1	<40	81	<200	<200	281[#1]
MW5	MW5	21/09/2011			<0.1	<0.01	1100	-	<0.1	-	12	<0.5	4300	<0.1	-	<0.1	0.04	1700	<0.2	4600	<0.1	<1	-	-	-	-	-
MW5	MW5	28/02/2012			<0.1	<0.01	1100	-	<0.1	-	25	<0.5	4700	<0.1	-	<0.1	0.21	2100	<0.2	-	<0.1	<1	-	-	-	-	-
Statistical Summary																											
Number of Results					15	15	15	5	15	5	10	15	15	15	5	10	15	15	15	10	15	15	5	5	5	5	5
Number of Detects					0	0	15	1	0	0	10	2	15	13	1	0	15	15	1	10	12	2	0	1	0	0	1
Minimum Concentration					<0.001	<0.0001	28	<0.002	<0.001	<0.005	1.8	<0.005	53	0.001	<0.00005	<0.001	0.03	7.7	<0.002	4600	0.01	<1	<40	<50	<200	<200	281
Minimum Detect					ND	ND	28	0.01	ND	ND	1.8	0.008	53	0.001	0.00011	ND	0.03	7.7	0.003	4600	0.01	8	ND	81	ND	ND	281
Maximum Concentration					<0.1	<0.01	1100	0.01	<0.1	<0.005	130	<0.5	4700	0.22	0.00011	<0.1	0.79	2100	<0.2	16,000	<0.1	12	<40	81	<200	<200	<450
Maximum Detect					ND	ND	1100	0.01	ND	ND	130	0.24	4700	0.22	0.00011	ND	0.79	2100	0.003	16,000	0.047	12	ND	81	ND	ND	281
Maximum Detect + 10%					NA	NA	1210	0.011	NA	NA	143	0.264	5170	0.242	0.000121	NA	0.869	2310	0.0033	17,600	0.0517	13.2	NA	89.1	NA	NA	309.1
Average Concentration					0.0095	0.00095	310	0.0028	0.0095	0.0025	23	0.064	971	0.064	0.000042	0.011	0.16	428	0.019	10,670	0.031	1.8	20	36	100	100	236
Median Concentration					0.0025	0.00025	150	0.001	0.0025	0.0025	7.1	0.0125	100	0.033	0.000025	0.0025	0.08	90	0.005	11,500	0.029	0.5	20	25	100	100	225
Standard Deviation					0.018	0.0018	397	0.004	0.018	0	39	0.099	1763	0.075	0.000038	0.02	0.21	767	0.035	4077	0.014	3.4	0	25	0	0	25
Number of Guideline Exceedances					3	9	0	5	0	0	0	0	0	0	0	2	0	0	3	0	15	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)					0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0

Comments

#1 ESDAT Combined with Non-Detect Multiplier of 0.5.

#2 ESDAT Combined.

#3 NA - Not applicable as reported as non-detect

ATTACHMENT 03:

Construction Erosion Control and Stormwater Management Plan

(CECSMP)

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1. PURPOSE

The purpose of this Construction Erosion Control and Stormwater Management Plan (CECSMP) is to address the management and mitigation of potential impacts caused by erosion and sedimentation due to the construction of the TAN Burrup Project located on the Burrup Peninsula, Western Australia (WA). The area to be disturbed during construction is approximately 35 hectares (ha) (the Site) (refer **Figures 1** and **2**).

This Plan needs to be read together with the Construction Environmental Management Plan (2-250-329-PRO-TRE-0111), in which general issues such as roles, responsibilities, environmental monitoring, inspection, auditing and reporting are described.

2. SCOPE

This CECSMP describes the measures to be implemented to manage and mitigate the potential impacts associated with the construction of the PROJECT, including:

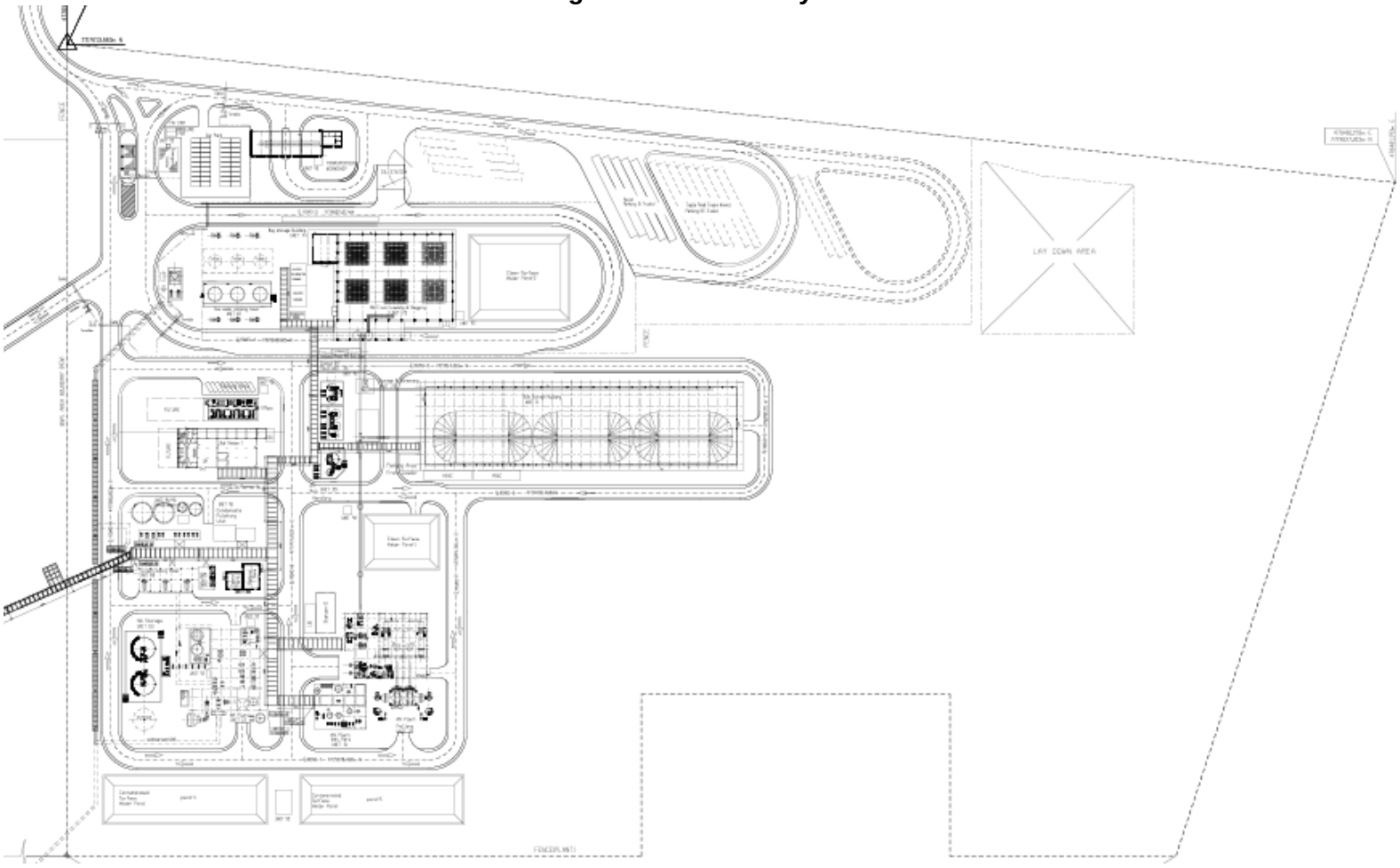
- erosion;
- sedimentation; and
- stormwater.

The procedures and protocols contained within this CECSMP are for the the construction phase only.

This Project will be performed by means of modular construction and therefore, this Construction Erosion Control and Stormwater Management Plan is applicable to all TAN Burrup Project Site areas at the Burrup Peninsula where the modules are going to be installed, erected and hooked up. Any issue related to yard(s) where modules are being constructed is not subject to this document's requirements.

Figure 1 Site Location

Figure 2 Site Layout



3. DEFINITIONS AND ACRONYMS

3.1 DEFINITIONS

COMPANY	Yara Pilbara Nitrates Pty Ldt
CONTRACTOR	Técnicas Reunidas S.A. (TR)
CONSTRUCTION	Includes any preparatory works required to be undertaken including clearing vegetation, cut and fill activities, the erection of any on-site temporary structures and the use of equipment for the purpose of breaking the ground for buildings or infrastructure.
PROJECT	TAN Burrup Project.
SITE	35 Ha area where construction works are going to be performed.

3.2 ACRONYMS

ANZECC	Australia and New Zealand Environmental and Conservation Council
ASS	Acid Sulphate Soils
YPNPL	Yara Pilbara Nitrates Proprietary Limited
CEMP	Construction Environmental Management Plan
CEO	Chief Executive Officer of the Office of the Environment Protection Authority
CWQMP	Construction Water Quality Management Plan
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
DoW	Western Australia Department of Water
EO	Environmental Officer
EP Act	Environmental Protection Act 1986
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
MUBRL	Multi-User Brine Return Line
m	Metres
mAHD	Metres in Australian Height Datum
mg/L	Milligrams per litre

µs/cm	Micrograms per centimetre
NATA	National Association of Testing Authorities
OEPA	Western Australia Office of Environment Protection Authority
PASS	Potential Acid Sulphate Soil
PESMP	Preliminary Erosion Control and Stormwater Management Plan
RUSLE	Revised Universal Soil Loss Equation
RiWI Act	Rights in Water and Irrigation Act 1914
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
SLC Act	Soil and Land Conservation Act 1945
TANPF	Technical Ammonium Nitrate Production Facility
TR	Técnicas Reunidas (construction contractor)
WC Act	Waterways Conservation Act 1976
WA	Western Australia
WAPC	Western Australian Planning Commission
WQPN	Water Quality Protection Notes
YPFPL	Yara Pilbara Fertilizers Proprietary Limited

4. LEGISLATIVE FRAMEWORK

This document has been prepared to address relevant legislative requirements in addition to environmental approval conditions relevant to erosion and sedimentation control. A summary of relevant legislation and environmental approval conditions is outlined below.

4.1 RELEVANT LEGISLATION

Legislation relevant to erosion and sedimentation control is outlined in **Table 1.**

Table 1: Erosion and Sediment Control and Stormwater Management Legislation

Legislation	Application
Environmental Protection Act 1986 (WA)	State environmental impact assessment and Ministerial approval process.
Rights in Water and Irrigation Act 1914 (WA)	Governs the management of water in Western Australia.
Waterways Conservations Act 1976 (WA)	Primary piece of legislation that controls activities impacting on watercourses in WA.
Soil and Land Conservation Act 1945	Includes provisions relating to the conservation of soil and land resources, and to the mitigation of the effects of erosion, salinity and flooding.
Environment Protection and Biodiversity Conservation Act 1999 (Cwth)	The Commonwealth Government's central piece of environmental legislation

This document also addresses the Ministerial Conditions outlined by the Commonwealth (EPBC 2008/4546) and WA (Statement No. 870) governments. For this CECSMP particular reference has been made to:

Commonwealth Approval (EPBC Approval 2008/4546):

Condition 7

To ensure the protection of the listed threatened species; listed migratory species and the values of the Dampier Archipelago national Heritage Place, the person taking the action must submit to the Department those management plans containing management actions aimed at reducing impacts upon these relevant matters of national environmental significance including:

a) CEMP which must be submitted to the Department at least 2 months prior to construction and must include but not be limited to management measures for the following:

Erosion Control and Storm Water.

WA Approval (Statement No. 870)

Condition 6

6-1 The proponent shall undertake rehabilitation to achieve the following outcomes:

1. *The project area shall be non-polluting and shall be constructed so that its final shape, stability, surface drainage, resistance to erosion and ability to support local native vegetation are comparable to natural landforms within the local area, as demonstrated by a methodology acceptable to the CEO*

6-2 *Rehabilitation activities shall continue until such time as the requirements of conondition 6-1 are demonstrated by inspections and reports to have been met for a mínimum of five years, to the satisfaction of the CEO on advice of the DEC.*

Notes

2. *The proponent is required to apply for a Works Approval and Licence for this project under the provisions of Part V of the Environmental Protection Act 1986.*

In addition to the Ministerial Conditions set by the Commonwealth and WA Governments, COMPANY committed to the preparation of a Construction Environmental Management Plan (CEMP) within the Public Environmental Review (PER) (ERM, 2010), of which this CECSMP is to be a part of. The PER also stated that the following key mitigation and management measures will be incorporated into this CECSMP:

- up gradient surface water run off diversion channels;
- temporary covering/ shoring of areas susceptible to erosion; and
- construction of temporary drainage channels and sediment traps.

These mitigation measures are described in Section 6.5 of this report.

5. DEVELOPMENT

5.1 OBJECTIVES AND PERFORMANCE

Objectives for the construction phase of the PROJECT with regard to water quality management are to:

- minimise impacts to natural drainage patterns;
- minimise potential for erosion during construction and operation;
- identify erosional features and mitigate where possible; and
- maintain the quality of surface water and marine water and to minimise the offsite deposition of sediment.

Detailed performance indicators for potential impacts caused by erosion and sedimentation are presented in **Table 2**.

Regular inspection of erosion and sediment controls will be undertaken against performance measures and indicators during construction activities. If monitoring and assessment indicates that a performance indicator has been exceeded, or is likely to be exceeded, CONTRACTOR will implement the contingency measures outlined in **Section 6.6**.

Table 2: Performance Measures

Performance Measure	Indicator of Success	Key Assessment Considerations
All erosional features identified and mitigated at an early stage	• Establishment of upslope diversion drain. • Site stabilised as soon as is practicable.	1. Does the monitoring indicate that a performance measure or development consent condition has not been met, or likely to not be met? 2. What are the ramifications of any surface water analyte exceedances to the down gradient environment. 3. What are the factors that may have contributed to the risk i.e. construction activities or natural climatic event? 4. What actions, if any are required to mitigate and/or minimise the potential for future impacts?
No accelerated erosion and run-off during and post construction work and during operations	• Establishment of upslope diversion drain. • Site stabilised as soon as is practicable.	
No discharges of contaminated stormwater	• Immediate investigation of any potential leaks or spills if elevated concentrations are identified in stormwater - no discharge of water to occur in this situation. • No discharge of untested water to the Environment (unless in cyclonic conditions where testing would pose a safety risk). • Water quality parameters in 2-250-329-PRO-TRE-0111-*att02* CWQMP to be met prior to discharge.	
No discharge of stormwater with elevated Total Suspended Solids (TSS) Levels	• Schedule works for the low rainfall periods of the year, stabilise exposed catchments in higher rainfall periods. • Drainage channel at site perimeter and use of temporary sediment basins. • Establishment of sediment controls as specified in Section 6.4.6 • No discharge of untested water to the Environment (unless in cyclonic conditions where testing would pose a safety risk). • Water quality parameters in **Table 6** to be met prior to discharge from drainage channel and/or sediment basins.	

5.2 BACKGROUND INFORMATION

5.2.1 Baseline Studies

A hydrogeological and hydrological investigation (ERM, 2011 and 2012) has been undertaken to provide baseline environmental data in regards to the surface water and groundwater conditions at the Site. A Project Environmental Review was developed during the project application from which the following relevant background information was obtained.

5.2.2 Site Soil Properties

5.2.2.1 Soil Texture Group and Dispersibility

The superficial soils at the Site variably comprise brown to red – brown clayey sands, silty sands, clayey gravels and clayey gravelly sands, extending from ground level to between 0.5 and 5m bgl. Shell grit inclusions were identified at some locations, consistent with the mapped geology.

The Site is located on colluvium of sand, silt and gravel in outwash fans of the supra tidal flats between King Bay and Hearson Cove. The area is associated with a large weathered dolerite dyke along the King Bay Hearson Cove lineament. As a result there are fewer outcrops of the exposed granophyre bedrock than in other areas of the Peninsula. The large areas of exposed granophyre bedrock outcrops are generally located to the southern and northern boundaries of the Site.

Supra tidal flats run through the middle of the Site and present a soil profile associated with a low energy marine depositional environment. The soil profile is largely comprised of sandy silts to silty sands generally brown to grey in colour with occasional variations including green, yellow and red mottling. The sediments are typically organically rich and often contain a thin veneer of shelly lenses. The soils of the area are generally alkaline as a result of the high carbonate content originating from marine sands and underlying calcrete bedrock.

Golders (2011) carried out Particle Size Distribution (PSD) analysis on soil samples collected from test pits. The soils were classified using the Unified Soils Classification (USC) system. The USC soil types and results of the PSD analysis have been adapted from Golders (2011) and are shown in **Table 2**.

Table 3 Particle size distribution analysis of on-site soils

Test Location	Unified Soils Classification (USC)	Particle Size Distribution (percentage %)		
		Gravel	Sand	Fine
TP03	GC/GM	54	30	16
TP07	SM	23	63	14
TP11	SM	27	60	13
TP18	SP/SM	0	90	10
TP22	SP	20	76	4

Test Location	Unified Soils	Particle Size Distribution (percentage %)		
TP23	SP/SM	15	79	6
TP24	GP/GC	52	36	12
TP25	SP/SM	5	90	5
TP28	SC/SM	4	72	24
TP29	SC	25	55	20
1. Fines = particles finer than 0.075mm, Sand= 0.075mm to 2mm, Gravel = 2mm to 63mm				

The Golders (2011) investigation described the soils on the Site as being:

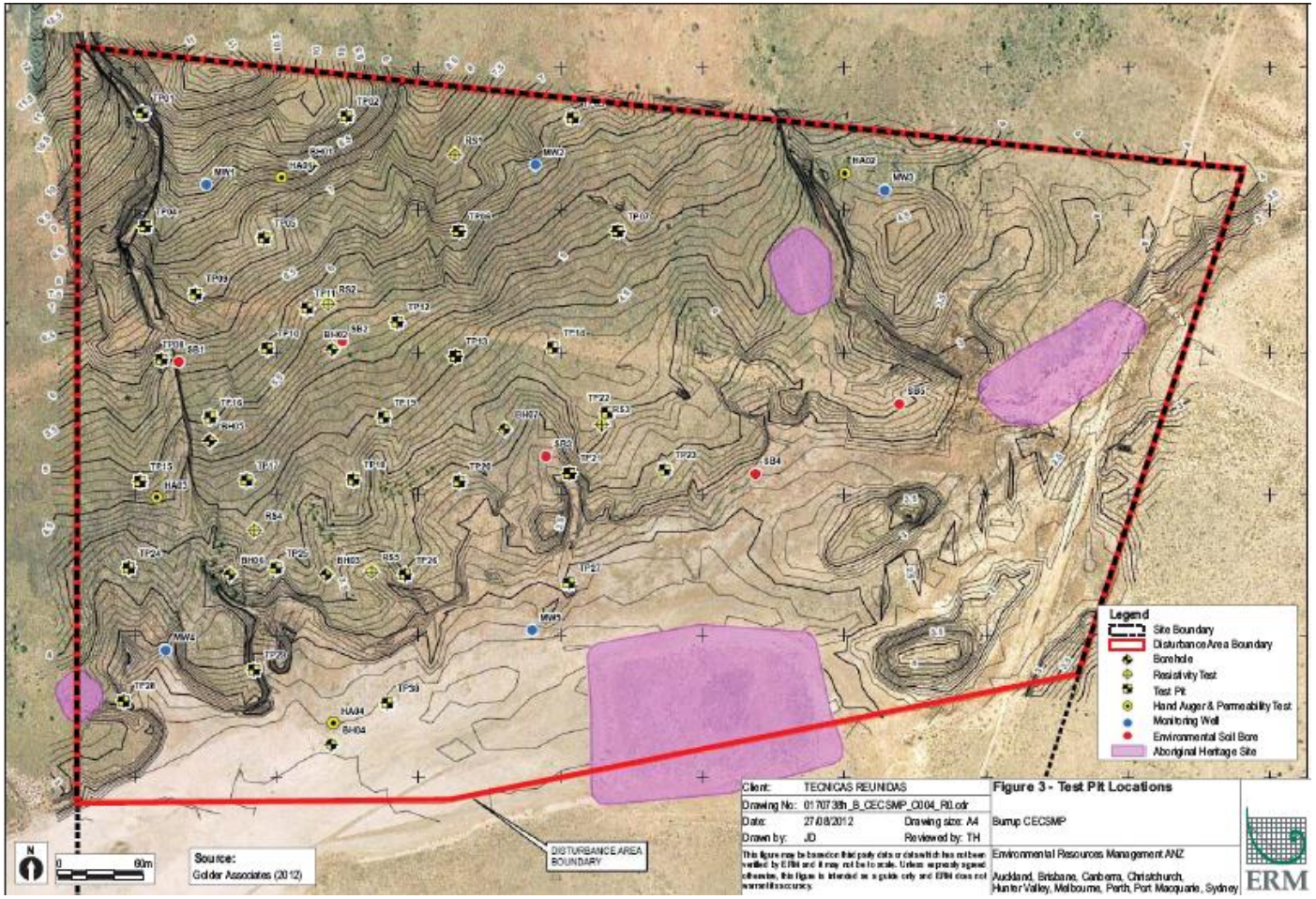
- Clayey or silty Gravel;
- Sandy Gravel;
- Gravelly Clayey Sand;
- Cobbly Silty Sand;
- Gravelly Sand; and
- Sand.

The corresponding USC classifications are shown in **Table 2**.

The soils were red, brown in colour, composed of fine grain sand, with between about 5% and 20% low plasticity fines. Interspersed were variable quantities of cobbles and boulders of granophyre to depths form between 0.5m and 3.0m.

The location of the test pits are shown in **Figure 3**.

Figure 3 Test Pit Locations



5.2.3 Surface Water Hydrology

As with much of the west Pilbara, the Burrup Peninsula has limited fresh surface water. Fresh water flows are highly variable, characterised by short periods of very high flow that coincide with major rainfall events usually associated with tropical cyclone activity. These periods of high flow are followed by dry period's sometimes lasting years, when stream flow stops and even deeper waterholes in gorges can dry up completely (2006).

Topographical features suggest that surface water naturally flows through the Site in a south/south–easterly direction in drainage channels that originate on the steep hillsides to the north. These drainage channels fan out onto the lower level supra-tidal mud flats located in the south of the Site, which drain westward to King Bay and Mermaid Sound.

5.3 POTENTIAL IMPACTS

5.3.1 Construction Phase

Construction of the PROJECT will take approximately 29 months with the workforce level likely to vary over the entire period.

During peak periods, approximately 450 persons will be on-site while the mean construction workforce is expected to be approximately 300 persons. These numbers include all categories of construction workforce personnel. Construction activities will be conducted during normal project working hours with the potential for some out of hours activities.

5.3.1.1 Site Preparation and Earth Works

The proposed site preparation works for PROJECT will include (but not necessarily be limited to):

- removing vegetation within the designated area;
- controlled blasting;
- preparing the plant footprint including laydown and stockpile areas;
- dewatering and trenching (as required);
- site drainage;
- establishing perimeter fencing; and
- road and access tracks for construction.

5.3.1.2 Civil Works

The proposed civil works for PROJECT will include:

- construction of pad by cut and fill;

- excavation for foundations and other civil works (eg. footings);
- laying of concrete pad/footings – including curing of the concrete (water equipment);
- equipment storage/construction laydown; and
- preparation of ammonia pipeline and utilities from YPFPL; no blasting will be performed inside YPFPL operating plant. Pigging will be used instead in case it is required.

5.4 MANAGEMENT ACTIONS AND RESPONSIBILITIES

5.4.1 Introduction

Proper planning for soil and water management is essential to ensuring that land disturbance associated with the development does not lead to significant detrimental impacts on the surrounding environment. Seven general principles of effective soil and water management for land disturbance are described in Landcom (2004) and have been applied to the development of this plan. These principles should be utilised by the construction team when undertaking any modifications to the Site. The principles can be paraphrased as:

- assess the soil and water implications of a project at the planning stage;
- plan for erosion and sediment control and assess site constraints during the design phase and before any earthworks begin;
- minimise the area of soil disturbed and exposed to erosion;
- control water flows around and through the project area – divert up-slope 'clean' water away from disturbed areas and ensure concentrated flows are below erosive levels;
- rehabilitate disturbed lands quickly; and
- maintain erosion and control measures for the duration of the project and until the Site is successfully rehabilitated.

In addition, programs should prioritise erosion control which is the most effective means of limiting adverse environmental impacts. Specific erosion controls should be targeted at 'high risk' areas, such as drainage lines that receive concentrated flows, steep or long slopes containing erodible materials, or areas that are not well protected by downstream pollution controls. Generally it is possible to stage the development in a way that reduces the erosion hazard. It is noted however that this particular site represents a challenge for erosion control due to the unavoidable large areas of exposed soil surface when developing the fill site, and erosion control will only ever be partially effective. Therefore, to protect receiving waters against pollution, sediment controls such as sediment basins and sediment traps targeting problem areas, will always be an extremely important element in managing runoff.

Engineering design of major works such as sediments and their outlet structures, energy dissipaters and major stormwater drains, is not provided in this CECSMP and should be undertaken before construction, should basins be required.

5.4.2 Summary of Site Constraints and Characteristics

Table 4 summarises the key site characteristics that help to assess the erosion control and design management works.

Table 4 Site Constraints and Characteristics

Constraint / Characteristic	Description / Value
Rainfall	R-factor = 1828
Slope gradients and length	Slope gradients and lengths vary within each work front catchment. Over the entire site, there is a fall of 8.5m from the highest to lowest point over a length of approximately 500m, but lengths are typically much less and will be managed throughout the construction period.
Soil erodibility	K-factor = 0.053, this value is conservative estimate of the likely site soil erodibility, based on the worst native soil factor from the soil types identified and given compact gravel seal that will be prevalent across the Site following development of the pad.
Calculated soil loss	Up to 185 tonnes/ha/year
Soil loss class	1 – low (refer Table 4.2 in the Landcom 2004)
Soil texture group	Type C – Coarse (refer *Section 5.2.2.1*)
Soil dispersiveness	Likely <10%
Disturbed site area	Total of 35 ha

The native soils of the Site are classed as Soil Hydrologic Group C, with Moderate to high runoff potential and soil infiltration is rated between slow and moderate according to laboratory permeability analysis.

If not managed properly, earthworks activities have the potential to result in mobilisation of sediment during rain periods, which in turn impacts the sediment load in streams, wetlands and coastal environment. The highest risk time for mobilisation of sediment is during site clearing, earthworks, blasting, and laying foundations. This period of the civil works is expected to take about 10 months.

5.4.3 Erosion Control

Erosion control measures to be implemented during construction activities are as follows:

- where possible, limit disturbance to two metres beyond the edge of any essential construction activity;
- plan construction works to limit the amount of disturbed area at any one time;

- provide a single stabilised site access point to each key construction area;
- coordinate work schedules, if more than one contractor is working on a site, so that there are no delays in construction activities which would cause disturbed land to remain unstabilised for longer than 2 weeks, as far as reasonably possible;
- progressively install stabilisation measures; such as sealing of access ways, to minimise exposed areas; and
- during windy weather unsealed roads and the earthworks pads will be kept moist (not wet) by sprinkling with water to reduce wind erosion.

The final result will be an area that is predominately stabilised by concrete or compacted gravel, with large areas of roof space preventing precipitation interacting with exposed areas.

5.4.3.1 Stockpile Management

Earthworks should be planned in stages to minimise exposure and potential erosion and sediment generation.

The two stockpile locations proposed are suitable given the:

- separation distance from the watercourse;
- location above the 5.5mAHD contour;
- relatively flat topography; and
- upslope stockpile location from sediment basins, allowing for an additional treatment for any sediment laden runoff generated.

Stockpile runoff collecting behind any of the aforementioned treatment trains should be monitored. Should any unusual visual or olfactory irregularities be identified then soil/water sampling and testing should commence. Sampling and testing will identify appropriate handling/disposal techniques should the soils be contaminated.

Stockpile conditions should be monitored given the hot and dry conditions occurring at the Site. Should dust be generated during dry and windy conditions, wetting down by water carts or other means is recommended. The likelihood of strong winds during the cyclone and storm season highlight the importance of stabilising stockpiles to prevent erosion of the stockpile and deposition of sediment off-site.

5.4.4 Drainage and Stormwater Management

Given the large area of disturbance involving cut and fill earthworks to establish the Site, the perimetral drainage channel at the north and west side of the site will manage stormwater run on from upslope the site. During site preparation and at an early stage of the construction phase, all site areas will be sloped, as much as possible, towards those drainage channels.Should an additional measure shall appear to be necessary, stormwater basins at the southwest end of the plot plan may be used for this purpose, as soon as they are finished (according to constructon planning, they will be constructed as part of the first works to be performed).

As stated in Department of Water and Swan River Trust (2007) almost everytime a stormwater event occurs, pollutants, whether in particulate or soluble forms, are conveyed by

stormwater. With studies in urban areas showing that there is no general trend of increased concentrations of contaminants such as nutrients and metals with increasing storm sizes. Wong et al. (1999) found that most hydraulic structures can be expected to treat over 99 per cent of the expected annual runoff volume when designed for a 1-year ARI peak discharge. Unlike flood mitigation measures, stormwater quality treatment devices do not need to be designed for rainfall events of high ARI to achieve high hydrologic effectiveness (i.e. the percentage of mean annual runoff volume subjected to treatment) (Department of Water and Swan River Trust, 2007).

Specific management measures will be put in place to avoid excess of sediments being transported by rain water to discharge from drainage channels directly to flooding areas, should it be required. The need for some flow velocity reduction system or a skimmer will be studied and assessed as required.

5.4.4.1 Access Road

Site access for the TAN Burrup Project will be via Village Road, an existing two lane bitumen access road constructed to service the already operational BFPL ammonia plant.

A connecting internal road from the PROJECT to the existing Village Road, north of the Site will be constructed as part of the project.

YPNPL will have in place a parking area for use by transporters on the Site, as well as offices (3 staff), workshop (3 mechanics) and a parking/truck wash (with all runoff water to be directed to the clean and/or contaminated surface water ponds). The area is foreseen to be adequate for parking of a fleet of about 20 road trains. Mud tracking on the bitumen sealed village road is an issue when construction is taking place in the wetter months of the year. To avoid the tracking of mud onto the public road network a stabilised site access, designed in accordance to Standard Design 6.14 Stabilised Site Access (Landcom 2004) is recommended. Alternatively an agitator grid or wheel wash may be used. All unsealed access ways should be monitored and regularly wet down with water carts to eliminate the creation of fugitive dust.

5.4.4.2 Dewatering Excavations

Dewatering is discussed in greater detail in 2-250-329-PRO-TRE-0111-att02 CWQMP.

5.4.4.3 Flooding Risk to the PROJECT

The final site level proposed for the TAN Burrup Project will be a minimum of 5.5m AHD. It is noted that the flood modelling undertaken by Golder (2011) indicates that a 1:100 year event, including storm surge, may result in flooding impacts up to 5.6 m AHD Protection to sensitive areas, such as bunding around storage areas, will provide additional protection against flooding and stormsurge events. Rock armourment on the embankments will provide protection against erosion during times of flood (ERM 2010).

To avoid any potential effect of this the site boudary below the 6.5 meter contour will be provided with a bund to 6.5 mAHD.

5.4.5 Sediment Control

5.4.5.1 Scheduling of Works

The PROJECT schedule of works so that unavoidable soil exposure activities primarily take place during periods of very low rainfall will be a key method of controlling the generation of sediment. As previously discussed the precipitation in the Burrup region is very low, with the majority of runoff being generated from storm and cyclonic activity in January February and March. Concentrating large earthworks and exposure of disturbed areas for outside of these months is a simplistic, yet very effective administrative control.

5.4.5.2 Concrete Washout Areas

Concrete washout bays provide a defined, controlled location for the dewatering of concrete washout. Concrete washout areas typically involve a small lined excavation or earthern turkey nest pond to allow for the evaporation of concrete wash water and the drying of the superfluous concrete. An example of a turkey nest washout basin lined with construction plastic is shown in **Figure 4**.

Figure 4 Example of a Turkey Nest Concrete Washout Pond (County of Lake, California, N.D.)

The effective operation of the concrete washout basin includes:

- position in a location so as to eliminate up-slope run off entering the washout area;
- position within the Site away from natural or constructed concentrated flows;
- any excess contaminated waste water to be disposed of off-site by a licensed waste contractor;
- dried concrete will be disposed by an approved means; and
- the concrete washout area will be fully rehabilitated after the construction phase is completed.

5.4.5.3 Pad Site Development

The development site will require a disturbance area of approximately 35ha. This includes a construction laydown área, which is proposed to be maintained at a single location throughoout the construction phases. There will be no additional temporary land requirements to be prepared for the operational phase.

Based on the land requirements of the PROJECT, laydown areas and internal roads it is planned that earthworks will be undertaken as described in **Table 5**.

Table 5 Earthworks and Associated Cut and Fill

Type of Earthworks	Volume of Cut/Fill (approximate)
Vegetation removal	350,000 m^2
Strip topsoil & stockpile	19,500 m^3
Cut soil	61,900 m^3
Load soil/haul/place	92,500 m^3
Imported engineered fill	is not foreseen
1. ERM PER (2010)	

Golders (2011) made several recommendations regarding the cut and fill earthworks to develop the pad site. The in-situ soil removed during the cut and fill operations can be stockpiled for later reuse as structural fill, if required. Golders (2011) indicate that the on-site cut material is capable of producing a competent structural fill material. The limited areas of soils with higher fines content should be excluded from use as structural fill.

The structural fill sourced from on-site or off-site will be covered with a minimum compacted surfacing basecourse grade material of 150mm thickness. The plant area and the pavements will then be covered with asphalt. The final surface will have appropriate grade and drainage such that water cannot pond and infiltrate soils beneath pavements and footings.

A soil embankment up to 3.5m thick will need to be construction of structural fill in the southern portion of the Site to accommodate the plant site. The soil embankment will be exposed to erosive forces such us surface water runoff, inundation of the supra-tidal flat and groundwater flows. The embankment should be protected during the construction phase by geofabric. The geofabric should be layed between the natural ground surfaces and the fill, and then lifted over the embankment as an erosion control measure during construction. Protection of the exposed embankment batters will be finalised upon completion by rock armouring.

5.4.5.4 Water Quality Criteria

Water collected in drainage channel (or sediment basins should they be required) can be reused on-site for dust suppression or construction water to assist in achieving required compaction rates. However should discharges off-site be required, the following discharge criteria should be met.

Table 6 Monitoring Parameters and Trigger Levels During Construction

Analyte	Units	Trigger Levels
pH	pH units	6.0-8.0[1]
Oil and Grease	Visible	None visible[2]
Total Suspended Solids	mg/L	50[2]
Turbidity	NTU	25[1]

1. ANZECC (2000) trigger values for physical and chemical stressors for lowland rivers for tropical Australia.
2. Trigger Level based on recognised industry standard.

It is noted that in some cases (i.e. pH) the target levels may need to be modified on a site specific basis to reflect source and receiving water conditions. Should any sample fail to meet these guidelines, a review of the soil and water management plans should be conducted to assess the reason(s) for failure and determine appropriate improvement measures.

Water quality and water sampling techniques are described in detail in the Construction Water Quality Management Plan (CWQMP).

5.4.6 Site Stabilisation and Rehabilitation

Construction to phase works so that manageable areas of land are exposed at any one time and ensure that site stabilisation measures are progressively installed throughout the development. Stabilisation in the case of this development includes the establishment of roofed areas, protection of exposed areas with rock or asphalting, compacting gravel seal on the laydown area and revegetating previously cleared areas with native species.

It is essential that all disturbed lands be stabilised to mitigate ongoing erosion problems and prevent sediment pollution of downstream lands and waterways.

Some finished slopes may be too steep to effectively revegetate, for example the final enbankment batters will be 2(horizontal):1(vertical)). In these situations it can be difficult to reinstate and prepare suitable growing media (ie topsoil) and protect this against erosion while plants establish. Longer term, steep slopes are also prone to drying out, leading to moisture stress in plants.

5.4.6.1 Revegetation

The use of revegetation as a stabilisation method will be limited on the Site given it industrial nature. However, where considered appropriate to use in previously disturbed areas and for the stabilisation of topsoil stockpiles, the successful revegetation of lands requires:

- availability of acceptable soil materials;

- correct site preparation and replacement of topsoil;
- selection of the most suitable establishment technique;
- selection of appropriate plant species, fertilisers and ameliorants;
- application of sufficient water for germination and to sustain plant growth if rainfall is insufficient; and
- an adequate maintenance program.

For longer term protection a mixture of perennial and annual species is best. While the perennial species are usually slower to establish, they will grow under the annual species and succeed them to provide a permanent surface protection.

Clearly visible barriers will be installed to limit access to vegetative buffer zones and rehabilitation areas.

Fertilising and watering will be used as required to assist establishment of vegetation during rehabilitation. Areas not satisfactorily revegetated will be investigated to determine the reason for failure. Appropriate remedial action will be undertaken, including replacing any lost topsoil and resowing the Site.

Note that supplementary watering may be required at all times of the year, but is more likely to be needed outside of the summer storm and cyclone season.

5.4.7 Stormwater Peak Flow Management

Stormwater retention basins will be used during the operational phase of the development to maintain predevelopment peak flows. Given that the basins will likely be implemented soon after/during the cut fill operation, the scheduling of the works is integral to ensuring the peak flows do not exceed predevelopment levels during construction. If the catchment areas undergoing earthworks are established within the low rainfall periods and the retention basins installed prior to the storm cyclone season, increases to peak flows will be minimal and will be somewhat addressed by the construction sediment basins should they be installed.

5.4.8 Site Monitoring and Maintenance

Essential to an effective system of sediment control devices, is an adequate inspection, maintenance and cleaning program. Inspections, particularly during storms, will show whether devices are operating effectively. Where a device proves inadequate, it should be quickly redesigned to make it effective (EPA, 1996). Regular site inspections are to be undertaken across the entire lease to identify erosional features, which will then be monitored on a weekly basis.

5.4.8.1 During Construction

The Environmental Supervisor will inspect the Site paying particular attention to:

- ensuring barrier fencing is maintained and exclusion zones are being observed by all site workers and contractors;
- waste receptacles are emptied regularly in a manner approved by the site superintendent;
- ensuring progressive and prompt rehabilitation of lands, that rehabilitation has effectively reduced the erosion hazard and that repairs or upgrades are initiated as appropriate;

- constructing additional erosion and/or sediment control works as might become necessary to ensure the desired erosion and sediment control is achieved, i.e. make ongoing changes to the Plan;
- maintaining erosion and sediment control measures in a functioning condition until all earthworks are completed and the Site is rehabilitated;
- removing trapped sediment and disposing this in safe areas; and
- removing temporary soil conservation structures as the last activity in the rehabilitation program.

Inspections should be undertaken on a weekly basis, and prior to, during and after rainfall events of greater than 5mm in any one 24-hr period. Maintaining records of these inspections is recommended to display due diligence.

5.4.8.2 Post Construction

- Inspect revegetation areas regularly, investigate failures and replant in failed areas.
- Ensure an adequate watering and fertilising system is maintained in revegetation areas.
- Identify any areas of localised soil erosion and implement preventative measures. This might include:
  - planting additional stabilising vegetation or wind breaks;
  - stabilising soils with a mulch or alternative soil binder; or
  - taking steps to minimise any concentrated stormwater flows.
  - Identify any areas of localised poor drainage and take remedial action. This might include:
  - installing formalised drainage channels or pipes;
  - improving soil permeability by cultivating the soil surface; and
  - improving soil permeability by installing infiltration trenches.

5.4.9 Extreme Storm Event/Cyclone Shut-down Protocol

Throughout the design of the TAN Burrup Project extreme weather events have been extensively analysed to ensure that the PROJECT will withstand such events.

The PROJECT has been designed for an operating life of 20 plus years. Accepted international design criteria have been used for proper sizing of equipment, buildings and other structures considering the extreme weather conditions likely to be experienced at the Site. Stormwater drains have been designed for 105 mm/h rainfall. The buildings will also be built to handle wind velocities up to 300 km/h in any direction at 10m above ground.

In the event of flooding due to a heavy rainfall and/or storm surge, the PROJECT (including clean surface water ponds and other areas of potential areas of contamination) will be raised to at least 5.5 m AHD to avoid any serious safety and/or environmental accidents associated with these events.

The majority of the precipitation experienced at the Site is typically associated with storm events and/or cyclones. The strong winds and regionally significant volumes of precipitation have the potential to cause erosion of the construction site and deposit sediment outside of the Site. Given the high potential for significant negative environmental impacts from such

events, it is integral that a protocol be implemented prior to site shut-down when such an event is forecast.

The protocol will involve:

- the runoff collected in the drainage channel and/or sedimentation basin should be tested, and if within the criteria, released such that the maximum basin capacity is available before the storm event;
- accumulated sediment within sediment basins is to be removed prior to large storm events to allow provide maximum capacity within the basin;
- cut drains/berms are installed on the fill site to direct runoff to sediment basin;
- all upslope diversion and clean water drains should be inspected and clear from debris to allow for the likely large volume of runoff;
- where reasonable and feasible, any stockpiles and exposed areas are to be stabilised; and
- works likely to expose large areas of soil are to be postponed to more favourable weather conditions.

5.4.10 Potential Pollutant and Waste Management

Potential pollutants and waste management is discussed further in 2-2-250-329-PRO-TRE-0111-att02 Water Quality Management Plan.

5.5 SUMMARY OF MITIGATION MEASURES

The detailed actions for managing stormwater and erosion/sedimentation and for responding to any incidents are provided in **Table 7**.

Table 7 Erosion Control and Stormwater Management Actions

Reference Number	Response and Management Actions	Timing / Critical Date	Responsible Person
CECSMP-1	Clean stormwater discharge will take the following format: • Discharge points will be controlled; • Scour protection will be provided at discharge points; and • Discharge will be to an open, shallow, gentle sloping drain. The drainage channels at north and west side of the site area will be used and constructed at an early stage.	Construction: Ongoing Operation: Ongoing	Relevant Section Manager
CECSMP-2	Schedule, as feasible, major earthworks and exposure of the site soils for lower rainfall periods.	Construction: Ongoing	Construction Site Manager
CECSMP-3	The total area to be disturbed will be 35ha area required for the PROJECT and laydown area, with disturbance to remaining landforms to be minimised where practicable.	Ongoing	Construction Site Manager Operations Site Manager
CECSMP-4	Erosion and sediment control structures will be routinely inspected and maintained to ensure they remain effective, including removal of eroded soil and silt where necessary.	Weekly (additional as required)	Environmental Officer
CECSMP-5	Manage stockpiles with the following measures: • perimetral drainage channels; • stabilsation; • wetting down;	Construction: Ongoing	Environmental Officer

CECSMP-6	Provide a single stabilised Access to the site to prevent mudtracking. Prohibit access outside approved disturbance boundary. Access outside the approved disturbance boundary is by written authorisation only. Access to be recorded on file. This will include controls for movement of vehicles and personnel on-site to avoid disturbance to undisturbed drainage lines or vegetation which may lead to increased erosion and/or sedimentation.	Ongoing	Construction Site Manager Operations Site Manager
CECSMP-7	Sample and analyse retained water prior to controlled discharge. Treat runoff as necessary to meet discharge criteria.	Prior to discharge	Laboratory Supervisor
CECSMP-8	Implement the contaminated stormwater contingency response (Figure 6) if the criteria in cannot be met.	Prior to discharge	Environmental Officer
CECSMP-9	Periodically remove solids from drainage channel as necessary. Dispose of solids appropriately.	As required	Relevant Section Manager
CECSMP-10	Install designated concrete washout basin at the site. Regularly monitor to ensure basin is emptied as required and concrete is disposed of appropriately.	Construction: As required.	Construction Site Manager Environmental Officer
CECSMP-11	Undertake regular site inspections to identify erosional features for future monitoring. Particularly following rainfall and storm/cyclone events.	Construction: Monthly	Environmental Officer
CECSMP-12	Implement Erosion Control Contingency Response should active erosion features develop. Rehabilitate/stabilise areas as soon as practicable	As required	Environmental Officer

5.6 IMPLEMENTATION

5.6.1 Contingency Response

The contingency response protocols shown in **Figures 5** and **6** will be implemented by the Environmental Officer in the event of erosion being identified on the Site or contaminated stormwater discharges. CONTRACTOR Site Manager will provide all necessary resources and all CONTRACTOR Site team will collaborate as required.

Figure 5 – Erosion Control Process Flowchart and Contingency Response

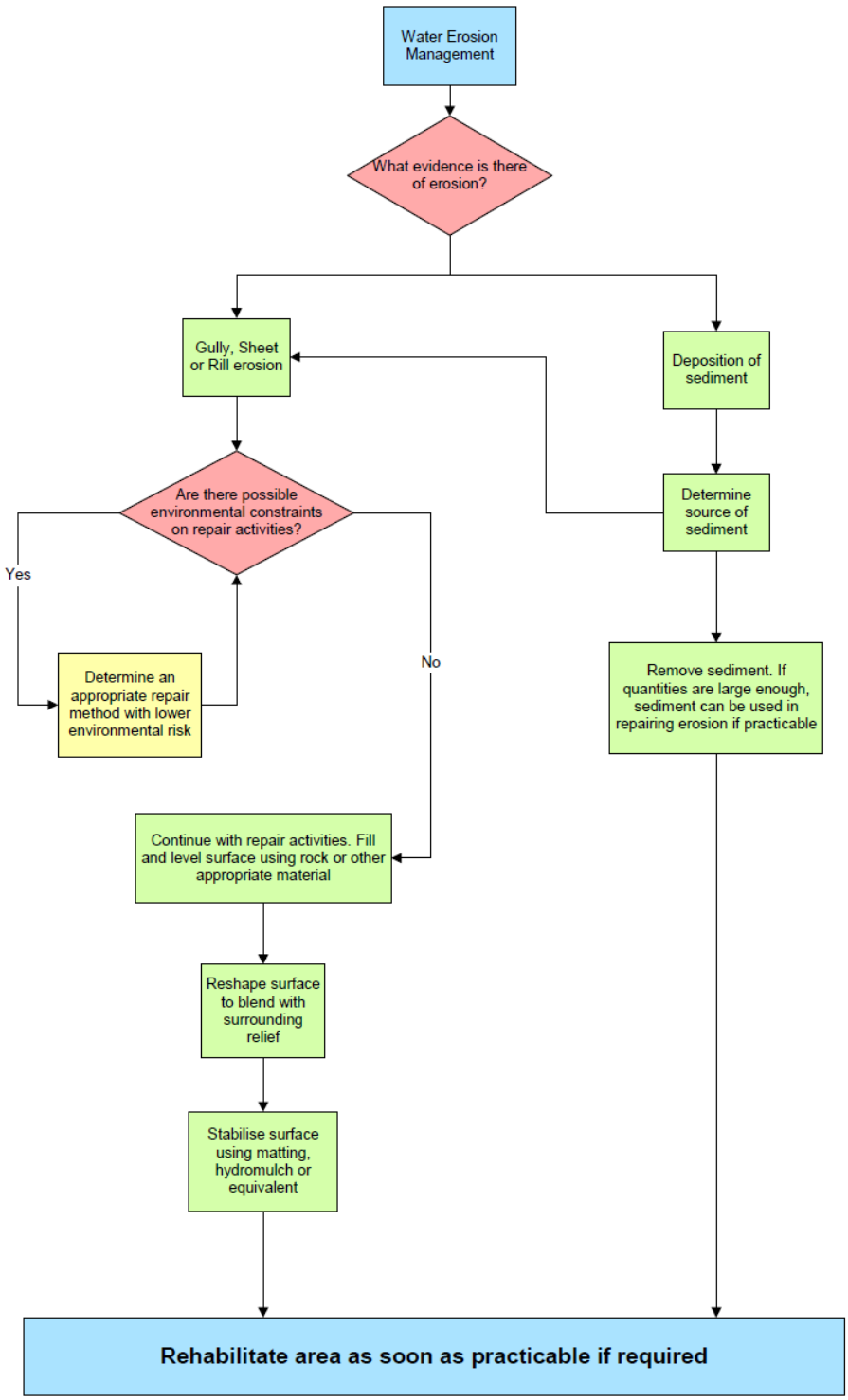
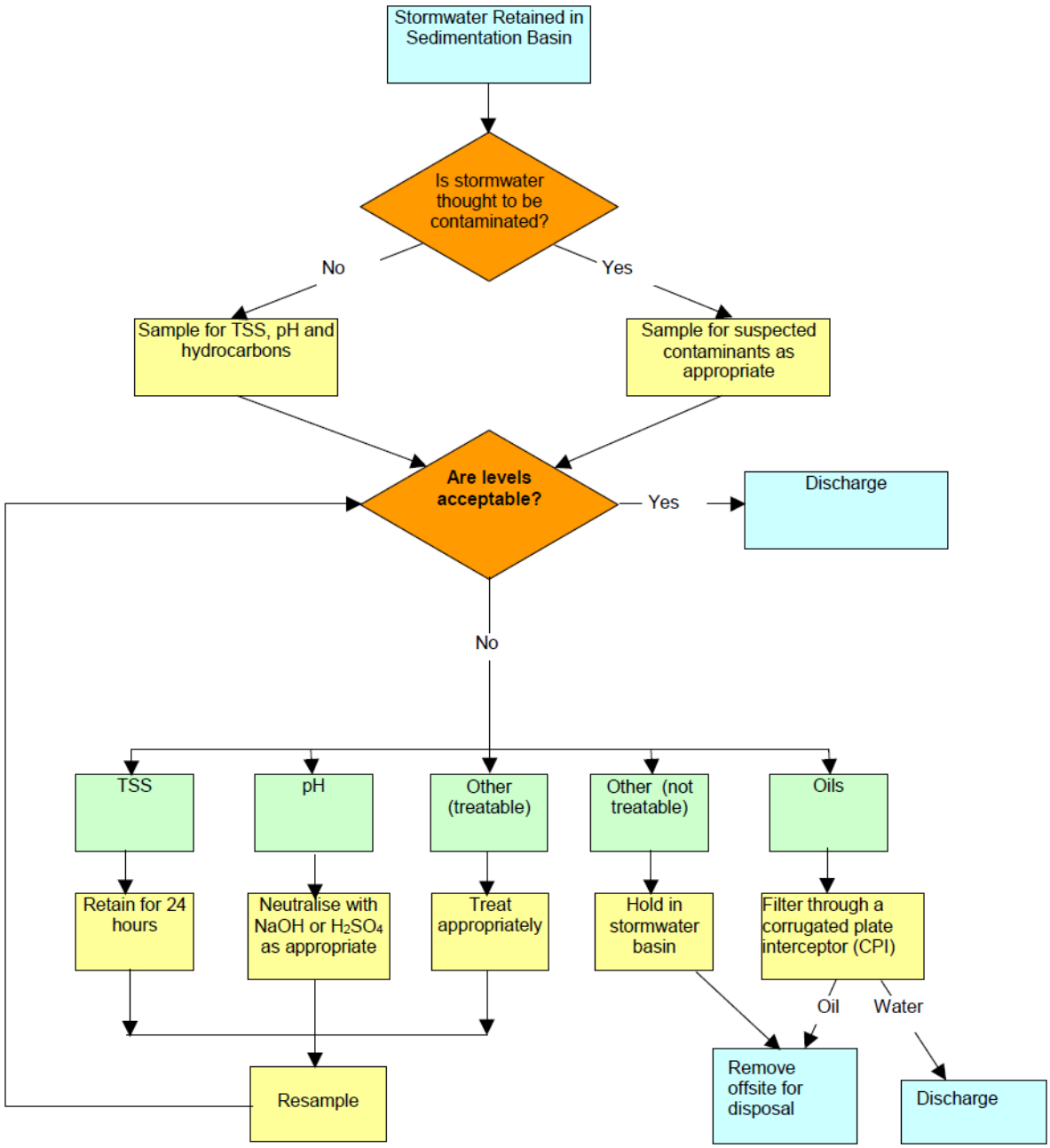


Figure 6 – Contaminated Stormwater Contingency Response



5.6.2 REPORTING

Site Inspections and stormwater quality monitoring results are to be recorded on forms similar to those provided in Attachment 02 detailing the following information:

- sampling date and location;
- brief summary of weather conditions (e.g. antecedent rain, wind, dry conditions);
- parameters and units to be detailed (to be confirmed); and
- reasons why any specified parameter could not be sampled.

In the event that monitoring indicates an exceedance of trigger levels stated in the CWQMP:

- CONTRACTOR will report such findings to the CEO within 7 days of the exceedance being identified;
- CONTRACTOR will provide evidence which allows determination of the cause of the exceedance;
- If determined by the CEO to be project attributable, the proponent shall submit actions to be taken to address the exceedance within 7 days of the determination being made to the CEO;
- CONTRACTOR will implement actions to address the exceedance and shall continue until such time as the CEO determines that the remedial actions may cease; and
- CONTRACTOR will submit bi-annually, or at a frequency defined to the satisfaction of the CEO, the results of monitoring required by condition 8-4 to the CEO, until such time as the CEO determines that reporting may cease.

Any negative impacts identified through the monitoring programs will be investigated and reported as will be required by COMPANYs Procedure: *Yara-DIR-01-P01 - Reporting of accidents, near-miss incidents, sickleave, environmental incidents, and security breaches*. This report will be provided to the General Manager (Operations), who will have the responsibility of reporting the incident to the SEWPaC if it has caused, or has the potential to cause pollution.

In addition to the Incident Report, a report will be prepared providing feedback on the cause of the incident and the response; the steps that are necessary to prevent a similar incident from occurring again; and any other opportunities for continued improvement. This report will be provided to management and disseminated throughout the operational personnel.

All non-compliances, and corrective actions implemented, will be reported by the EO in the monthly Environment Report and summarised in the annual Site Compliance Report, submitted to the SEWPaC. A summary of all water quality monitoring will be provided in the annual Environmental Report, along with any identified opportunities for improvement.

The SEWPaC will be consulted on sources of wastewater to be discharged via the brine return through the Works Approval and Operation license process, where agreed parameters and frequency of monitoring will be finalised.

5.6.3 AUDITS AND REVIEWS

The correct implementation of all provisions described in this CECSMP will be monitored by the site HSE team as part of periodic HSE inspections. Periodic inspections will be carried out by CONTRACTOR HSE Team as per Construction HSE Plan (2-250-329-PRO-TRE-0111-att12) using the HSE Inspection Sheet attached to this document (2-250-329-PRO-TRE-0111-tmp 01). Records shall be kept accordingly.

Identified deviations will be reported to all affected and involved personnel and actions follow up will ensure appropriate corrective actions are implemented. Serious deviations or incidents will be reported in writing and included in the Monthly HSE Report.

As part of Project Environmental Management system, compliance of this Construction Erosion Control and Stormwater Management Plan will be audited during internal HSE Audits performed on a periodic basis by CONTRACTOR HO HSE Team. HSE Internal Audits procedure is described in the Project Construction HSE Plan (2-250-329-PRO-TRE-0111-att12).

This CECSMP may also be audited by relevant government agencies under the scope of any external environmental compliance audits.

An internal review of this CECSMP will be conducted in response to:

- an pollution incident or unauthorised discharge is recorded as a result of the construction operations;
- a significant change in construction phase that may affect the implementation of this management plan;
- statutory requirements or directions/conditions of approvals requiring such action; or
- recommendations as a result of internal or external audits.

5.6.4 Training and Awareness

All construction personnel will undergo a general Site Induction prior to commencing work at the PROJECT. This will include an erosion and sediment control and stormwater management component to reinforce the importance of management and the measures that will be implemented to prevent erosion and protect water quality on and off the Site.

Site inductions will include:

- basic ERSED control principles;
- ‘clean’ and ‘sediment laden’ water separation on the Site;
- procedures to follow if dewatering is required;

- outline of surface water and groundwater monitoring programs; and
- spill response.

Site inductions and toolbox talks will highlight the specific environmental requirements and activities being undertaken at each worksite. These will be based on the measures outlined in the CEMP and associated sub plans.

Targeted training in the form of toolbox talks or specific training will also be provided to personnel with a key role in soil and water management. Examples of training topics include:

- sediment basin construction;
- sediment basin maintenance;
- working near or in drainage lines and creeks;
- emergency response measures in high rainfall events;
- spill response;
- ERSED control;
- stockpile location criteria;
- identification of potentially contaminated spoil and fill material; and
- the project's waste minimisation hierarchy principles of avoid, reduce, reuse, recycle or dispose and how they will apply to all aspects of the Site.

6. REFERENCES

6.1 CLIENT SPECIFICATIONS AND PROCEDURES

- Public Environmental Review for Yara Pilbara Nitrates Pty Ltd. (PER)
- YPNPL Works approval (15/07/2011)
- State of WA Statement No. 870 (07/07/2011)
- Commonwealth Approval letter from SEWPaC (14/09/2011)
- Appendix D-6 - HES Requirements during Construction & Fabrication
- Yara-DIR-01-P01 - Reporting of accidents, near-miss incidents, sickleave, environmental incidents, and security breaches

6.2 PROJECT MANAGEMENT SYSTEM PROCEDURES

Code	Title
2-250-329-PRO-TRE-0111	Construction Environmental Management Plan

6.3 ALL OTHER REFERENCES

County of Lake, California (N.D.) *Concrete*, sourced from http://www.co.lake.ca.us/Residents/Environment/Concrete.htm

Department of Water and Swan River Trust (2007) *Structural controls, Stormwater Management Manual for Western Australia*, Department of Water and Swan River Trust, Perth, Western Australia.

Environmental Protection Agency (EPA 1996) *Environmental Guidelines for Major Construction Sites*, Publication 480.

Environmental Resources Management Australia Pty Ltd (ERM) (2010) *Technical Ammonium Nitrate Production Facility Public Environmental Review*, prepared on behalf of Yara Pilbara Nitrates Pty Ltd (YPNPL) YPNPL, January 2010.

ERM (2012) *Technical Ammonium Nitrate Production Facility Hydrogeological and Hydrological Investigation,* Unpublished, ERM.

Golders (2012) *Geotechnical Investigation – Proposed Technical Ammonium Nitrate Production Facility, Burrup Peninsula*, Golder Associates, Perth WA.

IECA (2008) *Best Practice Erosion and Sediment Control, Books 1, 2 and 3*, International Erosion Control Association Australasia, Picton NSW.

Landcom (2004) *Managing Urban Stormwater Soils and Construction* (Volume 1, 4th edition). Landcom, Sydney.

Pilgrim, DH, (ed). (1987), *Australian Rainfall & Runoff - A Guide to Flood Estimation*, Institution of Engineers, Australia, Barton, ACT

7. ATTACHMENTS

Attachment 01 – Hydrological Data, IFD Chart

Attachment 02 – Site Inspection Checklist

Attachment 01 – Hydrological Data, IFD Chart

Hydrological Data

1. Intensity-Frequency-Duration Analysis

Hydrological data was obtained from an intensity-frequency-duration (IFD) table developed for the Site using the process outlined in Australian Rainfall and Runoff (Pilgrim, 1987). The Bureau of Meteorology's web-based IFD application was used to develop the table (found at http://www.bom.gov.au/hydro/has/cdirswebx/cdirswebx.shtml). A copy of the IFD table is provided within this Appendix.

2. Runoff Co-efficient

Runoff coefficient is a term that relates catchment runoff as a proportion of rainfall depth for nominated storm events, and is generally expressed as a decimal. The peak flow runoff coefficient was used for the derivation of the *Type C* sediments basins to be used on-site.

a. Peak Flow Runoff Coefficient (C10)

This converts rainfall intensity to peak discharge in a nominated 2-year Annual Recurrence Interval (ARI) storm event. The C_2 is used to estimate peak flows from a variety of storm events when multiplied by a frequency factor, used to size water conveyance structures and sediment basins for *Type C* soils. The C_2 value adopted in this plan equals 0.51.

b. Erosion Hazard Assessment

There are no permanent watercourses in the area. Assessment of the topographic features of the areas around the Site identify that significant volumes of runoff are likely to be yielded from up-gradient of the Site. A coarse estimate of catchment area based on the DEM topographic map suggests a minimum area of about 35km². Natural drainage patterns of the Site flow from north to south toward the supratidal flat separating King Bay and Hearson Cove.

The geology of the catchment is reported as being low permeability bedrock. This, coupled with shallow surface sediments will result in low infiltration of rainwater and the rapid saturation of surface soil leading to saturated overland flow. Furthermore, sparse vegetation within the catchment will lead to low interception storage of rainfall. The rapid response to rainfall, which is characteristic of the hills across the Burrup Peninsula, is described in the Karratha Storm Surge Inundation Study (Bureau of Meteorology Special Service Unit Report No. SSU96-7). The steep rocky terrain is known to favour the rapidly responsive catchment system within the region. During periods of high rainfall it is assumed that a significant volume of runoff will be produced given the low infiltration and low interception storage of rainfall being characteristic of the Site catchment.

Referring to topographic mapping, backfilling at the Site will impede at least four minor drainage channels. The upslope diversion drain will redirect runoff from these drains around the Site and into the supratidal flat, preventing localised flooding upslope of the Site.

The erosion risk of the Site has been predicted based on the average monthly rainfall depth. In accordance with IECA (2008) risk rating system, the following erosion risk table has been developed based on BOM (2012.) recorded rainfall information.

Table A1 Site Erosion Risk Based on Monthly Rainfall

Month	Average Monthly Rainfall (mm)	Erosion Risk Rating
January	47.7	Moderate
February	80.5	Moderate
March	51.3	Moderate
April	17.9	Very Low
May	25.1	Very Low
June	29.0	Very Low
July	14.6	Very Low
August	4.8	Very Low
September	1.5	Very Low
October	0.3	Very Low
November	1.6	Very Low
December	12.7	Very Low
1. Erosion Risk Rating based on IECA (2008) methodology.		

The erosion risk rating is moderate during the cyclone and storm season during January, February and March and for the remainder of the year, the Site will has a very low erosion risk rating. The annual erosivity factor or R factor was determined using the following formula:

$$R = 164.74\ (1.1177)^{S}\ S^{0.6444}$$

Where:

S = 2 year ARI, 6 hour rainfall event (8.94mm/hr).

A conservative estimate of 0.053 was assumed for the soil erodibility factor. This assumption was based on typical erodibility factors associated with the UCS soil types observed. The estimate of 0.053 will be highly conservative given:

- it was based on the highest erodibility factor typically observed in soils classified as GM using the USC system (IECA 2008);
- the compacted fill that will be prevalent across the Site during construction; and

- a k-factor of 0.075 is considered very high.

Given the dry climate and temporary nature of the construction activities, the magnitude of any potential impacts associated with mobilisation of sediment is considered to be low. There are no permanent water courses in the area, however the coastal mangrove ecosystems in King Bay are considered to representative a sensitivity that is Medium.

Therefore the significance of the potential impact associated with soil erosion and increased sediment load is expected to be considered Minor.

Attachment 02 – Site Inspection Checklist

EROSION AND STORMWATER INSPECTION CHECKLIST

Date of Inspection			
Start Time		**Finish Time**	
Conducted By			
Weather Conditions		Recent Rainfall …….. Y/N If Yes, Rainfall amount…….mm	

Inspections to be Completed	**Compliance with CEMP (tick one box)**			**Comments/ Corrective Action(s) Required?**	**Action by / Date**	**Date Completed**
	NA	**Yes**	**No**			
Site Erosion						
Are work activities and land disturbance being confined to the minimum area practicable and are sensitive areas being avoided/protected? [*Use barrier fence where required to control access and limit the extent of disturbance*]	☐	☐	☐			
Is site access controlled to limit unnecessary disturbance (preferably limited to a single stabilised access point)?	☐	☐	☐			
Is there evidence of problematic site erosion associated with project activities?	☐	☐	☐			
Does an erosion hazard exist that requires installation of new erosion and sediment controls?	☐	☐	☐			
Is upstream 'run-on' stormwater being successfully diverted around or through the work site to protect disturbed areas? [*stormwater diversions should be in place before land disturbance commences*]	☐	☐	☐			
If a surface water body is nearby, is there evidence of increased turbidity attributable to the project downstream of the construction activities?	☐	☐	☐			

Are appropriate site erosion control measures (barrier fencing, stormwater diversions, mulch, surface stabilisation) in place where required and are they being properly maintained?	☐	☐	☐			
Are suitable measures in place for collecting and disposing of wastewaters (e.g. turbid water from excavation dewatering, concrete wash water) and preventing discharge of pollutants to waterways	☐	☐	☐			
Are stockpiles located away from sensitive areas such as areas of concentrated flow (e.g. natural waterways, channels, gutters), steep slopes and native vegetation? [*Do not place stockpiled materials inside vegetation protection areas or within 5 metres of retained trees, or waterways*]	☐	☐	☐			
Is stormwater run-on being diverted away from stockpiles?	☐	☐	☐			
Are appropriate erosion and sediment controls in place around the worksite and are they properly maintained?	☐	☐	☐			
Are sediment traps filled with so much sediment that their function is reduced? [*Sediment should be removed from traps when it accumulates to 1/3 of the capacity of the device*]	☐	☐	☐			
Are all completed work areas being successfully stabilised (by vegetation or other means)?	☐	☐	☐			
Is the site inspected weekly and after all significant rain events to assess the integrity and performance of the erosion and sediment controls and ensure ongoing maintenance of erosion and sediment controls	☐	☐	☐			
Are fuels, waste oils, greases and chemicals stored in an appropriately bunded areas at the construction site	☐	☐	☐			
Are spill kits available and fully stocked?	☐	☐	☐			
Checked By:						
Authorised By:						

ATTACHMENT 04:

Construction Waste Management Plan

(CWMP)

TABLE OF CONTENTS

1. PURPOSE

The purpose of this Construction Waste Management Plan is to identify and take all necessary measures, especially preventive measures, to achieve an appropriate waste disposal during the execution of the TAN Burrup Project on behalf of BNPL.

This plan describes in detail how solid and liquid waste generated in this project shall be handled, treated and disposed of according with environmental provisions stated in the Construction HSE Plan.

This Plan needs to be read together with the Construction Environmental Management Plan (2-250-329-PRO-TRE-0111), in which general issues such as roles, responsibilities, environmental monitoring, inspection, auditing and reporting are described.

2. SCOPE

This Construction Waste Management Plan shall be applied to every activity performed in Site by CONTRACTOR or any of its SUBCONTRACTORS during the execution of the TAN Burrup Project.

This Project will be performed by means of modular construction and therefore, this Construction Waste Management Plan is applicable to all activities generating waste to be performed by CONTRACTOR and any of its SUBCONTRACTORS as part of the Construction, Pre-Commissioning and Commissioning phases of the TAN Burrup Project in the Construction Site at the Burrup Peninsula where the modules are going to be installed, erected and hooked up. Any waste generated in the yard(s) where modules are being constructed a different document will be applicable.

Activities to be carried out during Construction, Pre-Commissioning and Commissioning are:

- ✓ Site Preparation
- ✓ Temporary Facilities construction
- ✓ Civil works
- ✓ Mechanical Erection
- ✓ Module erection and hook ups
- ✓ Electrical and Instrument Erection
- ✓ Insulation and painting (most of it to be performed at yard)
- ✓ Hydrotesting
- ✓ Chemical cleaning
- ✓ Air/steam blowing
- ✓ Start up

3. DEFINITIONS AND ACRONYMS

3.1 DEFINITIONS

COMPANY	Yara Pilbara Nitrates Pty Ldt
CONTRACTOR	Técnicas Reunidas S.A. (TR)
ASSEMBLY AREA / MUSTER POINT	A safe place where personnel on site can be gathered in the event of an emergency.
CARRIER	Licensed by the DoE to collect and transport controlled waste on a public road for gain or reward.
CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN	Document issued by CONTRACTOR to describe in detail how construction activities are going to be dealt with in order to minimize environmental impact.
CONTAINER	A receptable for holding controlled waste

CONTROLLED WASTE	All liquid waste and any wastes that cannot be disposed of at a Class I, II or III landfill site.
DISPOSAL	Final stage in the management of the waste stream
DRIVER	A person who drives a vehicle used to transport controlled waste.
EMERGENCY	A situation that is beyond the ability of one person to resolve and /or has caused or has a potential to result in harm to people, the community, the environment, reputation or plant and property asset.
EMERGENCY RESPONSE	Combination of steps and actions carried out to manage an unplanned event or situation that may pose risk to people, assets or the environment and to achieve recovery from a that event.
ENVIRONMENTAL EMERGENCY	Unplanned event that impacts negatively on the environment in any way, including outside the construction site area.
GENERATOR	A person whose activities produce, or apparatus result in the production of controlled waste.
LANDFILL	A site used for disposal of solid material (i.e. is spadeable) by burial in the ground that is licensed as a landfill under the Environmental Protection Act 1986.
SITE	Area within the disturbance boundary.
STORAGE	Placement of material in one place for more than one day with the intention to relocate, reuse or dispose of the material within a time limit specified before commencement of such storage.
SUBCONTRACTOR	Organizations which, under the co-ordination of CONTRACTOR, perform construction and erection activities for the project.
TRACKING FORM	Paper based form, in triplicate, used to record the collection, transportation and treatment or disposal of controlled waste.

TREATMENT	Physical, chemical or biological processing of a waste for disposal or reuse.
WASTE	In Western Australia (Landfill Waste Classification and Waste Definitions), waste is defined as: • Any substance that is discarded, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration in the environment; • Any discarded, rejected, unwanted, surplus or abandoned substance; • Any otherwise discarded, rejected, unwanted, surplus or abandoned substance intended for sale or for recycling, reprocessing, recovery, or purification by a separate operation from that which produced the substance; • Any substance described in regulations under the Environmental Protection Act 1986 as waste.

3.2 ACRONYMS

AN	Ammonium Nitrate
BNPL	Burrup Nitrates Proprietary Limited
CEMP	Construction Environmental Management Plan
CWMP	Construction Waste Management Plan
DoE	Department of Environment
EPA	Environmental Protection Agency
MSDS	Material Safety Data Sheet
NA	Nitric Acid
Rd	Road
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
TAN	Technical Ammonium Nitrate
TANPF	Technical Ammonium Nitrate Production Facility
TR	Técnicas Reunidas S.A.
WA	Western Australia
YPFPL	Yara Pilbara Fertilisers Proprietary Limited

4. PROCEDURE

The first action towards an appropriate waste management should be focused on waste generation minimization by means of reducing waste at source. In pursuing this aim, best environmental practices summarised below will be implemented as far as reasonably practicable:

- Reconsidering the use of substances with problematic waste characteristics and choosing substances or materials that are re-usable or recyclable where practicable (early construction planning).
- Establishing an adequate preference order while planning waste management strategy:
    1. Source reduction.
    2. Reuse when possible.
    3. Recycling when possible.
    4. Treatment (under specialized waste management companies).
    5. Responsible disposal (under specialized waste management companies).

4.1 WASTE CLASSIFICATION

According with the Environmental Protection Regulations 1987, waste to be generated during Project execution can be classified as follows:

- Clean Fill: Material that will have no harmful effects on the environment and which consists of rocks or soil arising from the blasting operations and excavation of undisturbed material.
- Inert waste: Wastes that are largely non-biodegradable, non-flammable and not chemically reactive. Inert wastes are subdivided into three separate classes:
    - Type 1 - Inert wastes which contain contaminants in concentrations less than the specified criteria, including building and demolition waste which does not

contain any asbestos, asphalt waste, casting sand, blasting sand and biosolids.

- Type 2 - Wastes consisting of non-biodegradable organic materials such as tyres and plastics, which are flammable and require special management to reduce the potential for fires.

- Putrescible: Component of the waste stream likely to become putrid - including wastes that contain organic materials such as food wastes or wastes of animal or vegetable origin, which readily bio-degrade within the environment of a landfill.
- Hazardous: Hazardous wastes are generally unsuitable for landfill disposal because they pose a threat or risk to public health, safety or the environment and should only be accepted within landfills after appropriate treatment and/or in accordance with specific licence conditions or with specific, written approval from the Director, Environmental Management Division. It includes substances which are toxic, infectious, mutagenic, carcinogenic, teratogenic, explosive, flammable, corrosive, oxidising and radioactive.
  - Intractable: Waste not suitable for disposal in a Class I, II, III or IV landfill because of its toxicity or chemical or physical characteristics (i.e. radioactive waste, significantly contaminated soils, industrial sludge). They will be disposed of in Class V landfill.
- Special: Includes asbestos wastes and certain types of biomedical wastes that are regarded as hazardous but which, with special management techniques, may be disposed of safely within specified classes of landfill.
  - Type 1 Special Waste - Asbestos Wastes
  - Type 2 Special Waste – Biomedical Wastes

The expected wastes that will be generated during the different activities are:

Activity	Type of waste	Waste Classification
Blasting	Rocks	Clean Fill
	Non detonated material	Hazardous
Clearing/ Excavations	Soil	Clean Fill (not contaminated soils)
		Hazardous (contaminated soils)
		Intractable (significantly contaminated soils)
	Rest of vegetation not re-used, mainly spinifex.	Clean Fill
Civil works	Scrap metal, wood, paper, cardboard	Inert-Type 1
	Concrete/ Stained concrete soil	Inert-Type 1
	Plastics	Inert-Type 1 or 2
	Resins, striking material	Hazardous. See MSDS
	Paint drums, waste oil, waste paint, solvents.	Hazardous.
	Contaminated soil by accidental spill.	Hazardous (contaminated soils)
		Intractable (significantly contaminated soils)
Modules erection and hook ups	Scrap metal, wood, paper, cardboard	Inert-Type 1
	Plastics	Inert-Type 1 or 2
	Paint drums, waste oil, waste paint, solvents.	Hazardous.
	Isolating material	Inert
		Hazardous (See MSDS)
	Radiographic waste	Intractable
	Contaminated soil by accidental spill.	Hazardous (contaminated soils)
		Intractable (significantly contaminated soils)
Precomissioning and Commissioning	Hydrotesting water	Depending of the products used (see MSDS). In case of doubt, sampling and analysis may be needed.
	Cleaning materials (chemical products)	
	Dirty cloths	Inert-Type1 (if not contaminated)
		Hazardous (if contaminated)
	Filters, gaskets and other consumables, plastic, cardboard	Inert-Type 1 or 2

The expected wastes that will be generated in the different facilities are:

Facility	Type of Waste	Waste Classification
Temporally facilities	Paper, plastic, cardboard	Putrescible
	Batteries	Hazardous (if contains Hg)
Canteen	Bio degradable material	Putrescible
	Paper, plastic, cardboard	
First Aid	Bio medical waste	Special waste
	Paper, plastic, cardboard	Putrescible

Furthermore, emergency situations can occur, generating waste. These situations are included in the Construction Emergency Response Management Plan and can be summarised as follows:

Emergency scenarios		Waste	Type of waste
Natural Hazards	Cyclones / Storm Surge	Wet material Liquid streams Contaminated soil	Unknown composition: sampling and analysis may be needed. Known composition: management according with the type of waste.
	Potential Sea Level Rise		
	Earthquakes	Demolition waste	Inert-Type 1
Fire		Ashes	Unknown composition: sampling and analysis may be needed. Known composition: management according with the type of waste.
		Burn material	
		Extinguishing Wastewater	Hazardous
Spills		Contaminated soil	Hazardous (contaminated soils)
			Intractable (significantly

Emergency scenarios	Waste	Type of waste
		contaminated soils)

Hazardous waste, intractable waste and special waste is considered controlled waste and it cannot be disposed of at a Class I, II or III landfill site (see attachment 1 Controlled waste: categories and description).

4.2 SOLID WASTE MANAGEMENT

4.2.1 Collection, segregation and storage

Even though environmental best practices promote waste generation minimization some waste will be necessarily produced and therefore, it shall have to be dealt with; collection, segregation and storage of waste shall be done in a safe and healthy manner according with the following principles:

- Make sure you know the composition of the waste stream to be managed. If there is uncertainty about it, sampling and analysis will be carried out to enable appropriate storing, transportation requirements and disposal method and site.
- Waste storage areas and waste containers will be properly identified by means of signs and pictures to help workers segregate waste.
- Waste shall be collected and segregated according to waste classification so that no different types of waste are mixed.
- Hazardous and non hazardous waste must never be mixed, especially where flammable materials are involved.
- Waste storage areas will be protected against soil and groundwater contamination because of potential accidental spills. Moreover, containers to

be used will be anti-corrosive and will prevent waste being blown away during storage and handling and accidental leakage.

- Waste storage areas shall be provided with fire prevention measures, pest control, and odour control measures.
- Stock-piling of waste material and/or waste burning is forbidden.
- All leaks, spills and releases shall be recorded and reported.
- Storing areas will be inspected and audited on a periodic basis to ensure they comply with requirements and no contamination is produced.

Controlled waste

Due to the special hazardousness of this type of waste, specific safety and environmental requirements shall be complied with:

- Containers shall be marked with warning labels and waste composition identification.
- Storage will be done in specific areas clearly identified and provided with emergency response equipment (fire extinguishers, spill kits, warning and directional signs to indicate the nearest telephone and emergency exit).
- Waste shall be handled according to the initial products manufacturer's instructions.
- Containers will be appropriate for the waste stored and provided with secondary containment for liquid wastes so as to minimize the potential for an uncontrolled release.
- As far as reasonably practicable all hazardous waste shall be stored in its original container or, if not possible, it shall be stored in tightly closed, leak proof containers made of materials which are compatible with the hazardous waste to be stored.
- Radioactive waste disposal must be approved by the Radiological Council of Western Australia.

In order to avoid dangerous incidents, incompatible hazardous waste must never be mixed.

Incompatibilities by Hazard Class are showed bellow:

	Acids inorganic	Acids, oxidizing	Acids, organic	Alkalis (bases)	Oxidisers	Poisons, inorganic	Poisons, organic	Water-reactives	Organic solvents
Acids inorganic			x	x		x	x	x	x
Acids, oxidizing			x	x		x	x	x	x
Acids, organic	x	x		x	x	x	x	x	
Alkalis (bases)	x	x	x				x	x	x
Oxidisers			x				x	x	x
Poisons, inorganic	x	x	x				x	x	x
Poisons, organic	x	x	x	x	x	x			
Water-reactives	x	x	x	x	x	x			
Organic solvents	x	x		x	x	x			

4.2.2 Waste transportation and disposal

CONTRACTOR and its SUBCONTRACTORS shall ensure they hire an approved and authorized company to transport collected and segregated waste in required conditions and in compliance with all applicable requirements to minimize environmental, fire and explosion hazards as well as worker exposure. Carriers, drivers and vehicles and tanks must be licensed according with the Environmental Protection (controlled waste) regulations 2004.

Waste generators (CONTRACTOR and its SUBCONTRACTORS) shall:

- ✓ Provide accurate information to Carrier regarding the category, quantity and type (Bulk or Packaged) of the controlled waste to be transported.
- ✓ Collect and keep the “Controlled Waste Receipt” provided by the driver (no receipt is required for packaged controlled waste smaller than 200 litres or kilograms). This

receipt must include: controlled waste tracking number for the transportation of the waste, type and quantity of controlled waste and the loading date on the vehicle or tank. Waste generator shall keep the Controlled Waste Receipt for a period of at least 3 years.

- ✓ Sign the "Tracking Form" when the Carrier collects the consignment(s) of controlled waste. This is a paper based form, in triplicate (yellow, green, white copies), used to record the collection, transportation and treatment or disposal of controlled waste. Any of these copies shall not be retained by waste generators but submitted according to the following procedure as per Paper Tracking Forms – Guideline No. 5, based on the Environmental Protection (Controlled Waste) Regulations 2004:
  - Green copy, to be returned to the DEC.
  - Yellow copy, to be retained by the carrier.
  - White copy, to be retained by the disposal site.

Controlled waste will be transported as Packaged Controlled Waste, when collected in containers or drums, or as Bulk Controlled Waste when collected in enclosed tanks.

Packaged controlled waste applies to waste oil, waste solvents, sanitary wastewater, contaminated soils and clinical waste. Containers will be sealable (to prevent odours) and leak proofed.

On the other hand, bulk controlled waste must meet the following criteria for being transported as such:

- ✓ Flashpoint > 61 ºC
- ✓ 2 < pH < 12,5

SUBCONTRACTORS are also responsible for ensuring waste is carried to an authorized landfill and that it is disposed of in a correct manner according with statutory applicable regulations.

4.3 LIQUID WASTE MANAGEMENT

Several requirements are necessary to be taken into account in relation with the different wastewater streams expected during Construction, Pre-Commissioning and Commissioning phases:

- Construction activities:
    - Sanitary Wastewater will be driven to a septic tank until it is collected by truck and carried to an offsite treatment plant for necessary treatment prior to disposal. Wastewater removal is foreseen every 3-4 days having the tank a capacity for over a week quantity of wastewater generated during peak phase.
- Pre - Commissioning and Commissioning:
    - Hydrotesting wastewater shall be recycled and re-used. Non usable water will be dealt with by hydrotesting SUBCONTRACTOR. Hydrotesting wastewater shall be dealt with in compliance with regulations in force.
    - Chemical cleaning waste will be treated as hazardous waste where applicable. Awarded SUBCONTRACTOR will be responsible for managing all waste generated during such activities in compliance with requirements.

Wastewater generated will be classified and segregated as clean or contaminated wastewater, so that no contaminated water is directly discharged to drainage systems.

Water from the clean surface pond has to be tested, treated and confirmed as meeting Water Corporation and EPA acceptance criteria before its release off-site to Water Corporation.

Prior the use of the ponds it is necessary to ensure that:

- Ponds have been designed to comply with Department of Water requirements.
- Appropriate management measures will be put in place to deter birds from the ponds, in particular, EPBC Act migratory listed birds shall be prevented from entering into the contaminated water pond in accordance with DEC.

4.4 WASTE INVENTORY

Waste generated, removed and disposed of shall be controlled and identified. A waste inventory shall be produced and updated on a monthly basis including all relevant information required to allow waste traceability and identification at any moment.

The waste inventory included in Template 01 of this attachment shall be filled out and updated prior to Construction activities' commencement. Real quantities generated and disposed of will be recorded and included as part of the Environmental section of site HSE Monthly Reports to ensure the above required traceability. Detailed information regarding Controlled Waste Receipt and Tracking Form identification codes will be included in this inventory.

Find below a global estimation of waste expected to be generated during construction phase of the Project:

TYPE OF WASTE	ESTIMATED QUANTITY
Construction debris (inert waste)	300 m^3
Scrap metal waste	250 tn
Wood, packing and paper	1000 tn
Plastic	12 m^3
Hazardous waste (oil rags, paints, contaminated soil)	34 m^3
Waste oil	5,8 m^3
Sanitary / Grey water	25 m^3 / d
Domestic waste	143 kg / d

4.5 UNINTENDED RELEASE AND SPILL CONTROL

All necessary measures will be taken to prevent hydrocarbon (e.g. oil, diesel, etc.) and chemical (caustic, acid, detergent, etc.) contamination of soil and groundwater. CONTRACTOR HSE Site Manager will make sure that maintenance operations done to vehicles and equipment are correctly performed and that all equipment and machinery is in safe working conditions so that no spill shall occur.

In the event of a spill, it is necessary to take immediate action, especially if hazardous substances are involved. The soil affected has to be removed and treated as waste, following the instructions of this Plan and Yara-T0PS 5-04.

The incident shall be reported according with the Construction Emergency Response Management Plan (2-250-329-PRO-TRE-0113) and YARA-DIR-01-P01 (Reporting of accidents, near-miss incidents, stickleave, environmental incidents, and security breaches).

4.6 INVOLVED PARTIES

SUBCONTRACTORS shall be responsible for complying with all waste generator roles and responsibilities while managing generated waste. CONTRACTOR will be responsible for its own waste.

Additionally, CONTRACTOR shall coordinate all activities involved in waste management and shall support the SUBCONTRACTORS in their obligations.

DRIVERS shall transport the waste to an authorized site. They are responsible for a safe transportation and they must contact CONTRACTOR or SUBCONTRACTORS in case they require specific actions during the delivery of the waste from the waste generators to landfill.

4.7 INDUCTION AND TRAINING

To ensure awareness and knowledge of the hazards posed by the improper handling, storage and transport of waste substances and their containers, appropriate induction and training will be provided to all staff, especially those directly involved in waste handling.

It is mandatory for all construction workers to attend the HSE Induction Session organized by CONTRACTOR which will include environmental issues. No employee will be permitted to work or allowed access to site without first attending the Induction Session.

Main issues that shall be addressed as part of this environmental training during induction will include:

- Necessary regulatory compliance with applicable regulations as well as any other COMPANY requirements.
- How to handle, store and manage any kind of waste.
- Potential environmental problems recognition (e.g. spills, improper handling or storage, etc) for all waste streams.
- The recommended practices for reusing, recycling and disposal of different types of waste.
- Communication protocols in order to solve problems.

The attendants shall be identified by name and signature. This record shall be file in the HSE office at the Construction Site.

Additional specific environmental training will be scheduled and organized for the Environmental Team to undertake it. Refreshing training sessions will be organized as required along the duration of the Construction Project activities.

4.8 INSPECTIONS AND REPORTS

CONTRACTOR and its SUBCONTRACTORS shall inspect their own operations and correct deficiencies and/or non-compliance situations immediately.

Daily inspections shall be carried out by CONTRACTOR in order to ensure that no environmental problems exist, waste segregation and storing is done in compliance with requirements set forth in the previous sections of this Plan and corrective actions are taken where required.

The results of these inspections will be discussed during meetings and toolbox talks as deemed necessary and main issues included in a specific section of the HSE Monthly Report.

4.9 AUDIT

As part of Project Environmental Management system, compliance of this Construction Waste Management Plan will be audited during internal HSE Audits performed on a periodic basis by CONTRACTOR HO HSE Team.

5. REFERENCES

5.1 CLIENT SPECIFICATIONS AND PROCEDURES

Yara-T0PS 5-04	Handling of offspec material in production of AN-containing products
YARA-DIR-01-P01	Reporting of accidents, near-miss incidents, stickleave, environmental incidents, and security breaches.

5.2 LEGISLATION

- Waste Avoidance and Resource Recovery Act 2007
- Environmental Protection Regulations 1987-Landfill Waste Classification and Waste Definitions 1996 (as amended December 2009)
- Environmental Protection (Controlled Waste) Regulations 2004
- WA's Contaminated Sites Act 2003
- Works Approval (15/07/2011)
- Commonwealth Final Approval Decision for Burrup Nitrate facility (14/09/2011)
- WA Approval (Statement No. 870)

5.3 CONTRACTOR MANAGEMENT SYSTEM PROCEDURES

CONTRACTOR is in possession of the ISO 14001 certificate (environmental management system). The next procedures are currently in force and must be followed during the Tan Burrup Project:

PG-04	IDENTIFICATION AND EVALUATION OF ENVIRONMENTAL ASPECTS
PG-05	IDENTIFICATION AND ACCESS TO LEGAL AND OTHER ENVIRONMENTAL REQUIREMENTS

PG-06	DEVELOPMENT OF ENVIRONMENTAL MANAGEMENT PLANS
PG-07	OBJECTIVES PROGRAMMING
PG-08	IDENTIFICATION AND RESPONSE TO POTENTIAL ACCIDENTS AND
PG-10	COMPETENCE, TRAINING AND AWARENESS
PG-12	TREATMENT OF NON CONFORMITIES, CORRECTIVE AND PREVENTIVE
PG-14	WASTE MANAGEMENT
PG-15	ENVIRONMENTAL MANAGEMENT SYSTEM INTERNAL AUDITS

5.4 PROJECT RELEVANT HSE DOCUMENTATION

2-250-329-PRO-TRE-0111	Construction Environmental Management Plan
2-250-329-PRO-TRE-0113	Construction Emergency Response Management Plan

6. ATTACHMENTS AND TEMPLATES

Attachment 01	Controlled waste: categories and description
Attachment 02	Landfill Waste Classification
Template 01	Waste Inventory

Attachment 01 – Controlled waste: categories and description

Controlled waste: categories and description			
Category Group No.	**Category Group Name**	**Category No.**	**Description**
1	Biological waste	1.01	Animal wastes - smallgoods; tallow; and animals slaughtered for quarantine purposes.
		1.02	Septage wastes - wastes from apparatus for the treatment of sewage.
		1.03	Grease wastes - wastes resulting from food preparation processes.
		1.04	Vegetable oils and derivatives and other wastes (excluding wastes referred to in categories 1.01, 1.02 and 1.03)
		1.05	Sewage waste from the reticulated sewage system (ie Water Corporation)
2	Solid/Sludge Waste Requiring Special Handling	2.02	Contaminated soils (Class IV or V))
		2.03	Fly ash
		2.04	Filter cake
		2.05	Containers or drums contaminated with residues of a controlled waste
		2.06	Encapsulated, chemically-fixed, solidified or polymerized wastes
		2.07	Waste of an explosive nature not subject to other legislation
		2.08	Industrial waste treatment plant sludge's and residues
3	Clinical and Pharmaceutical Wastes	3.01	Clinical and related wastes (biomedical)
		3.02	Pathogenic substances
		3.03	Cytotoxic substances
		3.04	Waste from the production or use of pharmaceutical products
4	Pesticide Wastes	4.01	Concentrates
		4.02	Solutions
		4.03	Organochlorine pesticides
5	Paints and	5.01	Wastes from the production formulation or use of inks,

	Resins		dyes, resins, adhesives, glues, latex or plasticisers
		5.02	Oil based paints (all options)
		5.03	Water based and acrylic paints (all options)
6	Oils and Emulsions	6.01	Oil interceptor waste
		6.02	Oil/water mixtures
		6.03	Oil sludge's i.e. plate separators
		6.04	Waste mineral oils unfit for their originally intended use
7	Solvents	7.01	Halogenated aliphatics
		7.02	Non-halogenated aliphatics
		7.03	Halogenated aromatics
		7.04	Non-halogenated aromatics
8	Other Organic Chemicals	8.01	Engine Coolants
		8.02	Ethers
		8.03	Highly odorous organic chemicals (including mercaptans and acrylates)
		8.04	Isocyanate compounds
		8.05	Organohalogen compounds other than substances referred to elsewhere in this schedule
		8.06	PBB's (polybrominated biphenyls)
		8.07	PCB's (polychlorinated biphenyls)
		8.08	PCN's (polychlorinated napthalenes)
		8.09	PCT's (polychlorinated terphenyls)
		8.10	Phenols and phenol compounds including chlorophenols
		8.11	Phosphorous compounds
		8.12	Surface acting agent (Surfactant) - Detergents
		8.13	Surface acting agent (Surfactant) – Wetting Agents
		8.14	Surface acting agent (Surfactant) - Emulsifiers
9	Acids	9	
10	Alkalis	10	
11	Chromium	11	
12	Cyanide	12.1	Inorganic cyanide
		12.2	Organic cyanide

13	Inorganic chemicals other than inorganic chemicals referred to in Category Groups 9 - 12	13.1	Antimony or Antimony compounds
		13.2	Arsenic or Arsenic compounds
		13.3	Barium compounds (excluding barium sulphate)
		13.4	Beryllium; beryllium compounds
		13.5	Boron
		13.6	Cadmium or cadmium compounds
		13.7	Chlorates
		13.8	Cobalt compounds
		13.9	Copper compounds
		13.10	Fluorine compounds (excluding calcium fluoride)
		13.11	Lead; lead compounds
		13.12	Mercury
		13.13	Metal Carbonyls
		13.14	Nickel compounds
		13.15	Non toxic salts
		13.16	Perchlorates
		13.17	Phosphorous compounds
		13.18	Photographic waste
		13.19	Selenium; selenium compounds
		13.20	Sulphides
		13.21	Tellurium
		13.22	Thallium
		13.23	Vanadium compounds
		13.24	Zinc compounds
14	Low strength waste water	14.01	Industrial wash waters
		14.02	Storm water
		14.03	Pond water
		14.04	Fire debris and wash water (may vary)
15	Miscellaneous	15.01	Residues from industrial waste treatment or disposal operations
		15.02	Waste from the manufacture, formulation and use of wood-preserving chemicals

		15.03	Waste chemical substances arising from research and development or teaching activities including those which are not identified or new, or the effects on environment or human health are not known etc.
		15.04	Waste resulting from surface treatment of metals and plastics (potentially various categories)
		15.05	Waste tarry residue arising from refining, distillation or pyrolytic treatment
		15.06	Waste tyres

Source: Environmental Protection (Controlled Waste) Regulations 2004 / Schedule 1 of the Controlled Waste Regulations

Attachment 02 – Landfill Waste Classification

Landfill Waste Classification		
Landfill Class	**Common Name**	**Waste types permitted for disposal**
1	Inert	• Clean Fill • Type 1 Inert Waste • Contaminated solid wastes meeting waste acceptance criteria specified for Class I landfills (possibly with specific licence conditions) • Type 2 Inert Waste (with specific licence conditions) • Type 3 Inert Waste (subject to SEWPaC approval) • Type 1 Special Wast
2	Putrescible	• Clean Fill • Type 1 Inert Waste • Putrescible Wastes • Contaminated solid waste meeting waste acceptance criteria specified for Class II landfills (possibly with specific licence conditions) • Type 2 Inert Wastes (with specific licence conditions) • Type 1 and Type 2 Special Wastes (for registered sites as approved under the Controlled Waste Regulations)
3	Putrescible	• Clean Fill • Type 1 Inert Waste • Putrescible Wastes • Contaminated solid waste meeting waste acceptance criteria specified for Class II or Class III landfills (possibly with specific licence conditions) • Type 2 Inert Wastes (with specific licence conditions) • Type 1 and Type 2 Special Wastes
4	Secure	• Clean Fill • Type 1 Inert Waste • Contaminated solid waste meeting criteria specified for Class II, Class III or Class IV landfills (possibly with specific licence conditions)

		• Type 2 Inert Wastes (with specific licence conditions) • Type 1 and Type 2 Special Wastes
5	Intractable	• Intractable and other wastes in accordance with the approvals for the site.

Source: Landfill Waste Classification and Waste Definitions 1996" (As amended December 2009)

Template 01 – WASTE INVENTORY PROPOSAL FORM – To be filled out on a monthly basis and included in HSE Report

Activity	Type of waste	Quantity Estimated	Quantity Real	Waste Classification	Disposal date	Disposal site & Company	Documents' reference
Blasting	Rocks			Clean Fill			
	Non detonated material			Hazardous			
Clearing/ Excavations	Soil			Clean Fill (not contaminated soils)			
				Hazardous (contaminated soils)			
				Intractable (significantly contaminated soils)			
	Rest of vegetation not re-used, mainly spinifex.			Clean Fill			

Activity	Type of waste	Quantity Estimated	Quantity Real	Waste Classification	Disposal date	Disposal site & Company	Documents' reference
Civil works	Scrap metal, wood, paper, cardboard			Inert-Type 1			
	Concrete/ Stained concrete soil			Inert-Type 1			
	Plastics			Inert-Type 1 or 2			
	Resins, striking material			Hazardous. See MSDS			
	Contaminated soil by accidental spill.			Hazardous (contaminated soils)			
				Intractable (significantly contaminated soils)			
Modules erection and hook ups	Scrap metal, wood, paper, cardboard			Inert-Type 1			
	Plastics			Inert-Type 1 or 2			
	Paint drums, waste			Hazardous.			

Activity	Type of waste	Quantity Estimated	Quantity Real	Waste Classification	Disposal date	Disposal site & Company	Documents' reference
	oil, waste paint, solvents.						
	Isolating material			Inert			
				Hazardous (See MSDS)			
	Radiographic wastel			Intractable			
	Contaminated soil by accidental spill.			Hazardous (contaminated soils)			
				Intractable (significantly contaminated soils)			
Precomissioning and Commissioning	Hydrotesting water			Depending of the products used (see MSDS). In case of doubt, sampling and analysis may be			
	Cleaning materials (chemical products)						

Activity	Type of waste	Quantity Estimated	Quantity Real	Waste Classification	Disposal date	Disposal site & Company	Documents' reference
				needed.			
	Dirty cloths			Inert-Type1 (if not contaminated)			
				Hazardous (if contaminated)			
	Filters, gaskets and other consumables, plastic, cardboard			Inert-Type 1 or 2			

ATTACHMENT 05:

Construction Traffic Management Plan

(CTMP)

TABLE OF CONTENTS

1. PURPOSE

The purpose of this Construction Traffic Management Plan is to identify and analyse all traffic movements foreseen during TAN Burrup Project execution so as to prevent adverse environmental impact due to traffic operations. The main aim of this Plan is to ensure traffic is managed in an adequate manner so that all vehicle movements are performed in safe conditions and so that no impact is generated on the surrounding community, road users, sensitive habitants, terrestrial fauna and rock art.

This document is issued following the Public Environmental Report commitments and in compliance with the requirements set forth in the Commonwealth Approval, condition 7(a) and all applicable statutory laws and regulations, COMPANY Corporate and Project requirements and CONTRACTOR requirements. This Plan needs to be read together with the Construction Environmental Management Plan (2-250-329-PRO-TRE-0111), in which general issues such as roles, responsibilities, environmental monitoring, inspection, auditing and reporting are described. In addition to this document, more specific traffic documents describe in detail vehicle movement management both in the site and external to the site (Traffic and Logistics Plan (2-400-329-PRO-TRE-0001) & Heavy Lift Plan (2-500-329-PRO-TRE-0006)).

2. SCOPE

This Construction Traffic Management Plan shall be applied to every vehicle, machinery and equipment movement occurred in the site or near the surroundings due to any activity performed by CONTRACTOR or any of its SUBCONTRACTORS during the execution of the TAN Burrup Project.

This Project will be performed by means of modular construction and therefore, this Construction Traffic Management Plan is applicable to all activities involving vehicle movement to be performed by CONTRACTOR and any of its SUBCONTRACTORS as part

of the Construction, Pre-Commissioning and Commissioning phases of the TAN Burrup Project in the Construction Site at the Burrup Peninsula where the modules are going to be installed, erected and hooked up and in the surroundings. Any traffic issue related to yard(s) where modules are being constructed is not subject to this document's requirements.

3. DEFINITIONS AND ACRONYMS

3.1 DEFINITIONS

COMPANY	Yara Pilbara Nitrates Pty Ltd
CONTRACTOR	Técnicas Reunidas S.A. (TR)
HEAVY EQUIPMENT	Vehicles and equipments owned or rented by the subcontractor directly used in the construction activities (trucks, cranes, etc)
LIGHT VEHICLES	These are service automobiles, pick-up cars and mini pick-up trucks (normally having the seating capacity of 2-5 passengers)
BUSES	Vehicle being utilized for the staff in going to the work site and back to the camps. Each bus has capacity 45-50 workers
SUPPORT VEHICLES	Vehicles owned or rented by the SUBCONTRACTOR to support the construction activities
SITE	Area within the disturbance boundary.
SUBCONTRACTOR	Organizations which, under the co-ordination of CONTRACTOR, perform construction and erection activities for the project.

3.2 ACRONYMS

AN	Ammonium Nitrate
YPNPL	Yara Pilbara Nitrates Proprietary Limited
CEMP	Construction Environmental Management Plan

EPA	Environmental Protection Agency
ISBL	Inside Battery Limits
MSDS	Material Safety Data Sheet
OSBL	Outside Battery Limits
SPMT	Self Propelled Module Trailer
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
TAN	Technical Ammonium Nitrate
TANPF	Technical Ammonium Nitrate Production Facility
TR	Técnicas Reunidas S.A.
WA	Western Australia
YPFPL	Yara Pilbara Fertilisers Proprietary Limited

4. PROCEDURE

Traffic Management for the TAN Burrup Project execution is dealt with in several Project documents according to different areas of impact.

General issues regarding traffic operations and planning OSBL are addressed to in the Traffic and Logistics Plan (2-400-329-PRO-TRE-0001) where all relevant matters are included (ports to be used, packing requirements, equipment identification, compliance with AS and AQUIS requirements, etc).

Furthermore, the Heavy Lift Plan (2-500-329-PRO-TRE-0006) issued by Construction team describes in detail all vehicle, machinery and equipment movement ISBL regarding planning, circulation routes, timing, organization and responsibilities, but no environmental impacts are dealt with herein.

Therefore, the present Traffic Management Plan is intended to provide a framework for mitigating and managing environmental and safety risks due to traffic generated while executing Project Construction, Pre-Commissioning and Commissioning activities.

4.1 ENVIRONMENTAL IMPACTS

Potential traffic impacts expected while executing TAN Burrup Project construction activities can be summarized as follows:

- Increase in air pollution as a result of engines operation and dust generated by heavy vehicle movement
- Impacts from increased noise levels from vehicle movements.
- Threat to terrestrial fauna from increased vehicle movements.
- Social impact due to:
  - ✓ Road closures for equipment, modules and machinery transport as required.
  - ✓ Increased traffic volumes on road network.
- Impact on rock art from increased traffic levels to and from the area.
- Soil contamination due to fuel accidental spills during normal driving or maintenance operations.

4.2 FORESEEN VEHICLES

4.2.1 Light vehicles, buses and pick ups

Workers will be bused to and from the site to prevent excess of vehicles impacting on normal traffic. COMPANY, CONTRACTOR Management and some other SUBCONTRACTORS personnel are expected to be arriving to the site using their own cars or rental vehicles shared with other workers. As a general best practice, every car will be occupied on a 50% basis so that foreseen particular vehicles are not excessive. In addition to these, other

expected vehicles during Project execution are delivery vehicles, support vehicles (such as pick ups) and visitors' vehicles.

Personnel walkways' location will depend on current work progress as applicable but will be, in any case, properly signposted, identified and protected from vehicle pathways so that no additional risks are posed on workers or visitors while walking towards the site area or temporary offices.

4.2.2 Construction trucks

Main foreseen trucks to be used during construction activities will have different purposes:

- ✓ Dump trucks → used for removal of soil and ground resulting from blasting and civil works (site preparation of site area) and for returning back such material for backfilling as required.
- ✓ Concrete trucks → are used to transport and mix concrete up to the construction site for preparing foundations which will be performed mainly during civil works phase. The number of estimated trucks per day is included in table 1 below.
- ✓ Platform trucks → these trucks will be used for transporting material and small equipment and machinery as required. Main use is expected during mechanical erection activities.

4.2.3 Construction mobile equipment

Construction mobile equipment to be used includes mainly mobile cranes, earthmoving equipment for civil works and small equipment. All these pieces of equipment are subject to inspection procedure described in the Project Construction HSE Plan (2-250-329-PRO-TRE-0111-att12). Dust suppression measures and inspection program appropriate implementation will be responsible for minimum environmental impact due to the use of construction mobile equipment.

4.2.4 Modules' transport

Shipping, logistics and delivery of modules to the site will be carried out as per Project Traffic and Logistics Management Plan (2-400-329-PRO-TRE-0001) ensuring compliance with all applicable requirements and environmental impact due to such transport is reduced to ALARP level. Key issues are as follows:

- Transport by road from arrival port (HLO - Dampier) to site is expected between October 2013 and July 2014 approximately.
- Foreseen schedule: 12 main shipments for modules between October 2013 and July 2014, up to a maximum of 2 shipments per month. Process modules will not arrive before January 2014.
- Offloading activities shall take about 7 days per shipment plus 3 days for DAFF/AQIS activities.
- Local transport will be performed by means of Self Propelled Motor Trailers (SPMT) with a maximum configuration estimated in 4 files of 24 axle.
- Special transport, especially for modules out of gauge, will be moved during scheduled time as per local authorities (from 10 pm up to 6 am – to be confirmed).
- Local road actions will be performed to allow transport to be carried out in a properly planned manner; affected services and/or modified facilities will be returned back to normal after transport finishing as per established requirements. Affected services or installations include lights poles and cables to be buried or lifted.

Local authorities to be involved in the Project transport approvals process to ensure compliance with all statutory regulations and minimal traffic impact on affected community and environment are:

- ✓ Main Roads Western Australia
- ✓ Traffic Police
- ✓ Shire of Roebourne
- ✓ Pilbara Region Emergency Services

- ✓ Western Power (power lines)
- ✓ Dampier Port Authority
- ✓ Road Users / Businesses whose activities will be directly affected by the transportation works / traffic disruptions due to transport

4.3 CIRCULATION ESTIMATION

The table below is a summary of estimated vehicles and equipment foreseen to be moving to and from the site. The figures refer to an average quantity of vehicles estimated per day during each of the Project phases:

- ✓ Site Preparation → October 2012 – Sept 2013
- ✓ Civil Works → March 2013 – June 2013
- ✓ Mechanical Erection → November 2013 – April 2015
- ✓ Pre-Comm & Commissioning → April 2015 – July 2015

It shall be taken into account that this is a preliminary estimation that may be reviewed and modified as Project execution progresses.

VEHICLE / EQUIPMENT	ESTIMATED QUANTITY (average per day)			
	Site Preparation	Civil Works	Mechanical Erection	Pre-Commissioning & Commissioning
Buses / shuttles	2	5 - 8	8 - 10	3
Light vehicles	6	15	40 - 50	15 - 20
Pick-ups	4 - 6	8 - 12	15	
Dump trucks	8 - 12	4 - 6		
Concrete trucks		4 - 5		
Platform trucks	3	5	10	1
Mobile cranes (*)	1	4	8	
Earthmoving equipment (*)	15 - 20	8 - 12		
Other equipment (*)	6 - 8	12 - 16	12 - 16	6 - 8
SPMT			8 - 10	

(*) Equipment and vehicle movement inside the site.

4.4 AFFECTED ROUTES

Main affected local routes, roads and ways are those between Dampier port and the site, and Karratha and site. Additionally, some modules will necessarily arrive at Perth and will be transported by road to the site.

Because all these transports will affect local community and environment in some way, preventive and mitigation measures will be implemented as set forth in section 4.5 of the present Traffic Management Plan.

See attached drawings and pictures for further information (Attachment 01 / Attachment 02).

4.5 IMPACT MITIGATION

Potential traffic impact on the surrounding community shall be managed in order to mitigate this impact to ALARP level. Mitigation measures to be implemented are described below:

- All workers will be bussed to and from the site to avoid significant traffic impacts.
- During peak periods, workers entrance timing will not be coincident with trucks, equipment or construction machinery movements as far as reasonably practicable.
- Circulation routes ISBL will be properly planned, identified and signalised so that vehicles and equipment movements are under control, minimised and, therefore, potential impacts minimised.
- Transport of slow moving and heavy machinery and vehicles to site will be carried out outside of road network peak periods (especially heavy or complicated transports will only be performed during night timeframes as per applicable statutory regulations and following Authorities' approval).

- Alternative access routes will be foreseen and established to minimize traffic impacts should be necessary.
- Coordination with local general services will be established and followed up in order to ensure affected community is not exposed to additional hazards (due to road closure or slow moving equipment interfering on normal emergency vehicle movements).
- Dust minimization policies and best practices will be applied while transporting soils and ground material by means of dump trucks (covers placed over trucks, watering wheels and material, watering roads and circulation ways).
- Concrete trucks will be washed after its use inside the site in the specific area designed for such purpose to ensure no remains are spread while driving back to origin concrete plant across Western Australia's roads.
- All vehicles, equipment and machinery entering the site will be properly inspected and maintained so that neither accidental spill nor non-expected air emission takes place.
- Records on such inspections and performed maintenance will be provided by vehicle drivers and / or owners to CONTRACTOR who shall keep them for evidence.
- Random inspections and controls to vehicles and equipment will be carried out on a periodic basis in order to ensure compliance with all applicable requirements and statutory regulations.
- Any vehicle found non-compliant will be removed from the site; movements and operations with it will be stopped until deviations are corrected and evidenced in writing.
- Awareness and training regarding circulation routes, timeframe criteria and traffic best practices will be provided to all workers to promote traffic impact minimization.
- Restrict site traffic to designated internal roadways and suitably sealed to prevent disturbance of vegetated or natural areas.

- Basic information and tips on the above mentioned issues will be passed on to visitors and delivery personnel to reinforce impact minimization policy are acknowledged by all involved personnel.

A dedicated area where maintenance or refuelling activities can be carried out for non mobile or small equipment shall be designed in order to avoid, as much as possible, any impact on the soil and ground conditions. Maintenance and preventive inspection activities will be performed according to manufacturers' procedures and schedule and, therefore, under no circumstances such required maintenance activities will be cancelled or delayed due to progress or production reasons, because this~~situatio~~ may pose additional and avoidable risks.

Moreover, compliance with all provisions set forth in Construction Noise Management Plan and Construction Air Quality and Monitoring Management Plan will ensure no additional impact due to traffic activities affects the nearby community, local flora and fauna or the rock art site. Compliance with such Plans shall also ensure deviations from established criteria will be easily and promptly identified so that they can be immediately corrected.

Compliance with Australia regulations and standards includes compliance with AQUIS procedure and, therefore, all material and module arriving to the site will have associated an asbestos-free certificate, fumigation certificate, chemical analysis reports as required and MSDS which shall ensure no environmental impact due to any of these issues is to be expected.

4.6 MONITORING AND REPORTING

The correct implementation of all provisions described in this Traffic Management Plan will lead to minimum impact due to traffic activities. This performance will be monitored by the site HSE team as part of periodic HSE inspections which shall include general traffic issues and vehicle and equipment maintenance and operations.

Traffic impact on air and noise levels will be monitored by implementing monitoring measures set forth in the Construction Noise Management Plan and Construction Air Quality and Monitoring Management Plan as well as mitigation measures described above.

Identified deviations will be reported to all affected and involved personnel and actions follow up will ensure appropriate corrective actions are implemented. Serious deviations or incidents will be reported in writing and included in the Monthly HSE Report (as per Project Construction HSE Plan (2-250-329-PRO-TRE-0111-att12).

4.7 AUDIT

As part of Project Environmental Management system, compliance of this Construction Traffic Management Plan will be audited during internal HSE Audits performed on a periodic basis by CONTRACTOR HO HSE Team. HSE Internal Audits procedure is described in the Project Construction HSE Plan (2-250-329-PRO-TRE-0111-att12).

5. REFERENCES

5.1 CLIENT SPECIFICATIONS AND PROCEDURES

- Public Environmental Review for Yara Pilbara Nitrates Pty Ltd. (PER)
- YPNPL Works approval (15/07/2011)
- State of WA Statement No. 870 (07/07/2011)
- Commonwealth Approval letter from SEWPaC (14/09/2011)
- Appendix D-6 - HES Requirements during Construction & Fabrication

5.2 LEGISLATION

- Environmental Protection Act 1986

5.3 PROJECT RELEVANT HSE DOCUMENTATION

2-250-329-PRO-TRE-0111	Construction Environmental Management Plan
2-400-329-PRO-TRE-0001	Traffic and Logistics Plan
2-500-329-PRO-TRE-0006	Heavy Lift Plan

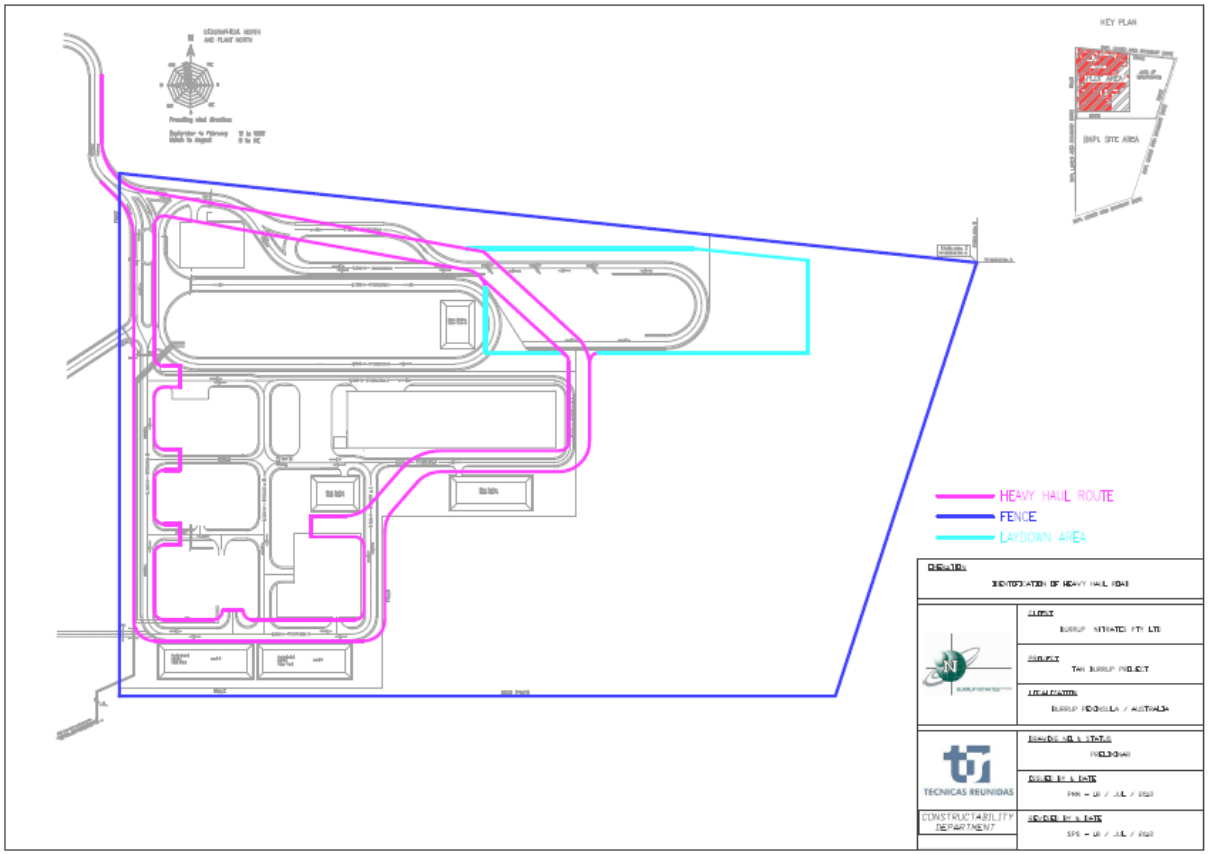
6. ATTACHMENTS

Attachment 01. Modules transport route

Attachment 02. Site circulation

Attachment 01. Modules transport route

Attachment 02. Site Circulation



ATTACHMENT 06:

Construction Blast Management Plan

(BMP)

INDEX

1. PURPOSE

The purpose of this Blast Management Plan is to describe in detail how blasting activities will be managed at the TAN Burrup Site to ensure compliance with the PROJECT Permit conditions, applicable regulations and standards so as to grant personnel, asset's, environment, heritage and operating neighboring plant protection.

This Blast Management Plan is issued because blasting activities may produce noise, blast overpressure, vibration, fly-rock and dust emissions which may adversely impact the industrial areas and so they have the potential to result in damage to property, injury or death to person(s) and damage to the environment.

This document is issued following the commitments set forth in the Public Environmental Report and further COMPANY letter in response to SEWPaC request for additional information, and in compliance with the requirements included in the WA State and Commonwealth Approval (condition 7), Works Approval and all applicable statutory laws and regulations, COMPANY Corporate and Project requirements and CONTRACTOR requirements. The present Blast Management Plan must be understood as part of the global Construction Environmental Management Plan.

2. SCOPE

The Blast Management Plan shall be applicable in all activities and disciplines included in the TAN BURRUP Project regarding drilling and blasting. It applies to all blast SUBCONTRACTOR personnel, SUBCONTRACTORS and any other personnel involved in Blasting Operations on the PROJECT site.

This Project will be performed by means of modular construction and therefore, this Blast Management Plan is applicable to all activities to be performed by CONTRACTOR and any of its SUBCONTRACTORS as part of the Construction, Pre-Commissioning, Commissioning and Start Up phases of the TAN Burrup Project in the Construction Site at the Burrup Peninsula where the modules are going to be installed, erected and hooked up. For any activity performed in the yard(s) where modules are being constructed a specific document will be applicable.

3. DEFINITIONS AND ACRONYMS

3.1 Definitions

COMPANY	Yara Pilbara Nitrates Pty Ltd
CONTRACTOR	Técnicas Reunidas S.A. (TR)
AIRBLAST LEVEL	Noise level resulting from blasting.
BLASTING	Use of explosives to fracture rock, coal or other minerals for later recovery, or structural components to facilitate removal from a site or for reuse.
BOOSTER	Priming charge used in association with a detonator or other initiating system to ensure that efficient and stable detonation in a column of explosive is reached and maintained
BURDEN	Distance between the blast hole and the nearest free face. In pattern markout it is the distance between rows of blast holes
BUTT or SOCKET	Remaining or enlarged portion of a drill hole, in rock, remaining after a charge of explosive, blasting agent, or both has been fired in that hole
CHARGE	Explosive, blasting agent, or both placed in a drill hole or other position for the purpose of producing an explosion
DETONATOR	Device containing high explosive which upon ignition will explode itself and is also used to initiate the explosion of a charge (whether directly or through a primer)
INITIATING SYSTEM	Combination of detonators, detonating cord, signal tube, safety fuse, igniter cord or other devices, designed to initiate the shot
MISFIRE	Charge or part of a charge which has failed to explode
PRIMER	Packaged explosive charge which is prepared and designed to be used in conjunction with a detonator or other initiating

	system to ensure efficient detonation of an explosive charge in blasting operations.
PROJECT	TAN Burrup Project.
SHOTCREW	Team of trained and authorized personnel who load drilled holes with explosives and stemming materials.
SHOTFIRER	Person whose responsibility includes preparing, loading and firing explosives.
SPACING	Linear distance between drill holes within the same row.
SUBCONTRACTOR	Organizations which, under the co-ordination of CONTRACTOR, perform construction and erection activities for the project.
TOE	Area at the foot of the face. The term is also used for areas of hard ground that have remained above the proposed floor level after a blast area has been excavated.

3.2 Acronyms

ALARP	As Low As Reasonably Practicable
AS	Australian Standards
ASAP	As Soon As Possible
YPNPL	Yara Pilbara Nitrates Propriety Limited
CEMP	Construction Environmental Management Plan
DoIR	Department of Industry Resources
HSE	Health, Safety and Environment

MDS	Mining and Drilling Services
MSIR	Mines Safety and Inspection Regulations
NONEL	Non Electric Signal Tube Detonator as produced by Orica
PCF	Penetrating Cone Fracture
PER	Public Environmental Review
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
TAN	Technical Ammonium Nitrate
WA	Western Australia
YPFPL	Yara Pilbara Fertilizers Proprietary Limited

4. DEVELOPMENT

4.1 OBJECTIVES

The objectives of the Blast Management Plan are to detail management and mitigation measures that ensure that blasting activities:

- do not result in air blast overpressure and ground vibration that exceeds permit guidelines or affects neighbor operating plant;
- do not damage property, infrastructure or historical heritage sites; and
- do not cause injury or death to person(s).

4.2 SPECIFIC TARGETS

Specific targets to be achieved during blasting operations are summarized in the following table:

Item	Target
Flyrock	0
Noise (sound pressure level)	< 125 dB
Vibration	< 10 mm/s

Table 1. Targets

4.3 ROLES AND RESPONSIBILITIES

It is the responsibility of all CONTRACTOR and its SUBCONTRACTORS management and supervisory personnel to ensure that hazards and safety issues are resolved as quickly as possible and the workplace is free from hazards.

4.3.1 Drill and Blast Supervisor

Drill and Blast Supervisor's is responsible for the safe and efficient operation of drilling and blasting activities. A description of his main roles and responsibilities can be summarized as follows:

- ✓ Ensure adequate and technically competent resources are allocated for blasting operations. He shall appoint a Blast Controller who will be responsible for coordinating all blasting activities.
- ✓ Ensure that all personnel involved in the Drill and Blast process and in the handling of explosives have been trained and found competent.
- ✓ Make an assessment of the area that is to be drilled and blasted.
- ✓ Issue a written site specific blasting procedure for the PROJECT which shall include the responsibilities of relevant personnel, site emergency procedures and any site specific requirements (method statement regarding existing plant interfaces)
- ✓ Blasting plans are developed using all available information, including geotechnical input and that plans, procedures and method statements are reviewed and properly authorized before being issued for implementation;
- ✓ Ensure blast results are formally reviewed and any appropriate changes made to improve blasting effectiveness.

4.3.2 Blast Controller

- ✓ Blast Controller will provide Site Manager a blasting schedule so as to allow correct planning of every activity in order to avoid interferences or interrupting other activities. 24 hours in advance of every blast, all SUBCONTRACTOR s will be informed of the planned blast time for next day.
- ✓ Blast Controller informs all site affected personnel that blasting will take place in approximately 30 minutes.
- ✓ Blast Controller informs YPFPL control room that blasting will take place in approximately 30 minutes.
- ✓ Blast controller gains verification from blast guards that all personnel are clear of the blast area for placement of blast cones and roadblocks.
- ✓ Blast controller informs all personnel on the designated radio Channel of blast location and scheduled time and for all personnel directly involved with the blast to change to channel 32 for a radio check.
- ✓ The blast controller informs the shot firer that all personnel on channel 32 and at YPFPL have been notified of the blast and that all road blocks are in position and he may proceed with the blast clearance.
- ✓ Blast Controller acknowledges and informs Shot Firer that he is clear to proceed.
- ✓ When the Blast is cleared, the Shot Firer informs the Blast Controller that the blast area is all clear.
- ✓ Blast Controller confirms the all clear from the Shot Firer and informs all personnel on Channel 32 that the blast is all clear.
- ✓ Blast Controller confirms the all clear from the Shot Firer and informs YPFPL control room that the blast is all clear.

4.3.3 Blast Guards

- ✓ Prevent unauthorised access into the blast zone during blasting operations.
- ✓ Notify blast controller immediately of any incursion into the blast zone.
- ✓ Report any unauthorised activity in the blast zone to the blast controller

4.3.4 Shotfirer

- ✓ Must have a shotfiring licence valid for the blasting activity (i.e. surface, underground)
- ✓ Must have a dangerous goods security card and be a secure employee of the licence holder
- ✓ Nominated shotfirer to sign off on blast plan and control the blasting operation
- ✓ Person who fires the shot must be a shotfirer or supervised by a shotfirer
- ✓ Shot Firer acknowledges Blast Controller and informs he is commencing the area clearance.
- ✓ Shot Firer informs Blast Controller that the area clearance is complete and is proceeding to hook up and run out lead in line.
- ✓ Shot Firer acknowledges Blast Controller and announces that he is firing in 30 Seconds.
- ✓ Shot Firer informs Blast Controller that the shot has been fired and a shot clearance is to be carried out.

4.4 DESCRIPTION OF BLASTING

The TAN Burrup site will require blasting to achieve Final Excavation Level with blasting generally required down to a maximum depth of 5.5m.

Blasting in this area will be typified by ‘shallow’ blasting, where the depth of blast holes is not significantly greater than the distance between blast holes. Good control of blasting operations will ensure that this type of blast does not generate flyrock and airblast. The major hazards identified from the supplied drawings are the proximity to the neighboring (YPFPL) plant, heritage areas and the temporary construction facilities. This risk assessment addresses the major issues of flyrock, airblast, vibration and noise control (see specific Blast Risk Management Plan – Attachment 02)

The following table gives an overview of typical blasting configuration:

	Normal (ANFO) Blasting	PCF Blasting
Blast Description	Benches between 2.0 to 5.5 m high	PCF will be used in highly sensitive areas where vibration and/or flyrock hazards cannot be eliminated - Generally benches of less than 2.0m in height.
Hole Diameter	89 mm	45mm to 76mm
Burden x Spacing	From 2.0 x 2.0m to 3.0 x 3.0m	From 0.5 x 0.5m to 2.0 x 2.0m
Typical Charge per hole	From 8kg to 26kg	From 60g to 300g
Maximum Instantaneous Charge	From 16 to 52 kg, depending on location in the construction area	From 600g to 3kg, depending on location in the construction area
Stemming Material	12 mm screened rock	5 to 7mm screened rock

Table 2. Blasting Configuration

4.5 ENVIRONMENTAL IMPACTS FROM BLASTING

The environmental impacts of blasting operations are:

- Noise from drilling
- Dust from the blasting operation
- Airblast generated by the explosion gases venting to atmosphere
- Vibration generated by shockwaves travelling through the rock mass
- Flyrock caused by poorly designed or poorly controlled blasting operations
- Waste generated

4.5.1 Noise from Drilling

Noise from drilling and the operation of machinery also impact on the environment. Noise from drill and blast operations will be monitored to ensure compliance with set limits and is addressed in detail in the PROJECT Construction Noise Management Plan.

4.5.2 Dust from Blasting Operations

Dust has also been identified as having an impact on the environment, but this issue has been addressed by the Construction Air Quality Management Plan, so will not be addressed in this risk assessment.

4.5.3 Airblast and Vibration

To obtain accurate predictions of blasting impacts, data will need to be collected from the field. This will require an appropriate experimental design, using historical data from methods of blasting in similar conditions. The actual blast design will be formalized through the use of a Blast Proposal form. This data can be collected once excavation operations commence on the site whereby field measurements are undertaken and data interpretation completed. Changes to blast parameters will be made on a 'blast by blast' basis. Blast Proposal forms will be submitted to the Project Manager to outline any changes to the blast parameters and will include the estimated impact on vibration and noise levels.

Where calculated vibration or noise levels exceed set limits with the use of traditional high explosives, PCF (Penetrating Cone Fracture) will be used.

4.5.4 Airblast

General conditions for the PROJECT are:

1. for 95% of blasts, air blast over pressure must not exceed 115dB (Lin Peak);
2. airblast over pressure must not exceed 120dB (Lin Peak);

These limits are the same as applied to quarry blasting operations, which comply with Australian Standard AS2187.2 - Use of Explosives. This standard specifies the following limits on vibration:

AIRBLAST LIMITS FOR HUMAN COMFORT CHOSEN BY SOME REGULATORY AUTHORITIES (see Note to Table J5.4(B))

Category	Type of blasting operations	Peak sound pressure level (dBL)
Human comfort limits		
Sensitive site*	Operations lasting longer than 12 months or more than 20 blasts	115 dBL for 95% blasts per year. 120 dBL maximum unless agreement is reached with occupier that a higher limit may apply
Sensitive site*	Operations lasting for less than 12 months or less than 20 blasts	120 dBL mm/s for 95% blasts. 125 dBL maximum unless agreement is reached with occupier that a higher limit may apply
Occupied non-sensitive sites, such as factories and commercial premises	All blasting	125 dBL maximum unless agreement is reached with the occupier that a higher limit may apply. For sites containing equipment sensitive to vibration, the vibration should be kept below manufacturer's specifications or levels that can be shown to adversely effect the equipment operation

* A sensitive site includes houses and low rise residential buildings, hospitals, theatres, schools, etc., occupied by people.

Table 3. Airblast limiits

4.5.5 Control of Airblast

Airblast from blasting can be controlled by ensuring that the explosives have sufficient confinement within the rock mass, to ensure that the explosives' energy is completely used before the gases vent to the atmosphere. From a practical perspective, this means that careful control needs to be maintained on;

- ✓ The burden on front row blast holes
- ✓ The amount of stemming used in blast holes to confine the gases in the holes.
- ✓ The rate of movement of the rock mass during the blast

The prevailing wind direction also has a significant effect on airblast, generally increasing the level of airblast downwind of the blast.

4.5.6 Vibration

Permit conditions for the project are:

1. for 95% of blasts ground vibration must not exceed 5mm/sec peak particle velocity; and
2. ground vibration must not exceed 10 mm/sec peak particle velocity.

These limits are the same as applied to quarry blasting operations, which comply with Australian Standard AS2187.2 - Use of Explosives. This standard specifies the following limits on vibration.

GROUND VIBRATION LIMITS FOR HUMAN COMFORT CHOSEN BY SOME REGULATORY AUTHORITIES (see Note to Table J4.5(B))

Category	Type of blasting operations	Peak component particle velocity (mm/s)
Sensitive site*	Operations lasting longer than 12 months or more than 20 blasts	5 mm/s for 95% blasts per year 10 mm/s maximum unless agreement is reached with the occupier that a higher limit may apply
Sensitive site*	Operations lasting for less than 12 months or less than 20 blasts	10 mm/s maximum unless agreement is reached with occupier that a higher limit may apply
Occupied non-sensitive sites, such as factories and commercial premises	All blasting	25 mm/s maximum unless agreement is reached with occupier that a higher limit may apply. For sites containing equipment sensitive to vibration, the vibration should be kept below manufacturer's specifications or levels that can be shown to adversely effect the equipment operation

*A sensitive site includes houses and low rise residential buildings, theatres, schools, and other similar buildings occupied by people.

NOTE: The recommendations in Table J4.5(A) are intended to be informative and do not override statutory requirements with respect to human comfort limits set by various authorities. They should be read in conjunction with any such statutory requirements and with regard to their respective jurisdictions.

Table 4. Ground vibration limits

4.5.7 Controlling Vibration

The vibration generated by blasting can be controlled using two main methods;

1. Reduce the charge mass of explosives detonating at any instant
2. Ensure that the blast design and initiation design promote forward movement of the rock mass

The mass of explosives detonating is controlled by using delay detonators. These provide an effective initiation sequence that delays the detonation of the each charge so that all the charges detonate in a controlled sequence, each separated from the other by a few thousandths of a second.

Promoting forward movement of the rock mass ensures that charges that fire towards the back of the blast are not confined by many metres of rock in front of the charge. The amount of rock in front of the charge is calculated to reflect the energy of the charge, and ensures that the explosive energy is used to effectively fragment the rock mass, rather than being wasted by generating excessive ground vibration.

4.5.8 Modeling Vibration

An initial estimate of vibration can be made assuming an 'average' rock response, using the equation for estimating vibration:

$$V(mm/s) = K(R\sqrt{Q})B$$

Vibration B Factor (B) = -1.6

Where as

V = estimate of the peak particle velocity

K = constant determined by field measurements

R=distance from the blast

Q = charge weight

This formula will be used to model the expected vibration at the sensitive locations around the site, especially at heavy machinery locations.

4.5.9 Flyrock

Flyrock from blasting operations has the greatest potential impact on personnel safety, damage to plant or infrastructure and the environment. Fly rock will be controlled using 6 main methods:

- ✓ Correct selection of blast pattern sizes
- ✓ Correct loading of blast holes to proposed stem height or weight
- ✓ Correct choice of stemming (0.1 of hole diameter)
- ✓ Correct tie in and movement of the shot (preferably to a free face)
- ✓ The use of blast mats when risk of fly rock increases
- ✓ The use of PCF when the potential for fly rock cannot be removed

A quality control log of all blast holes loaded and fired shall be made available to the Project Manager. This log shall include the following:

- ✓ Hole ID
- ✓ Proposed hole depth
- ✓ Attained hole depth
- ✓ Proposed charge weight
- ✓ Proposed stem height
- ✓ Attained stem height

In the event of flyrock being ejected from the shot, the contractor will immediately inform the Contractor site manager, an automatic review of Blast Proposal, quality control and drill logs shall be conducted. An incident report describing the occurrence, causes and consequences shall be issued.

4.5.10 The Use of PCF (Penetrating Cone Fracture)

PCF propellant gas generating cartridges fracture and break up oversize boulders, mass rock, dimension stone and reinforced concrete without the need for high explosives and detonators. PCF utilizes a composite propellant and an electric match to generate gas pressure in a properly confined, correctly drilled and loaded hole to fracture rock, boulders or reinforced concrete by use of **tensile pressure** not shock energy, hence minimal vibration and fly rock is generated. The product although containing small amounts of propellant, the average gas generation is 1 litre of gas for each gram of propellant which highlights the efficiency of energy generation.

4.5.11 Waste Management

All waste generated during blasting operations will be managed by Blasting SUBCONTRACTOR as per PROJECT Construction Waste Management Plan and always in compliance with applicable laws and regulations.

4.6 ENVIRONMENTAL MONITORING

General environmental monitoring shall be performed to assess the correct implementation of provisions set in this Blast Management Plan. This performance will be monitored by the site HSE team as part of periodic HSE inspections. Identified deviations will be reported to all affected and involved personnel, and actions followed up to ensure appropriate corrective actions are implemented.

Blast monitoring shall take place next to the existing YPFPL plant. Monitoring and data recovery shall only be performed by a trained person. Results from vibration monitoring shall be recorded on the Blast Report.

4.7 SAFETY OF OPERATIONS

4.7.1 Drill and Blast Risk Register

A complete and detailed Risk Management Plan is included in attachment 02 where all blasting operations activities are split step by step so as to assess risks and hazards associated with each of them. Upon established risk rating, different specific control measures are defined and shall be put in place to ensure health, safety, environment and asset protection is guaranteed during all blasting operations performance.

4.7.2 Bench Preparation

Good bench preparation contributes strongly to improve quality of blasting because blasting personnel can move around the site easier and with reduced hazard to their personal safety. Benches should be as flat as possible with easy access for bulk explosive manufacturing trucks.

4.7.3 Survey

Survey will be required to pick up each blast pattern and generate a drill map and blast volume before drilling commences. The drill map shall show all blast holes and design depth including sub drill. A distance from the closest blast hole and greatest depth hole should also be calculated to ensure correct calculation of vibration and noise modeling.

4.7.4 Drilling

Drilling commences once the blast proposal has been approved, pattern has been marked up, surveyed and the driller has a copy of the drill map. This ensures accuracy of all blast holes drilled. A drill log shall be kept by the driller and any abnormalities such as voids or water shall be recorded. On completion of the drill pattern the log shall be given to the shotfirer for future reference. All drill patterns shall be delineated with orange cones and Danger sign stating Drilling in Process. Permission from the driller/s must be obtained before entering the drill pattern. All drilling operations are performed as per Drill and Blast Procedure in attachment 01.

4.7.5 Blasting Operations

The safe management and execution of blasting operations is contained wholly in Mining and Drilling Services' (MDS) Drill & Blast Procedure document. It is a comprehensive document used to control operations at every site where MDS is responsible for controlling the blasting operation. This document and the associated procedures cover every aspect of the design and control of blasting operations for use in quarrying and construction blasting.

No blasting operations will be carried out without a written and approved work permit as per PTW procedures and the site construction site HSE Management Plan. The permit to work shall include name and ID of all appointed and authorized personnel who shall sign the permit at the beginning and each time entering or exiting the barricaded area. A copy of the approved and signed permit shall be available at the site location where the blasting is being performed.

A HSE representative shall be present where and when a shot is being fired to ensure all safety precautions and preventive measures established in the work permit are being complied with, in addition to this, the HSE representative shall be present where the explosives are once their arrival to the site until checked that the blast has been fired correctly.

Key aspects include:

- **Storage of Explosives**

Explosives will not be stored on-site at the TAN Burrup Project. All explosives will be procured through MDS from an off-site authorised supplier.

- **Transporting of Explosives**

The safe transportation of explosives between the magazine compound and the blast pattern is to be carried out in approved vehicles by authorized personnel at all times.

- **Loading of Explosives**

Prior to loading, all blast holes shall be dipped and recorded on the quality control log and yellow cones and signs stating DANGER BLASTING IN PROGRESS shall be in place. The shot firer now takes ownership of the shot. Permission from the shot firer must be obtained before entering the blast pattern. The shot firer shall prime and load the shot. Each blast hole shall then be checked to ensure the correct stem height has been attained. The shot may then be stemmed and tied in as per the blast proposal. Only persons trained in the correct method of handing explosives may handle any explosives. The shotfirer must hold a current Western Australian Shotfirers licence and Western Australian Dangerous Good Security Card. Only trained personal with current Western Australian Dangerous Good Security Cards may be left unattended with explosives. All loading operations are performed within Drill and Blast procedures.

- **Clearance Area**

A 500m exclusion zone must be implemented for all shots, firing times may be adjusted to suit production both onsite and at the existing plant. All personnel must be clear of the exclusion zone 15min before blasting.

- **Notifications and permit to work**

Blast notices on all main entrances shall be erected; all blast boards shall state the following, as a minimum

  - Date of blast
  - Time of blast
  - Location of Blast

The blast contractor shall inform the Contractor Site Manager of a blast a minimum 24 notice prior to blasting. All contactors/visitors on site must be made aware of blasting times. Including the neighboring YPFPL plant.

- **Blast Reporting**

MDS will provide a blast report to the Project Manager on the day of the blast. The report will include all explosives usage and monitoring results, including the impact on the YPFPL existing and operating plant (affected interface area / length).

- **Lightning**

The Shotfirer will monitor weather conditions on a daily basis to minimize delays cause by lightning. Firing times may need to adjust to suit weather conditions. Notification of changed firing times must occur 1 hour before blast. In the event of an imminent lightning storm the following will occur:

- Loaded Shot that has not been tied in:
  1. Shot tied in and fired if safe to do so
  2. If unsafe, a 200m exclusion zone must be implemented and blast guards placed in position until the threat has passed
- Tied in loaded shot:
  1. Shot fired if safe to do so
  2. If unsafe, a 500m exclusion zone must be implemented and blast guards placed in position until the threat has passed
  3. If the storm has not passed to allow firing to occur within daylight hours, the shot shall be slept until the next day.

- **Weather conditions**

Weather conditions may delay operations should a cyclone warning have been received. In case strong wind is measured no shot will be performed.

Blast controller shall be responsible for monitoring wind speed on a daily basis prior to performing the blast. For wind speed above 35 km/h no blasting will be carried out.

In the event of a cyclone, al safety precautions will be put in place as per the PROJECT Cyclone Management Plan.

- **Sleeping of Blasts**

Occasional delays on the construction site may mean that, for operational reasons, a blast might need to be slept overnight and fired the next day. Some reasons for this may include, but not be limited to the following;

- Breakdown of equipment in front of the blast face
- Difficulty of access leading to charging delays.
- Wind or other meteorological condition that is likely to result in undesirable environmental outcomes if the blast were to be fired.

In these circumstances, sleeping of the blast requires a guard to be posted to prevent any unauthorised access to the blast site. The engagement and briefing of a blast guard will follow documented safety procedures.

4.7.6 Quality Assurance

Blasting Quality Assurance (QA) will involve the continuous checking of the processes that go together to make up a blast. MDS has a proven quality regime to ensure that drilling and blasting is conducted according to design specifications to result in a blast that will significantly reduce adverse effects and still be adequate for the purpose.

QA will be used on the following processes:

- Drill pattern mark-up
- Accuracy of collar location
- Depth of drilled hole
- Rock/ground competency in the area of the hole, and its subsequent relation to the charge mass of the hole after loading
- Depth of stemming
- Blast control regime

4.8 SUMMARY OF BLAST MANAGEMENT MEASURES

Blasting will be carried out in accordance with this Blast Management Plan, which satisfies the requirements of PROJECT Permit conditions and applicable regulations and standards.

✓ Blasts will be designed to not exceed the permitted noise and vibration limits.

- ✓ Calculations have been undertaken to verify that existing limits associated with noise and vibration will not be exceeded.
- ✓ Monitoring of noise and vibration will be undertaken to verify that the effects of blasting activities are within the specified limits, and that the operating plant (YPFPL) is not affected.
- ✓ At the completion of each blasting event, a blast report will be produced and made available to the Contractor Site Manager.
- ✓ If the specified limits in relation to vibration, noise and dust have been exceeded, further blasting in the area shall not recommence until a review of the blast records and model has been undertaken by a suitably qualified person, and a revised blast procedure has been produced

The table below summarizes all prevention and protection actions outlined across all previous sections of the present Blast Management Plan.

ACTION No.	ACTION	TIMING	RESPONSIBLE PERSON
BMP-1	All affected personnel will be properly trained on blasting risks and preventive measures.	Prior to entering the site & refreshing if required.	HSE Team & all workers
BMP-2	Fluent and efficient communication between all parties. Notification to workers and YPFPL control room prior to blasting operations.	Ongoing, 24 hours & 30 minutes before blasting.	Blast Controller
BMP-3	Noise reduction actions as per Construction Noise Management Plan.	During site preparation (blasting operations).	HSE Team & Blasting SUBCONTRACTOR
BMP-4	Air quality protection as per Construction Air Quality Management Plan.	During site preparation (blasting operations).	HSE Team & Blasting SUBCONTRACTOR
BMP-5	Airblast will be controlled by ensuring explosives have sufficient confinement within the rock mass.	During site preparation (blasting operations).	Blasting SUBCONTRACTOR
BMP-6	Vibration control will be undertaken by reducing the charge mass of explosives and ensuring design of operations promotes forward movement of the rock mass.	Prior to and during blasting operations.	Blasting SUBCONTRACTOR

BMP-7	Flyrock will be avoided by selecting correct blast pattern sizes, perform blasting in adequate conditions and using PCF when and where required.	Prior to and during blasting operations.	Blasting SUBCONTRACTOR
BMP-8	Explosives will not be stored on site and shall be transported according to all applicable regulations and standards.	During blasting operations.	Blasting SUBCONTRACTOR
BMP-9	A 500 m. exclusion zone will be implemented for every shot. Blasting affected area will be barricaded, posting signs and placing cones to ensure non-authorized personnel is not entering the area.	During blasting operations.	Blasting SUBCONTRACTOR & HSE Team (verification).
BMP-10	Weather conditions shall be monitored in detail to ensure additional risks and hazards are under control.	Prior to and during blasting operations.	Blasting SUBCONTRACTOR
BMP-11	SUBCONTRATOR will prepare and submit to CONTRACTOR for approval a method statement describing how to minimize impact of blasting along the interface area between the site and the existing YPFPL plant.	Prior to blasting operations commencement.	Blasting SUBCONTRACTOR & HSE Team
BMP-12	Survey to existing plant will show blast results. If plant affected, a report will be made and CONTRACTOR immediately informed of impact.	Immediately after blasting operations.	Blasting SUBCONTRACTOR & HSE Team

Table 5. Blast management measures

5. REFERENCES

5.1 COMPANY SPECIFICATIONS AND PROCEDURES

- Public Environmental Review for Yara Pilbara Nitrates Pty Ltd. (PER)
- YPNPL Works approval (15/07/2011)
- State of WA Statement No. 870 (07/07/2011)
- Commonwealth Approval letter from SEWPaC (14/09/2011)
- Appendix D-6 - HES Requirements during Construction & Fabrication
- Yara-TOPS 1-02 Work permits
- Yara-POL-01 Health, Environment, Safety, Quality and Product Stewardship
- Yara-DIR-01-P01 Reporting of accidents, near-miss incidents, sick leave, environmental incidents, and security breaches
- Yara-DIR-01-P02 Investigation and follow-up of accidents and near-miss incidents

5.2 LEGISLATION AND STANDARDS

- Environmental Protection Act 1986
- Occupational Safety and Health Regulations, 1996, version 07-f0-00 of 26 may 2010 (WA)
- Dangerous Goods Safety Act 2004 (WA)
- Mines Safety and Inspection Act 1994 (Western Australia)
- Mines Safety and Inspection Regulations 1995 (Western Australia)
- Australian Standards – Explosive Storage, Transport and Use Part 2 AS 2187.2 – 1993
- Australian Standards – Explosive Storage and Land Transport Part 1 AS 2187.1
- Australian Standards - AS2187.1-1998 Explosives- Storage, Transport and Use-Part 1- Storage
- Australian Standards - AS2187.2-2006 Part 2- Use of Explosives
- Western Australian Notes for the Shotfirer
- Western Australian Mines Safety and Inspection regulations 1995
- Western Australian Mines Safety and Inspection Act 1994
- Western Australian Dangerous Goods Act 1961
- Australian Explosive Code March 2000 2nd Edition – Transport by Road and Rail

5.3 PROJECT RELEVANT HSE DOCUMENTATION

2-250-329-PRO-TRE-0111	Construction Environmental Management Plan
2-250-329-PRO-TRE-0113	Construction Emergency Response Management Plan
2-250-329-PRO-TRE-0122	Hazardous Materials Management Plan

6. ATTACHMENTS AND TEMPLATES

Attachment 01 – Drill and Blast Procedure

Attachment 02 – Risk Management Plan

Attachment 01 – Drill and blast procedure

This procedure has been issued taking into account that all blasting accessories, such as detonators and connectors, will be supplied by Orica Mining Services.

1. PLANNING & STORAGE

Each MDS Drill & Blast Supervisor shall:

- Issue written site specific blasting procedure for the project which shall include the responsibilities of relevant personnel, site emergency procedures and any site specific requirements. The personnel include but are not limited to the licensed Shotfirer, Blast Guards, Shotcrew and any other personnel involved in the blasting process.

- Appoint a Blast Controller who shall be responsible for coordinating blasting activities. The appointed person or persons shall be someone who has been found competent with all MDS blasting processes and procedures and preferably possesses a current Western Australian Shotfirer's Permit.

- In consultation with the contractor create a "Blast Area Plan" for each area (pit) to be blasted showing blast exclusion zones 500m or greater, blast guard positions, firing positions and any other information required for carrying out the blasting operation in a safe and efficient manner. These plans must be posted for all to see.
- make an assessment of the area that is to be drilled and blasted
- Appoint a Blast Controller who shall be responsible for coordinating blasting activities
- Ensure that personnel involved in the Drill and Blast process and in the handling of explosives have been trained and found competent. Records will be kept available and provided for checking evidence upon request.

2. EXPLOSIVES

- A person who handles and uses explosives must remember, at all times, that these materials can be hazardous. Explosives are safe when properly treated but in careless or inexperienced hands they can cause serious injury, death, and destruction.

- Most explosives are perishable materials and will deteriorate if exposed to unsatisfactory or prolonged storage. In a deteriorated state some explosives are not safe to use. Refer to Manufacturers recommendations on storage and ensure stock is rotated using the oldest first.

- Proper methods of handling, storage and removal of explosives to and from the blast area must be rigidly enforced.

- For the purposes of storage and transportation, explosives have been divided into two main classes;
  - ✓ High explosives such as detonator sensitive packaged emulsion or water gel, emulsions, blasting agents (including mixed ANFO), and detonating cord must be stored in the high explosive magazine.
  - ✓ Detonators (electric, non-electric, instantaneous and delayed), detonating relay connectors and igniter cord connectors must be stored in the detonator magazine separated from any other magazine or building.

- Blasting agents may be mixed/blended on site using factory manufactured ingredients, supplied in packages or delivered in semi-bulk or bulk form. Appropriate licences and permits to mix and store must be obtained from the relevant statutory authority.

- Oxidising agents such as Ammonium Nitrate (AN), and various emulsions (or equivalent) are not required to be stored in magazines. They are classed as hazardous materials Class 5.1 CON No 1479 and as such have specific storage requirements which must be complied with. Refer to SSAN Guidelines.

- Where an explosives company provides storage facilities and equipment, that company shall:
  - ✓ Be responsible to ensure that the initial installation meets the appropriate statutory requirements and approvals.
  - ✓ Supply comprehensive documentation relating to the safe operation of these facilities.

- The MDS Drill & Blast Supervisor shall be responsible for the operation and licensing of these storage facilities and equipment strictly in accordance with statutory requirements. Refer to section 1. Planning & Storage.

- The person responsible for handling, charging, connecting, testing and firing of explosives shall have a current Shotfirers permit.

- The relevant mining or extractive industries act and regulations shall be adhered to at all times (see References section at main document).

3. PREPARATION FOR DRILLING A BLAST PATTERN

Each MDS Drill & Blast Supervisor shall:

- Ensure site preparation such as levelling, site clean-up and safe access and egress should be arranged and maintained for the entire drill and blast process before any mark out or drilling commences. Access must be of a high standard to allow personnel to safely access and leave the pattern.

- The Drill & Blast Supervisor or Shotfirer should make an assessment of the area that is to be drilled and blasted. A Blast Proposal with all relevant details should be forwarded to the contractor for consideration. When approved, with the relevant signatures, a copy must be forwarded to the Shotfirer to commence the mark out of the pattern as per the approved Drill & Blast proposal sheet.

- Ensure that the original Blast Proposal sheet is placed on file on site. A copy is to be made available for the client upon request.

Where it is not necessary to have a pre-determined blast proposal, the Shotfirer should then develop the following in consultation with the contractor: Written records of this must be kept on file for future reference.

- The blast pattern dimensions (e.g. Burden and Spacing distances).
- The depth of the bench to be blasted plus subdrill (if required).
- The diameter of the blast holes.
- The type and nature of wall control to be used (if required).

4. MARKING OUT THE BLAST PATTERN

To transfer the pattern to the ground from the approved Blast Proposal Sheet the Shotfirer must complete the following steps:

- The Shotfirer must make a visual check of the area within the Blast Proposal Sheet boundaries for suspected misfires and miscellaneous hazards (i.e. Toe). Where a misfire is discovered refer to the MDS misfire procedure.
- Where there is a known Reverse Circulation (RC) drill pattern in the vicinity of the proposed blast pattern the Shotfirer will liaise with the contractor to discuss back-filling the RC holes.
- Establish the whereabouts of the nearest Temporary Bench Mark (TBM). All patterns are to have spot heights placed by survey prior to drilling.
- Be sure that the pattern is of correct orientation.

- Measure out all dimensions with a tape measure and be prepared to work in intervals of 0.1m (Do not pace out distances).
- Offset the pattern from the previous benches' blast and or grade control holes, where available use survey. This is to prevent drilling into the butts of previously charged holes and also to prevent drilling into RC holes which can lead to misfires.
- Mark the position of the collar of every blast hole accurately and clearly using survey paint on rocks or pin flag markers to mark each hole.
- Cordon off the drill pattern with 750mm traffic cones to prevent vehicles driving onto or through the marked pattern. Cones should be spaced evenly at no more than 12.0m intervals and be no closer than 8.0m to the nearest drill hole so as to provide a visual barrier.
- When tramming drill rig, horn signals (2 blasts for forward and 3 blasts for reverse) are to be used.

5. TRANSPORTING EXPLOSIVES

The transport of explosives from the magazine to the site of the proposed blast must be conducted in a safe manner using the following steps:

- All explosives transported on site must be transported in a vehicle designed for that purpose. The MDS Explosive/Shotfirers vehicle on each site has been designed and built to meet the requirements of Risk Category 2.

- Whilst the vehicle is transporting explosives the driver must posses an Explosive Drivers License or be a licensed Shotfirer with the authority to be in possession of the explosives being transported. The driver must also possess a current Western Australian driver's license for the vehicle type being driven.

- Explosives and detonators must be transported in separate boxes that meet the requirements of MSIR 8.14 (1) - (4-8). The boxes fitted to MDS explosive vehicles meet these requirements and are to be used for the transport of explosives on site.

- Only the quantity of explosive required for carrying out the blast should be removed from the magazine and transported to the workplace.

- Ensure when travelling to the designated blast area that at no stage should explosive agent accompany fuses or detonators in same transport vehicle. Or the assembly of primer to detonator should not also be transported as a whole unit; this task is to be performed on the shot at the point of charging

6. PREPARATION FOR LOADING BLAST HOLES

Before loading takes place, hole depths must be checked, and any back-filling or re-drilling of holes carried out as required prior to charging. Before any explosives are loaded, take the following steps.

- A MDS Quality Control Sheet must be completed. Any redrills found must be clearly marked and shown to the driller. All redrills must be completed and rechecked prior to any holes being primed for loading. Quality control of the blasting process cannot be overemphasised as this will assist in producing a better outcome.
- The area to be blasted should be effectively cordoned off with Orange cones with white reflective bands and blast signs (No Entry Blasting in Progress). These should form a visible barrier no closer than eight metres beyond the nearest blast hole. Traffic cones should be placed at intervals of not greater than 12 metres and blast signs not greater than 50 metres (any accesses should be given particular attention with signs on each side). Site specific procedures may dictate greater controls than these mentioned.
- Check blast holes for water. Wet holes must be identified on the MDS Quality Control Sheet and also be marked as wet at the collar. ANFO must not be loaded into wet holes.
- Check drill cuttings for black pyretic (graphitic) shales and sulphuric odour as this is a key indicator of reactive ground. If these elements are present consult Mine Manager or Senior Geologist prior to commencement of loading. Once confirmed a site specific procedure must be implemented to alleviate the hazards of loading in reactive ground.
- The handling of all explosives should be under the direct supervision of a person holding a current statutory Western Australian Shotfirer's Permit or equivalent permit required by the relevant local or state government authority.
- No personnel are allowed onto the loaded shot without permission of the Shotfirer or the Drill & Blast Supervisor in that order.
- No smoking or naked flames are allowed within 8 metres of or to any explosives. No machinery or working equipment is to be operating within 6 metres of any part of a loaded hole. MDS recommends a distance of 8 metres.
- All vehicles or equipment not directly involved in the charging and loading of the blast holes should be removed from the area prior to charging commencing.

7. PRIMING BLAST HOLES

Before priming takes place refer to the Blast Proposal Sheet to ensure that the correct products and firing sequence to be used are booked out of the magazine and transported to the blast area. When priming take the following steps:

- Lay the Non electric (nonel) detonator sequence out on the shot with each delay next to the hole for which it is to be loaded into if using down hole delay. If using “Connectadet” surface delay lay the proposed downhole number alongside each hole which is to be charged, the delay used is normally 500ms. Make sure that every blast hole to be fired has the correct delay number alongside it.
- Assemble the primer only at the hole for which it is intended.
- Do not force detonators into primers.
- Place the entire body of the detonator inside the primer.
- Ensure that the detonator cannot be pulled out of the primer as it is lowered into the blast hole or during the charging operation.
- When loading cartridges of explosives into a blast hole do not use excessive force, do not drop them into holes and do not attempt to load them into blast holes with a smaller diameter than the cartridge itself.
- When lowering primers, be sure to prevent drill cuttings from falling down blast holes.
- When bottom priming (which is standard practise for the majority of products MDS use), ensure that the detonator in the assembled primer is pointing up into the main explosive column.
- Where blast holes are to be charged with ANFO, suspend the primer at bench floor level. Where an emulsion type explosive is to be used, lower the primer to the bottom of the blast hole and as soon as the blast hole has been charged, pull the primer up to a position level to the bench floor.
- Secure the Nonel tail on the surface to prevent it from falling down the hole. Take care not to kink or otherwise damage the Nonel tail.
- Only those holes that are intended to be blasted as per the Blast Proposal Sheet are to be primed up and charged.
- No pre-loading of shots shall be carried out where there is a risk of cut-off or premature initiation (i.e. fly rock) fired from another blast in close vicinity.

8. REDRILLS WITHIN A PRIMED SHOT.

Wherever possible re-drills are to be completed prior to priming of any blast holes. If this is not possible then the following procedure must be adopted without exception and supervised by either the appointed shotfirer in charge or the site supervisor/manager.

- All holes must be dipped and re-drills clearly marked.
- Establish the shortest and safest route to the re-drills. Clearly mark a corridor along this route with traffic cones or flagging tape. Allow room for the drill rig to manoeuvre within the marked area (i.e. minimum of 8 metres from the nearest primed up hole). When tramming drill rig, horn signals (2 blasts for forward and 3 blasts for reverse) are to be used.
- Nonel detonators, boosters or primers will then be pulled up from the existing holes to a minimum of 8 metres out from the corridor boundaries, establishing a legal safety buffer outside of the drill rig manoeuvring area. If using Down the Hole Nonel Delays, the Shotfirer will supervise the replacement of detonators and boosters to avoid disrupting the sequences of numbers.
- No driller will tram onto a primed shot until the corridor has been marked and all explosives have been withdrawn beyond the safety buffer area. The driller will at all times be guided by a shotfirer whilst on the primed shot. The driller will obey all instructions and directions given by the shotfirer. When tramming drill rig, horn signals (2 blasts for forward and 3 blasts for reverse) are to be used.
- If a hole needs redrilling within 8 metres of a charged hole, permission to re-drill this hole must be sought from the registered Mine Manager on Site or the Mine Superintendent.

9. CHARGING BLAST HOLES

Loading dry holes (ANFO).

- Ensure that the explosive truck is guided on and off the shot and any movement within the shot is closely supervised by the appointed shotfirer.
- Advise explosives truck operator of the product type and the amount per hole required.
- ANFO is to be used in dry holes only. Check Holes prior to loading to ensure that they are dry.
- Always check prior to loading the blast hole that the primer is not covered with drill cuttings.
- Make sure the tail of the detonator is secured while loading the hole.

- A bucket weight must be taken when you start loading then at 2 tonne intervals to ensure that holes are being loaded with the correct weight of explosive.
- Load the hole to the required stemming height, this can be done using the blower, buckets or the auger mounted on the truck. All care must be taken not to over load the hole or lose or damage the nonel tube. The hole is to be loaded as to ensure that a continuous line of charge is maintained, this does not apply if deck loading
- All care must be taken to minimise spillage of ANFO. Any spillage must be made inert with water.
- Only holes intended to be fired within the shot are to be loaded.
- Where blast holes are not fired on the day (i.e. Pre-load) the Shotfirer must gain approval from the Production Superintendent to sleep the shot overnight before loading commences. The Shotfirer must ensure all necessary barricades and signage are in place (i.e. Witches Hats, Blast Signs, Flashing Light, Danger Tape and other requirements deemed necessary by the client).
- If a shot is to be slept overnight (i.e. Pre-loaded) all site personnel must be informed of the location of the sleeping shot. Under no circumstance is anyone permitted to enter the coned off area without the direct permission of the appointed shotfirer or Drill & Blast supervisor.

Loading wet holes (Emulsion).

- Ensure that the explosive truck is guided on and off the shot and any movement within the shot is closely supervised by the appointed shotfirer.
- Advise explosives truck operator of the product, density and the amount per hole required.
- Emulsion can be used in both wet & dry holes.
- Always check prior to loading the blast hole that the primer is not covered with silt or drill cuttings.
- Make sure the tail of the detonator is secured while loading the hole.
- Check the weight delivered and the density prior to loading, then 5 holes after the commencement of loading and then every 50 holes throughout the shot. When loading emulsion explosives, the original density check should be kept throughout charging to monitor the progress of gassing product over time.
- When loading emulsion type explosives in wet holes, place the hose to the bottom of the hole and lift the hose 300mm off the bottom before loading (the priming charge should be located in this space). Start pumping, if the hose doesn't move freely upwards in the column of explosive then pull it up at a slow and even pace ensuring a continuous line of explosive is maintained throughout the charge.

- When the required stemming height is reached, signal the explosives truck operator to cease pumping. Take care not to overload holes.
- Once pumping has ceased pull the hose out and check that the primer is in the product by gently pulling it up to a point level with the bench floor. Slight tension should be felt as the primer is pulled through the emulsion.
- Check that the stemming height is correct.
- Take care to minimise spillage and protect the ground and have a spill kit available ready to use..
- When moving to load the next hole care must be taken to ensure the hose does not knock any Nonel's down the holes. It is recommended that a person be used to help manoeuvre the hose.
- Prior to the commencement of stemming ensure that the product has had time to gas. Times may vary depending on the product used however if in doubt wait a minimum of half an hour before commencing stemming.
- Only holes intended to be fired within the shot are to be loaded.
- Where blast holes are not fired on the day (i.e. Pre-load) the Shotfirer must gain approval from the Production Superintendent to sleep the shot overnight before loading commences. The Shotfirer must ensure all necessary barricades and signage are in place (i.e. Witches Hats, Blast Signs, Flashing Light, Danger Tape and other requirements deemed necessary by the client). Site specific procedures may apply and must be adhered to.
- If a shot is to be slept overnight (i.e. Pre-loaded) all site personnel must be informed of the location of the sleeping shot. Under no circumstance is anyone permitted to enter the coned off area without direct permission from appointed shotfirer or Drill & Blast Supervisor.

10. STEMMING CHARGED BLAST HOLES

All blast holes must be stemmed in accordance with the drill and blast proposal. All holes must be stemmed before the end of shift if the shot is to be slept for any period of time.

- Where holes are charged with gassed product (Emulsion), the explosive column requires time to expand as part of the sensitising process. This can take up to 30 minutes and needs some of the remaining column space to do so. Stemming will not occur until this time has elapsed.
- Holes loaded with ANFO can be stemmed as soon as they have been loaded and checked for correct stem height.

- All Nonel tubes must be secured before stemming commences. If a Nonel lead is lost down a hole it will be reported to the appointed shotfirer immediately, they will then inform survey and have the whole collar surveyed and treated as a misfire. A record of this occurrence will be noted in the misfire register. Once the shot has been fired the position of the misfire must be remarked by survey prior to digging commencing, this area must only be excavated under the supervision of the appointed shotfirer.
- Stem every blast hole to the specified depth with approved stemming material such as drill cuttings or angular crushed rock (aggregate) as per drill and blast proposal requirements.
- When using aggregate for stemming a loader/IT is required. Under no circumstance shall the loader/IT manoeuvre around the shot without a spotter in attendance.
- Extreme care should be taken to avoid damage to signal tubes during stemming.
- Don't stem blast holes with large sharp rocks as in hole cut off's may occur.
- Don't hack around the collars with shovels as accidental damage to nonel's may occur.
- Be careful not to bridge the stemming in the blast hole (leaving air above the charge results in poor fragmentation).
- Where angular stemming is used to stem an emulsion charge, a small amount of fine material should be dropped on top of the charge to ensure that the aggregate does not penetrate the top of the charge.
- All open holes from re-drills or RC drilling within the blast pattern must be back-filled to prevent the venting of gasses in order to eliminate air-blasts and the throw of fly-rock.

11. BLAST TIE IN

Once the "down the hole" sequence has been established, primed, loaded and stemmed the shot is ready to be tied in. Before connecting up a blast sequence refer to the Blast Proposal Sheet to ensure that the right products and firing sequence are being used.

Depending on what products and or sequence have been used, your choice for what is used to connect the holes on the surface may be limited.

Due to site specific requirements many variations of surface to down the hole delay and tie-in can apply. Below is a general guide to the three most commonly used surface initiation methods.

12. DETONATING CORD TIE IN

The system is a sequence of Nonel down the hole delays initiated by an instantaneous burning cord (Detonating Cord) on the surface. The cord can be delayed at regular intervals on the surface to create the desired timing and firing sequence of the holes.

The shotfirer should identify all time cells and bridge locations throughout the shot first. If time and space permits run the detonating cord completely around the individual blocks. This highlights the perimeter to all on the shot and makes it easier to tie off rows of cord as they terminate. Be prepared to bridge the shot as the nonel number series reaches the highest number.

Continue the same sequence into the next block by delaying with a Nonel on the surface. Visualise the rows and sequence that the firing front will take remembering the lowest number down the hole will be the first to fire in that line.

The location of the lowest number of the sequence in each row will give you an apparent 'spine' of the blast. This 'spine' will indicate the general movement of the blast, however, the sequence in the ground and any surface delays give the actual slope of the firing front. The main points to remember are:

- Treat detonating cord and Nonel's with care.
- Use only approved cutters for cutting detonating cord. (Single blade anvil type)
- Don't cut Nonel's; this exposes the internal product to moisture.
- Use only approved knots for tying detonating cord. All joins should be square (90º or 180º) to avoid cut-offs. Double wrap clove hitch, reef knot or other similar square joining methods should be used.
- Make sure that every Nonel "tail" is connected to the detonating cord trunkline and that the "tail" cannot be pulled out of the clip. Pull extra signal tube through the clip and secure away from other detonating cord rows.
- Keep any extra Nonel tube away from surface delays or other rows of detonating cords. Keep the Nonel down line at least 200mm away from detonating cord knots or delays.
- Where surface delays are used, place them nearer to the blast hole or row of blast holes being delayed.
- Take your time to check the tied-up shot thoroughly to make sure that all blast holes have been connected in, all connections are at right angles, and any surface delays have been properly positioned and tied in correctly. Do not rush this process as this is where the majority of the causes of misfires can be identified and remedied.

13. CONNECTADET TIE IN

Since a single number of Nonel delay is generally used down the hole all the timing is decided on the surface by the Connectadet layout. This layout is an infinite series so there is

no need to bridge or stop and start the sequence (this may be required when using some detonating cord to Nonel sequences).

Connectadet delays are an Orica product which consists of a signal tube detonator with a special plastic cover that allows the tails of other connectadet's to be clipped in to be initiated. They are fitted with a standard "J hook" on the opposite end of the signal tube to the detonator this is generally not used.

- When tying in a shot with connectadet's lay out the control line or spine of the blast alongside each hole, start at the hole at the end of the line from your proposed initiation hole as per blast proposal ensuring that the correct delay is used. This control line is the line of connectadet's that connect each row. The delay between each control line hole is generally larger than what is along the rows.
- The connectadet's for each row are then laid out starting at the end of the row farthest from the control line and working back to the control line using the delay required in the blast proposal.
- Once all the holes to be fired have a connectadet alongside them they can be clipped in. Start at the last hole that is to be initiated in each row and work back towards the control line, inspect the connectadet and down hole signal tube for damage clip the down hole tube into the connectadet clip shrouding the detonator. Ensure that the down hole tube is sitting squarely in the groove over the detonator. Coil up and secure any excess signal tube.
- On each successive hole the signal tube from the previous hole connected and the down hole tube must be clipped in. Once again ensure that they are sitting individually in the grooves and are not crossed in the clip. Crossovers are a major cause of misfires when using connectadet's.
- Continue this sequence on each row, tying in each row prior to tying in the control line. The control line should only be connected shortly before checking the shot and firing. The control line is tied in the same way, starting at the hole farthest from the initiation hole and working back towards it, remembering to clip the down hole tube as well as the tube from the row adjacent.
- The initiation hole is the last hole to be connected; this hole is only to be connected during the firing process once permission has been received from the blast controller. Once the second last hole in the control line is clipped in the shot must be checked, start at the end of each row and work back to the control line ensuring each downlink for each hole is clipped in. Check each clip is at ground level centred above the hole and that the tubes in the clip have not crossed. Coil all excess tubes and secure by burying.
- In effect a connectadet shot is tied in backwards by starting at the last hole in each row to be initiated and working back to the control line connecting each row. The control line is tied in the same way finishing at the initiation hole.

- To initiate the shot the lead in line is joined to the signal tube of the initiation connectadet.

Points to remember when using this system:

- Treat all signal tube products with the same care and respect as other explosives.
- When cutting signal tube join it immediately or use the sealing caps provided to limit the ingress of moisture; when joining connectadet's to connectaline cut a minimum of 1.0 metre from the roll of connectaline in case moisture has entered.
- Use long delay Nonel's down the hole to prevent cut-offs (500Ms is the minimum that should be used).
- It is important that all the Connectadet's face the right direction. When checking, start at the last hole and work in along each row ensuring each tail has a detonator to initiate it. The first hole will have the lead in line.
- Keep all lines taught with excesses gathered and secured from other detonators.

Take the time to check the shot thoroughly. The Connectadet system doesn't have the return or "safety line" associated with the detonating cord tie in. A failed detonator (or failure to clip in a detonator) within the series will most certainly result in misfires. All connections must be checked for crossovers in the clip as the detonator used is of a low strength and this has been known to cause misfires.

14. NOTICE OF BLASTING TIMES

It is the responsibility of the Shotfirer to ensure all persons likely to be affected by blasting operations are notified of the blast.

- Site alert and map must be sent to the contractor for approval 24 hour prior to blast, when approved by the CONTRACTOR Site Manager the alert and blast map will be distribution to all site personnel including the YPFPL plant at their prestart meetings.
- Site blast boards will advise blast times 24 hours before the blast time.

15. GUARDING AND FIRING BLASTS

During the planning of the shot, the firing position and the number and location of Blast Guards shall be determined and marked on the "Blast Area Plan" and persons trained and deemed competent to carry out these roles assigned to these positions.

- Access to the affected area shall be prevented by as many Blast Guards as the project demands. Locations and names shall be recorded on a "Blast Area Plan". The Blast

Controller shall nominate Blast Guards. These guards must have an operational two-way radio in their vehicle.

- The Shotfirer and their assistant will retire to a position of safety; this firing position will be at the Shotfirers discretion.

- Firing times should be authorised by the Registered Manager. Firing should only take place during daylight hours and only when there is sufficient light remaining after the blast to check the shot thoroughly. For blasting at night permission must be sought from the Quarry Manager/Registered Manager.

- If blasting is likely to cause a public nuisance the Registered Manager may require further controls to be put in place.

- Blast guards should block off any approach roads. The positioning of blast guards should be approved by the Quarry Manager and made well known to all on the mine site. The aim is to provide a reliable barrier to prevent persons entering during blasting operations. Blast guards should be arranged well in advance of blasting.

A site-specific procedure may be needed for some sites. Below are some general points that must be followed.

- Blast Guards shall proceed to their posts 15 minutes before the commencement of the blast period and commence reporting project security to the Blast Controller by radio.
    - Reporting shall continue until security is established.
    - The Blast Controller when asking for Blast Guard reports shall specify location as well as the Blast Guard's name, to avoid any possible confusion.
- All personnel are withdrawn from the blast site and behind the blast guards (no closer than 500m from the blast).
- Where there is a risk of fly rock greater than 500 metres blast guards should be positioned beyond 500 metres to the necessary safe distance. Refer to Fly Rock see below.
- All damageable equipment to be removed from the blast area. This includes but is not limited to all machinery, lighting towers, laser levels, generators, pumps and anything that could receive damage from fly rock or over pressure.

- Contact will be made with each individual blast guard to establish that they are positioned and the accesses blocked. Blast Guards should also position their vehicle across the road they are guarding with the drivers side to traffic approaching the blast area.
- The Shotfirer or Blast Controller then proceeds to make the blast call on a predetermined radio channel which includes:
    - An announcement that blasting is about to take place and the position.
    - A request for radio silence until the all clear is given except in cases of emergencies.
- The blast vehicle proceeds to do a blast siren run using a siren as a final warning.
- On completion of the siren run all Blast Guards are rechecked.
- Once the Blast Controller and then the Shotfirer is satisfied the area is free of all personnel, secure and ready to fire the Blast Controller gives permission to “Connect the detonator”.
- The Shotfirer connects the detonator to the shot and returns to the firing position and informs blast controller that the “detonator is connected”.
- The Blast Controller if satisfied that it is safe to proceed calls “permission to fire when ready”.
- The Shotfirer connects the firing system and announces “firing in 10 seconds” and fires the shot after the elapsed time. Once the shot has been fired successfully the firing system is disconnected and disabled.
- Once the dust, smoke and fumes have cleared the shotfirer can approach the shot to check it has fired without misfire. After checking the blast the Shotfirer announces “all clear”.
- The Blast Controller repeats the “all clear” and gives permission for the blast guards to stand down.

16. NONEL INITIATION

Procedure to safely connect Nonel Connectaline onto a loaded shot and initiate the blast.

***This procedure should only commence once the pit is cleared of personnel and blast guards have been put in place*.**

- Secure one end of the roll of Nonel Connectaline close to the tied in shot (do not connect it to the initiation detonator) and roll the Connectaline out ensuring that the line is not kinked, until you have reached a safe distance no closer than 500m or the approved firing area as shown on the “Blast Area Plan”.

- Cut the Connectaline with approved sharp cutters and place the supplied cap on the end of the Connectaline to prevent moisture from entering the nonel tube.
- Check the Nonel tubing for kinks as you walk back to the tied in shot.
- Once permission has been given to connect the shot attach the initiating detonator to the Connectaline using the MDS preferred method.
- Attach the initiating detonator to the shot. If using Detonating cord initiation the detonator must be attached by taping to a trunkline pointed in the direction of initiation using the MDS preferred method. Once this is done retire to the firing position.
- If the shot is using Connectadet initiation clip the detonator to the downline of the initiation hole and then clip in the signal tube tails from the next hole in the control line and tubes from any rows initiating from this hole.
- Ensure that at no stage is the signal tube pulled tight as it may pull the join between the connectaline and the initiation detonator apart. Taping the joiner loop to a survey stake will help prevent this.
- Retreat back to the safe firing position, and call up the blast controller to confirm your position and firing status.
- Once the blast controller has given the OK to fire, attach the approved Nonel Starter Gun to the Connectaline and fire the shot.
- Once the shot has fired, remove the Starter Gun and secure from unauthorised use by disabling and/or locking.
- When the dust and gasses have dispersed, check the shot and give the all clear if it is safe to do so.
- Do not use the Connectaline for extending down lines or surface delays**.**

17. CHECKING A FIRED BLAST

After a blast has been fired it is the responsibility of the Shotfirer to check the blast results.

- Wait a full 5 minutes after the initial explosion or non explosion before proceeding to the blast site. Disable and lock the firing system to prevent unauthorised use before leaving the firing position.
- Wait until dust and fumes have dispersed.
- Check the fired shot to ensure no holes have misfired
- If there are known underground workings (i.e. Stopes) and/or methane gas emissions from these workings the Shotfirer will conduct a visual inspection from a safe vantage point and liaise with the client.
- After consultation with the contractor the Shotfirer will not re-enter the blast zone until they are satisfied it is safe to do so.

- When the Shotfirer is satisfied that all charges have been fired the Shotfirer announces over the radio “blast all clear”.

18. MISFIRES

A misfired charge or any undetonated explosive, whether remaining in cut-off blast holes or thrown out in the rock pile, introduces a hazard into later operations. Every misfire is a potential accident, and the safest way to handle a misfire is to prevent it. Therefore, all efforts must be made to prevent misfires by charging, priming, stemming and firing correctly. Misfires when they occur must be fully investigated and recorded in the mine record book.

- Misfires are always dangerous, difficult to handle and require the Shotfirer’s best judgement. Working on or near a misfired blast hole is one of the most hazardous aspects of blasting. All possible precautions must be taken and if any doubt exists retreat and consult the Project Manager/Quarry Manager.

Common causes of misfires include:

- Improper charging and tie in method used.
- Use of inappropriate combinations of explosives and initiators.
- Use of deteriorated explosives or explosives outside their normal age limits.
- Cut-offs induced by ground movement or incorrect timing causing fly rock cut off.
- Failure to adequately check the shot prior to firing.
- Product failure.

The Department of Industry Resources (DoIR) require misfires to be reported and major misfires to be dealt with under their supervision.

Misfires shall be deemed to occur when a charge fails to explode or only partially explodes. Evidence of misfires includes but is not limited to:

- Undamaged signal tube, detonating cord, a primer or packaged or bulk explosive exposed or protruding from a hole or portion of a hole that has been fired.
- Signal tube with unburned powder still inside.
- Evidence of cut offs, butts or remaining portion of holes. Which shall all be assumed to contain explosive until proved free of explosive.

The object in treating all misfires is to render the charge harmless.

- In most instances the safest way to handle a misfired blast hole is to retire it at the earliest opportunity after retying or re priming the hole; before allowing any further operations to be carried out.

Accidents arising from misfires can be summarised as follows:

- Attempting to rectify a misfire too soon after blasting.
- Use of inappropriate methods to expose an explosive charge.
- Drilling into unexploded charges.
- Initiation of explosives in the blast hole by any means other than planned firing.

The following precautions shall be taken in the event of a misfire.

- All misfires must be reported to the Production Superintendent/Quarry Manager.
- The firing system must be disconnected and locked to prevent unauthorised use.
- No person shall enter the danger area until at least 5 minutes (assuming signal tube firing) after the time of attempted firing. After the prescribed time has elapsed only the Shotfirer and his assistant or other authorised persons shall enter the danger area.
- The misfired holes shall be clearly marked and guarded in accordance with regulatory requirements until they can be dealt with.
- If the cause of the misfire is readily identified the Shotfirer shall correct the cause and refire the shot. Refiring of misfires shall be treated as a normal blast with all the normal precautions and exclusion zones being observed.
- If the refiring is not possible, then stemming material shall be removed using a strong jet of water or water and compressed air using non ferrous tools. This must continue until either sufficient downline is available to attempt refiring, or until the explosive is exposed and a new primer can be inserted.
- A careful decision must be made as to whether the blast hole should be re-stemmed or not. No attempt must be made to recover the misfired charge using force or by withdrawing it using a tool etc.
- Misfired holes containing ANFO which fail to refire shall, if possible, be washed out completely and primers carefully removed.
- Where it is not possible to refire the misfired holes or to remove the charge safely then other methods must be used such as after confirming the position of the hole; drilling a hole at the required minimum distance away and charging and firing the hole. Another method involves digging alongside the misfire to expose it and either repriming and firing or washing it out. Both methods must have a procedure developed in consultation with the contractor before being attempted..

- In the event that a misfire cannot be cleared or re-fired on the day intended or a misfire is discovered in the mining process the Shotfirer must notify the Quarry Manager as soon as practicable.
- The Shotfirer must also ensure any necessary barricades and signage are in place (i.e. Witches Hats, Blast Signs, Flashing Light, Danger Tape and other requirements deemed necessary by the Client).
- The Shotfirer must ensure that the next relieving supervisor is notified of any misfires or relevant information pertaining to blasting activities conducted. This involves personally showing the person the affected area, marking it on blast boards as a misfire and informing all mining personnel by way of pre shift meeting.

19. FLY ROCK

Fly rock may cause injury or damage during blasting. To minimise fly rock there are a number of variables that need to be considered. Quality control of the blasting process plays a large part in minimising fly rock, toe and poor fragmentation..

- Can the toe be incorporated in the blast to be drilled to blast hole depth? If the toe is fired with the blast, load the blast hole including the toe to a normal blast hole stemming height. This will create a uniform stemming height, which will help contain the fly-rock compared to firing just the toe on a shallow hole.
- If the toe is fired separately, include sub-drill to the depth of the hole. This will give the hole greater depth which will allow more stemming height to be added. (I.e. 1m deep hole + 0.5m sub-drill = 0.5m of charge and 1m of stemming and solid burden to help contain the fly-rock).
- Reduce the bit size to help get a better energy distribution throughout the toe shot (i.e. the smaller the hole diameter the smaller the charge concentration the better the containment).
- Do not drill holes <1.0 metre deep.
- Do not have the spacing's and burdens greater than the depth of the hole. The burden should not be less than one third to half the depth of the hole.
- Try to use a ratio of 85:15 to 50:50 (85% stemming to 15% charge). The greater the stemming the greater the confinement of energy.
- Use blasting mats if they are available. Give consideration to creating an artificial burden.

Firing oversize rock pops can create fly rock if not done carefully always load them conservatively to minimise the chance of fly rock.

- Drill the hole in the centre of the rock to achieve an even burden.
- Drill the hole roughly 2/3 through the rock.

- Use a ratio of 95:5 (95% stemming to 5% charge). The reason for this is that you only want to split the rock into a couple of pieces not shatter it across the floor.
- One detonator and 150g booster, placed in the bottom of the drill hole and stemmed, will produce enough energy to split a rock (the size of a Toyota Land cruiser PC) into several manageable pieces, providing the hole is drilled in the centre of the rock.

Fly-Rock within a Blast

- Ensure the holes are loaded to a correct stemming height as per the Proposal Sheet. The stemming height should be equal to or greater than the burden.
- On blast sites where the ratio of sub-drill is 10% of the bench height (i.e. 5.0m hole 10% = 5.5m) the stemming height is roughly 2.0m. The 2.0m stemming height is really 1.5m of solid ground and 0.5m of pre-conditioned rock, which was the sub-drill from the bench above. When the sub-drill ratio is increased to say .8m on a 5.0m bench the hole depth becomes 5.8m. The stemming height must be increased to compensate for the extra sub-drill otherwise you will not have enough solid rock to contain the energy and stop it from venting. The stemming height would have to be increased roughly the same ratio as the sub-drill.
- DO NOT stem overloaded holes. Remove the excess product where safe to do so or alternatively bury the hole in sand to give greater stemming.
- Ensure the burden on the face is a minimum of half the burden in vertical holes. Where angle face holes are put in to eliminate face toe, only lightly load the holes, and in some cases add artificial burden to the hole to help reduce the fly-rock. Always fire the angled face holes with the same timing as the vertical blast row where there is a small burden between the two holes as this will prevent cut offs.
- Where cavities may occur or fractured broken ground, do not keep loading excess product into the hole to try and achieve the required stemming height because the extra product will increase the powder factor of that hole.
- Always try to fire to a blasted or free face and keep the timing to help promote that movement as this will reduce cratering and hence fly-rock.
- Try not to do too many centre lifts as they are designed to throw the rock up.

REMEMBER

- When firing toe or rock pops, or blasting with a free face, always ensure that in pit machinery are moved well clear of the blast zone. Also when firing toe, rock pops, or free-faced blasts, move the blast guards back to a safer position. Do not just rely on the 500m exclusion zone.
- In the event of injury to personnel or damage to machinery or plant, or a near miss, and incident report and memorandum must be filled out. The Quarry Manager must be informed before the end of the shift.

20. SAFE LOADER OPERATION ON BLAST PATTERNS

To safely operate a loader on a loaded shot whilst stemming out of the bucket.

- Only qualified drivers who have been deemed competent by MDS, are allowed to operate a loader on a mine site/blast pattern.
- Prior to starting the loader, a pre-start check shall be completed to ensure that all relevant requirements are adhered to – e.g. oils, water, tyres, fire extinguishers, grease points, clean windows, no visible oil leaks that may constitute a fire.
- When picking up the stemming in the bucket, try not to contaminate the stemming with rocks or mud.
- When entering or leaving the pit always call up on the radio to make your presence known.
- When approaching the loaded shot, wait at the barricades until a member of the Shotcrew comes and guides the loader onto the shot.
- The loader operator must not move on the shot unless guided by the spotter. The spotter must not move the loader if there is any chance of coming in contact with any nonel signal tube lead.
- When being guided on the shot, straddle a blast row to ensure that the tyres of the loader are not running over the Nonel's on the blast rows on either side of the loader.
- Ensure that the Shotcrew have coiled the Nonel tubes up over the top of the blast hole and secured the loose Nonel tube to prevent the Nonel tubes from being run over by the loader tyres.
- Never try to turn the loader around on the blast pattern. Always reverse back down the line that you accessed until the loader is clear of the blast holes. Once off the blast pattern set the loader up over another blast row.
- The Shotcrew is ultimately responsible for guiding the loader and setting the height of the bucket as they have a better view. Never move on the loaded shot without their guidance.
- When moving from hole to hole, always ensure that the Shotcrew are at a safe distance away from the loader and have only one person guide you to avoid confusion.
- In the event of the loader breaking down or getting bogged whilst on the shot, a JSA must be completed before there is an attempt to remove the loader.

In the event of a flat tyre or tyre blow out, remove the loader off the shot to a nearby safe place to be fixed. Do not continue to use the loader on the shot or try to drive it out of the pit with a flat tyre.

21. SUMMARY

The Licensed shotfirer is directly responsible for carrying out the blasting process in a safe and efficient manner. The shotfirer must ensure that all relevant policies, procedures & state and federal statutes as referenced above are followed and enforced.

Personnel involved in the blasting process report to the licensed shotfirer, if any problem is encountered the shotfirer must be immediately informed.

Attachment 02 – Risk Management Plan

Risk Management Plan

(Drill & Blast Risk Register)

Project: WBHO- Tan Burrup Project Location: Dampier. Western Australia	Date:September 2012	

Task / Facility / Equipment / System	Risk Identified	Unmanaged Hazard		Risk Rating • High • Significant • Medium • Low	Control Methods	Managed Hazard		Final Risk Rating
		Prob	Consq			Prob	Consq	
Drill & Blast								
Operating in highly contaminated weed areas	Unidentified weed areas	2-Likely	B-Major	High B2	Identify weed areas for drilling, excavating and dumping. Areas are clear of weeds before drilling commences. Designated wash down / park up and service areas to be identified and signposted	4-Unlikely	D-Minor	Low D4
	Servicing plant and equipment - spills	3-Possible	B-Major	High C2	Establish a service area adjacent to designated area. Service at workshop. Equipment to be serviced in the designated service area. Spill kit at service area. Service area to have damp rags available to wipe down the inside of cabins	4-Unlikely	D-Minor	Low D4
	Moving plant and equipment between weed zones	3-Possible	C-Moderate	Significant C3	Machines trammed to designated wash down area and washed down, cabin wiped out with damp rag. The Contractor is to inspect and authorise movement of machines from designated area (Weed and Seed)	4-Unlikely	D-Minor	Low D4
	Overclearing	3-Possible	C-Moderate	Significant C3	Vegetation Disturbance Approval obtained prior to clearing.	5-Rare	D-Minor	Low E4
General Drill Maintenance								
Set up for servicing.	Location may not be designed for maintenance work to take place due to likelihood for oil spills to occur.	2-Likely	B-Major	High B2	Servicing of drills shall only be undertaken in designated service areas and / or Workshop. Personnel engaged on site will be advised of this requirement, included in JHA. Spill kits are available in designated servicing area or workshop in the event of any spillage.	4-Unlikely	C-Moderate	Medium D3
Washing machinery	High pressure fluid blasting material from drilling equipment. With potential for pressurized fluid coming into direct contact with body	2-Likely	B-Major	High B2	Ensure area is clear of other personnel. Correct PPE is to be worn including safety glasses,face shield, gloves and wet weather gear if required. Double eye protection is mandatory. Use of a minimum 1 metre nozzle length. Water blasting sign to be displayed on machine	4-Unlikely	D-Minor	Low D4
	Contaminated run-off	2-Likely	B-Major	High B2	Maintenance personnel to comply with site specific procedures relating to washing machine. Wash in designated areas. Do not use unapproved chemicals, all chemicals to be approved by the Contractor prior to arrival on site	4-Unlikely	D-Minor	Low D4
Working on hot components	Burns, fumes	2-Likely	B-Major	High B2	Maintenance staff to ensure that equipment has had time to cool sufficiently before attempting to work directly on hot components. Wear appropriate PPE.	4-Unlikely	D-Minor	Low D4
Refuelling of plant	Spill	2-Likely	C-Moderate	Significant B3	Hose not to be left unattended while refuelling. Turn pump flow pressure down. Spill kit, drip tray under overflow hose.Competent service operators, truck to approach machine after radio contact with drill operator. Drill rig finishes hole and reverses off pattern.	4-Unlikely	D-Minor	Low D4
	Refuelling truck colliding with drill	3-Possible	C-Moderate	Significant C3	Driller to spot service truck to drill	5-Rare	D-Minor	Low E4
Changing track or hydraulic ram pins	Using hard head hammers creating the potential for metal fragments getting embedded in body	3-Possible	B-Major	High C2	Maintenance personnel to comply with task specific procedure "No hardened steel hammers on site, Use of chicken bars which have nylon safety collars fitted to the striking face,Care with pinch points for fingers.Gloves and other appropriate PPE	4-Unlikely	D-Minor	Low D4
Working on broken / uneven ground /contour work	Uneven ground	3-Possible	C-Moderate	Significant C3	Lace up boots to be fully laced and in good condition,Work areas to be kept clear as is practicable. Look for hazards - eyes on path, Ground preparation	5-Rare	D-Minor	Low E4

Drilling Operations								
Drilling Operations	Drilling Operations	3-Possible	C-Moderate	Significant C3	All operators to maintain three points of contact climbing on or off equipment.Access to machine components shall be limited to designated walkways. Eyes on task, eyes on path.	4-Unlikely	D-Minor	Low D4
	Fall from height.	3-Possible	B-Major	High C2	All operators to maintain three points of contact climbing on or off equipment.All personnel required to work at height shall be trained by an approved training organisation and shall be VOC'ed. Approved harnesses to be worn for all work at heights.	4-Unlikely	C-Moderate	Medium D3
	Fall from height working near open face.	3-Possible	B-Major	High C2	Drillers to be aware of the potential open face when dipping holes, if no windrow in place do not approach closer than 2m	4-Unlikely	C-Moderate	Medium D3
	Bunding around shot not high enough	3-Possible	B-Major	High C2	All open edges to be checked prior to drilling, if insufficient the bunds are to be built up	4-Unlikely	C-Moderate	Medium D3
	Rushing tasks and taking short cuts	3-Possible	C-Moderate	Significant C3	Plant selection to ensure ample capacity to meet the schedule Work team reminded at Pre starts that zero accidents is the goal. All tasks that do not have a procedure shall have a hand written JHA prepared and signed off. A new JHA shall be prepared after 7 days, or any time the job changes.Eyes on the task, evaluate ground conditions before walking over when carrying objects.Take 5 to be completed by each crew member for every new task.	4-Unlikely	D-Minor	Low D4
Drilling	Water and oil tank under pressure when filling up the tanks.	2-Likely	B-Major	High B2	The air pressure is vented through an exhaust muffler before removing the cap on the rock oil	4-Unlikely	C-Moderate	Medium D3
	Excessive noise from pressure release.	3-Possible	C-Moderate	Significant C3	Operator to wear hearing protection prior to releasing air pressure in tanks. The tap on top of the water tank is opened to vent pressure.	4-Unlikely	D-Minor	Low D4
	Potential for contact with energized underground services through work area.	3-Possible	B-Major	High C2	Excavation permit, surveyors to outline any existing services on drill maps. Checks needed if necessary - excavation and vicinity permit needed if workingwithin powerlines.All drills to carry copy of excavation permit in cabin. All drilling personnel to sign onto the Excavation permit prior to shift. Ensure the correct excavation permit is signed on to and that it is kept current. Drill perpendicular to the edge of cutting where there is likelihood of edge slippage. Shot marked out and visually clear. Drillers to be aware of drilling in weed areas Accurate drilling log shall be maintained for every blasthole Blast Design Submission form shall be developed and submitted to client representative 24hrs prior to any drilling for the blast. Drilling not to commence until approval has been obtained	4-Unlikely	D-Minor	Low D4
Accessing or leaving drill cabin	Potential for injury from falling. Rocks and loose material	3-Possible	C-Moderate	Significant C3	All operators to maintain three points of contact climbing on or off equipment. Ensure the ground is as clear and level as possible prior to entering andOperators and other staff requiring access to drills will use designated steps and handrails. Operator to face the cabin when climbing in or out of the cabin.	4-Unlikely	D-Minor	Low D4
Drilling in areas where light vehicles interfacing	Potential for interaction between Drills Rigs	3-Possible	B-Major	High C2	Interactions to be controlled by a traffic management plan. Drill patterns to be coned and sign posted to traffic. Unauthorised personnel and vehicles are not allowed in these areas	4-Unlikely	D-Minor	Low D4
	Other personnel unaware of drill areas	2-Likely	B-Major	High B2	Induction and training of personnel to recognise and avoid areas delineated byyellow cones. The use of yellow cones to delineate the drill pattern area, signage "DANGER - KEEP OUT - Drilling in Progress", communications via 2 way procedures	4-Unlikely	D-Minor	Low D4

Drilling in proximity to earthmoving equipment	Equipment Collision due to congestion	3-Possible	B-Major	High C2	Traffic management plan to be in place TMP Communication to all parties of works Area delineated and non accessible to other parties Trucks and Excavators to work with a minimum safe working distance as delineated by the traffic cones & excavator swing distance Personnel and drills are minimum of 8m at the closest hole.	4-Unlikely	D-Minor	Low D4
Drilling in proximity to personnel.	Potential for injuries due to personnel on the ground in drilling operations. This mainly applies to survey, soil technicians and maintenance staff.	3-Possible	B-Major	High C2	Pre start meeting advise of potential for drills and personnel interaction Radio/visual contact to be maintained at all times. Maintain an 8m min distance exclusion zone for ground personnel. Equipment operations to cease if the exclusion zone is breached and the Supervisor advised. Appropriate barricading and signage to be displayed. No unauthorized personnel allowed onto the drill pattern unless the driller has been notified by radio and JHA signed.	4-Unlikely	D-Minor	Low D4
	Excess noise levels	2-Likely	C-Moderate	Significant B3	Ensure adequate supervision by contractor. Ensure hearing protection is worn if within 35m of the working drill rig	4-Unlikely	D-Minor	Low D4
Drilling in ground containing weed contaminated material	Drill rig spreading weed contaminated material outside designated weed zone boundary	3-Possible	C-Moderate	Significant C3	Identification of contaminated areas. Top soil is pushed up and removed from the area before the drill pattern is marked up. All drilling shall be carried out using water injection to minimise dust Drill not to be parked up on vegetation Wash down drill rig in designated wash down area before leaving contaminated area.	4-Unlikely	D-Minor	Low D4
Oil leaks in the motor compartment of drill rigs	Potential for fire	3-Possible	B-Major	High C2	High Standard of maintenance, fire extinguisher located on equipment accessible from both the cabin and ground. All personnel trained in use of fire fighting equipment and techniques. Prestart checks on plant	4-Unlikely	D-Minor	Low D4
	Environmental - Leaks	3-Possible	C-Moderate	Significant C3	Machine prestarts, check for oil leaks, report and repair any oil leaks. Spill kits available on service truck.	4-Unlikely	D-Minor	Low D4
Drilling Contours on rough/uneven ground	Potential to roll drill rig while tramming	3-Possible	B-Major	High C2	Drill areas to be made as level as possible prior to drill rigs accessing the area. All personnel appropriately trained. Supervisors to assess drill areas prior to drills accessing the drill area. Ground preparation, ramps not too steep/narrow Driller will drive up and reverse back down the rows. No turning half way up the contour	4-Unlikely	D-Minor	Low D4
Operating drill rigs during electrical storms	Electric shock - lightning	2-Likely	B-Major	High B2	Drilling shall cease when electrical storm's approach the working area. Mast of drills to be laid down and isolation switch turned off. Lightning monitors available. Operator moves to a safe location out of the work area.	4-Unlikely	D-Minor	Low D4
Changing drill bits.	Potential for operator to get caught / entangled whilst attempting to remove drill bit.	3-Possible	B-Major	High C2	Operators shall only change drill consumables when all levers have been placed into the neutral position, engine idled down. Only trained personnel shall change drill consumables. Eyes on task, wear gloves and appropriate PPE.	4-Unlikely	D-Minor	Low D4
Changing drill rods.	Potential for operator to get caught / entangled, or sustain a strain related injury as a result of manual handling	2-Likely	B-Major	High B2	Operators shall only change drill consumables when the feed rail is in the service position and all levers are placed in the neutral position. Only trained personnel shall change drill consumables. All personnel shall comply with manual handling procedure.Operator to wear clothing that is not loose or wear jewellery or any other item that may become entagled in the working parts of the drill, including wedding rings. Employees shall wear appropriate PPE including gloves.	4-Unlikely	D-Minor	Low D4
Operating drills which generate noise levels in excess of 85 DbA	May result in personnel sustaining damage to hearing	2-Likely	B-Major	High B2	Personnel required to operate drills shall a provided suitable hearing protection and instruction in the correct use of said PPE. Blue and White mandatory ear plugs sticker on cabin. Hearing protection to be worn if within close vicinity of the working drill rig (35 metres)	4-Unlikely	D-Minor	Low D4

Working in area prone to flooding or sudden violent storms	Flooding	3-Possible	B-Major	High C2	Personnel will comply with the site specific emergency procedures as defined in the emergency management plan. All personnel instructed in this procedure in the site specific induction. Approaching electrical storms, drills to stop drilling, lower mast, isolate rig and move to a safe place until the storm has passed	4-Unlikely	C-Moderate	Medium D3
Operating in proximity to aboriginal heritage sites	Damaging Aboriginal Heritage site	3-Possible	C-Moderate	Significant C3	Personnel operating on site will participate in the site specific induction during which information relating to known aboriginal heritage sites will be provided	4-Unlikely	D-Minor	Low D4
Drilling adjacent open face	Falling over face	3-Possible	B-Major	High C2	Drill perpendicular to the edge of cutting where there is likelihood of slipping over edge	4-Unlikely	D-Minor	Low D4
Drilling into butts (potential unfired explosive	Drilling into unfired explosive	3-Possible	B-Major	High C2	Wash mis fire out thoroughly and Inspect shot for misfires, then have survey offset drill holes between benches	4-Unlikely	D-Minor	Low D4
	Dust	2-Likely	C-Moderate	Significant B3	Dust suppression - drilling with water injection	4-Unlikely	D-Minor	Low D4
Blasting								
Notify personal of blasting times	Personnel unaware of when blasting is to occur	2-Likely	B-Major	High B2	Contractor to notify all affected groups and companies of blast times via site notification system. The contractor to notify all parties on the project at a minimum of 24 hours prior to the blast. Blast boards to be placed along the main access roads to the area that is being blasted. Blast boards to display date, time and location of blasting 24 hours prior to blast.	4-Unlikely	D-Minor	Low D4
Charging operations - general	Loose surface/ uneven ground	3-Possible	C-Moderate	Significant C3	Lace up boots, work areas to be kept clear	4-Unlikely	D-Minor	Low D4
	Poor interaction with other Operations	2-Likely	B-Major	High B2	All personnel entering into the site, shall have completed a Contractor induction. Attend any relevant interface meetings (as required), display exclusion zones Restrict access to essential personnel only Strict compliance with site operational rules Competency training requirements for all personnel involved with drilling and blasting operations. JHA to be signed onto before entering work area and reviewed and altered if conditions change.	4-Unlikely	D-Minor	Low D4
	Working at heights on open faces - fall over edge	3-Possible	B-Major	High C2	Windrow to be maintained at all times, delineation, blast crew to face edge when near face.	4-Unlikely	C-Moderate	Medium D3
Erecting Delineation prior to charging operation	Poor delineation of shot, vehicles running over shot	3-Possible	B-Major	High C2	All patterns are coned off with yellow traffic cones and have signage "DANGER - KEEP OUT - Explosives". Only the loader for stemming is brought onto the shot. The loader is guided by a crew member at all times. Shotfirer takes possession of shot, Where working on multiple benches, ensure faces and toes are windrowed off to maintain 6m rule.	4-Unlikely	C-Moderate	Medium D3
Explosives transport & Handling	Manual Handing	3-Possible	B-Major	High C2	Only personnel trained and authorized to transport and store explosives shall be permitted to undertake these tasks. Manual handling procedures shall be complied with. Explosive packaging (including bagged ANFO) shall not exceed 25kg in weight. Each shot shall have a shot manifest including explosives and accessories removed from the explosives truck, what is used and what is returned. This is then entered into the explosives manefest register. Lost / misplaced material shall be reported immediately to the Registered Manager/ QuarryManager.	4-Unlikely	D-Minor	Low D4
Priming holes on a contour shot	Loose materials, Manual handling muscle strain.	3-Possible	C-Moderate	Significant C3	Lace up boots, work areas to be kept clear. Eyes on path. Only personnel trained and authorized to transport, store and handle explosives shall be permitted to undertake such tasks. Manual handling procedures shall be complied with. Explosive packagings shall not exceed 25kg in weight.	4-Unlikely	D-Minor	Low D4
	Primer lost down hole.	3-Possible	D-Minor	Medium C4	If a primer is lost down the hole, the hole shall be recorded indicating that a primer is down the hole. The hole will be re-primed and loaded to initiate the lost primer. Survey notified of hole for future reference when excavating	4-Unlikely	D-Minor	Low D4

	Hole collapses on top of primer - potential misfire	3-Possible	D-Minor	Medium C4	If primer is lodged in drill column employee is not to pull on nominated lead. If the primer is within the stemming zone, it shall be stemmed and have an artificial burden placed on top to prevent unwanted fly-rock. If the primer is in the charge column area it shall be reprimed and loaded to stemming height design. An extra primer shall be recorded on the charge sheet & shipping document.	4-Unlikely	E-Insignificant	Low D5
	Down hole delay lead length too short - primer does not initiate product	3-Possible	C-Moderate	Significant C3	Detonator leads shall be of the best possible length to enable correct length for priming and tying in holes, primer at bottom on hole	4-Unlikely	D-Minor	Low D4
	Down hole delay lead length too long - trip on hazard	3-Possible	C-Moderate	Significant C3	Detonator leads shall be coiled up using a rock to secure the lead	4-Unlikely	D-Minor	Low D4
Charging primed up holes	Loose surfaces/ uneven ground, manual handling injury, muscle strain.	3-Possible	C-Moderate	Significant C3	Lace up boots, work areas to be kept clear. Eyes on path. Only personnel trained and authorized to transport, store and handle explosives shall be permitted to undertake such tasks. Manual handling procedures shall be complied with. Explosive packagings shall not exceed 25kg in weight.	4-Unlikely	D-Minor	Low D4
	Product runs away in hole- overloaded blast hole -flyrock	3-Possible	B-Major	High C2	Driller logs cavities on log sheet which charge crew monitor when loading. Cavities are bagged off above the cavity. Holes will not be loaded past the set designed weight.	4-Unlikely	D-Minor	Low D4
	Water in hole - product (ANFO diluted)	3-Possible	C-Moderate	Significant C3	Holes dipped and marked "W" for wet holes. The holes will then be re-drilled to blow the water out or loaded with packaged product designed for wet holes.	4-Unlikely	D-Minor	Low D4
	Product spillage on surface	3-Possible	D-Minor	Medium C4	Care taken when loading holes to pour the ANFO down the hole and not around the surface	4-Unlikely	E-Insignificant	Low D5
Stemming Blast Holes	Loose surface, manual handling injury	3-Possible	C-Moderate	Significant C3	Take care when walking across shot with a bucket full of stemming.	4-Unlikely	D-Minor	Low D4
	Large rocks in stemming bridges hole - fly-rock, cut detonator tube by scratching around hole for stemming	3-Possible	C-Moderate	Significant C3	Use clean crushed aggregate to suit approx 10-15% of relevant hole diameter	4-Unlikely	D-Minor	Low D4
	Loader Run over Signal Tube	3-Possible	C-Moderate	Significant C3	Coil the detonator tubes and place between the holes parallel to IT access Loader to straddle row to minimise risk of running over leads. Spotter used. Stem up and down hill only Use loader with spotter to transport stemming onto shot.	4-Unlikely	D-Minor	Low D4
	Bridging of hole - unwanted fly-rock	3-Possible	C-Moderate	Significant C3	Use buckets/shovels to pour stemming down hole Take care when pouring the stemming down the hole to prevent bridging	4-Unlikely	D-Minor	Low D4
Tying in Pattern	Loose rocks or loose leads.	3-Possible	C-Moderate	Significant C3	Care taken when walking over shot not to trip on or stand on signal tube. Use trained personnel. The ends of the detonator leads are clipped in and tied up together to minimise lead length	4-Unlikely	D-Minor	Low D4
	Misfire due to not clipping in a detonator	3-Possible	B-Major	High C2	The pattern is tied in and walked by the shotfirer and again by the blastcrew and supervisor. The number of down hole detonators must equal surface detonators used.	4-Unlikely	D-Minor	Low D4
	Damaged signal tube from being stepped on	3-Possible	D-Minor	Medium C4	Training by the shotfirer on not stepping on top of signal tube detonator leads. Excess lead is tied up and secured.	5-Rare	D-Minor	Low E4
	Incorrect timing of the shot causing unwanted fly	3-Possible	B-Major	High C2	The shotfirer is given a copy of the approved tie diagram that is to be used for each shot	4-Unlikely	D-Minor	Low D4
Blast clearance blasting away from sensitive or populated work areas	Poor communication, area not cleared	3-Possible	C-Moderate	Significant C3	Initially a 500 meter exclusion zone and blast clearing procedure shall incorporate.	4-Unlikely	D-Minor	Low D4
	Excessive fly-rock	3-Possible	C-Moderate	Significant C3	Use approved blast design criteria and follow SWP protocol	4-Unlikely	D-Minor	Low D4
	Blast exclusion zone breached	3-Possible	B-Major	High C2	Blast Guards approved and registered. Adopt Contractorblasting guidelines and make site specific. Experienced shotfirer and blasting superintendent / controller. Only personnel holding current shotfiring licenses issued by the DOCEP shall initiate blasts	4-Unlikely	D-Minor	Low D4
Blasting within critical Operating Zone e.g. concrete tilt panels, rail, steel structures	Poor communication, area not cleared	3-Possible	B-Major	High C2	A 500 meter exclusion zone and blast clearing procedure shall incorporate the Contractor guidelines. It is preferred to pull exclusion zone into 400m to minimise disruption to other work areas (subject to risk assessment and Contractorapproval).	4-Unlikely	D-Minor	Low D4

	Fly-rock	3-Possible	B-Major	High C2	Blasting designs to be approved and signed off . Blast crew following design. Due to the nature of controlled blasting, small holes (80mm, 89mm, 102mm) and stipulations of ZERO fly-rock - For COZ blasting no flyrock larger than 150mm in diameter will be projected further than 15m (horizontal distance) in any direction; and for general blasting no flyrock larger than 150mm in diameter will be projected in any direction further than 30m (horizontal distance)close to rail and no greater than 15m in any other direction, the risk of damage to structures and injury to personnel is reduced compared to large hole production blasting	4-Unlikely	C-Moderate	Medium D3
	Fly-rock - damage to existing offices, plant and equipment	3-Possible	C-Moderate	Significant C3	Proper blasting techniques that have been proven in similar ground to be adhered to in order to promote breakage and prevent flyrock.	4-Unlikely	D-Minor	Low D4
	Blast exclusion zone breached	3-Possible	B-Major	High C2	Blast Guards are trained and registered. Adopt Contractorblasting guidelines and make site specific. Use supervisors in charge of each contractors area to sweep area of responsibility and report back to blast controller when areas is clear of personnel. Blast controller lists supervisors / sweepers and accounts for each section in blast procedure. Experienced shotfirer has a copy of the blast procedure as well as the blasting superintendent / controller. Siren run carried out throughout work area. Only personnel holding current shotfiring licenses issued by the Western Australian DOCEP shall initiate blasts. Blast boards showing personnel coming into the work area the location, time and date of every blast. The blast boards shall be prominently displayed on every access road to the blast area. Notification shall be given prior to commencement of day shift Approval to blast to be given by rail operations before charging commences when blasting near rail. Blasting inside time window granted by rail operations. Co-ordinate blast to coincide with other Contractoroperations (where possible) Blast Permit for every blast submitted to Contractorrepresentative 24hrs before the proposed blast firing.	4-Unlikely	C-Moderate	Medium D3
	Fly-Rock, Vibration, Air Blast	3-Possible	C-Moderate	Significant C3	Only qualified personnel shall be used to load and initiate shots. Blast designs and charge sheets shall be strictly adhered too. Any changes must be approved by blast engineer & Client. The site specific blast management plan and SWP'S relating to blasting shall be complied with. Blast design will be undertaken using suitably trained personnel using appropriate software programs. Blast design to utilize drillers log to determine the explosive charge that can support ground conditions. All holes dipped for depth, correct weight of explosives per hole, check stemming height. All holes when loaded shall be cut off when the loading reaches the designed weight or if the stemming height is reached first. Ground vibration levels shall be measured and recorded at the nearest sensitive structure in at least two locations (Limits as per Tender Specifications) Airblast overpressure limit shall not exceed 135 dBL at any infrastructure location	4-Unlikely	C-Moderate	Medium D3
Blasting in close proximity to flammable vegetation.	Fire	3-Possible	B-Major	High C2	The contractor shall ensure that vegetation is cleared from intended drill patterns and a suitable vegetation free buffer is maintained around blast zones at all times. All personnel trained in the use of fire fighting equipment and techniques.	4-Unlikely	D-Minor	Low D4
Checking shots	Slip / Trip, Uninitiated Explosives, damage to infrastructure	3-Possible	B-Major	High C2	Only personnel trained and authorized to conduct/ undertake such tasks. Lace up boots to be fully laced and in good condition, watch your footing when walking on blasted rock.	4-Unlikely	C-Moderate	Medium D3
	Misfire found while checking the shot	3-Possible	B-Major	High C2	Misfire procedure to be adhered to in the event that a misfire is found. If it can be checked and refired immediately the shotfirer will notify the blast controller, drive back to the firing position and fire the shot while the area is locked out.	4-Unlikely	C-Moderate	Medium D3

Initiating misfired explosive products from excavation area.	Uncontrolled explosion, Fly-Rock, Vibration, Air Blast	3-Possible	B-Major	High C2	Only qualified personnel shall be used to initiate explosives. Approval of RM required Delineate area, notify QuarryManager. Carry out JHA on the best way to clear the misfire. Place soft artificial burden over the misfire to prevent fly-rock if the misfire cannot be removed by hand. Take care when placing soft oxide material over misfire . Bury signal tube leads before placing too much burden on top of the misfire. Approval obtained on the method of firing the misfire	4-Unlikely	D-Minor	Low D4
Sleeping shot	Leaving shot unattended overnight.	3-Possible	B-Major	High C2	Provide guard / security, lighting plant, area coned off. Obtain Registered Manager or Delegates approval	4-Unlikely	D-Minor	Low D4
Security								
	Theft	3-Possible	B-Major	High C2	Magazines are located inside a locked compound Magizines are purpose built to AS 2187.1 with tamper proof locks AN is stored in 1200kg bulka bags in a locked compound Magazine and AN compounds are inspected daily Ammonium Nitrate is fenced and compliant to ASA. No loose Amonium Nitrate left in compound. Manifest of storage and usage is kept and updated after every useage. Magazine and Ammnium Nitrate is checked daily. Registered manager and local authorities are notified in the event of theft. Register of authorised personnel maintained Compounds located within a secure site, with controlled access	4-Unlikely	D-Minor	Low D4
	Unexplained loss	3-Possible	B-Major	High C2	Delivery of SRS checked against delivery docket and counted on arrival. SRS counted out and in to magazine, reconcillation completed at the end of each days use. Discrepancies reported and investigated in accordance with ROG procedure	4-Unlikely	C-Moderate	Medium D3
	Unauthorised access	3-Possible	B-Major	High C2	Only authorised personnel allowed access Register of authorised personnel maintained Compounds located within a secure site, with controlled access. Usually a mine site SRS located in locked compounds and magazines Controlled access to sites usually via security gates Sites are generally in a remote location SRS vehicles and boxes are locked when in transport from magazine to shot	4-Unlikely	D-Minor	Low D4

ATTACHMENT 07:

Construction Noise Management Plan

(CNMP)

TABLE OF CONTENTS

1. PURPOSE

This Construction Noise Management Plan (CNMP) lays down the measures to be adopted to minimise noise generation during the construction of the TAN Burrup Project so as to ensure that noise impact does not affect workers, the nearby public and/or amenities and that it complies with applicable statutory regulations. Therefore, this CNMP is focused on the noisy activities of the project and the main receptors of this noise.

This document is issued following the commitments set forth in the Public Environmental Report and further COMPANY letter in response to DEC request for additional information, and in compliance with the requirements included in the WA State and Commonwealth Approval, Works Approval and all applicable statutory laws and regulations, COMPANY Corporate and Project requirements and CONTRACTOR requirements. The present Construction Noise Management Plan must be understood as part of the global Construction Environmental Management Plan.

2. SCOPE

This Construction Noise Management Plan shall be applied to every activity performed by CONTRACTOR or any of its SUBCONTRACTORS for the execution of the TAN Burrup Project during Construction, Pre-Commissioning, Commissioning and Start Up phases.

This Project will be performed by means of modular construction and therefore, this Construction Noise Management Plan is applicable to all activities to be performed by CONTRACTOR and any of its SUBCONTRACTORS as part of the Construction, Pre-Commissioning, Commissioning and Start Up phases of the TAN Burrup Project in the Construction Site at the Burrup Peninsula where the modules are going to be installed, erected and hooked up. Any noise impact due to activities performed in the yard(s) where modules are being constructed will be managed according with an independent document and in compliance with national applicable codes and standards.

3. DEFINITIONS AND ACRONYMS

3.1 DEFINITIONS

COMPANY	Yara Pilbara Nitrates Pty Ltd
CONTRACTOR	Técnicas Reunidas S.A. (TR)
AIRBLAST LEVEL	Noise level resulting from blasting.
ASSIGNED NOISE LEVEL	Maximum levels of noise to be received at a premises at a particular time of the day or night.
BLASTING	Use of explosives to fracture rock, coal or other minerals for later recovery, or structural components to facilitate removal from a site or for reuse.
CONSTRUCTION SITE	Premises on which the sole or principal activity is the carrying out of construction work.
DECIBEL	The units of sound level and exposure measurement where a step of 10 dB is a ten-fold increase in intensity or sound energy and actually sounds a little more than twice as loud.
L Linear Peak	The maximum reading in decibels (dB) obtained using the "P" time-weighting characteristic as specified in AS 1259.1-1990 with all frequency-weighting networks inoperative and with sound level measuring equipment that complies with the requirements of Schedule 4 of the Environmental Protection (Noise) Regulations 1997.

LA, max	Noise assigned level which is not to be exceeded at any time.
LEASE AREA	The entire project lease, including the undisturbed area and the plant site.
NOISE	Vibration of any frequency, whether transmitted through air or any other physical medium. Sound that is loud or unpleasant or causes a disturbance.
NOISE LEVEL	Noise measured in decibels with the A-weighting switched in. The A-weighting is an electronic weighting network which approximates the frequency response of the normal human ear.
OFFSITE IMPACTS	Environmental impacts in the undisturbed area or outside the lease area.
PLANT SITE	Area within the disturbance boundary.
PREMISES	Residential, industrial or other premises of any kind whatsoever and includes land, water and equipment.
PROJECT	TAN Burrup Project.
SUBCONTRACTOR	Organizations which, under the co-ordination of CONTRACTOR, perform construction and erection activities for the project.

3.2 ACRONYMS

ALARP	As Low As Reasonably Practicable
AS	Australian Standards
ASAP	As Soon As Possible
YPNPL	Yara Pilbara Nitrates Propriety Limited
CEMP	Construction Environmental Management Plan
dB	Decibels
EPA	Environmental Protection Agency
HSE	Health, Safety and Environment
HO	Home Office (central CONTRACTOR offices in Madrid)
NATA	National Association of Testing Authorities
PER	Public Environmental Review
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
SLM	Sound Level Meter
SPL	Sound Pressure level – the basic measure of noise loudness. The level of the root-mean-square sound pressure in decibels given by: SPL = 10xlog 10 (P/Po) where P is the sound pressure in pascals referenced to another power value 20 µPa.
SWL	Sound Power Level – A measure of the energy emitted from a source as Sound Power Level and is given by: SWL = 10xlog10 (W/Wo) where W is the sound power in watts and Wo is the sound reference power at 10^{-12} watts.
TAN	Technical Ammonium Nitrate
WA	Western Australia

YPFPL Yara Pilbara Fertilizers Proprietary Limited

4. PROCEDURE

In compliance with Commonwealth Approval conditions, any revision of this Management Plan shall be submitted for the Minister's written approval. The new approved revision will then have to be implemented on site.

The Construction, Pre-Commissioning, Commissioning and Start Up phases of the TAN Burrup Project execution will increase noise levels within and in the immediate adjacent site areas. Therefore, this Construction Noise Management Plan aims to ensure that compliance with all applicable statutory regulations is achieved by maintaining ALARP level during all activities and, at the same time, it aims there is no adverse impact on the surrounding amenities (especially Hearson Cove and Deep Gorge).

Environmental Protection (Noise) Regulations state that main construction activities are not subject to assigned noise levels set forth in such regulations (except for blasting operations and working time scheduled) but that noise shall be dealt with by making every effort to reduce noise emission at source. This reduction shall be achieved by ensuring all machinery, vehicles and equipment are the quietest reasonably available, as requested to SUBCONTRACTORS prior to being awarded the contract. Additionally, inspections and appropriate maintenance to all equipment will provide appropriate noise level emissions during construction activities' performance.

4.1 NOISE GENERATING ACTIVITIES

Although site activities to be carried out during Construction, Pre-Commissioning, Commissioning and Start Up phases of the TAN Burrup Project are not expected to be producing noise levels above established criterion (50 dB(A) as per DPRM 2002), they may

have an impact in nearby noise levels and, therefore, they must be identified, measured and controlled.

In the chart below, noise generating activities and its predicted noise levels are summarised. This data does not include every construction activity but only those expected to be generating noise impact both inside the TAN Burrup site and at nearby noise sensitive premises (Hearson Cove and Deep Gorge).

SITE PREPARATION			
Activity	**Source**	**Noise level prediction** *Sound pressure level at boundary*	**Preventive measures**
Blasting	Explosion (shot)	< 125 dB(A)	• Detailed planning and time restrictions (take into account legal noise levels timeframe). • Advise affected premises in advance. • Limit charge mass to quantities that ensure compliance with established noise levels.
Earth moving & backfilling	Excavators, trucks	< 60 dB(A)	• Select quietest machinery and equipment available. • Ensure periodic maintenance is being performed and equipment is in well operating condition. • Perform initial inspections prior to being authorised access to the site.

CIVIL WORKS			
Activity	**Source**	**Noise level prediction** *power / pressure at boundary*	**Preventive measures**
Earth moving & excavations	Excavators, trucks	< 60 dB(A)	• Select quietest machinery and equipment available. • Ensure periodic maintenance is being performed and equipment is in well operating

CIVIL WORKS			
			condition. • Perform initial inspections prior to being authorised access to the site.
Back filling	Leveller	<75 dB(A)	• Ensure periodic maintenance is being performed and equipment is in well operating condition. • Perform initial inspections prior to being authorised access to the site. • Fit silencers as possible.
Roads & pavement	Engines and equipment.	< 75 dB(A)	• Ensure periodic maintenance is being performed and equipment is in well operating condition. • Perform initial inspections prior to being authorised access to the site.
Concrete pouring	Concrete pump, vibrator	< 75 dB(A)	• Do not let aggregates fall from an excessive height. • Ensure periodic maintenance is being performed and equipment is in well operating condition. • Perform initial inspections prior to being authorised access to the site.

MECHANICAL ERECTION & MODULE HOOK UPS			
Activity	**Source**	**Noise level prediction** *power / pressure at boundary*	**Preventive measures**
Equipment erection, piping installation, lifting operations	Engines, equipment, signals.	< 75 dB(A)	• Select quietest machinery and equipment available. • Ensure periodic maintenance is being performed and equipment is in well operating condition. • Perform initial inspections prior to being authorised access to the site.

MECHANICAL ERECTION & MODULE HOOK UPS			
			• Promote workers awareness to minimise noise generation.
Scaffolding erection	Material lifting and tools use.	< 50 dB(A)	• Promote workers awareness to minimise noise generation.

PRE-COMMISSIONING & COMMISSIONING			
Activity	**Source**	**Noise level prediction** *power / pressure at boundary*	**Preventive measures**
Chemical cleaning	Material being swept	< 85 dB(A)	• Place screens at the outlet. • Signposting of noise hazardous areas. • Advise affected premises in advance.
Air / steam blowing	Material being swept	< 85 dB(A)	• Choose silent blowing method. • Place screens at the outlet. • Signposting of noise hazardous areas. • Advise affected premises in advance.
Material transport	Trucks	< 65 dB(A)	• Ensure circulation routes are defined and identified. • Select quietest machinery and equipment available. • Ensure periodic maintenance is being performed and equipment is in well operating condition. • Perform initial inspections prior to being authorised access to the site.

Note. Noise level prediction data is based on the noise assessment using the CONCAWE method carried out as for Public Environmental Review purposes, on machinery and equipment information provided by manufacturers and previous CONTRACTOR experience.

As a result of the noise generating activities described above, special attention has to be paid to ensure all possible preventive and protective measures are adopted so that noise impact is minimised to ALARP level

4.2 NOISE CRITERIA

Construction noise generated on a construction site is not required to meet assigned noise levels (except for blasting activities), as long as preventive measures are put in place to minimise noise impact to ALARP level. The next section describes in detail all these measures; correct implementation will be monitored during regular site inspections and formal audits to be carried out during the whole Project execution by CONTRACTOR and SUBCONTRACTORS supervisory personnel as well as CONTRACTOR HO HSE Team.

When blasting is required, next criteria must be followed:

Noise requirements	**Day time**		**Night time**
	7:00 – 18:00 Monday to Saturday	**7:00 – 18:00 Sunday or Publ. Holiday**	**18:00-7:00 Any day**
For any blast	125 dB $L_{linear\ peak}$	120 dB $L_{linear\ peak}$	90 dB $L_{linear\ peak}$
For 9 in any 10 consecutive blasts (regardless of the interval between blasts)	120 dB $L_{linear\ peak}$	115 dB $L_{linear\ peak}$	

Source: Environmental Protection (Noise) Regulations, 1997 - Reg 11.

Any blasting required during the construction phase would also represent a source of noise at frequencies below the audible frequency range (infrasound) caused by the airblast overpressure wave. Therefore, vibration limits as per below chart shall be observed:

Vibration requirements	Day time 7:00 – 18:00	Night time 7:00 – 18:00
No vibration level resulting from blasting on any premises or public place, when received at any other premises.	may exceed a peak particle velocity of 10mm/s	must not exceed 5mm/s
The vibration levels for 9 in any 10 consecutive blasts (regardless of the interval between blasts), when received at any other premises.	may exceed a peak particle velocity of 1.0 mm/s	must not exceed 0.5mm/s

Source: Guidance No. 8 Revised Draft for public and Stakeholder Review

According with these criteria, ground vibration levels are expected to be below acceptable levels prescribed in AS 2187.2, and air blast levels are likely to be well below the applicable criteria within the Environmental Protection (Noise) Regulations 1997, at noise sensitive premises.

In addition to legal requirements, the effect on the operation of the neighbouring ammonia plant shall also be taken into account and, therefore, it is likely that these vibration levels are reduced to acceptable levels far below those stated in the table.

4.3 PREVENTIVE MEASURES TO MINIMISE NOISE

The TAN Burrup Project is going to be executed by means of a modular strategy which aims to achieve 2 main objectives from and HSE point of view:

- ✓ Site man-hours reduction so as to minimise potential incidents.
- ✓ Minimise environmental effect, such as noise impact on the nearby premises (because a big percentage of activities and worked man hours will be performed in a dedicated enclosed yard outside the site).

In line with this general Project strategy, the most effective measure to prevent noise impact both on site workers and nearby premises is to reduce noise at source. This will be achieved by means of the following general practices:

- Accurate construction strategy planning during early stages of the TAN Burrup Project.
- Requiring SUBCONTRACTORS to use quietest equipment and machinery available and practicable.
- Organizing and signalling circulation routes so as to minimise vehicle movement during deliveries and plant operation on site.

- Ensuring SUBCONTRACTORS perform regular and effective maintenance of equipment, vehicles and machinery.
- Providing silencers to noisy equipment as far as possible (generators and compressors).
- Ensuring enclosure panels are closed when equipment is in use and/or acoustic covers are provided where reasonably practicable.
- Promoting workers' awareness on noise reduction while performing their assigned tasks (i.e. do not let concrete pouring or material falling from excessive heights, take care while driving vehicles and equipment).
- Promoting supervision awareness on noise control and plant inspection for deficiencies in requirements or defective maintenance.
- Providing screening on the outlet of piping during cleaning and blowing operations.
- Placing temporary barriers and/or screens made of material stockpiles prior to its use as back filling so as to mitigate noise effects outside the site.

If during periodic inspections carried out by CONTRACTOR supervisory personnel any equipment and/or machinery is found to be generating more noise than desirable or expected, maintenance certificates and records will be required. Non compliances will be identified and immediately corrected and equipment and/or machinery removed from the site until deficiencies disappear. Should the case be the maintenance has been performed correctly and it is not expired yet, additional inspection and further best practices will be required to ensure noise is reduced to ALARP level (proactive maintenance).

Specific activities such as blasting and blowing will be thoroughly monitored in order to ensure noise impact on sensitive premises achieves acceptable levels. Even though they are the noisiest activities, neither of them is going to last a long period of time and therefore, the expected contribution of both to existing noise level is not considered significant. Despite this, the noise sensitive premises will be advised in advance of the performance of such activities in compliance with what is set out in the Environmental Protection (Noise) Regulations, 1997.

4.3.1 Blasting

Blasting operations to be carried out during site preparation phase consists of the controlled use of explosives to break down and remove rock so as to prepare the area for construction of the TAN Burrup Plant.

Planned blasting activities are foreseen to last approximately 4 months but in any case, will take no longer than a 6 month period, depending upon ground conditions and effectiveness of the blasting. It is scheduled that an average of one shot will be performed every two days, even though the worst expected scenario could mean one shot per day (never more than one a day). Drilling and blasting preparation will be done during daywork time but shots will be performed preferably between 5.00 pm (when no workers remain in the site) and 6.00 pm (limit established by noise criteria). In case shots are needed after 6.00 pm, acceptable noise level will fall down to 90 dB(A) and mass charges will need to be re-calculated as necessary.

Affected premises will be advised in advance to be aware of blasting activities' performance and noise impact that may occur.

Daily monitoring of blasting noise impact will be performed during operations to ensure compliance with assigned levels and records shall be kept. Special care shall be taken to neighbouring operational plant (YPFPL) so that mass charges used do not have negative effect on it due to vibrations.

Additional information regarding mass charge, explosives used and detailed process description is provided in the Blasting Management Plan (2-250-329-PRO-TRE-0111-att06).

4.3.2 Air / Steam blowing

This activity will be performed as part of the Pre-Commissioning, Commissioning and Start Up phases of the TAN Burrup Project and consists of a process for the removal of oxide

scales and construction debris by mechanical drag forces. Silent steam blowing will be used where reasonably practicable to ensure noise levels do not exceed 80 dB(A). additionally, silencers and/or screening will be used at the pipe outlet to mitigate noise level.

Blowing shall be done during daytime period (7 am – 6 pm) and following a specific method statement to be developed in a later stage of the Project by awarded SUBCONTRACTOR. This document will include a specific Job Safety Analysis in which more specific mitigation measures will be set out and described in detail.

Affected area where blowing is going to be performed will be barricaded, signaled and identified as hazardous area to avoid non-involved workers being affected by the noise impact generated by this activity. Use of ear protection will be mandatory in these areas.

4.4 NOISE SENSITIVE PREMISES

4.4.1 Site workers

Site workers performing the works are the most exposed community to construction noise impact. In addition to all preventive measures to be put in place, some noise levels exceeding those established by regulations, standards or codes of practice shall be mitigated by means of personal protective equipment.

Correct daily planning and activities' coordination will be a key issue to reduce exposure time and number of workers exposed.

Blasting will be performed outside normal working hours or during break periods to prevent non-involved workers from being exposed. Chemical cleaning and blowing will be carried out during working hours but only in specified areas that shall be barricaded, signalised and protected as necessary to avoid non-involved workers being near noisy areas.

4.4.2 Nearby premises

Hearson's Cove and Deep Gorge are considered noise sensitive premises according with regulations' definitions. Therefore, noise prediction has been modelled according with available information in order to assess the need for further mitigation measures. This modelling results predict a maximum of about 42 dB(A) at Hearson Cove beach which is less than the amenity criterion level of 50 dB(A) for Hearson Cove beach established by the former Department of Minerals and Petroleum Resources (SKM, 2002). The same has been modelled at Deep Gorge with similar results, with no expected noise level received over 50 dB(A).

Based on this modelling, no further mitigation measure will be required on addition to those already stated in this document.

4.5 NOISE MONITORING

In order to ensure compliance with noise level criteria set above, sound level measurements will be carried out on a periodic basis and results recorded and reported accordingly. These measurements will be performed at site boundary because no impact is expected to be caused at nearby premises. Should the results obtained show noise levels above those established or foreseen, additional monitoring will be performed and, if required, sound level measurements will be carried out at noise sensitive premises to ensure no impact is being generated. In case these results show non-compliance, action shall be taken immediately at source.

Sound level meters used for monitoring blasting operations shall have the capability to measure in linear peak hold mode ($L_{linear\ peak}$). Airblast level measurements will be made placing the measuring microphone (sound level meter) between 1.2–1.6 metres above the ground and using Class 1 monitors (or type 1 according to older standards – AS IEC 60942) such as B&K 2250 or B&K 2260 which will ensure accurate measures of the peak level of a blast, by means of microphones with extremely low frequency capabilities and electronics

with very low cut-off frequencies - 2Hz or less (as per Environmental Protection (Noise) Regulations, 1997 request). Other monitor may be used provided they are Class 1 and they comply with relevant requirements set forth in AS IEC 61672. In addition to this, sound level measuring instruments shall be calibrated to establish that their sensitivity remains within +0dB and -3 dB of the sensitivity at 100 Hz when tested at selected frequencies within the range 2 Hz to 10 Hz and shall have an upper frequency response of at least 500 Hz,

Additionally, general measurements will be performed on a periodic basis in order to monitor compliance with established noise levels and to correct or improve preventive and protective measures where required. Site workers shall be provided with ear protection according with the results of these measurements and nearby premises shall be advised of noise impacts also due to these monitoring collected data.

Sound level metres measuring instruments used shall be calibrated according with Environmental Protection (Noise) Regulations requirements to check that its performance meets the standards and that results provided are accurate. Therefore, they shall comply with the following:

- Instrument has to have been calibrated within the previous 2 years (recommended interval not to exceed 1 year).
- Calibration laboratory has to be approved by the CEO of the Department of Environment Protection and/or registered in the National Association of Testing Authorities (NATA).

CONTRACTOR will ensure that all sound measuring instruments certificates' are available and in force by means of document periodic inspections. No instrument will be allowed to be carrying out measurements without being correctly calibrated as per above described requirements.

5. REFERENCES

CONTRACTOR and SUBCONTRACTORS shall comply with project specifications, laws and regulations of Australia as applicable. In this way, CONTRACTOR shall use the next reference documentation:

5.1 CLIENT SPECIFICATIONS AND PROCEDURES

- Public Environmental Review for Yara Pilbara Nitrates Pty Ltd. (PER)
- YPNPL Works approval (15/07/2011)
- State of WA Statement No. 870 (07/07/2011)
- Commonwealth Approval letter from SEWPaC (14/09/2011)
- Appendix D-6 - HES Requirements during Construction & Fabrication

5.2 LEGISLATION

- Environmental Protection Act 1986
- Environmental Protection (Noise) Regulations, 1997
- AS 2436-2010 – Guide to noise and vibration control on construction, demolition and maintenance sites.
- AS IEC 61672 – Electroacoustics. Sound level metres.

5.3 CONTRACTOR MANAGEMENT SYSTEM PROCEDURES

PG-04	IDENTIFICATION AND EVALUATION OF ENVIRONMENTAL ASPECTS
PG-05	IDENTIFICATION AND ACCESS TO LEGAL AND OTHER ENVIRONMENTAL REQUIREMENTS
PG-06	DEVELOPMENT OF ENVIRONMENTAL MANAGEMENT PLANS

PG-07	OBJECTIVES PROGRAMMING
PG-08	IDENTIFICATION AND RESPONSE TO POTENTIAL ACCIDENTS AND ENVIRONMENTAL EMERGENCIES
PG-10	COMPETENCE, TRAINING AND AWARENESS
PG-12	TREATMENT OF NON CONFORMITIES, CORRECTIVE AND PREVENTIVE ACTION RELATED TO ENVIRONMENTAL MANAGEMENT SYSTEM
PG-14	WASTE MANAGEMENT
PG-15	ENVIRONMENTAL MANAGEMENT SYSTEM INTERNAL AUDITS

5.4 PROJECT RELEVANT HSE DOCUMENTATION

2-250-329-PRO-TRE-0111	Construction Environmental Management Plan
2-250-329-PRO-TRE-0113	Emergency Response Plan

ATTACHMENT 08:

Construction Terrestrial Fauna Management Plan

(CTFMP)

TABLE OF CONTENTS

1. PURPOSE

The purpose of this Construction Terrestrial Fauna Management Plan (CTFMP) is to address the management and mitigation of potential impacts to terrestrial fauna during the construction phase of the Technical Ammonium Nitrate Production Facility (the Project) which is to be developed within a 35 Ha site (the Site) on the Burrup Peninsula, Western Australia (WA), (**Figure 1**).

This CTFMP is to be read in conjunction with the Construction Environmental Management Plan (CEMP) (2-250-329-PRO-TRE-0111), in which general construction roles and responsibilities are defined as well as environmental monitoring, inspection, auditing and reporting requirements.

2. SCOPE

This CTFMP describes the measures to be implemented to manage and mitigate the potential impacts associated with the construction of the Project on:

- Threatened and protected fauna species, populations and communities[1];
- Migratory birds[2]; and
- Terrestrial fauna and habitat values.

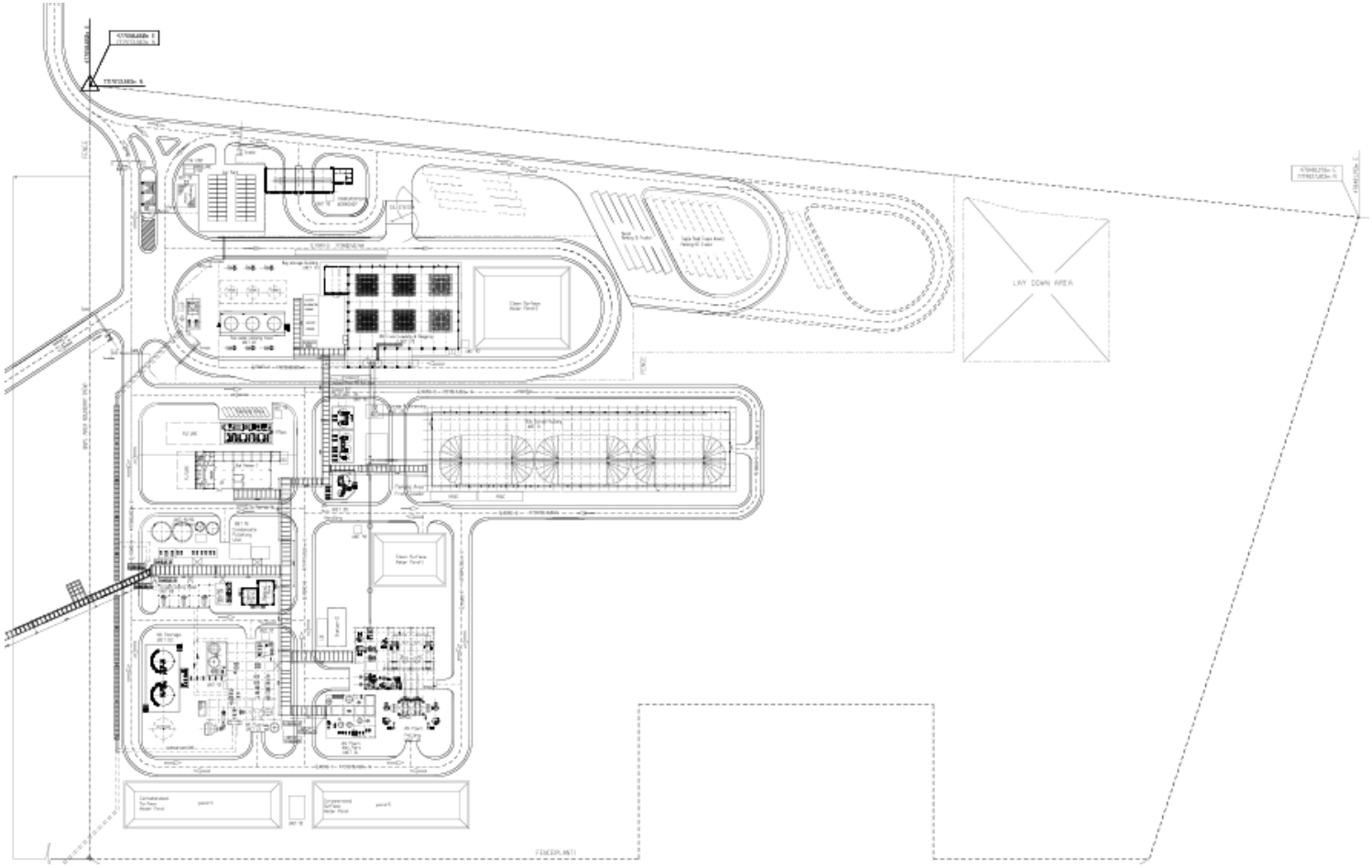
The procedures and protocols contained within this CTFMP are for the construction phase of the Project and are limited to construction activities within the Site only (i.e. not the offsite development of modules to be used for the modular construction of the Project).

This Project will be performed by means of modular construction and therefore, this Construction Terrestrial Fauna Management Plan is applicable to all terrestrial fauna existing in the TAN Burrup Project Site areas at the Burrup Peninsula where the modules are going to be installed, erected and hooked up. Any issue related to yard(s) where modules are being constructed is not subject to this document's requirements.

[1] Listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the WA *Wildlife Conservation Act 1950* (WC Act).

[2] Listed under the China Australia Migratory Bird Agreement (CAMBA), Japan Australia Migratory Bird Agreement (JAMBA) and Republic of Korea Australia Migratory Bird Agreement (ROKAMBA).

Figure 1: Site boundary and Project Layout



3. DEFINITIONS AND ACRONYMS

3.1 DEFINITIONS

Company	Yara Pilbara Nitrates Pty Ltd.
Contractor	Técnicas Reunidas S.A. (TR)
Construction	Includes any preparatory works within the Site required to be undertaken including clearing vegetation, cut and fill activities, the erection of any on-site temporary structures and the use of equipment for the purpose of breaking the ground for buildings or infrastructure.
Project	TAN Burrup Project.
Site	35 Ha area approved for construction works.
Trench	For the purpose of the CTFMP, a trench is defined as any construction related void greater than 500 mm deep and left open for more than 24 hours.

3.2 ACRONYMS

YPNPL	Yara Pilbara Nitrates Proprietary Limited
CAMBA	China Australia Migratory Bird Agreement
CEMP	Construction Environmental Management Plan
CTFMP	Construction Terrestrial Fauna Management Plan
Cwth	Commonwealth
EO	Environmental Officer
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
Ha	Hectare
HO	Home Office
HSE	Health, Safety and Environment
JAMBA	Japan Australia Migratory Bird Agreement
OEMP	Operational Environmental Management Plan
PER	Public Environmental Review
PTFMP	Preliminary Terrestrial Fauna Management Plan
ROKAMBA	Republic of Korea Australia Migratory Bird Agreement
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
TAN	Technical Ammonium Nitrate
TANPF	Technical Ammonium Nitrate Production Facility
TEC	Threatened Ecological Community
TR	Técnicas Reunidas (construction contractor)
WA	Western Australia
WC Act	Western Australia *Wildlife Conservation Act 1950*
YPFPL	Yara Pilbara Fertilizers Proprietary Limited

4. LEGISLATIVE FRAMEWORK

This document has been prepared to address relevant legislative requirements in addition to environmental approval conditions relevant to fauna management. A summary of relevant legislation and environmental approval conditions is outlined below.

4.1 RELEVANT LEGISLATION

Legislation relevant to fauna management is outlined in Table 1

Table 1: Relevant Legislation and its Application

Legislation	Application
Environmental Protection Act 1986 (WA)	State environmental impact assessment and Ministerial approval process.
Wildlife Conservation Act 1950 (WA)	Assesses the conservation significance of fauna species and forms the framework for significant species protection at the State level.
Environment Protection and Biodiversity Conservation Act 1999 (Cwth)	Assesses the conservation significance of fauna species and forms the framework for significant species protection at the Commonwealth level. Provides for the protection of matters of National Environmental Significance.

4.2 ENVIRONMENTAL APPROVAL CONDITIONS

This document also addresses the Ministerial Conditions outlined by the Commonwealth (EPBC 2008/4546) and WA (Statement No. 870) governments. For this CTFMP particular reference has been made to:

Commonwealth Approval (EPBC Approval 2008/4546)

Condition 7

To ensure the protection of the listed threatened species; listed migratory species and the values of the Dampier Archipelago (including Burrup Peninsula) National Heritage Place, the person undertaking the action must submit to the Department those management plans containing management actions aimed at reducing impacts upon these relevant matters of national environmental significance.

WA Approval (Statement No. 870)

Condition 7

7.2 During construction of the TANPF the proponent shall ensure that the following requirements are met:

1. *Fauna refuges are to be placed in the trenches and other construction related voids at intervals not exceeding 50 metres;*
2. *The proponent shall employ at least two "fauna-clearing people" that are appropriately licensed by the DEC to remove fauna from the trenches and other construction related voids;*

3. *Inspection and clearing of fauna from trenches and other construction related voids by fauna clearing people shall occur at least twice daily and not more than half an hour prior to backfilling of trenches and other construction related voids, with the first daily inspection and clearing to be completed no later than 3.5 hours after sunrise, and the second inspection and clearing to undertaken daily between the hours of 3:00 pm and 6:00 pm;*
4. *In the event of rainfall, the proponent shall, following the clearing of fauna from the trenches and other construction related voids, pump out any pooled water in the open trenches and other construction related voids (with the exception of groundwater) and discharge it via a mesh (to dissipate energy) to adjacent vegetated area, having regard for the DEC's draft guideline on the treatment and management of acid sulfate soils and water in acid sulfate soil landscapes (DEC, 2009)[3] and any subsequent revisions; and*
5. *Within 14 days following completion of the construction activities requiring the use of open trenches and other construction related voids, the proponent shall provide a report on fauna found, both dead and alive, within the TANPF site boundary to the CEO.*

In addition to the Ministerial Conditions set by the Commonwealth and WA Governments, YPNPL committed to the preparation of a Construction Environmental Management Plan (CEMP) within the Public Environmental Review (PER) (ERM, 2010)[4]. This CEMP will incorporate all specific construction management plans.

[3] DEC 2011, Treatment and management of soils and water in acid sulfate soil landscapes. This document replaces DEC (2009) DRAFT Treatment and management of soils and water in acid sulfate soil landscapes.

[4] ERM 2010, Public Environmental Review for a proposed Technical Ammonium Nitrate Production Facility. Prepared for Yara Pilbara Nitrates Pty Ltd

5. DEVELOPMENT

5.1 OBJECTIVES AND PERFORMANCE

Objectives for the construction phase of the PROJECT in regards to the terrestrial fauna values of the Site are to:

- minimise impacts to terrestrial fauna and habitats, in particular those of conservation significance;
- monitor the presence of significant fauna at the Site; and
- minimise accidents to fauna as a result of activities associated with the PROJECT construction (e.g. vehicle strike and entrapment).

Detailed performance indicators for potential impacts to threatened and migratory terrestrial fauna are presented in **Table 2.**

Limited monitoring will be used to assess the impact of the construction activities against the performance measures and indicators. If monitoring and assessment indicates that a performance indicator has been exceeded, or likely to be exceeded, the Contractor will implement the contingency measures outlined in **Section 5.4.1**.

Table 2: Performance Measures

Performance Measure	Indicator of Success	Key Assessment Considerations
Level of fauna habitat loss and disturbance beyond approved Site boundary.	• No unauthorised disturbance of vegetation or fauna habitat beyond approved Site areas.	1. Does the monitoring indicate that a performance measure or development consent condition has been exceeded, or likely to be exceeded? 2. Does this exceedance increase the risk for any of the ecological issues (species, populations, communities or habitats) under investigation? 3. What is the nature of the risk? • habitat loss; • habitat connectivity/fragmentation; • species diversity; • increased predation (feral animals); or • competition for resources and weed invasion. 4. What are the potential factors that may have contributed to the risk i.e. construction activities or natural climatic event? 5. What actions, if any are required to mitigate and/or minimise the potential for future impacts?
To minimise the direct impacts on fauna within the approved Site boundary through impacts with vehicles.	• Vehicle speeds limited to 20 km/h on unformed access tracks and construction worksite. • No relative increase in the number of road kill or vehicle impacts recorded over the reporting period.	
To minimise the direct impacts on fauna within the approved Site boundary through entrapment in construction works, or extraordinary exposure to predators.	• Site fenced following clearing to avoid entrance by fauna. • Trenches left open for a limited period of time. • Fauna refuges are placed in the trenches (and other construction related voids) at intervals not exceeding 50 m. • Inspection and clearing of fauna from trenches and other construction related voids by dedicated HSE fauna teams at least twice daily and no more than half an hour prior to backfilling as per **Attachment 02**. • No increase in the number of fauna species (diversity and/or	

Performance Measure	Indicator of Success	Key Assessment Considerations
	abundance) reported during the trench monitoring operations. • No increase in the number of fauna injuries or mortality reported during the trench monitoring operations. • In the event of rainfall (and following the clearing of fauna from the trenches) any pooled water, with the exception of groundwater, is pumped out and discharged via a mesh to adjacent vegetated area. • Designated fauna handlers are appropriately trained and have all of the required licences and equipment.	
To minimise light impacts on fauna receptors	• Lighting designed in full compliance with AS 4282 - 1997: Control of the Obtrusive Effects of Outdoor Lighting. • Appropriate management measures for lighting incorporated into the CEMP and Construction Site HSE Management Plan without compromising safe working conditions.	
To avoid adverse noise impacts to fauna	• All construction works undertaken in accordance with the Noise Management Plan to ensure monitoring and management of noise emissions and compliance with statutory requirements.	

5.2 POTENTIAL IMPACTS

Construction for the Project as it relates to the management of fauna impacts will require the following activities:

Site preparation

- Mobilisation of machinery;
- Fencing;
- Excavations and blasting;
- Backfilling (material from excavation and borrowed material);
- Slope protection;
- Anti-flooding barrier;
- Drainage perimeter channel; and
- Demobilisation of machinery.

Temporary Facilities

- Site temporary facilities (including power, sewerage and utilities);
- Foundations of temporary buildings;
- Temporary fencing; and
- Temporary access roads.

Civil Works

- Excavations, backfilling works;
- Foundations of structures, permanent buildings, equipment and modules;
- Concrete structures (in situ and precast);
- Roads and pavements;
- Underground piping;
- Underground grounding; and
- Electrical trenches.

All works will be conducted within the approved 35 Ha disturbance footprint. This includes the requirement for construction laydown areas such as stockpile sites, small worksites, access roads and water storage facilities.

Disturbance of vegetation and fauna habitats (including low-lying grassed slopes and supra-tidal flats) within the Site will occur as part of the construction process. Where practical, disturbance will be minimised in the laydown areas (refer to the Construction Flora and Vegetation Management Plan and Construction Weed Management Plan for details on vegetation management). Disturbance outside of the Site will be avoided unless relevant approval from appropriate authorities is received.

Conservation Significant fauna species listed under both the WC Act and Commonwealth EPBC Act which have the potential to occur within the Site are included in **Attachment 01**.

The Site does not contain key habitat requirements that are critical to the ongoing survival of these species such as hollow bearing trees and rock outcrops. Similar habitats to those contained within the Site are known to occur within the proposed Burrup Conservation Reserve, and are well represented within the broader region. Nonetheless, the Site would comprise part of the matrix of habitats utilised by locally occurring fauna species within the Burrup Peninsula. Detailed descriptions and assessment of potential impacts to terrestrial fauna and their habitats associated with these construction works are included within the PER and include:

- death/injury of fauna from impact with vehicles;
- short term displacement of fauna species due to earth moving activities or as a result of high intensity noise, and/or dust generating activities;
- attraction of bird species to the site due to the congregation of insects resulting from construction lighting;
- loss of terrestrial and supra-tidal flat habitat (temporary and permanent); and
- stress or mortality through exposure or increased predation from entrapment in excavated trenches and voids (temporary).

5.3 MANAGEMENT ACTIONS AND RESPONSIBILITIES

Table 3 specifies the responses and actions to manage potential impacts to fauna from Project construction, and defines the responsibility and timing for their implementation.

Table 3: Management Actions and responsibilities

Reference Number	Response and Management Actions	Timing/ Critical Date	Responsible Person
CTFMP-1	An environmental officer will be on Site at all times to ensure compliance with this CTFMP and that terrestrial fauna is being appropriately managed in accordance with this management plan.	Ongoing	Contractor Site Manager and Environmental Officer (EO)
CTFMP-2	Induct all staff on the requirement to protect threatened fauna and habitat. Induction will include: • no pets on Site; • removal of refuse and waste from construction areas with reference to the measures outlined in the Mosquito and Pest Management Plan; • no feeding of any native wildlife; • checking of machinery prior to start-up for the presence of native wildlife; • no backfilling or pumping out pooled water within trenches or construction-related voids until they have been monitored and cleared by experienced and designated fauna handlers (refer	Prior to employees/contractors conduction works on site.	EO and designated fauna handlers.

Reference Number	Response and Management Actions	Timing/ Critical Date	Responsible Person
	to CTFMP-13); • vehicle speeds limited on unformed access tracks and construction worksite; • reference and use of the fauna contingency plan (**Figure 2**); • identification of threatened and migratory fauna with the potential to occur on Site; • no firearms on the Site; and • fauna is only to be captured and/or relocated by experienced and designated fauna handlers (refer to CTFMP-17).		
CTFMP-3	The construction disturbance footprint will be clearly marked on all construction drawings and physically flagged on the ground during clearing to ensure only the minimum area required is cleared.	Prior to commencement of clearing activities	Contractor Site Manager
CTFMP-4	Site will be fenced immediately following clearing and prior to any excavation works to avoid entrance by fauna.	Following clearing	Contractor Site Manager
CTFMP-5	Mechanical clearing will progress in a systematic manner, slowly progressing so as not to create habitat islands and allow fauna within the area of disturbance to move out of the area of their own accord.	Ongoing	Contractor Site Manager
CTFMP-6	Trained fauna handlers will be present during clearing activities to remove fauna (including snakes) from the site with appropriate efforts taken to minimise stress to animals. Fauna handlers will seek appropriate licences for the translocation of fauna with the DEC / SEWPaC prior to clearing (refer to CTFMP-17).	During clearing activites	Contractor Site Manager and EO
CTFMP-7	Avoid disturbance to areas mapped as Sm and supratidal within the construction laydown area as far as practical (**Figure 1**).	Ongoing	Contractor Site Manager Environmental Officer
CTFMP-8	Access for vehicles and machinery to the construction area will be along designated access tracks and parking areas.	Ongoing	Environmental Officer
CTFMP-9	Open trenches must be inspected and cleared by experienced fauna handling teams at least twice daily and not more than half an hour prior to backfilling of	Twice daily	Contractor Civil Supervisor and EO

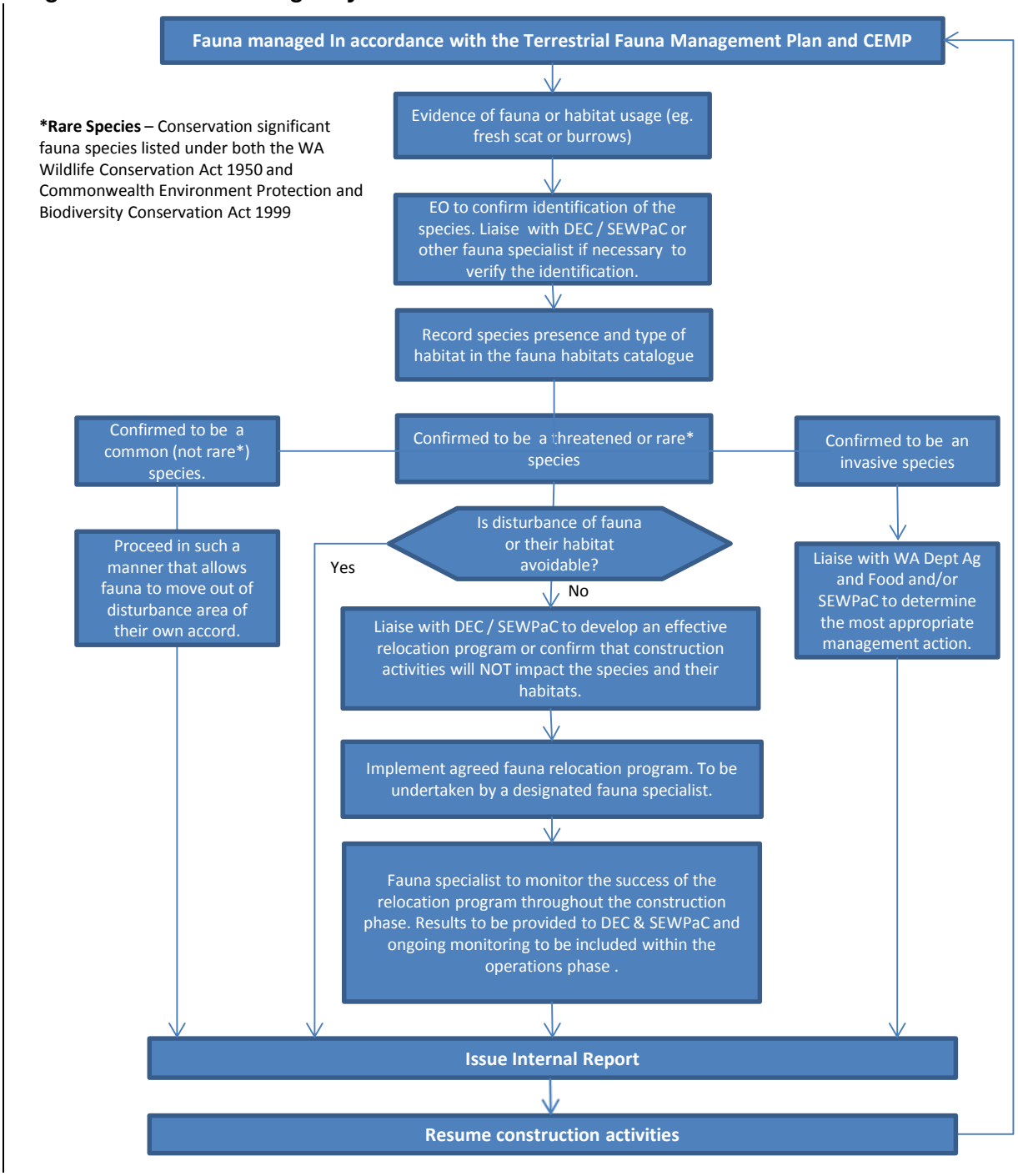
Reference Number	Response and Management Actions	Timing/ Critical Date	Responsible Person
	trenches and other construction related voids. See **Attachment 02** for fauna management protocol and reporting requirements.		
CTFMP-10	Report the presence of any species listed in **Attachment 01** or their habitats (mounds or burrows) to the EO for investigation and follow-up.	Ongoing	All employees (particularly botanical/ zoological contractors)
CTFMP-11	Report all rare fauna sightings to DEC / SEWPaC (Nature Conservation) and refer injured fauna to the Pilbara Wildlife Carers Association. See **Figure 2** and **Attachment 02** for fauna management protocol.	Ongoing	Environmental Officer
CTFMP-12	Visual monitoring for fauna and disturbance adjacent to or outside the working areas as well as on all vehicle access tracks and local transport routes will be undertaken during clearing and construction activities. All observations will be reported to the EO.	Ongoing	All drivers and Contractor Site Manager
CTFMP-13	Provide support to adjacent operation, YPFPL, to maintain signage on Village Road and Hearson Cove Road warning drivers of the potential of fauna on the road (particularly the Pilbara Olive Python).	Ongoing	Contractor Site Manager
CTFMP-14	In the event of rainfall, the proponent shall, following the clearing of fauna from the trenches and other construction related voids, pump out any pooled water in the open trenches and other construction related voids in accordance with the trench management protocol (**Attachment 02**).	Ongoing	Contractor Site Manager and Civil Supervisor
CTFMP-15	Surface water ponds have been designed to deter birds from entering the contaminated water pond, clean water pond and sewerage wastewater treatment station evaporation pond. All structures must be installed and operational prior to commissioning.	Prior to commissioning	Contractor Site Manager
CTFMP-16	Designated HSE team members are properly skilled and trained in the identification, survey and handling of fauna as outlined in **Attachment 02** including at least one team member holding a current Regulation 17 Scientific Licence issued by DEC / SEWPaC. All team members trained as designated fauna handlers must also be authorised under the licence.	Prior to commencement of clearing activities	Environmental Officer

5.4 IMPLEMENTATION

5.4.1 Contingency Response

The following contingency plan (**Figure 2**) will be implemented by the EO in the event of fauna discovery within the Site. The Contractor Site Manager will provide all necessary resources, with all Contractor Site team members to cooperate as required.

Figure 2: Fauna Contingency Plan.



5.4.2 Management Response

In the event the performance measures and actions provided in **Table 2** are considered to have been exceeded, or are likely to be exceeded, the Contractor will undertake the following:

- The EO will report incident immediately to the Contractor HSE Manager and Site Manager;
- The EO will report the likely exceedance of the performance indicator as soon as practicable to the relevant agencies as required under the development consent or legislation after becoming aware of the exceedance;
- The EO, together with the Contractor Site Management will identify an appropriate course of action with respect to the identified impact in consultation with appropriate specialists and relevant agencies; and
- The Contractor will review the effectiveness of this CTFMP and performance measures to adequately manage potential construction impacts within the limits of the Project approval.

5.4.3 Reporting

All incidents of non-compliance and corrective actions are to be reported internally by the EO on a monthly basis during the construction period.

In addition, the EO will summarise all incidents in the annual Site Compliance Report (as per Project Compliance Assessment Plan (2-250-329-PRO-TRE-0104)). This report must be submitted to the SEWPaC and DEC/OEPA and published on the YPNPL website within three months of every 12 month anniversary of the commencement of the Project. Reporting will identify opportunities for continuous improvement in terrestrial fauna management on the Site.

Within 14 days following completion of construction activities requiring the use of open trenches and other construction related voids, YPNPL shall provide a report on fauna found, both dead and alive, within the Site to the DEC and CEO of SEWPaC. A final summary report shall also be forwarded to the relevant regulatory agencies on completion of construction.

5.4.4 Monitoring and Auditing

The correct implementation of all provisions described in this CTFMP will be monitored by the Site HSE team as part of periodic HSE inspections. Periodic inspections will be carried out by Contractor HSE Team as per the Construction HSE Plan (2-250-329-PRO-TRE-0111-att12) using the HSE Inspection Sheet attached to this document (2-250-329-PRO-TRE-0111-tmp 01). Records shall be kept accordingly.

Identified deviations from this CTFMP will be reported to all affected and involved personnel and actions followed up to ensure appropriate corrective actions are implemented. Incidents that exceed performance indicators will be reported in writing and included in the Monthly HSE Report.

As part of Project Environmental Management System, this CTFMP will be audited during internal HSE Audits performed on a periodic basis by the Contractor HO HSE Team. The HSE Internal Audits procedure is described in the Project Construction HSE Plan (2-250-329-PRO-TRE-0111-att12).

This CTFMP may also be audited (if required) under the scope of any external environmental compliance audits.

An internal review of this CTFMP will be conducted in response to:

- An incident recorded as a result of the construction operations that potentially affects threatened species or populations;
- A significant change in construction phase that may affect the implementation of this management plan;
- Statutory requirements or directions/conditions of approvals requiring such action; or
- Recommendations as a result of internal or external audits.

6. REFERENCES

6.1 LEGISLATION

See section 4 of this Plan.

6.2 COMPANYSPECIFICATIONS AND PROCEDURES

- Public Environmental Review for Yara Pilbara Nitrates Pty Ltd. (PER)
- Appendix D-6 - HES Requirements during Construction & Fabrication
- YPNPL Works approval (15/07/2011)
- State of WA Statement No. 870 (07/07/2011)
- Commonwealth Approval letter from SEWPaC (14/09/2011)

6.3 PROJECT MANAGEMENT SYSTEM PROCEDURES

Internal documentation and procedures relevant to this CTFMP are outlined in **Table 4.**

Table 4: Other Relevant Documentation and Procedures

Code	Title
2-250-329-PRO-TRE-0104	Compliance Assessment Plan (MS 870)
2-250-329-PRO-TRE-0111	Construction Environmental Management Plan
2-250-329-PRO-TRE-0113	Construction Emergency Response Management Plan

7. ATTACHMENTS

- Attachment 01 - Listed fauna species that have potential to occur within the site
- Attachment 02 - Trench management and fauna monitoring protocol
- Attachment 03 – Fauna Catalogue

ATTACHMENT 01- LISTED FAUNA SPECIES THAT HAVE POTENTIAL TO OCCUR WITHIN THE SITE

Conservation Significant fauna species listed under both the WC Act and EBPC Act which have a high or medium likelihood of occurrence within the Site (**Table A.1**) are included in **Table A.2** and **Table A.3**. It should be noted that migratory wetland bird species are considered as a single group based on their common habitat requirements (**Table A.3**).

For those fauna species that are listed under the EPBC Act and WC Act as potentially being present within or in close proximity to the construction area (refer **Table A.2**), none have key habitat critical to the ongoing survival of the species (e.g. critical nesting and denning areas) within the Site.

Table A.1: Likelihood of occurrence categories

RECORDED	Species previously recorded within survey area
HIGH	Species recorded in proximity to the survey area and suitable habitat occurs
MEDIUM	Species recorded outside survey area and limited suitable habitat occurs
LOW	Species rarely, or not recorded, within 100km and/or suitable habitat does not occur

Table A.2: Conservation Significant fauna species which have the potential to occur within the Site

Species	Conservation Status*		Habitat Requirements	Habitat Potential of the Site?
	WC Act	EPBC Act		
Mammals				
Northern Quoll *Dasyurus hallucatus* 	S1	E	The Northern Quoll is described as being most abundant within rocky eucalypt woodland but is also known from a variety of habitat types, usually within 200 km of the coast where the species dens within tree hollows or rock crevices (Menkhorst & Knight 2001).	Preferred rocky eucalypt habitat not present within the site and potential denning habitat is unlikely to be present. Site may form part of broader foraging habitat within the local area.
Little North-western Mastiff Bat *Mormopterus loriae cobourgiana* 	P1	-	Restricted to mangroves and adjacent vegetation along narrow coastal strip (Menkhorst & Knight 2001). Roost in tree hollows and under loose bark.	No mangroves or potential roosting habitat occurs within the site. Site may form part of broader foraging habitat within the local area.
Ghost Bat *Macroderma gigas* 	P4	-	Known from Pilbara and Kimberly's in WA. Requires undisturbed roost caves or mine shafts (Menkhorst & Knight 2001).	Roosting habitat not present, Site may form part of broader foraging habitat within the local area.

Species		Conservation Status*		Habitat Requirements	Habitat Potential of the Site?
		WC Act	EPBC Act		
Western Pebble-mound Mouse Ngadji *Pseudomys chapmani*		P4	-	Formerly on Burrup Peninsula, now confined to central and east Pilbara. Found on stony Hillsides with hummock grassland.	Nesting sites not recorded or observed within the Site. No longer known on the Burrup Peninsula.
Pilbara Leaf-nosed Bat *Rhinoicteris aurantius (Pilbara form)*		-	V	Colonies of the Pilbara Leaf-nosed Bat are found in three distinct areas: in the mines of the eastern Pilbara; scattered throughout the Hamersley Range in smaller colonies; and in sandstone formations south of the Hamersley Range. This includes the confirmed roosts of: Bamboo Creek mine, Copper Hills mine, Klondyke Queen mine, Lalla Rookh mine and one cave in Barlee Range; and 16 other likely permanent occurrences.	Potential roosting habitat not present however it is unknown if roosting habitat occurs elsewhere within the Burrup Peninsula. The Site may provide some foraging habitat as part of a large home range.
Birds					
Peregrine Falcon *Falco peregrinus*		S4	M	Nests on cliffs, crevice or large tree hollow. Occurs in a variety of environments including wetlands, plains and timbered watercourses (Pizzey & Knight 1997).	Site represents potential foraging habitat.

Species		Conservation Status*		Habitat Requirements	Habitat Potential of the Site?
		WC Act	EPBC Act		
Australian Bustard *Ardeotis australis*		P4	-	Grasslands, open shrublands and open scrublands. Species is relatively common away from settled areas (Pizzey & Knight 1997).	Species not previously recorded within the Site or adjacent YPNPL site.
Bush Stonecurlew *Burhinus grallarius*		P4	-	Open woodland, coastal scrub and mangrove fringes (Pizzey & Knight 1997).	Species not previously recorded within the Site or adjacent YPNPL site.
Eastern Curlew *Numenius madagascariensis*		P4	-	Tidal mudflats, saltmarses and grasslands near water (Pizzey & Knight 1997).	Site represents potential habitat.
Flock Bronzewing *Phaps histrionica*		P4	-	Flooded claypans, watercourses and treeless grassy plains, nest on the ground by low bush or tussock.	Site represents potential habitat.

Species	Conservation Status*		Habitat Requirements	Habitat Potential of the Site?
	WC Act	EPBC Act		
Reptiles				
Pilbara Olive Python *Liasis olivaceus barroni* 	S1	V	The Olive Python is generally found in rocky areas or gorges and especially rocky habitat associated with water courses. Besides taking refuge in caves and rock crevices they also can be found in hollow logs and burrows beneath rocks (Pilbara Pythons, 2008). Radio-telemetry has shown that individuals are usually in close proximity to water and rock outcrops.	Preferred rocky habitats and areas such as gorges, caves and rock crevices are not present within the Site with these areas generally occurring approximately 500 metres to the north and extending over much of the Burrup Peninsula. Site may represent part of the species broader habitat requirements within the local area and connectivity to potential habitats north of the Site would be maintained within the strip of vegetation retained between Hearson Cove and the Site.
Migratory Bird Species				
EPBC Listed Species (see **Table A3** below)	-	M	Migratory bird species are known to rely on coastal wetland habitats along western Australia as part of their habitat requirements. The Supratidal flat located within the site is considered to provide a potential foraging resource.	Supratidal flat is likely to provide an occasional foraging resource for migratory bird species (refer to **Figure 1**).

** EPBC Conservation Status: E = Endangered; V = Vulnerable; M = Migratory*

WC Act Conservation Status: S1 = Fauna that is rare or likely to become extinct.

S4 = Fauna that is in need of special protection.

P1 = Taxa with few, poorly known populations on threatened lands.

P4 = Taxa in need of monitoring.

Migratory bird species considered to have the potential to utilise the Site and nearshore habitats within the Burrup Peninsula as part of their habitat requirements are listed in **Table A.3**.

The potential foraging habitats located within a portion of the Site form part of the matrix of aquatic and tidal habitats utilised within the local area by migratory and aquatic bird species. The Site may also supplement surrounding habitats in the period after storm surges or extreme high tides.

Table A.3: EPBC listed Migratory species which may potentially frequent the Site

Matters of National Environmental Significance – Migratory Species				Potential to Occur on Site
Species	**JAMBA**	**CAMBA**	**ROKAMBA**	
Apus pacificus Fork-tailed Swift	✓	✓	✓	Site represents potential habitat.
Ardea alba Great Egret, White Egret	✓	✓		Supratidal flat is likely to provide an occasional foraging resource
Ardea ibis Cattle Egret	✓			Supratidal flat is likely to provide an occasional foraging resource
Ardea sacra Eastern reef heron		✓		Supratidal flat is likely to provide an occasional foraging resource
Arenaria interpres interpres Ruddy turnstone	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Calidris acuminata Sharp-tailed sandpiper	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Calidris alba Sanderling	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Calidris canutus rogersi Red knot	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Calidris ferruginea Curlew sandpiper	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Calidris ruficollis Red-necked stint	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Calidris subminuta Long-toed stint	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Calidris tenuirostris Great knot	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Charadrius l. leschenaultii Great sand plover	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Charadrius mongolus Lesser sand plover	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Charadrius veredus Oriental Plover, Oriental Dotterel			✓	Supratidal flat is likely to provide an occasional foraging resource
Cuculus saturatus optatus Oriental cuckoo	✓	✓		Site represents potential habitat.
Fregata ariel Lesser frigatebird	✓	✓	✓	Site represents potential habitat.
Gallinago stenura Pin-tailed snipe	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Glareola maldivarum Oriental Pratincole	✓	✓		Site represents potential habitat.

Matters of National Environmental Significance – Migratory Species				Potential to Occur on Site
Species	**JAMBA**	**CAMBA**	**ROKAMBA**	
Haliaeetus leucogaster White-bellied sea-eagle		✓		Site represents potential habitat.
Hirundo rustica Barn Swallow		✓	✓	Site represents potential habitat.
Limicola falcinellus Broad-billed sandpiper	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Limosa lapponica menzbieri Bar-tailed godwit	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Macronectes giganteus Southern Giant Petrel				Supratidal flat is likely to provide an occasional foraging resource
Merops ornatus Rainbow Bee-eater				Recorded on site.
Numenius madagascariensis Eastern curlew	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Numenius minutus Little curlew	✓		✓	Supratidal flat is likely to provide an occasional foraging resource
Numenius minutus Little Curlew, Little Whimbrel	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Numenius phaeopus variegatus Whimbrel	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Oceanites oceanicus Wilson's storm petrel	✓			Supratidal flat is likely to provide an occasional foraging resource
Phalaropus lobatus Red-necked phalarope	✓	✓	✓	Site represents potential habitat.
Pluvialis squatarola Grey plover	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Puffinus pacificus Wedge-tailed shearwater	✓			Supratidal flat is likely to provide an occasional foraging resource
Sterna anaethetus Bridled tern	✓	✓		Supratidal flat is likely to provide an occasional foraging resource
Sterna bengalensis Lesser crested		✓		Supratidal flat is likely to provide an occasional foraging resource
Sterna bergii Crested tern	✓			Supratidal flat is likely to provide an occasional foraging resource
Sterna caspia Caspian tern		✓		Supratidal flat is likely to provide an occasional foraging resource
Sterna hirundo Common tern	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Sterna leucoptera White-winged black tern	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource

Matters of National Environmental Significance – Migratory Species				Potential to Occur on Site
Species	**JAMBA**	**CAMBA**	**ROKAMBA**	
Sula leucogaster plotus Brown booby	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Tringa brevipes Grey-tailed tattler	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Tringa cinerea Terek sandpiper	✓	✓	✓	Supratidal flat is likely to provide an occasional foraging resource
Tringa hypoleucos Common sandpiper	✓	✓	✓	Recorded on site.
Tringa nebularia Common greenshank	✓	✓		Recorded on site
Tringa stagnatilis Marsh sandpiper	✓	✓		Supratidal flat is likely to provide an occasional foraging resource

ATTACHMENT 02 – TRENCH MANAGEMENT AND FAUNA MONITORING PROTOCOL

It is recognised that fauna may be trapped or seek shelter in excavations during construction of the PROJECT.

The purpose of this protocol is to:

- provide for the management of interactions between people/machinery and fauna during construction; and
- ensure compliance with the Ministerial Conditions outlined by the Commonwealth (EPBC 2008/4546) and Western Australia (Statement No. 870) governments related to fauna.

For the purpose of this protocol, a trench is defined as any construction related void greater than 500 mm deep and left open for more than 24 hours.

This monitoring protocol provides general guidelines for trench management and fauna capture to ensure minimum stress and injury to the animals and handlers during the construction phase of the Project only. This protocol has also been prepared with specific reference to the approved DEC Standard Operating Procedure (SOP) No.9.6 Hand capture of wildlife[5] and DEC SOP No. 14.2 First aid for animals[6].

B.1 FAUNA EXCLUSION

The entire 35ha site will be fenced following clearing and prior to construction works being undertaken to avoid fauna entering the Site. During construction activities, a fine plastic mesh 1.2m high will also be attached to the base of the fence as a further deterrent to small mammals and reptiles.

Fencing of individual trenches is not required although the use of trench plugs and fauna exit ramps should be installed at both ends of trenches at intervals not exceeding 500 m and ramp slopes are not to exceed 45°.

B.2 FAUNA SHELTER

Fauna shelters/refuges will be placed in open trenches at intervals not exceeding 50 m. Shelter materials may include hessian sacks, shaded polyvinylchloride (PVC) pipes, cardboard boxes or other materials that provide shade or shelter from predators. Shelters deployed would provide both small and large recesses and/or features to allow smaller animals refuge and protection from larger predators.

[5] DEC, 2009. Standard Operating Procedure (SOP) No. 9.6: Hand capture of wildlife. Prepared for DEC Animal Ethics Committee. Version 1.0 (June 2009)

[6] DEC, 2009. Standard Operating Procedure (SOP) No. 14.2: First aid for animals. Prepared for DEC Animal Ethics Committee. Version 1.0 (June 2009)

B.3 TRENCH INSPECTIONS

Open trenches must be inspected and cleared by designated fauna handling teams at least twice daily and not more than half an hour prior to backfilling of trenches and other construction related voids. Inspection and clearing must be completed by:

- 3.5 hours after sunrise; and
- between 3pm and 6pm

Further opportunistic trench inspections for fauna may be undertaken by work personnel and fauna handlers will be notified to remove any fauna that are found entrapped.

Local weather forecasts will be monitored on a daily basis. In the event of rainfall, the proponent shall, following the clearing of fauna from the trenches and other construction related voids, pump out any pooled water in the open trenches (with the exception of groundwater) and discharge it via a mesh (to dissipate energy) to adjacent vegetated area, having regard for the DEC's draft guideline on the Treatment and Management of Acid Sulfate Soils and Water in Acid Sulfate Soil Landscapes[7] and any subsequent revisions.

Trench inspection procedures shall ensure inspection of the entire base of the trench, with attention to evidence of burrowing reptiles, and inspection of all shelters/refuges.

Open trench lengths shall not exceed lengths capable of being practically inspected and cleared in accordance with this protocol by the available fauna teams at any time.

A dedicated checklist will be used for daily inspections. All written records will be kept for review or auditing purposes.

B.4 FAUNA TEAMS

Fauna inspection and handling shall only be undertaken by teams of a minimum of two designated HSE team members. At least one person in each team must be able to demonstrate experience in:

- fauna identification, capture and handling (including venomous snakes);
- identification of tracks, scats, burrows and nests of conservation significant species;
- fauna vouchering;
- assessing injured fauna for suitability for release, rehabilitation or euthanasia;
- familiarity with the ecology of the species that may be encountered in order to be able to appropriately translocation fauna encountered;
- performing euthanasia; and
- interacting with venomous snakes.

[7] DEC, 2009. Treatment and Management of Acid Sulfate Soils and Water in Acid Sulfate Soil Landscapes.

Basic fauna handling training is to be provided to all other members of the fauna handling team who do not possess the above experience. This training is to be provided before the designated HSE team members are employed in fauna inspection or clearing activities and shall be recorded in writing.

At least one member of the HSE fauna team must hold a current Regulation 17 *Licence to Take Fauna for Scientific Purposes* issued by DEC under the *Wildlife Conservation Act 1950*. As a condition of the licence, the licensee will also be required to submit a return detailing the species and numbers that were released or sighted. All team members trained as designated fauna handlers must also be authorised under this licence.

Fauna handlers shall be equipped with a hoop-bag for capturing animals, a snake stick, and means of inspecting fauna shelters without the need to enter the trench (where possible).

Fauna handling shall only be undertaken by an experienced member of any designated HSE fauna team, or under the direct supervision of an experienced fauna handler.

An experienced zoologist or veterinarian shall be available for consultation on fauna handling matters as required. The zoologist or veterinarian does not need to be located on site or a member of the HSE team.

Trench inspections and clearing could, on average, be expected to progress at walking pace (~3 km/hr). Based on this, limitations on the lengths of trench permitted to be open at any one time can be related directly to the number of fauna teams available.

B.5 CAPTURE, TRANSLOCATION AND RELEASE

Where animals are to be captured for immediate translocation, this shall be done in a manner that will minimise stress and risk of injury to both the animal and the handler.

It is important to plan for fauna capture by:

- having a thorough knowledge of the possible species being caught (behaviour, reaction to stress, ability to defend itself) and the appropriate capture techniques with reference to the DEC SOP 10.2 Hand restraint of wildlife[8]; and
- having all equipment required for hand capture ready and accessible.

Translocation shall be immediate to suitable habitat at a suitable distance from the disturbance.

There may be a trade-off between distance from disturbance (and, therefore, chance of re-encounter) and habitat or species requirements (and, therefore, species' survival). For small species, species with small home ranges, or species that have reasonably specific habitat requirements, this may mean that the optimum release point is near the point of disturbance. For example, species from rocky habitats need to be released in rocky habitats even if these lie only 50 m from the trench.

For large species, species with broad home ranges, or species that have broad/general habitat requirements, the release point could be over 1 km from the void. In uniform habitat, practicality may determine the appropriate release distance. A suitably experienced

[8] DEC, 2009. Standard Operating Procedure (SOP) No. 10.2: Hand restraint of animals. Prepared for DEC Animal Ethics Committee. Version 1.0 (June 2009)

specialist with a sound working knowledge of fauna ecology and requirements may need to be contacted to verify the management of this process.

B.6 INJURED AND INTRODUCED SPECIES

In some instances, injured animals may be found. If the injuries to an animal are so serious that it is decided that the animal will not survive if released, transfer to a wildlife carer (i.e. Pilbara Wildlife Carers Association) may be appropriate. The same situation would apply with nesting birds. The alternative to caring for such fauna would be euthanasia and will only be considered as a last resort and under the direction of a veterinarian (see below).

B.6.1 Transfer to a wildlife carer

Transfer of injured or orphaned fauna to a wildlife carer (such as the Pilbara Wildlife Carers Association) will be dependent upon a number of factors, including:

- Native species - Decisions to rehabilitate or not rehabilitate wildlife shall be made by a suitably experienced/trained specialist, in consultation with DEC / SEWPaC in the case of rare species.
- Introduced species - As a policy, injured introduced species should be treated the same as other native species (see above) unless they are listed as invasive species by the WA Department of Agriculture and Food[9]. Invasive species will not be released back into the wild and actions to be undertaken will be determined in consultation with the WA Department of Agriculture and Food (listed invasive species) or SEWPaC (cane toads or feral cats).

A directory of recognised DEC / SEWPaC wildlife carers shall be distributed to relevant project construction personnel and HSE team members.

B.6.2 Euthanasia

If an experienced specialist/veterinarian advises that rehabilitation is not an option for an injured or orphaned animal because access to a carer is not possible or justified or because the fauna is unlikely to survive or will not be fit to be returned to the wild even if it does survive, then euthanasia is required. Injured animals shall not be left to suffer.

Euthanasia shall only be carried out by a suitably qualified person and only under the direction of an experienced specialist/veterinarian. If euthanasia is deemed necessary then it must be implemented humanely and all fauna handlers shall have access to the SOP for fauna translocation, monitoring and euthanasia in the field[10] and vouchering vertebrate fauna specimens[11].

[9] Check WA Department of Agriculture and Food website for an up to date list of invasive species.

[10] Chapman, et al. 2008. Minimising Disease Risk in Wildlife Management Standard Operating Procedures for translocation, monitoring and euthanasia in the field, 2nd edition. Department of Environment and Conservation, Perth

[11] DEC, 2009. Standard Operating Procedure (SOP) No. 8.1: Vouchering vertebrate fauna specimens. Prepared for DEC Animal Ethics Committee. Version 1.0 (June 2011)

In most cases, dead animals, either found during operations or euthanised, shall be removed from the immediate vicinity of activity to prevent carrion-feeding species being attracted to areas where they may, in turn, be injured. Carcases shall be incinerated or buried.

B.7 RECORDING

Records shall be kept of all animals encountered during fauna management operations as well as opportunistic listings of fauna (native and introduced) on the Fauna Catalogue (see example in **Attachment C)**. Detailed records shall be made of all animals handled, including (where practicable):

- fauna species;
- time and date of capture;
- name of fauna handler and/or fauna team;
- location (coordinates);
- status (alive, alive injured, dead predated, dead heat exhaustion, dead drowned, dead hypothermia, dead other known cause, dead unknown cause);
- actions taken (relocation, rehabilitation, release, euthanasia, none);
- euthanasia record (the method of euthanasia, species of animal, cause of injury/reason for euthanasia, the person responsible for administering euthanasia and name of veterinarian directing the process);
- voucher number (if voucher specimen taken);
- trench data if fauna have been entrapped in a trench or excavation (presence and number of trench ramps, the temperature, the total length of the open trench and the presence of any water pooling); and
- age and gender (if readily determined).

Within 14 days following completion of the construction activities requiring the use of open trenches and other construction related voids, COMPANY shall provide a report on fauna found, both dead and alive, within the Site to the DEC and CEO of SEWPaC. A final summary report shall also be forwarded to the relevant regulatory agencies on completion of construction. The CONTRACTOR shall provide COMPANY with all required information regarding this process.

B.8 HYGIENE

All animals are to be handled with the assumption that they carry disease, especially if they appear sick.

These risk management practices are to be applied by fauna handlers:

- Basic principles of personal and equipment hygiene must be followed at all times to minimise the risk of exposure to disease agents and minimise the risk of spreading disease.
- Maintain high levels of personal hygiene such as washing and sanitising hands before and after handling animals and before eating.

- Do not eat, drink or smoke cigarettes while handling animals.
- Ensure appropriate PPE (including gloves, eye protection, face mask, long-sleeved shirt and long pants) is worn when handling injured fauna.
- Disinfect, wash or dispose of bags and equipment that have been in contact with animal blood, waste and other body fluids.
- Fresh gloves and sanitised equipment will be used for handling of each individual animal to prevent the spread of disease between handled animals.

B.9 EPBC ACT LISTED THREATENED AND/OR MIGRATORY SPECIES

Surface water ponds have been designed to deter birds from entering the contaminated water pond, clean water pond and sewerage wastewater treatment station evaporation pond. All structures must be installed and operational prior to commissioning.

Whilst clean water (surface runoff and rainfall) may enter the ponds during the construction phase of the project, the actions described in this protocol are considered adequate to cover the management of threatened and/or migratory fauna species listed under the EPBC Act.

The long term monitoring of these ponds and any potential impact on shore birds will form part of the Operation Terrestrial Fauna Management Plan.

B.10 TRIGGER ACTION REPONSE PLAN (TARP)

Trigger	Action	Responsibility
Weather forecast indicating rainfall sufficient to cause substantial flooding of trench and drowning of entrapped fauna	The decision on whether the trench should be backfilled following the clearing of fauna from the trenches and other construction related voids shall be undertaken in consultation with the Canberra SEWPaC (prior to the flood event). In the event of rainfall the proponent shall pump out any pooled water in accordance with the trench management protocol and other related construction management plans (i.e. erosion and surface water management plan).	Construction Contractor and Environmental Officer
High levels of mortality (in excess of threshold to be determined)	Advise SEWPaC as soon as practically possible in order to determine a possible cause and implement appropriate and timely contingency measures. Response measures shall include modifications to escape structures/shelters and clearance arrangements.	Construction Contractor
Death of any WC Act or EPBC Act listed species	Advise Canberra SEWPaC regional staff as soon as practically possible.	Construction Contractor
Injured animals	Injured animals shall be reported to the HSE fauna team in the first instance and assessed by an experienced fauna specialist/veterinarian to determine whether translocation, transfer to wildlife carer or euthanasia is the required action. If the injured fauna is of conservation significance, the Canberra SEWPaC office shall be advised.	All drivers Construction Contractor

Invasive species	Invasive species will not be released back into the wild and actions to be undertaken will be determined in consultation with the WA Department of Agriculture and Food (listed invasive species) or SEWPaC (cane toads or feral cats).	Environmental Officer

ATTACHMENT 03 – FAUNA CATALOGUE

Please complete as much of the form as possible. Applicable to the construction phase of the Project only.

DATE:	/ /	**TIME:**	:
OBSERVERS			

SPECIES:
Threatened ☐ Priority ☐ Introduced ☐ Invasive ☐ Migratory ☐ Marine ☐ Other ☐

DESCRIPTION OF LOCATION:		
LAT/Northing:		No. satellites: _____
LONG/Easting:		Map used: _____
Datum: GDA94 / MGD94 ☐ AGD84 / AMG84 ☐ WGS84 ☐ Unknown ☐		
Coordinate Source: GPS ☐ Differential GPS ☐ Map ☐		

HABITAT INFORMATION		
Landform:	**Dominant Vegetation:**	**Associated flora species:**
Upper Slope ☐	Heathland ☐	
Lower Slope ☐	Grassland ☐	
Coastal Flat ☐	Shrubland ☐	
Saline Inlet ☐	Other ☐	
Tidal Flat ☐		

AGE AND SEX	**CERTAINTY OF IDENTIFICATION:**
Adult ☐ Juvenile ☐ Unknown ☐ Male ☐ Female ☐ Unknown ☐	NOT SURE ☐ MODERATELY CERTAIN ☐ VERY CERTAIN ☐
DISTINGUISHING FEATURES OBSERVED	

OBSERVATION/COLLECTION METHOD:			
Trench Monitoring		**Secondary signs**	**Incidental Sighting**
Live	**Dead**	Scats ☐	Day sighting ☐
Injured ☐	Predated ☐	Diggings ☐	Night sighting ☐
Uninjured ☐	Heat exhaustion ☐	Nest or mound ☐	Heard ☐
Evidence of disease ☐	Drowned ☐	Tracks ☐	Roadkill ☐
	Hypothermia ☐	Hair/skin ☐	Other ☐
	Unknown ☐	Eggs ☐	
	Other ☐	Feathers ☐	

Trench Details

Presence of fauna shelter ☐ If yes, provide details

Presence of trench ramps ☐ If yes, provide details

Presence of water pooling ☐ If yes, provide details

Total length of trench (m) Temperature (°C)

Action: Released ☐ Relocation ☐ Taken into care ☐ Euthanasia ☐

Details:

EUTHANASIA RECORD:

Reason for Euthanasia:

Injured (Native) ☐

Injured (Introduced) ☐

Evidence of disease ☐

Other (Please specify) ☐

Approval by:

Fauna Specialist ☐

Veterinarian/Zoologist ☐

DEC ☐

Dept Ag and Food ☐

Date: / /

Time: :

Name:

Method:

Disposal:

EUTHANASIA PERFORMED BY:

SPECIMEN:

Collected as voucher ☐

Catalogue No:

Retained by collector ☐

WA Museum ☐

Other (Please specify) ☐

SPECIMEN AS:

Frozen specimen ☐

Degenerated specimen ☐

Spirit specimen ☐

Skull/bones ☐

Hair/skin ☐

Scats ☐

REPRODUCTIVE STATE:

Non-breeding ☐

Mating ☐

Pregnant ☐

Eggs/young in nest ☐

Young in pouch ☐

Lactating ☐

Not known ☐

Other (Please specify) ☐

SPECIMEN IDENTIFIED BY:

OTHER COMMENTS (Please include recommended management actions and/or implemented actions. also include details of additional data available, and how to locate it)**:**

ATTACHED: Map ☐ Mudmap ☐ GIS data ☐ Photo ☐ Field notes ☐ Other:

Submitter of Record: _____ Role: _

Signed: _____ Date: / /

ATTACHMENT 09:

Construction Terrestrial Vegetation And Flora Management Plan

(CTVFMP)

TABLE OF CONTENTS

1. PURPOSE

The purpose of this Construction Terrestrial Vegetation and Flora Management Plan (CTVFMP) is to address the management and mitigation of potential impacts to threatened/protected flora species and communities[1] as a result of construction of the Technical Ammonium Production Facility (the Project) which is to occur within a 35 Ha site (the Site) on the Burrup Peninsula, Western Australia (WA) (**Figure 1**).

This CTVFMP needs to be read in conjunction with the Construction Environmental Management Plan (CEMP) (2-250-329-PRO-TRE-0111), in which general construction roles and responsibilities are defined, as well as environmental monitoring, inspection, auditing and reporting requirements.

2. SCOPE

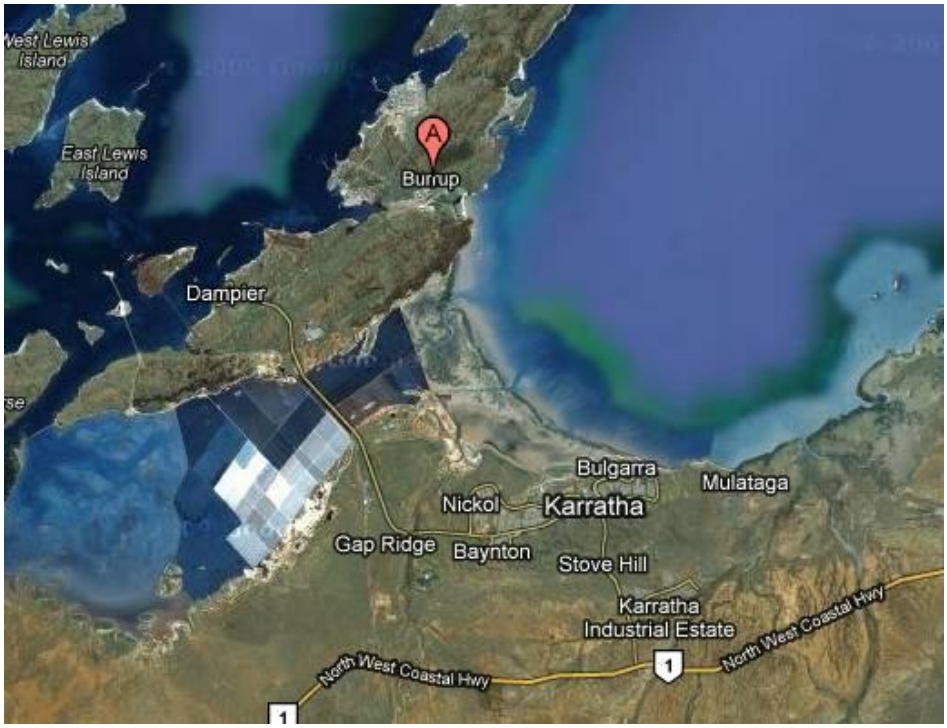
This CTVFMP describes the procedures and protocols to be implemented to manage and mitigate the potential impacts associated with the construction of the Project on threatened/protected flora species and communities.

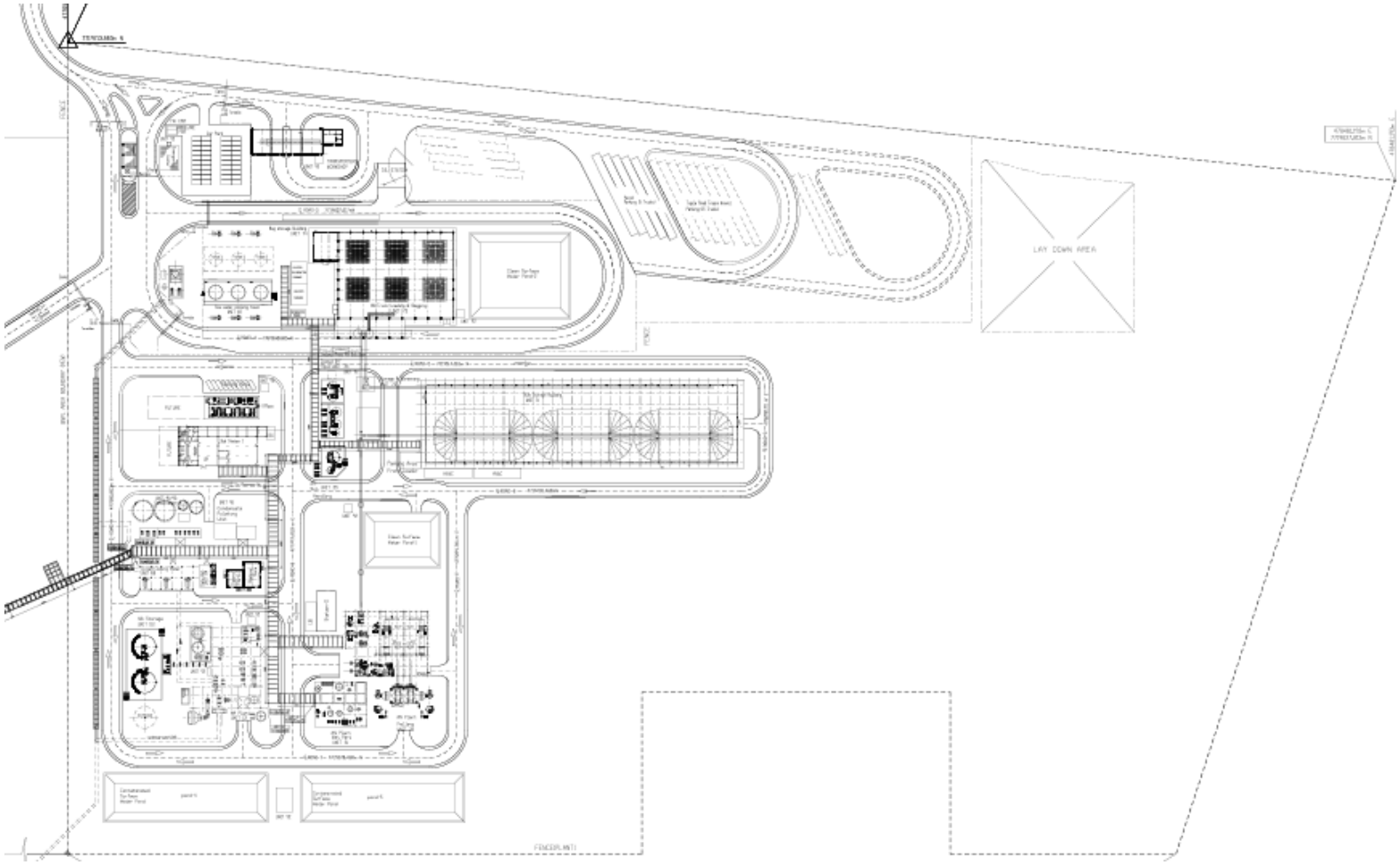
This Project will be performed by means of modular construction and therefore, this Construction Terrestrial Vegetation and Flora Management Plan is applicable to all terrestrial vegetation and flora existing in the TAN Burrup Project Site areas at the Burrup Peninsula where the modules are going to be installed, erected and hooked up. Any issue related to yard(s) where modules are being constructed is not subject to this document's requirements.

[1] Listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the WA *Wildlife Conservation Act 1950* (WC Act).

Figure 1 Project location and layout

Figure 1 Site Location





3. DEFINITIONS AND ACRONYMS

3.1 DEFINITIONS

Company	Yara Pilbara Nitrates Pty Ltd.
Contractor	Técnicas Reunidas S.A. (TR)
Construction	Includes any preparatory works required to be undertaken, including clearing vegetation, the erection of any onsite temporary structures and the use of equipment for the purpose of breaking the ground for buildings or infrastructure.
Endangered species	A native species facing a very high risk of extinction in the wild in the near future[2].
Threatened ecological communities	Threatened ecological community (TEC) is a term used in Australia for ecosystems that are in danger of being lost due to some threatening process. TECs are identified and protected under the EPBC Act and WC Act.
Project	TAN Burrup Project.
Site	35 Ha area approved for construction works.
Threatened species	Collectively refers to Endangered and Vulnerable species and ecological communities as listed under the EPBC Act and WC Act.
Vulnerable species	A native species facing a high risk of extinction in the wild in the medium-term future2.

3.2 ACRONYMS

YPNPL	Yara Pilbara Nitrates Proprietary Limited
CEMP	Construction Environmental Management Plan
Cwth	Commonwealth
CTVFMP	Construction Terrestrial Vegetation and Flora Management Plan
EO	Environmental Officer
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
Ha	Hectare
HO	Home Office
HSE	Health, Safety and Environment
PER	Public Environmental Review
PTFMP	Preliminary Terrestrial Fauna Management Plan
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities

[2] Departments of Sustainability, Environment, Water, Population and Communities 1999. Environment Protection and Biodiversity Conservation Act 1999.

Sm	Saline inlet and Supra-tidal flats vegetation community
TAN	Technical Ammonium Nitrate
TANPF	Technical Ammonium Nitrate Production Facility
TEC	Threatened Ecological Community
TR	Técnicas Reunidas (construction contractor)
WA	Western Australia
WC Act	Western Australia *Wildlife Conservation Act 1950*
YPFPL	Yara Pilbara Fertilizers Proprietary Limited

4. LEGISLATIVE FRAMEWORK

This document has been prepared to address relevant legislative requirements in addition to environmental approval conditions relevant to vegetation and flora management. A summary of relevant legislation and environmental approval conditions is outlined below.

4.1 RELEVANT LEGISLATION

Legislation relevant to vegetation and flora management is outlined in table below**.**

Table 1: Relevant Legislation and its Application

Legislation	Application
Environmental Protection Act 1986 (WA)	State environmental impact assessment and Ministerial approval process.
Wildlife Conservation Act 1950 (WA)	Assesses the conservation significance of native flora species and forms the framework for significant species protection at the State level.
Environment Protection and Biodiversity Conservation Act 1999 (Cwth)	Assesses the conservation significance of flora species and forms the framework for significant species protection at the Commonwealth level. Provides for the protection of matters of National Environmental Significance.

4.2 ENVIRONMENTAL APPROVAL CONDITIONS

This document also addresses the Ministerial Conditions outlined by the Commonwealth (EPBC 2008/4546) and WA (Statement No. 870) governments. For this CTVFMP particular reference has been made to:

Commonwealth Approval (EPBC Approval 2008/4546)

Condition 7

To ensure the protection of the listed threatened species; listed migratory species and the values of the Dampier Archipelago (including Burrup Peninsula) National Heritage Place, the person undertaking the action must submit to the Department those management plans containing management actions aimed at reducing impacts upon these relevant matters of national environmental significance.

In addition to the Ministerial Conditions set by the Commonwealth and WA Governments, YPNPL committed to the preparation of a Construction Environmental Management Plan (CEMP) within the Public Environmental Review (PER) (ERM, 2010)[3]. This CEMP will incorporate all specific construction management plans.

[3] ERM 2010, Public Environmental Review for a proposed Technical Ammonium Nitrate Production Facility. Prepared for Burrup Nitrates Pty Ltd

5. DEVELOPMENT

5.1 OBJECTIVES AND PERFORMANCE

Objectives for the construction phase of the Project with regard to the terrestrial vegetation and flora values are to:

- minimise impacts to terrestrial vegetation and flora, in particular those of conservation significance as a result of activities associated with the construction of the Project (eg. land clearing); and
- monitor the presence of significant vegetation and flora at the Site.

Detailed performance indicators for potential impacts to threatened vegetation and flora are presented in **.**

Table 2.

Monitoring will be used to assess the impact of construction activities against the performance measures and indicators. If monitoring and assessment indicates that a performance indicator has been exceeded, or likely to be exceeded, the Contractor will implement the contingency measures outlined in Section 5.4.

Table 2: Performance Measures

Performance Measure	Indicator of Success	Key Assessment Considerations
To minimise the level of unnecessary disturbance to vegetation and flora within the approved Site boundary.	• Construction disturbance footprint physically flagged on the ground during clearing and only the minimum area required is cleared. • Areas mapped as Sm and supratidal (see **Figure 1**) within the construction laydown area are clearly marked to minimise the disturbance to this community as far as practical. • Compliance with weed management protocols (see Construction Weed Management Plan)	1. Does the monitoring indicate that a performance measure or development consent condition has been exceeded, or likely to be exceeded? 2. Does this exceedance increase the risk for any of the ecological issues (species, populations, communities or habitats) under investigation? 3. What is the nature of the risk? • habitat loss; • habitat connectivity/fragmentation; • species diversity; or • competition for resources and weed invasion. 4. What are the potential factors that may have contributed to the risk i.e. construction activities or natural climatic event? 5. What actions, if any are required to mitigate and/or minimise the potential for future impacts?
To avoid vegetation loss and disturbance beyond approved Site boundary.	• Compliance with weed management protocols (see Construction Weed Management Plan).	

5.2 POTENTIAL IMPACTS

Construction of the Project as it relates to the management of vegetation and flora impacts will require the following activities:

Site preparation

- Fencing;
- Excavations and clearing;
- Backfilling (material from excavation and borrowed material);
- Slope protection;
- Anti-flooding barrier; and
- Drainage perimeter channel.

Temporary Facilities

- Site temporary facilities (including power, sewerage and utilities);
- Foundations of temporary buildings;
- Temporary fencing; and
- Temporary access roads.

Civil Works

- Excavations, backfilling works;
- Foundations of structures, permanent buildings, equipment and modules;
- Concrete structures (in situ and precast);
- Roads and pavements;
- Underground piping; and
- Underground grounding.

Main works will be conducted within the approved 35 Ha disturbance footprint but some additional activity shall be performed out of site fencing (connection to Village road and service corridor). This includes the requirement for construction laydown areas such as stockpile sites, small worksites, access roads and water storage facilities.

Disturbance of vegetation and fauna habitats (including low-lying grassed slopes and supra-tidal flats) within the Site will occur as part of the construction process. Saline Inlet and Supra-tidal Flats (Sm) is not a Threatened Ecological Community (TEC) but it is considered sensitive to disturbance, such as vehicle movements and clearing. Whilst approximately 7.6 Ha of Sm will be cleared as part of the Project construction footprint, where practical, disturbance will be minimised in the laydown areas.

No known threatened[4] flora or TECs have been identified within the Site. Vegetation communities recorded within the Site are included in **Attachment 01**. Similar habitats to those contained within the Site are known to occur within the proposed Burrup Conservation Reserve, and in most cases are well represented within the broader region. Detailed descriptions and assessment of potential impacts to terrestrial vegetation and flora associated with these construction works are included within the PER and include:

- loss of vegetation and flora (temporary and permanent); and
- introduction of invasive weed species (temporary and permanent).

5.3 MANAGEMENT ACTIONS AND RESPONSIBILITIES

Table 3 specifies the responses and actions to manage potential impacts to vegetation and flora from the construction of the Project, and defines the responsibility and timing for their implementation.

Table 3: Management Actions and Responsibilities

Reference Number	Response and Management Actions	Timing/ Critical Date	Responsible Person
CTVFMP-1	An EO will be onsite at all times to ensure that the CTVFMP is being complied with and that terrestrial vegetation and flora is being appropriately managed in accordance with this management plan.	Ongoing	Contractor Site Manager and Environmental Officer
CTVFMP-2	Induct all staff on the requirement to protect threatened flora and vegetation. The induction will include: • no pets on Site; • the need for all off road vehicles and equipment to be free of any weed propagules as per the Construction Weed Management Plan; • reference and use of the contingency plan (Figure 2); and • identification of threatened flora species with the potential to occur on Site.	Prior to employees/ contractors conducting works onsite	Environmental Officer

[4] Listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and the WA Wildlife Conservation Act 1950 (WC Act).

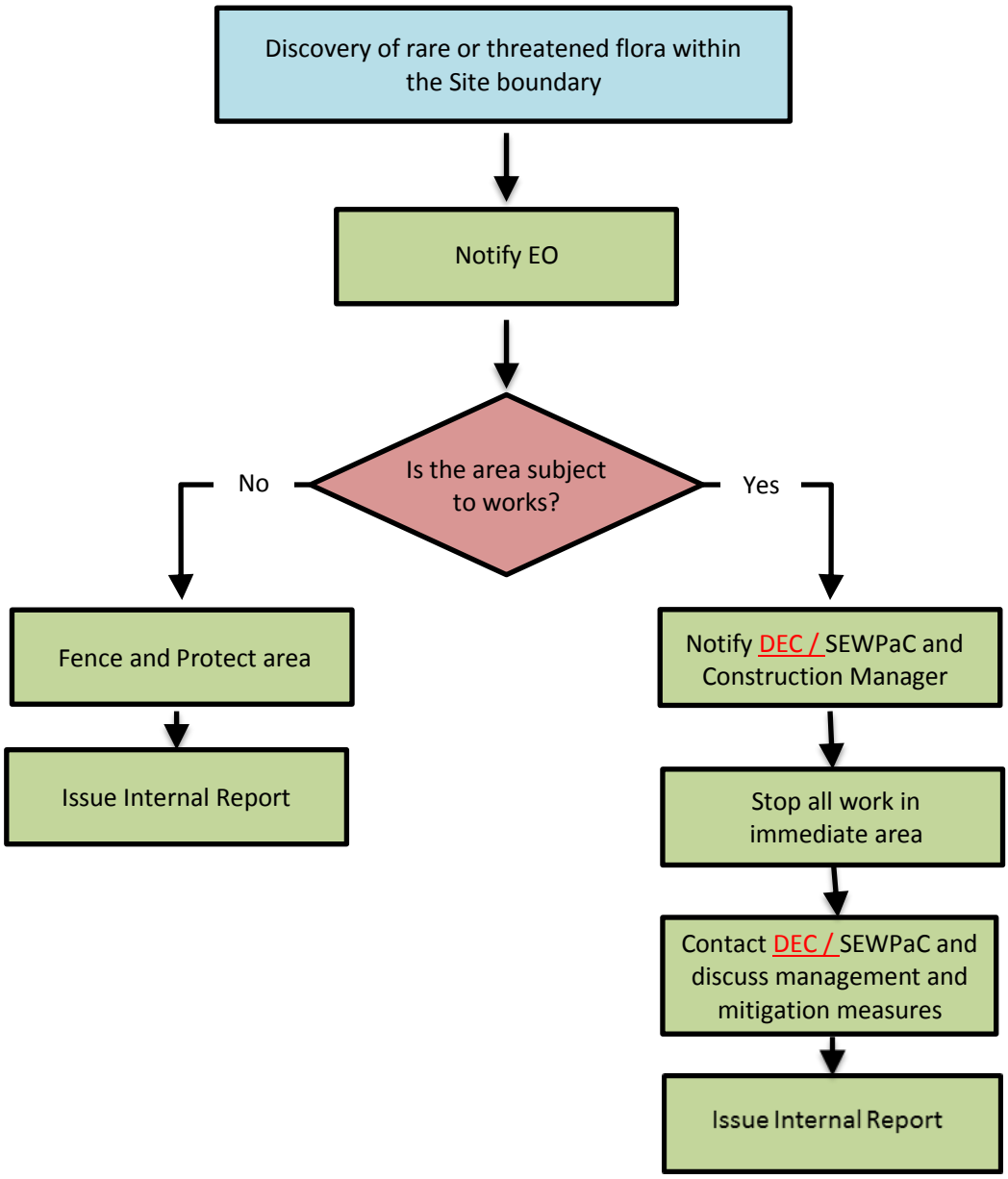
Reference Number	Response and Management Actions	Timing/ Critical Date	Responsible Person
CTVFMP-3	The construction disturbance footprint will be clearly marked on all construction drawings and physically flagged on the ground during clearing to ensure only the minimum area required is cleared. Areas mapped as Sm and supratidal (See **Figure 1**) within the construction laydown area will be flagged with readily identifiable barricading to minimise the disturbance to this community as far as practical.	Prior to clearing activities Ongoing	Environmental Officer & Contractor Site Manager
CTVFMP-4	Prohibit access to greenfield areas outside approved disturbance boundary. Access outside the Site is by written authorisation only and recorded on file.	Ongoing	Contractor Site Manager
CTVFMP-5	Access for authorised vehicles and machinery to the construction area as per Construction Site HSE Management Plan and Site Security Plan will be along designated access tracks and parking areas.	Ongoing	Environmental Officer
CTVFMP-6	Implement contingency plan in the event of threatened or rare flora discovery within the fenced Site. See **Figure 2**.	Ongoing	Environmental Officer & Contractor Site Manager
CTVFMP-7	Report the presence of any DEC/SEWPAC Priority listed species listed in **Attachment 01** to the EO for investigation and follow-up.	Ongoing	All employees
CTVFMP-8	Report the discovery of any rare or threatened vegetation and flora to DEC/SEWPAC (Nature Conservation). See **Figure 2** for flora management protocol.	Ongoing	Environmental Officer
CTVFMP-9	All vegetation clearing to be undertaken in accordance with the vegetation management protocol outlined in **Attachment 02**.	Ongoing	Environmental Officer
CTVFMP-10	Should fill be required it will be obtained from a suitable weed free source. Potential sources coming from outside Burrup Peninsula should be inspected by a suitably qualified botanist or HSE team member as per the Construction Weed Management Plan.	Ongoing	Environmental Officer
CTVFMP-11	Establishing and maintaining plant, vehicles and equipment hygiene as per the Construction Weed Management Plan.	Ongoing	Environmental Officer
CTVFMP-12	Designated HSE team members are properly skilled and trained in the identification and survey of rare and threatened flora species likely to occur on Site.	Prior to commencement of clearing activities	Environmental Officer

5.4 IMPLEMENTATION

5.4.1 Contingency Response

The following contingency (**Figure 2**) will be undertaken by the EO in the event of rare or threatened flora discovery within the fenced construction Site. The Contractor Site Manager will provide all necessary resources, with all Contractor Site team members to cooperate as required.

Figure 2: Flora Contingency Plan



5.5 MANAGEMENT RESPONSE

In the event the performance measures and actions provided in**.**

Table 2 are considered to have been exceeded, or are likely to be exceeded, the Contractor will undertake the following:

- The EO will report incident immediately to the Contractor HSE Manager and Site Manager.
- The EO will report the likely exceedance of the performance indicator as soon as practicable to the relevant agencies as required under the development consent or legislation after becoming aware of the exceedance;
- The EO, together with the Contractor Site Management will identify an appropriate course of action with respect to the identified impact in consultation with appropriate specialists and relevant agencies; and
- Review the effectiveness of this CTVFMP and performance measures to adequately manage potential construction impacts within the limits of the project approval.

5.6 REPORTING

All incidents of non-compliance and corrective actions are to be reported internally by the EO on a monthly basis through the construction period.

In addition, the EO will summarise all incidents in the annual Site Compliance Report (as per PROJECT Compliance Assessment Plan (2-250-329-PRO-TRE-0104)). This report must be submitted to the SEWPAC and published on the YPNPL website within three months of every 12 month anniversary of the commencement of the Project. Reporting will identify opportunities for continuous improvement in terrestrial vegetation and flora management onsite. A final summary report shall also be forwarded to the relevant regulatory agencies on completion of construction.

5.7 MONITORING AND AUDITING

The correct implementation of all provisions described in this CTVFMP will be monitored by the Site HSE team as part of periodic HSE inspections. Periodic inspections will be carried out by Contractor HSE Team as per the Construction HSE Plan (2-250-329-PRO-TRE-0111-att12) using the HSE Inspection Sheet attached to this document (2-250-329-PRO-TRE-0111-tmp 01). Records shall be kept accordingly.

Identified deviations from this TVFMP will be reported to all affected and involved personnel and actions followed up to ensure appropriate corrective actions are implemented. Incidents that exceed performance indicators will be reported in writing and included in the Monthly HSE Report.

As part of Project Environmental Management System, compliance of this CTVFMP will be audited during internal HSE Audits performed on a periodic basis by the Contractor HO HSE Team. The HSE Internal Audit procedure is described in the Project Construction HSE Plan (2-250-329-PRO-TRE-0111-att12).

This CTVFMP may also be audited by relevant regulators under the scope of any external environmental compliance audits.

An internal review of this CTVFMP will be conducted in response to:

- An incident recorded as a result of the construction operations that potentially affects threatened species or populations;
- A significant change in construction phase that may affect the implementation of this management plan;
- Statutory requirements or directions/conditions of approvals requiring such action; or
- Recommendations as a result of internal or external audits.

6. REFERENCES

6.1 LEGISLATION

See section 4 of this Plan.

6.2 COMPANY SPECIFICATIONS AND PROCEDURES

- Public Environmental Review for Yara Pilbara Nitrates Pty Ltd. (PER)
- Appendix D-6 - HES Requirements during Construction & Fabrication
- YPNPL Works approval (15/07/2011)
- State of WA Statement No. 870 (07/07/2011)
- Commonwealth Approval letter from SEWPaC (14/09/2011)

6.3 PROJECT MANAGEMENT SYSTEM PROCEDURES

Internal documentation and procedures relevant to this CTFMP are outlined in **Table 4.**

Table 4: Other Relevant Documentation and Procedures

Code	Title
2-250-329-PRO-TRE-0104	Compliance Assessment Plan (MS 870)
2-250-329-PRO-TRE-0111	Construction Environmental Management Plan

7. ATTACHMENTS

- ATTACHMENT 01 – Vegetation Communities and Listed Flora Species that Have Potential to Occur Within the Site
- ATTACHMENT 02 – Vegetation and Flora Clearing Protocols

ATTACHMENT 01 – Vegetation communties and Listed flora species that have potential to occur within the site

A Level 1 flora survey was conducted by ERM across the Site in 2009[5]. The report indicates that there are at least 383 native vascular plant species from 54 families currently known from the Burrup Peninsula.

The 2009 survey confirmed the presence of five vegetation types as shown in **Figure 1** and **Table A1**. The vegetation types correspond to vegetation assemblages previously identified and mapped as occurring within the area by Trudgen (2002)[6].

Table A1: Vegetation types known to occur in the Site.

Abbreviation	Description
AbImTe (Upland and Upper Slopes)	Recorded on the upper slopes of the northern part of the Site, this community is described as an open *Acacia bivenosa* shrubland over gravel and stone. Additional shrub species present include *Indigofera monophylla*.
AbTa	*Acacia bivenosa* high open shrubs over *Triodia angusta* hummock grassland.
AbTeWa (Coastal Flats)	The coastal flats run parallel to the saline inlet to the south and the lower hill slopes to the north and occur in the southern and northern portions of the Site. They are comprised of High Open to Open Heath of *Acacia bivenosa, A. coriaceae* subsp. *Coriacea* over Low Open Shrubland over *Triodia epactia* hummock grassland and mixed Closed Grasses over Herbs on the coastal flats.
AoIlTw	*Acacia bivenosa*, *Grevillea pyramidalis* subsp. *pyramidalis* scattered tall shrubs over *Acacia orthocarpa*, *Indigofera linnaei*, *Crotalaria medicaginea* (Burrup for; B65-11) low open shrubland over *Triodia wiseana* (Burrup form), *Cenchrus ciliaris* hummock grassland/grassland.
CcTe	*Cajanus cinereus* open heath to low shrubs over *Acacia orthocarpa* open shrubland over *Triodia epactia* hummock grassland.
ChRe	*Corymbia hamersleyana* low open forest over *Rhagodia eremaea* high open shrubland.
GpCwTe	*Grevillea pyramidalis* subsp. *pyramidalis* open heath over *Corchorus walcottii* scattered low shrubs to low open heath over *Triodia epactia* hummock grassland.
ItTa	One small occurrence of this unit is mapped in the south-east corner of the Site. It is comprised of *Indigofera trita* low shrubland over *Triodia epactia* (*T. angusta*) hummock grassland.
MF	Mudflat.

[5] Burrup Nitrates Pty Ltd 2010. *Technical Ammonium Nitrate Production Facility – Public Environmental Review.*

[6] Trudgen M E (2002). A flora, vegetation and floristic survey of the Burrup Peninsula, some adjoining areas and part of the Dampier Archipelago, with comparisons to the floristics of areas on the adjoining mainland. Volume 1. Prepared for the Department of Mineral and Petroleum Resources. Feb. 2002, Perth WA.

Abbreviation	Description
Sm (Saline inlet and Supra-tidal Flats)	The saline inlet runs approximately east-west through the surrounding area and is dominated by *Tecticornia (syn. Halosarcia)* spp. scattered low shrubs to low open heath. Supratidal flats with *Tecticornia-Trianthema* succulent Dwarf Scrub also occur.
TcTeSg	*Termanalia canescens* low open woodland over *Stemodia grossa* low open shrubland.
TeAb	*Triodia epactia* (Burrup form) hummock grassland with scattered *Acacia bivenosa* shrubs.
TeSv (Coastal Flats)	This unit occurs in the north of the Site, and is mixed with AbTeWa. Broadly described as *Sporobolus virginicus* grassland occurring on the edge of tidal flats, *Acacia bivenosa* occurs as a scattered shrub species and associated species include *Trianthema turgidifolia* and *Eragrostis falcate.*
Tw	*Triodia wiseana* hummock grassland.

In summary, there are no known threatened[7] flora or endangered ecological communities identified within the Site, however, the Saline inlet and Supra-tidal Flats (Sm) vegetation community is considered to be of elevated conservation significance based on criteria established by Trudgen (2002)[8]. Approved clearing activities will require the removal of a maximum of 7.6 ha of the Saline inlet and Supra-tidal Flats Sm vegetation community of which about 100 ha is known to occur on the Burrup Peninsula (approximately 56 ha within the proposed Burrup Peninsula Conservation Reserve)[4]. Where practical, disturbance will be minimised in the laydown areas. Disturbance outside of the designated 35 Ha Site will be avoided unless relevant approval from appropriate authorities is received.

There is currently no known threatened flora or EPBC Act listed flora species identified on the Burrup Peninsula and the Site does not provide any preferred habitat for SEWPAC listed Priority Flora species that have been previously recorded within the Burrup Peninsula (see **Table A2**).

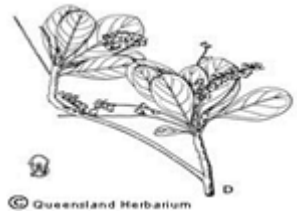
[7] Listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and the WA Wildlife Conservation Act 1950 (WC Act).

[8] Trudgen M E (2002). A flora, vegetation and floristic survey of the Burrup Peninsula, some adjoining areas and part of the Dampier Archipelago, with comparisons to the floristics of areas on the adjoining mainland. Volume 1. Prepared for the Department of Mineral and Petroleum Resources. Feb. 2002, Perth WA.

Table A2: Conservation significant flora species recorded on the Burrup Peninsula

Species		Status	General Description	Habitat Requirements5	Recorded within Site5
Acacia glaucocaesia		Priority 3	Dense, glabrous shrub or tree, 1.8-6 m high. Yellow flowers between July and September. WA Distribution limited to Dampierland, Great Sandy Desert and Pilbara.	Occurs on floodplains of Red loam, sandy loam or clay.	Not recorded on Site
Hibiscus brachysiphonius		Priority 3	Procumbent perennial, herb or shrub, 0.1–0.3 m high. Pink flowers between August –October. WA Distribution limited to Carnarvon, Ord Victoria Plain, Pilbara and Tanami.	Occurs on Creeklines and clay flats in clay soils.	Not recorded on Site
Rhynchosia bungarensis		Priority 3	Compact, prostrate shrub to 0.5 m high. Yellow flowers. WA Distribution limited to Carnarvon, Gascoyne and Pilbara	Occurs on pebbly, shingly coarse sand amongst boulders.	Not recorded on Site

Species		Status	General Description	Habitat Requirements5	Recorded within Site5
Stackhousia clementii		Priority 1	Dense broom-like perennial herb, to 0.45 m high. Green, yellow and brown flowers. WA Distribution limited to Carnarvon, Central Ranges, Dampierland, Little Sandy Desert, Murchison and Pilbara	Occurs on skeletal soils on sandstone hills.	Not recorded on Site
Themeda sp. Hammersley Station		Priority 3	Tussocky perennial, grass-like or herb 0.9–1.8 m high. Flowers during August. WA Distribution limited to Pilbara.	Occurs on clay pan, grass plain in red clay soils.	Not recorded on Site

Species		Status	General Description	Habitat Requirements5	Recorded within Site5
Gymnanthera cunninghamii		Priority 3	Erect shrub, 1–2 m high. Flowers cream, yellow, green from Jan–Dec.	Occurs on sandy soils, species records within Karratha area.	Not recorded on Site
Terminalia supranitifolia		Priority 3	Spreading, tangled shrub or tree, 1.5–3 m high. Flowers green, yellow from May–Jul/Dec.	Occurs on sand and among basalt rocks. Specimen recorded within Karratha area	Identified on rocky outcrops and hillsides on the northern part of the adjacent YPFPL site. Not recorded on Site.

Priority 1	*These species are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat. These species are under consideration for declaration as 'rare flora', but are in urgent need of further survey.*[9]
Priority 2	*These species are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). These species are under consideration for declaration as 'rare flora' but are in urgent need of further survey.*9
Priority 3	*These species are known from several populations, and the taxa are not believed to be under immediate threat. These species are under consideration for declaration as 'rare flora' but are in need of further survey.*9
Priority 4	*These species are considered to have been adequately surveyed and which, whilst being rare (in Australia) are not currently threatened by any identifiable factors. These species require monitoring every 5 – 10 years.*9

[9] Department of Conservation and Land Management (2005) *Declared Rare and Priority Flora List.* Publicly available list prepared by the Department of Conservation and Land Management, Western Australia.

Attachment 02 - VEGETATION AND FLORA CLEARING PROTOCOLS

A2.1 VEGETATION AND FLORA CLEARING WITHIN APPROVED SITE BOUNDARY

To mitigate potential impacts on flora and vegetation at the Site, where practical, the Contractor will minimise the amount of vegetation that is permanently cleared within the laydown areas. In addition the Contractor will prevent the disturbance of flora and vegetation adjacent to work areas and beyond the Site boundary.

COMPANY and CONTRACTOR will consult with the SEWPaC in regard to the development of suitable management measures in the event that any Priority flora species are identified. General management measures for vegetation and habitat clearance are detailed in **Table 3**.

A2.2 VEGETATION AND FLORA CLEARING OUTSIDE APPROVED SITE BOUNDARY

In the event that additional areas are required to be cleared for construction work the following management measures will be followed:

- Prior to clearing, all areas of potential disturbance must be checked by the onsite EO and/or suitably trained HSE team member for threatened or endangered species of flora.
- If threatened flora species or ecological communities are discovered the EO will notify the CONTRACTOR Site Manager for information and action.
- If threatened flora species or ecological community is discovered the EO will liaise with SEWPaC to determine the most appropriate management action, including the potential for seed collection and/or relocation.

The following records must be kept (as a minimum) of all threatened or priority species identified:

- species and flora associations;
- abundance;
- percentage cover;
- habitat attributes;
- general health of the specimen, including any evidence of fruiting bodies etc.
- management actions (in consultation with SEWPaC).

A2.3 WEED MANAGEMENT PROCEDURES

In order to prevent the introduction and spread of invasive weeds into the Site and across the local area, mitigation measures have been developed as detailed in the Construction Weed Management Plan (2-250-329-PRO-TRE-0116).

ATTACHMENT 10:

Weed Management Plan

(WDMP)

TABLE OF CONTENTS

1. PURPOSE

The purpose of this Construction Weed Management Plan (CWDMP) is to address the potential introduction and spread of weeds during the construction phase of the Technical Ammonium Nitrate Production Facility (the Project) which is to be developed within a 35 Ha site (the Site) on the Burrup Peninsula, Western Australia (WA), (**Figure 1**).

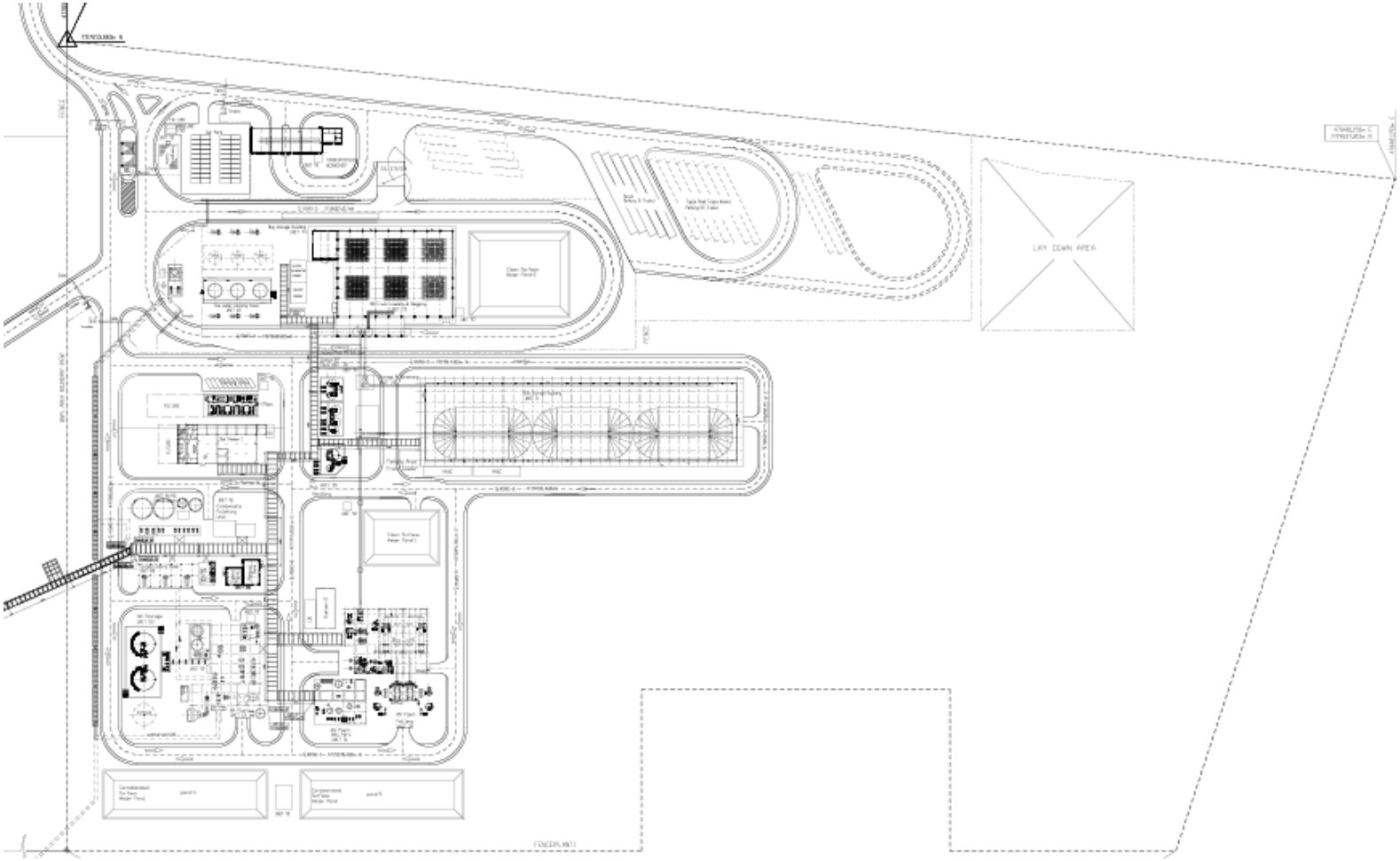
This CWDMP needs to be read in conjunction with the Construction Environmental Management Plan (CEMP) (2-250-329-PRO-TRE-0111), in which general construction roles and responsibilities are defined, as well as environmental monitoring, inspection, auditing and reporting requirements.

2. SCOPE

This CWDMP describes the measures to be implemented to manage and mitigate the potential introduction of weed species and their impact on terrestrial habitat values.

This Project will be performed by means of modular construction and therefore, this Construction Terrestrial Weed Management Plan is applicable to all terrestrial weed existing in the TAN Burrup Project Site areas at the Burrup Peninsula where the modules are going to be installed, erected and hooked up. Any issue related to yard(s) where modules are being constructed is not subject to this document's requirements.

Figure 1 Project location and layout



3. DEFINITIONS AND ACRONYMS

3.1 DEFINITIONS

Company	Yara Pilbara Nitrates Pty Ltd.
CONTRACTOR	Técnicas Reunidas S.A. (TR)
Construction	Includes any preparatory works required to be undertaken including clearing vegetation, cut and fill activities, the erection of any onsite temporary structures and the use of equipment for the purpose of breaking the ground for buildings or infrastructure.
Project	TAN Burrup Project.
Site	35 Ha area approved for construction works.

3.2 ACRONYMS

APB	Agriculture Protection Board
ARRPA	Agricultural and Related Resources Protection Act 1976
AWS	Australian Weeds Strategy
YPNPL	Yara Pilbara Nitrates Proprietary Limited
Cwth	Commonwealth
DEC	Department of Environment and Conservation
EO	Environmental Officer
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
Ha	Hectare
HO	Home Office
HSE	Health, Safety and Environment
OEMP	Operational Environmental Management Plan
PER	Public Environmental Review
PTFMP	Preliminary Terrestrial Fauna Management Plan
PTVFMP	Preliminary Terrestrial Vegetation and Flora Management Plan
PWMP	Preliminary Weed Management Plan
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
TAN	Technical Ammonium Nitrate
TANPF	Technical Ammonium Nitrate Production Facility
TFMP	Terrestrial Fauna Management Plan
TR	Técnicas Reunidas (construction contractor)

WA	Western Australia
WC Act	Western Australia Wildlife Conservation Act 1950
WONS	Weed of National Significance
YPFPL	Yara Pilbara Fertilizers Proprietary Limited

4. LEGISLATIVE FRAMEWORK

This document has been prepared to address relevant legislative requirements in addition to environmental approval conditions relevant to weed control. A summary of relevant legislation and environmental approval conditions is outlined below.

4.1 RELEVANT LEGISLATION

Legislation relevant to weed control is outlined in **Table 1.**

The principle legislation in Western Australia is *the Agricultural and Related Resources Protection Act 1976* (ARRPA). The ARRPA is administered by the Agriculture Protection Board (APB), which is now incorporated into the WA Department of Agriculture. Regional Advisory Committees advise the APB on weed and other protection issues within WA and the Board has the authority to declare plants for part or all of the State under five different categories.

The five categories of declared weeds defined under the ARRPA are:

P1 Prohibits movement of declared plants and/or their seeds through the prevention of trade, sale or movement of plants into the State or that area of the State.

P2 Eradication of plants from the State or that area of the State.

P3 Controlling infestations by reducing area and/or density of infestation from the State or that area of the State.

P4 Preventing infestations spreading beyond existing boundaries of infestation.

P5 Infestations must be controlled on public land or land under the control of a local government.

'Environmental weeds' is a secondary category of weeds, used to describe plants that establish themselves in natural ecosystems and proceed to modify natural processes, usually adversely, resulting in the decline of communities they invade.

Table 1: Relevant Legislation and its Application

Legislation	Application
Agriculture and Related Resources Protection Act 1976 (WA)	Declared plants and animals which are nominated by the Agriculture Protection Board as current or potential pests.
Biosecurity and Agriculture Management Act 2007 (WA)	To prevent new animal and plant pests (weeds and vermin) and diseases from entering Western Australia, to manage the impact and limit the spread of those already present in the State, and to safely manage the use of agriculture and veterinary chemicals and ensure agricultural products are not contaminated with chemical residues.
Environmental Protection Act 1986 (WA)	Prevention, control and abatement or pollution and conservation protection and enhancement of environment.
Wildlife Conservation Act 1950 (WA)	Provides for the conservation and protection of wildlife (flora and fauna). Special provisions and schedules cover protection and management of gazetted rare flora and fauna.

Legislation	Application
Biological Control Act 1985 (Cwth)	Under which a weed may be declared a target for biological control, or a weed control agent may be identified.
Environment Protection and Biodiversity Conservation Act 1999 (Cwth)	Protection on environmental matters of national significance. The EPBC Act also regulates the import and export of plants.
The Quarantine Act 1908 (Cwth)	Enables the Australian Quarantine and Inspection Service to physically prevent the introduction of weeds through the inspection of incoming luggage, cargo, mail, animals and plants and their products. It also provides inspection and certification for a range of exports.

4.2 RELEVANT GUIDELINES/STRATEGIES

4.2.1 Australian Weeds Strategy

The Australian Weeds Strategy (AWS) was first developed in 1997 as the National Weeds Strategy and revised by the Australian Weeds Committee and endorsed as the Australian Weeds Strategy (the Strategy) by the Natural Resources Management Ministerial Council on 24 November 2006. The revised Strategy maintains the policy focus of the National Weeds Strategy, taking into account changes to the institutions, legislation, policies and programs that support weed management in Australia.

The Strategy provides a framework to establish consistent guidance for all parties, and identifies priorities for weed management across Australia with the aim of minimising the impact of weeds on Australia's environmental, economic and social assets.

A central component of the Strategy is the identification of Weeds of National Significance (WONS). The Australian, state and territory governments have agreed a list of twenty WONS, which are prioritised according to the invasiveness, impact, potential for spread and socioeconomic and environmental values for each weed. Fourteen WONS have been found in WA.

None of the weeds identified onsite or known to occur on the Burrup Peninsula are recognised as WONS and are not listed under the National Weeds List.

4.2.2 Western Australia Environmental Weed Strategy

The Environmental Weed Strategy for Western Australia (1999) and the associated environmental weed database provide both the direction and an approach to managing environmental weed issues and ultimately led to the establishment of the State Weed Strategy which addresses both agricultural and environmental weeds. A list of 1,350 weeds were rated as either high, moderate, mild or low in terms of their invasiveness, distribution and environmental impacts.

In an effort to progress this strategy, update the weed ratings and implement an integrated approach to weed management in WA, the Invasive Plant Prioritisation Process[1] was developed. A focus of the process is to consider both:

1. a "species-led"; and
2. a "site-led" or "asset based approach" to control the threat of environmental weeds within WA.

The prioritisation results for individual weeds within each DEC region are available on the DEC website[1]. Within the Pilbara Region, 84 environmental weeds were identified as occurring. Of these, only nine are listed under either Commonwealth or WA legislation.

4.3 ENVIRONMENTAL APPROVAL CONDITIONS

This CWDMP addresses the Ministerial Conditions outlined by the Commonwealth (EPBC 2008/4546) and WA (Statement No. 870) governments for the the Project. For this CWDMP particular reference has been made to:

Commonwealth Approval (EPBC Approval 2008/4546)

Condition 7

To ensure the protection of the listed threatened species; listed migratory species and the values of the Dampier Archipelago (including Burrup Peninsula) National Heritage Place, the person undertaking the action must submit to the Department those management plans containing management actions aimed at reducing impacts upon these relevant matters of national environmental significance.

WA Approval (Statement No. 870)

Condition 6.1

(5) No new species of weeds (including both declared weeds and environmental weeds) shall be introduced into the area as a result of the implementation of the proposal; and

(6) The coverage of weeds (including both declared weeds and environmental weeds) within the rehabilitation areas shall not exceed that identified in baseline monitoring undertaken prior to the commencement of operations, or exceed that existent on comparable, nearby land which has not been disturbed during implementation of the proposal.

In addition to the Ministerial Conditions set by the Commonwealth and WA Governments, COMPANY committed to the preparation of a Construction Environmental Management Plan (CEMP) within the Public Environmental Review (PER) which will incorporate all specific construction management plans.

[1] http://www.dec.wa.gov.au/content/view/6295/2358/

5. DEVELOPMENT

5.1 OBJECTIVES AND PERFORMANCE

Objectives for the construction phase of the Project with regard to invasive weeds are to:

- prevent the introduction and spread of introduced species;
- control and/or eradicate both noxious and environmental weeds within the Site; and
- minimise impacts to terrestrial flora and fauna habitat, in particular those of conservation significance.

Detailed performance indicators for weed control are presented in **Table 2**.

Limited monitoring will be used to assess the impact of the construction activities against the performance measures and indicators. If monitoring and assessment indicates that a performance indicator has been exceeded, or likely to be exceeded, the CONTRACTOR will implement the contingency measures outlined in **Section 5.4**.

Table 2: Performance Measures

Performance Measure	Indicator of Success	Key Assessment Considerations
To avoid the introduction of any new weed species within and/or beyond the approved Site boundary	• Site fenced following clearing and no unauthorised disturbance of vegetation beyond approved Site disturbance boundary (35 Ha). • Any fill obtained from outside of the Site is sourced from a weed free environment inspected by a suitably qualified botanist or HSE team member. • All earthmoving machinery is inspected prior to entering the undisturbed part of the lease to ensure they are clean of mud and plant debris, which may contain weed propagules. • Adherence to the *Quarantine Act 1908* and regulations. • Access for vehicles and machinery is limited to designated access tracks and parking areas. • No new weed species reported as a result of movement of vehicles or equipment during construction activities.	1. Does the monitoring indicate that a performance measure or development consent condition has been exceeded, or likely to be exceeded? 2. Does this exceedence increase the risk for any of the ecological issues (species, populations, communities or habitats) under investigation? 3. What is the nature of the risk? • habitat loss; • species diversity; and/or • competition for resources and weed invasion. 4. What are the potential factors that may have contributed to the risk i.e. construction activities or natural climatic event? 5. What actions, if any are required to mitigate and/or minimise the potential for future impacts?
To minimise the spread of existing weed species within and/or beyond the approved	• Site fenced following clearing and no unauthorised disturbance of vegetation beyond approved Site disturbance boundary (35 Ha).	

Performance Measure	Indicator of Success	Key Assessment Considerations
Site boundary	• No spread of weeds from infested areas to previously weed free areas. • No net increase in the density or distribution of known weed species within and/or beyond the approved Site boundary when compared to baseline or comparative monitoring results from adjacent sites (refer to Table 3 CWDMP-9). • No negative impacts to native flora and fauna from increased competition of weed species.	

5.2 POTENTIAL IMPACTS

Construction of the PROJECT as it relates to the management of weed species within the approved Site boundary will require the following activities:

Site preparation

- Mobilisation of machinery;
- Fencing;
- Excavations and blasting;
- Backfilling (material from excavation and borrowed material);
- Slope protection;
- Anti-flooding barrier;
- Drainage perimeter channel; and
- Demobilisation of machinery.

Temporary Facilities

- Site temporary facilities (including power, sewerage and utilities);
- Temporary fencing; and
- Temporary access roads.

Civil Works

- Excavations, backfilling works;
- Foundations of structures, permanent buildings, equipment and modules;
- Roads and pavements;
- Underground piping;

- Underground grounding; and
- Electrical trenches.

Main works will be conducted within the approved 35 Ha disturbance footprint but some additional activity shall be performed out of site fencing (connection to Village road and service corridor). This includes the requirement for construction laydown areas such as stockpile sites, small worksites, access roads and water storage facilities. Disturbance outside of the designated disturbance area will be avoided unless relevant approval from appropriate authorities is received.

Weed species listed under the *Environmental Weed Strategy for Western Australia (1999)* which have been recorded on Site or are known to occur on the Burrup Peninsula are included in **Attachment 01**, with detailed species profiles provided in **Attachment 02**.

Disturbance of vegetation and terrestrial habitats (including low-lying grassed slopes and supra-tidal flats) within the Site will occur as part of the construction process. Detailed descriptions and assessment of potential impacts associated with this clearing and construction works are included within the PER and include the introduction of new weed species or the spread of existing environmental weed species with and adjacent to the Site.

The key potential impacts associated with construction of the Project are:

- import of contaminated fill to the Site;
- the introduction of transmission pathways (i.e. weed species being spread by machinery, vehicle or pedestrian movement);
- soil disturbances (clearing and grading) creating soil conditions conducive to weed establishment; and
- poor weed hygiene.

5.3 MANAGEMENT ACTIONS AND RESPONSIBILITIES

Table 3 specifies the responses and actions to manage and/or reduce weeds within the Site, and defines the responsibility and timing for their implementation.

Table 3: Management Actions and Responsibilities

Reference Number	Response and Management Actions	Timing/ Critical Date	Responsible Person
CWDMP-1	An environmental officer will be onsite at all times to ensure compliance with this CWDMP and that environmental weeds are being appropriately managed in accordance with this CWDMP.	Ongoing	Environmental Officer
CTFMP-2	Induct all staff on the requirement to prevent the spread of weeds. The induction will include: • no access to greenfield areas outside of approved disturbance boundary without written authorisation from the Construction Site Manager;	Prior to employees/ contractors conducting works onsite.	Environmental Officer

Reference Number	Response and Management Actions	Timing/ Critical Date	Responsible Person
	• the need for all off road vehicles and equipment to be free of any weed propagules; • the provision of wash-down facilities at the entrance to the Site; • reference and use of the contingency plan within this CWDMP (**Figure 2**); and • identification of environmental weeds with the potential to occur on Site.		
CTFMP-3	Prohibit access to greenfield areas outside approved disturbance boundary. Access outside the approved Site is by written authorisation only and recorded on file.	Ongoing	CONTRACTOR Site Manager
CTFMP-4	The construction disturbance footprint will be clearly marked on all construction drawings and physically flagged on the ground during clearing to ensure only the minimum area required is cleared.	Prior to commencement of clearing activities	CONTRACTOR Site Manager
CWDMP-3	Inspections for introduced weed species on all newly exposed areas (bare soil) will be undertaken, and observations will be reported to the relevant site manager/s or EO.	Ongoing	Environmental Officer
CWDMP-4	Undertake weed control actions whenever new introductions or spread of weed species are observed. See **Figure 2**.	Within 4 weeks of identification	Environmental Officer
CWDMP-5	Should fill be required it will be obtained from a suitable weed free source. Potential sources coming from outside Burrup Peninsula should be inspected by a suitably qualified botanist or HSE team member.	Ongoing	Environmental Officer
CWDMP-6	Conduct inspections of all earthmoving machinery prior to them entering the undisturbed portions of the Site, to ensure they are clean of mud and plant debris, which may contain weed propagules.	Ongoing	Environmental Officer and Civil Supervisor
CWDMP-7	Establishing and maintaining plant, vehicles and equipment hygiene to prevent introduction and transfer of weeds including the provision of wash-down facilities. Refer to **Attachment 03** for vehicle wash protocols.	Ongoing	Environmental Officer
CWDMP-8	Access for authorised vehicles and machinery to the construction area as per Construction Site HSE Management Plan and Site Security Plan will be along designated access tracks and parking areas only.	Ongoing	Environmental Officer
CWDMP-9	A weed monitoring and treatment programme will be implemented prior to the commencement of construction activities. The programme will identify appropriate treatment and control	Prior to commencement of clearing activities	Environmental Officer

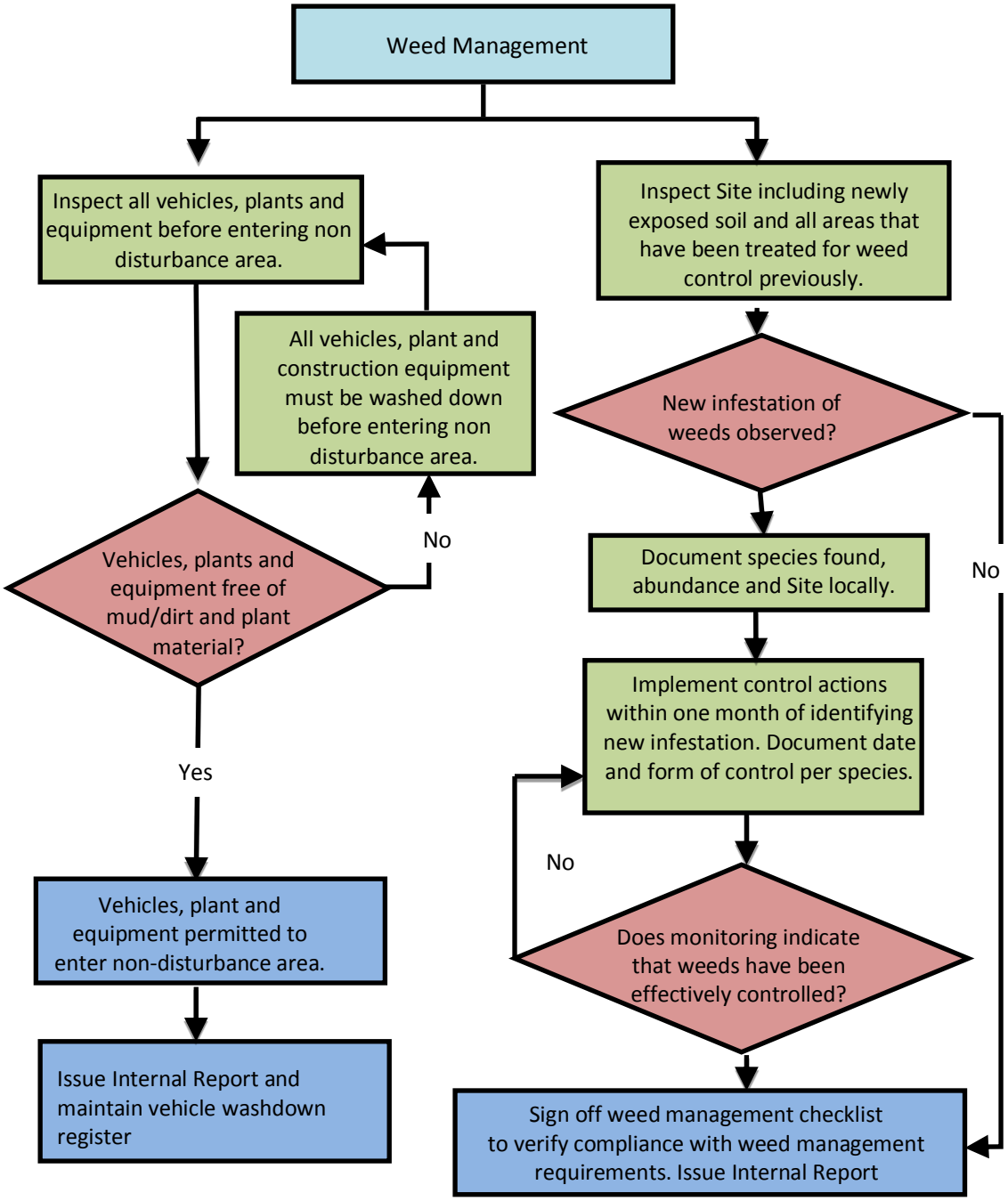
Reference Number	Response and Management Actions	Timing/ Critical Date	Responsible Person
	techniques for weed species encountered in the Site. SEWPaC will be consulted following initial monitoring and the development of specific performance targets.		
CWDMP-10	Designated HSE team members are properly skilled and trained in the identification and treatment of weed species.	Prior to commencement of clearing activities	Environmental Officer

5.4 IMPLEMENTATION

5.4.1 Contingency Response

The following contingency plan (**Figure 2**) will be implemented by the EO in the event of weed discovery within the fenced Site. The CONTRACTOR Site Manager will provide all necessary resources, with all CONTRACTOR Site team members to cooperate as required.

Figure 2: Weed Management Contingency Plan



5.5 MANAGEMENT RESPONSE

In the event the performance measures and actions provided in **Table 2** are considered to have been exceeded, or are likely to be exceeded, the CONTRACTOR will undertake the following:

- The EO will report immediately to the CONTRACTOR HSE Manager and Site Manager.
- The EO will report the likely exceedance of the performance indicator as soon as practicable to the relevant agencies as required under the development consent or legislation after becoming aware of the exceedance;
- The EO together with the CONTRACTOR Site Management will identify an appropriate course of action with respect to the identified impact in consultation with appropriate specialists and relevant agencies; and
- Review the effectiveness of this CWDMP and performance measures to adequately manage potential construction impacts within the limits of the project approval.

5.6 REPORTING

All incidents of non-compliance and corrective actions are to be reported internally by the EO on a monthly basis through the construction period.

In addition, the EO will summarise all incidents in the annual Site Compliance Report (as per PROJECT Compliance Assessment Plan (2-250-329-PRO-TRE-0104)). This report must be submitted to the SEWPaC and DEC/OEPA and published on the YPNPL website within three months of every 12 month anniversary of the commencement of the project. Reporting will identify opportunities for continuous improvement in terrestrial habitats on the site. A final summary report shall also be forwarded to the relevant regulatory agencies on completion of construction.

5.7 MONITORING AND AUDITING

The correct implementation of all provisions described in this CTVFMP will be monitored by the Site HSE team as part of periodic HSE inspections. Periodic inspections will be carried out by CONTRACTOR HSE Team as per the Construction HSE Plan (2-250-329-PRO-TRE-0111-att12) using the HSE Inspection Sheet attached to this document (2-250-329-PRO-TRE-0111-tmp 01). Records shall be kept accordingly.

Identified deviations from this TVFMP will be reported to all affected and involved personnel and actions followed up to ensure appropriate corrective actions are implemented. Incidents that exceed performance indicators will be reported in writing and included in the Monthly HSE Report.

As part of Project Environmental Management System, compliance of this CTVFMP will be audited during internal HSE Audits performed on a periodic basis by the CONTRACTOR HO HSE Team. The HSE Internal Audit procedure is described in the Project Construction HSE Plan (2-250-329-PRO-TRE-0111-att12).

This CWDMP may also be audited (if required) under the scope of any external environmental compliance audits.

An internal review of this CWDMP will be conducted in response to:

- An incident recorded as a result of the construction operations that potentially introduces or encourages any declared or Nationally listed weed species;
- A significant change in construction phase that may affect the implementation of this management plan;
- Statutory requirements or directions/conditions of approvals requiring such action; or
- Recommendations as a result of internal or external audits.

6. REFERENCES

6.1 LEGISLATION

See section 4 of this Plan.

6.2 COMPANY SPECIFICATIONS AND PROCEDURES

- Public Environmental Review for Yara Pilbara Nitrates Pty Ltd. (PER)
- Appendix D-6 - HES Requirements during Construction & Fabrication
- YPNPL Works approval (15/07/2011)
- State of WA Statement No. 870 (07/07/2011)
- Commonwealth Approval letter from SEWPaC (14/09/2011)

6.3 PROJECT MANAGEMENT SYSTEM PROCEDURES

Internal documentation and procedures relevant to this CTFMP are outlined in Error! Reference source not found..

Table 4: Other Relevant Documentation and Procedures

Code	Title
2-250-329-PRO-TRE-0104	Compliance Assessment Plan (MS 870)
2-250-329-PRO-TRE-0111	Construction Environmental Management Plan

7. ATTACHMENTS

- Attachment 01 – Weeds Known to Occur on the Burrup Peninsula
- Attachment 02 - Weed Profiles
- Attachment 03 - Weed Management Protocols

ATTACHMENT 01 - WEEDS KNOWN TO OCCUR ON THE BURRUP PENINSULA

Three introduced weed species; *Cenchrus ciliaris* (Buffel Grass), *Aerva javanica* (Kapok bush) and *Vachellia farnesiana* (Mimosa Bush) were found during a survey of the Site conducted by ERM in 2009[2]. None of these introduced species are Declared Weeds under the ARRPA, however they are all listed as Environmental Weeds with 'High' rating under the *Environmental Weed Strategy for Western Australia (1999)*. Detailed weed profiles for the three species recorded on Site are provided in **Attachment 02**.

Table A1.1 below details all weeds known to occur in the Burrup Peninsula. None of these weeds are recognised as Weeds of National Significance (WONS) and are not listed under the National Weeds List.

Table A1.1: Weeds known to occur on the Burrup Peninsula[3]

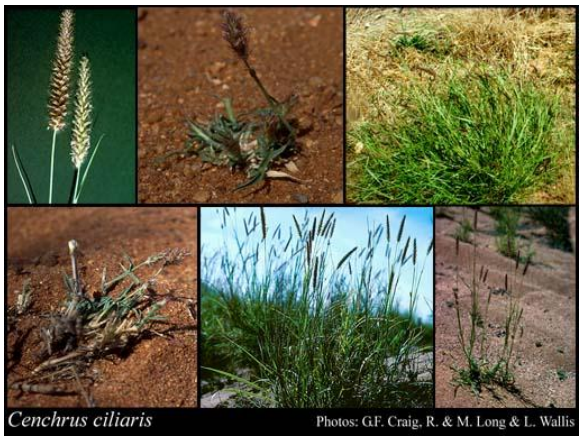
Species Name	Common Name	Environmental Weed Rating	Ecological Impact Rating[4]
Cenchrus ciliaris	Buffel Grass	High	High
Aerva javanica	Kapok bush	High	High
Vachellia farnesiana	Mimosa Bush	High	High
Cenchrus setigerus	Birdwood Grass	High	High
Cenchrus enchinatus	Mossman River Grass	Low	Moderate
Rumex vesciarius	Ruby Dock	High	High
Stylosanthes hamata	Carribean stylo	Mild	High
Bidens bipinnata	Bipinnate Beggar-Ticks	Not Determined	Unknown
Euphorbia hirsuta	Strawberry Weed	Moderate	-
Passiflora foetida	Wild Passionfruit	High	High
Solanum nigrum	Nightshade	Moderate	-
Chloris barbata	Purple-top chloris	Low	High
Pennisetum setaceum	Fountain grass	Mild	-
Malvastrum americanum	-	Moderate	High

[2] Yara Pilbara Nitrates Pty Ltd 2010. *Technical Ammonium Nitrate Production Facility – Public Environmental Review.*

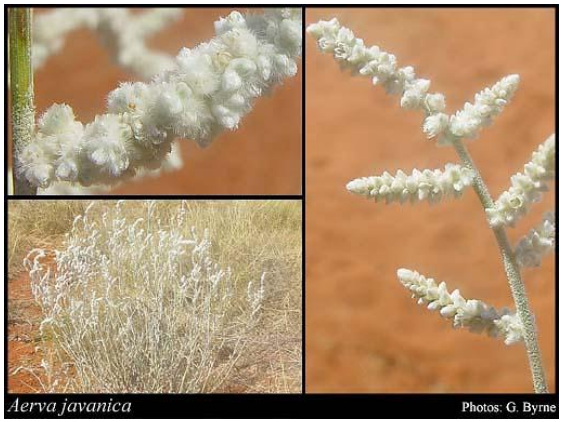
[3] DEC, 1999. *Environmental Weed Strategy for Western Australia*. A WWW publication accessed in October 2009 at http://www.dec.wa.gov.au/pdf/plants_animals/environmental_weed_strategy_wa.pdf

[4] DEC, 2009. *Pilbara Region – Environmental Weed List.* http://www.dec.wa.gov.au/content/view/6295/2275/1/1/

ATTACHMENT 02 – WEED PROFILES

Species	Description	Control Methods	Known distribution on Site[2]
Cenchrus ciliaris (Buffel Grass) 	Buffel grass is a long-lived tussock grass with a deep, tough root system. It is widespread in central and northern Australia and can dominate the ground layer, displacing native grasses and other plants. Seedbank persistence can exceed 5 years and active growth during all seasons, except winter. Its rapid regrowth and high biomass may alter the intensity, frequency and extent of fires, changing vegetation structure and composition. [5] Its seed is readily dispersed by wind, water and animals. Seeds are also dispersed when caught on mammals, birds and on vehicles. Germination can occur throughout the entire year[4].	Mature plants are difficult to remove physically. Herbicide can be effective if applied when plants are actively growing and follow-up action is undertaken. Spot spraying or grubbing individual tussocks minimises chemical wastage and risk of damage to other species. Large-scale mechanical removal favours re-establishment of buffel grass and slashing needs to be combined with other methods to have significant, lasting impact. A combination of physical and chemical treatments may be most effective. Du to buffel grass being a valuable foraging species, biological control is not an option.	Widespread throughout the Site, especially on the eastern and southern sides.

[5] CRC for Australian Weed Management. 2008. Weed Management Guide Buffel grass – *Cenchrus ciliaris*

Species	Description	Control Methods	Known distribution on Site[2]
Aerva javanica (Kapok bush)  	Kapok bush is a branched perennial herb occurring often on sandy and calcareous soils. This species is widespread across northern Australia and grows to heights between 0.4-1.6 m. Distinguished by dense covering of white star-like hairs on stems and on alternate to clustered leaves[5]. Kapok bush seeds are primarily dispersed by wind. [6]	Kapok bush can be removed by physical methods, either by cutting the plant close to the ground and allowing the plant to starve, or by digging up the roots and remove the entire plant. Individuals can also be removed by using a herbicide such as glyphosate.	Recorded within the Site

[6] Weeds Australia *Kapok Bush Aerva javanica* http://www.weeds.org.au/cgi-bin/weedident.cgi?tpl=plant.tpl&state=&s=&ibra=all&card=S42.

Species	Description	Control Methods	Known distribution on Site[2]
Vachellia farnesiana (Mimosa Bush) 	Mimosa bush is a rounded shrub or small tree generally growing 1–3 m tall. It often forms thorny thickets, and is nearly always multi-stemmed. The branches grow in a zigzag shape and are usually a grey-brown colour with prominent white spots.[7] Seed pods are 5-7cm long, cylindrical, 10-15mm diameter and mature to black or dark brown.[8] This species reproduces by seed, and also produces suckers when its aboveground parts are damaged. Seeds are primarily dispersed when livestock and feral animals eat the fruit and pass the seeds intact[9].	A combined approach of different control methods including chemical and mechanical with land management practices is most effective.	Three specimens recorded in the northwestern section in relatively undisturbed vegetation[2].

[7] DEC Western Australia Herbarium, Florabase. Accessed 12/08/2012. http://florabase.dec.wa.gov.au/browse/profile/30716

[8] Macquarie Valley Weeds Advisory Committee and Lachlan Valley Weeds Advisory Committee. 2008. *Mimosa Bush*. http://www.westernweeds.org/index.php?act=weeds_detail&weed=24

[9] The University of Queensland. 2011. Mimosa bush *Vachellia farnesiana* Fact Sheet. http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Vachellia_farnesiana.htm

ATTACHMENT 03 - WEED MANAGEMENT PROTOCOLS

Plant construction and excavation activities have the potential to introduce new weed species to the Site or promote the spread of existing weed species within the area through:

- contaminated fill introduced to the Site;
- the introduction of transmission pathways (i.e. weed species being spread by machinery, vehicle or pedestrian movement);
- soil disturbances (clearing and grading) creating soil conditions conducive to weed establishment; and
- poor weed hygiene.

These impacts will be managed by strict adherence to the following protocols.

A3.1 TOPSOIL REMOVAL

Topsoil removal needs to be planned to minimise the spread of weeds originating from the seed bank, while making best use of the native seed bank. In selecting which areas of topsoil are to be salvaged, treated and re-used, consideration needs to be given to the probable level of weed seed in the soil. Inspection of the Site indicates that no declared weeds or WON have been recorded on Site and is not expected to constitute a significant restraint to salvaging topsoil.

However, should any declared weeds be reported on site during the construction activities, the weeds will need to be controlled and the area inspected by a suitably qualified botanist or HSE team member prior to construction to ensure that all weeds have been suppressed sufficiently.

A3.2 USE OF FILL

Any fill delivered to the Site will be obtained from a suitable weed free source and all potential sources outside of the Burrup Peninsula will be inspected by a suitably qualified botanist or HSE team member to reduce the risk of new weed species being introduced in to the Site. Topsoil should be free from noxious weeds and weed seeds, and not previously treated with herbicides having a long residual effect.

A3.3 VEHICLE WASH PROTOCOLS

For the purpose of controlling weed spread during the construction activities, it shall be ensured that all equipment and vehicles are required to arrive on Site in a clean condition to minimise the risk of weed introduction. Vehicles wash-down facilities will be located at the entrance to the Site.

All entrances and exits to the Site will be flagged/sign-posted to ensure that all personnel are aware that they are entering/exiting a “clean zone” where all vehicles should be free from soil or debris that could facilitate the introduction or spread of weed species. This is particularly important for any vehicles/machinery travelling from outside of the Burrup Peninsula.

Wash down bays should be available for use by vehicle/machinery operators who will be responsible for checking that their vehicles are clear of soil, seeds or plant remnants prior to them entering the undisturbed portions of the Site.

The following cleaning and wash down protocols will apply:

- Ensure that the vehicle is parked in a stable position within the wash down bay prior to conduct any activity.
- Wash down facilities will prevent the run off of weed remnants or seeds pooling in the surrounding soils.
- Sumps or water runoff areas will be fenced to prevent birds or fauna from collecting seeds and translocating them. During wash down, all soil, soil slurry, seeds, mud, and vegetation shall be removed from the vehicle or machinery, not only from tyres but from all areas of the vehicle.
- If the vehicle is towing equipment, the towed equipment shall also be washed down as well.
- Vehicles may be inspected by the EO or other trained HSE team member after the wash down. If the vehicle fails to pass the inspection, it will require further cleaning before entering the undisturbed portions of the Site.

A3.5 VEHICLE MOVEMENTS

All vehicle movements should occur on predetermined pathways to reduce movements over native vegetation communities or weeds. Access outside the approved disturbance boundary is by written authorisation only and is to be recorded on file.

A3.5 PEOPLE MOVEMENTS

Weed seeds are not only transported by vehicles and animals, but are commonly spread via pedestrian movements with seeds readily attaching to clothing and shoes.

As for vehicle access, people access outside the approved disturbance boundary into greenfield areas is to only occur under written authorisation and recorded on file. It is also important to note that the principle of the wash down protocol also applies to people, clothing and shoes as well as the plant and equipment. Personnel entering and exiting the Site should check clothing and footwear daily for traces of seed. This will involve making sure all soil is removed off the bottom of shoes/work boots.

A3.6 MONITORING

A weed monitoring and treatment program will be implemented prior to the commencement of construction activities. The program will identify appropriate treatment and control techniques for weed species encountered in the Site. SEWPaC and DEC/OEPA will be consulted following initial monitoring and the development of specific performance targets.

The monitoring of weed species across the Site and surrounds will provide information on the success of weed management protocols. Regular monitoring of known weed infested areas and areas of newly exposed soils will ensure that protocols can be reevaluated when necessary.

In the event that any new introductions or spread of weed species are observed weed control will be undertaken within four weeks as per the weed contingency plan in Figure 2. Weed control measures will be dependent on the species identified and will most likely involve the implementation of both chemical and physical control measures.

ATTACHMENT 11:

Construction Integrated Pest Management Plan

(CIPMP)

TABLE OF CONTENTS

1. PURPOSE

The purpose of this Construction Integrated Pest Management Plan (CIPMP) is to address the management and mitigation of potential impacts to humans from mosquitoes and other nuisance insects and to the environment from other invertebrate and vertebrate pest species during the construction phase of the TAN Burrup Project which is to be developed within a 35 Ha site (the Site) on the Burrup Peninsula, Western Australia (WA), (**Figure 1**).

Mosquitoes pose a risk to human health as mosquitoes are vectors for many serious diseases, such as Ross River Virus and Barmah Forest Virus. Other invertebrate and vertebrate pests pose a risk to the environment. Accordingly, this Construction Integrated Pest Management Plan (CIPMP) has been developed to manage mosquitoes, nuisance insects and other pests during the construction phase of the Project to protect the environment, health and safety of the workforce and public.

This CIPMP is to be read together with the Construction Environmental Management Plan (CEMP) (2-250-329-PRO-TRE-0111), in which general construction roles and responsibilities are defined, as well as environmental monitoring, inspection, auditing and reporting requirements.

2. SCOPE

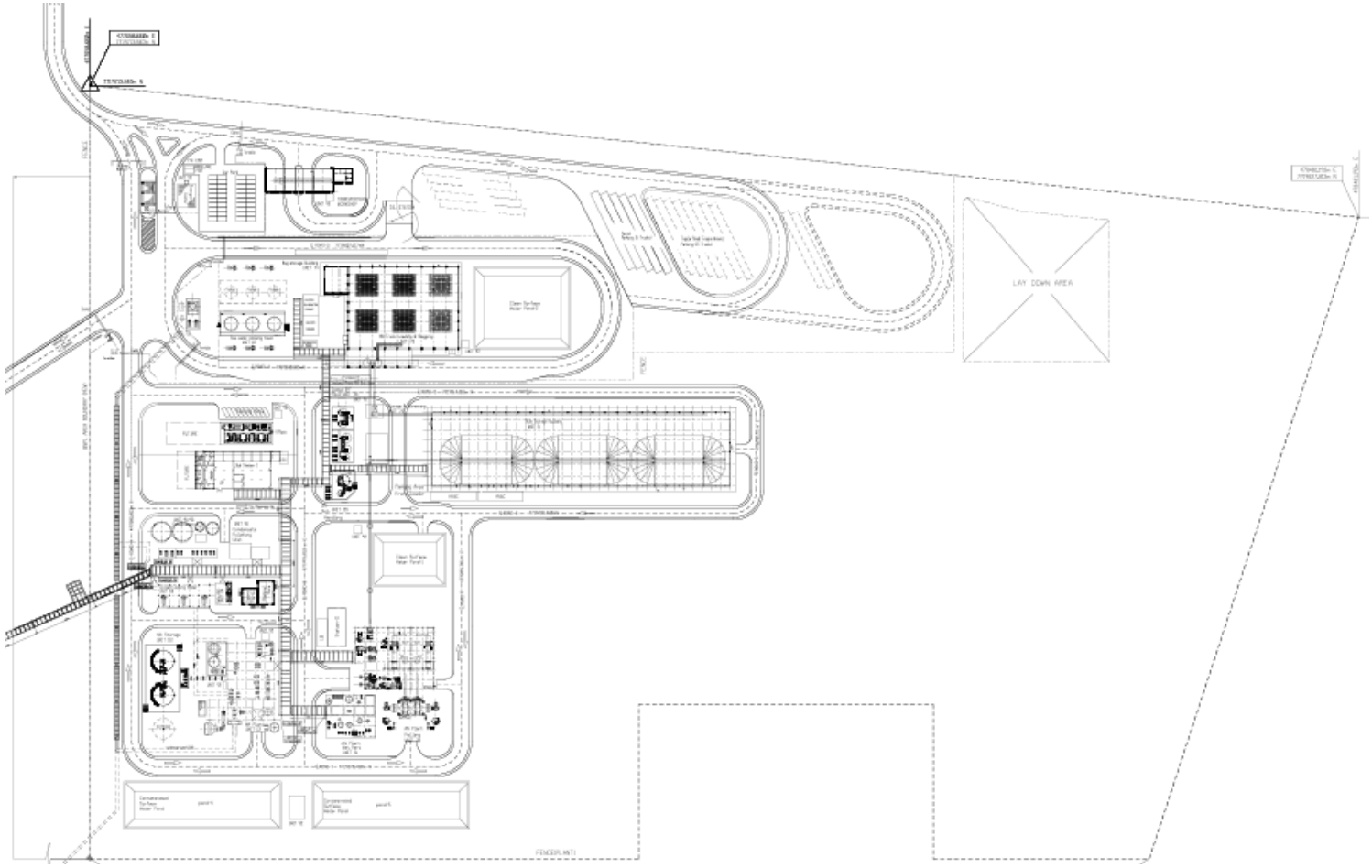
This CIPMP provides a framework for identifying and monitoring mosquito and other pest populations as well as outlining procedures for implementing management strategies during the construction phase.

Accordingly, this CIPMP describes the following:

- Identification of those mosquitos and other nuisance pests that may be located on-site or attracted to the Site during construction activities;
- Management strategies including source reduction, personal protection, breeding habitat modification and chemical control methods;
- Monitoring program; and
- Reporting, training and auditing requirements.

This PROJECT will be performed by means of modular construction and therefore, this Construction Integrated Pest Management Plan is applicable to all mosquitoes, pest and other nuisance insects existing in the TAN Burrup Project Site areas at the Burrup Peninsula where the modules are going to be installed, erected and hooked up. Any issue related to yard(s) where modules are being constructed is not subject to this document's requirements.

Figure 1: Site location and Project Layout



3. DEFINITIONS AND ACRONYMS

3.1 DEFINITIONS

Adulticide	Is any chemical or combination of chemicals designed to prevent the breeding of adult mosquitoes.
Company	Yara Pilbara Nitrates Pty Ltd.
Contractor	Técnicas Reunidas S.A. (TR)
Construction	Includes any preparatory works within the Site required to be undertaken including clearing vegetation, cut and fill activities, the erection of any on-site temporary structures and the use of equipment for the purpose of breaking the ground for buildings or infrastructure.
Larvicide	Is any chemical or combination of chemicals designed to prevent the hatching or development of larval mosquitoes.
Project	TAN Burrup Project.
Site	35 Ha area where construction works are going to be performed.

3.2 ACRONYMS

YPNPL	Yara Pilbara Nitrates Proprietary Limited
CAMBA	China Australia Migratory Bird Agreement
CEMP	Construction Environmental Management Plan
CIPMP	Construction Integrated Pest Management Plan
Cwth	Commonwealth
DoH	Western Australia Department of Health
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EO	Environmental Officer
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
Ha	Hectare
JAMBA	Japan Australia Migratory Bird Agreement
PER	Public Environmental Review
ROKAMBA	Republic of Korea Australia Migratory Bird Agreement
TAN	Technical Ammonium Nitrate
TANPF	Technical Ammonium Nitrate Production Facility
TR	Técnicas Reunidas (construction contractor)
UWA	The University of Western Australia
WA	Western Australia

WC Act	Western Australia *Wildlife Conservation Act 1950*
YPFPL	Yara Pilbara Fertilizers Proprietary Limited

4. LEGISLATIVE FRAMEWORK

This document has been prepared to address relevant legislative requirements in addition to environmental approval conditions relevant to mosquito and other pest management. A summary of relevant legislation and environmental approval conditions is outlined below.

4.1 RELEVANT LEGISLATION

Legislation relevant to mosquito and pest management is outlined in **Table 1.**

Table 1: Relevant Legislation and its Application

Legislation	Application
Environmental Protection Act 1986 (WA)	State environmental impact assessment and Ministerial approval process.
Wildlife Conservation Act 1950 (WA)	Assesses the conservation significance of fauna species and forms the framework for significant species protection at the State level.
Environment Protection and Biodiversity Conservation Act 1999 (Cwth)	Assesses the conservation significance of fauna species and forms the framework for significant species protection at the Commonwealth level. Provides for the protection of matters of National Environmental Significance.
Public Health Act 2005	Division 2 of the *Public Health Regulation 2005*, which requires the owner, occupier of premises to prevent mosquito breeding on their premises and sets out the requirements for rainwater tanks to ensure the tanks do not breed mosquitoes.
Fisheries Act 1994	All marine plants (including mangroves, seagrasses and saltmarsh species) and declared fish habitat areas are protected by this legislation.

4.2 ENVIRONMENTAL APPROVAL CONDITIONS

This document also addresses the Ministerial Conditions outlined by the Commonwealth (EPBC 2008/4546) and WA (Statement No. 870) governments. For this CIPMP particular reference has been made to:

Commonwealth Approval (EPBC Approval 2008/4546)

Condition 5

*To ensure the protection of listed threatened species and listed migratory species, the person taking the action must notify the **Department** of any proposal to apply **larvicide** or **adulticide** within the project site and develop a management plan for such an application(s). This management plan must be approved by the Minister and include details as to:*

- *the chemical make-up to be applied;*
- *the areas in which spray will be applied;*

- *the timeframe over which spray will be applied;*
- *the season in which spray will be applied;*
- *potential impacts of the larvicide or adulticide on listed threatened and listed migratory species; and*
- *mitigation measures proposed for potential impacts on listed threatened and migratory species.*

*This notification must be provided to the **Department** in writing at least six (6) months prior to any proposed application.*

Any proposal to apply larvicide or adulticide within the project site must be undertaken in accordance with this management plan.

In addition to the Ministerial Conditions set by the Commonwealth and WA Governments, YPNPL committed to the implementation of a Health and Safety Management Plan incorporating an integrate Mosquito and Other Nuisance Insects Management Plan and integrated Pest Management Plan to ensure the health and safety of the workforce and public are protected. YPNPL also committed to the preparation of a Construction Environmental Management Plan (CEMP) within the Public Environmental Review (PER) (ERM, 2010). This CEMP will incorporate all specific construction management plans.

5. DEVELOPMENT

5.1 POTENTIAL PEST SPECIES AND ASSOCIATED IMPACTS

Construction activities can result in the attraction of pests or inadvertently create breeding habitat for pest species. Pest species can pose a range of risks to both humans and the environment including the natural biodiversity.

A summary of pests that may be encountered on-site during construction and their potential impacts are outlined in **Table 3**.

Table 2: Invertebrate and Vertebrate Pest Species Likely to be Present within the Site Boundary

Species	Habitat	Construction Activities that may Attract Species or Create Breeding Areas	Potential Impacts/ Hazards
Mosquitoes			
Ochlerotatus vigilax (previously *Aedes vigilax*)	Intertidal wetland species	Hearson Cove, located east of the Site boundary, is a small tidal beach with tidal mudflats and a small mangrove community at the northern end. Between Hearson Cove and King Bay, located 2.5 km to the south of the Site, there is a large low-lying expanse of tidal flats and sand dunes between one and two km wide. The outer shoreline of King Bay comprises shallow sand and mud flats, and mangrove communities that back onto extensive mudflats.	Primary coastal vector of Ross River virus and Barmah Forest virus.
Mucidus alternans (previously *Aedes alternans*)			Ross River virus
Culex sitiens			Ross River virus
Aedeomyia catasticta	Freshwater species	The majority of potential freshwater mosquito habitats on the Burrup Peninsula and in the Site during construction are likely to be related to human activity. Potential freshwater habitats for mosquitoes in the Site may include: • pooled water in bunded areas, containers or other vessels • low lying areas	None known.
Aedes sp. Marks' species No. 92			Unknown but found in such low numbers that unlikely to be a major vector.
Aedes sp. Marks' species No. 125			Unknown but found in such low numbers that unlikely to be a major vector.
Aedes sp. Marks' species No. 147			Unknown but found in such low numbers that unlikely to be a major vector.

Species	Habitat	Construction Activities that may Attract Species or Create Breeding Areas	Potential Impacts/ Hazards
Anopheles amictus	Freshwater species	temporarily flooded by high rainfall • sediment ponds • wastewater treatment ponds • storm water drainage systems • depressions created during construction works • spoon drains, road verges and trenches • borrow and rubbish pits	Ross River virus
Anopheles annulipes s.l.			Ross River virus
Anopheles hilli			Ross River virus
Anopheles meraukensis			Not known to transmit viral diseases to humans in Australia.
Culiseta atra			Unknown
Culex annulirostris			• Ross River virus • Barmah Forest virus • Murray Valley Encephalitis • Kunjin virus.
Culex bitaeniorhynchus			• Ross River virus • Murray Valley Encephalitis
Culex pullus			Kunjin virus
Culex quinquefasciatus			• Ross River virus • Barmah Forest virus • Murray Valley Encephalitis
Culex starckeae			Kunjin virus
Culex sp. Marks' species No. 92			Unknown but found in such low numbers that unlikely to be a major vector.
Mucidus alternans (previously *Aedes alternans*)			Ross River virus
Ochlerotatus bancroftianus (previously *Aedes bancroftianus*)			• Ross River virus • Barmah Forest virus
Ochlerotatus normanensis (previously *Aedes normanensis*)			• Ross River virus • Barmah Forest virus • Murray Valley Encephalitis
Tripteroides punctolateralis			No information
Uranotaenia albescens			No information

Species	Habitat	Construction Activities that may Attract Species or Create Breeding Areas	Potential Impacts/ Hazards
Biting Midges			
Culicoides spp.	• Sandy estuarine and foreshore areas • Mangrove swamps	Extensive tidal mudflats surrounding the Site, the closest being 600 m away at Hearson Cove. Edge of water bodies or in decaying vegetable material.	Bites can be painful and irritating with some people having severe local allergic reactions.
Other Nuisance Insects			
Cockroaches	Areas of human habitation	Cracks and crevices of construction buildings, storage areas and structures. May be attracted to light, food items in both discarded human scraps and congregation of prey biomass, availability of fresh water, nesting opportunity, etc.	Spoil foodstuffs, can carry microbes harmful to humans.
Ants	All areas		Nuisance and environmental pests. Can cause damage to insulation and electrical wiring.
Ticks	All areas		Bites can cause local irritation to severe allergic reaction.
Vertebrate Pests			
House Mouse *Mus musculus*	All areas, particularly areas of human habitation	Around construction buildings, storage areas, laydown areas and structures. May be attracted to light, food items in both discarded human scraps and congregation of prey biomass, availability of fresh water, nesting opportunity, etc.	• Spoil foodstuffs • Cause physical damage to materials • Possible vectors of disease • Displacement of native species
Black Rat *Rattus rattus*	All areas, particularly areas of human habitation		• Spoil foodstuffs • Cause physical damage to materials • Possible vectors of disease • Displacement of native species
Cat *Felis catus*	All areas		• Predation on native species
Fox *Vulpes vulpes*	All areas		• Predation on native species
Wild Dog *Canis lupus familiaris/dingo*	All areas		• Predation on native species

5.1.1 Mosquito-borne Diseases

Mosquitoes act as vectors or transmitters of diseases or parasites through either (Russell 2011):

- mechanical methods – where the mosquito picks up the pathogen as a contaminant; or

- biological methods – where the pathogen or parasite develops or multiplies within the vector before it is passed on.

Mosquito bites can also be painful and irritating and cause allergic reaction in some people. Potentially fatal mosquito-borne diseases known from the Pilbara region, including the Burrup Peninsula, are listed in **Table 4**.

Table 3: Mosquito-borne Diseases Known in the Pilbara Region (Department of Health 2010, Shire of Roebourne 2011)

Disease	Occurrence and Symptoms	Period of High Risk
Ross River virus	• Can occur anywhere in Western Australia; occurs in the Pilbara. • Symptoms may persist for several months and include joint pain and swelling, sore muscles, rash, fever, headache and fatigue.	Whenever heavy rainfall or unusually high tides occur.
Barmah Forest virus	• Can occur anywhere in Western Australia; occurs in the Pilbara. • Symptoms similar to Ross River virus.	Whenever heavy rainfall or unusually high tides occur.
Murray Valley Encephalitis	• Often active in the Pilbara. • Symptoms include fever, headaches, lethargy, irritability and floppiness. Severe cases can lead to brain damage, paralysis and death.	Highest risk during February to April, following heavy wet season rains, however risk period can commence early or extend later in very wet years.
Kunjin virus	• Related to Murray Valley Encephalitis, with similar, but less severe symptoms which may also include joint pain.	As for Murray Valley Encephalitis.

5.2 OBJECTIVES AND PERFORMANCE

Objectives for the construction phase of the Project in regards to the management of mosquitoes, other nuisance insects and pests on the Site are to:

- minimise the risk of mosquito-borne disease to personnel;
- reduce the potential for mosquito breeding within the Site;
- minimise the presence of other insect pest species within the Site; and
- minimise the presence of vertebrate pest species within the Site.

Detailed performance indicators for this CIPMP are presented in **Table 5.** Limited monitoring will be used to assess the impact of the construction activities against the performance measures and indicators. If monitoring and assessment indicates that a performance indicator has been exceeded, or likely to be exceeded, the Contractor will implement the contingency measures outlined in **Section 9**.

Table 4: Performance Measures

Performance Measure	Indicator of Success	Key Assessment Considerations
Incidence of mosquito-borne diseases within the Site.	• No outbreaks of mosquito-borne diseases from within the Site.	1. Does the monitoring indicate that a performance measure or development consent condition has been exceeded, or likely to be exceeded? 2. Does this exceedance increase the risk for any of the ecological issues (species, populations (incl. human) or communities) under investigation? 3. What is the nature of the risk? • health and safety of workforce; • increased predation (feral animals); or • competition for resources. 4. What are the potential factors that may have contributed to the risk i.e. construction activities or natural climatic event? 5. What actions, if any are required to mitigate and/or minimise the potential for future impacts?
To minimise the potential breeding habitat for mosquitoes.	• No relative increase in the available habitat for mosquitoes to breed.	
To minimise the impacts from vertebrate pest species	• No relative increase in the number of vertebrate pest species within the Site boundary.	
To minimise the potential environmental impacts from mosquito and other insect pest species management controls.	• Appropriate management measures for mosquitoes without harming the environment.	

5.3 MANAGEMENT ACTIONS AND RESPONSIBILITIES

For effective mosquito and pest management and to help achieve environmentally sustainable outcomes, the following management approaches are proposed to be implemented as required during construction (in order of preference):

1. indirect management controls (e.g. training and awareness programs, including personal protection measures, appropriate planning and source reduction); and
2. direct management controls (e.g. chemical controls, breeding habitat modification and biological controls).

A regional approach is also important and consultation with WA Department of Health (DoH) Mosquito-Borne Disease Control Branch and Shire of Roebourne and surrounding industries will be undertaken.

Based on the above approach, management actions required to meet the objectives (Section 6) are outlined in **Table 6**.

5.3.1 Indirect Management Controls

Training and awareness programs, including personal protection measures, appropriate planning and source reduction are the preferred management strategies to reduce the potential of mosquito breeding within the Site and minimising the risk of mosquito-borne diseases. Personal protection measures are the first line of defence against mosquito-borne diseases. For the purpose of this CIPMP source reduction refers to the elimination and removal of potential breeding grounds, feeding opportunities and harbourage in areas associated with human habitation.

5.3.2 Direct Management Controls

Chemical control of mosquitoes (either larvicide or adulticide) has been included in Table 6 as a management response, but will only be implemented if necessary within areas that cannot be managed with other management controls and/or monitoring shows that the number of mosquitoes has increased to an unacceptable level. The advantage of chemical control methods is that pesticides can be quickly applied with rapid results at relatively low cost. However, chemical usage will not be viewed as a long term control strategy as prolonged use can result in the development of resistance in mosquito populations and be detrimental to the environment.

To ensure the protection of listed threatened species and listed migratory species, CONTRACTOR / COMPANY must notify the Department of Sustainability, Environment, Water, Population and Communities (DSEWPAC) of any proposal to apply larvicide or adulticide within the Site and develop a management plan for such an application (Condition 5, EPBC Act referral 2008/4546). Consultation will also be undertaken with the Shire of Roebourne and DoH prior to the planning of and implementation of this management option.

Relatively few chemicals can be recommended for use in wetlands, whether natural or constructed (which usually flow into natural water systems), because of environmental concerns. The importance of pre-inspection activities is further reinforced when considering the selection of the most suitable treatment chemical. The effectiveness of the various

'acceptable' agents depends on appropriate formulations and local conditions and the target mosquito species is also of critical concern.

Table 5: Management Actions and Responsibilities

Reference Number	Response and Management Actions	Timing/ Critical Date	Responsible Person
CIPMP-1	Training and awareness will be provided to personnel on the mosquito and nuisance insect problem, and the management strategies and responsibilities for their own health (through induction, regular communication and posters throughout the construction site).	Prior to employees/contractors conducting works on site.	Environmental Officer (EO)
CIPMP-2	Personnel will avoid being outdoors at peak biting times, specifically at dusk.	Whilst on site	All personnel
CIPMP-3	Personnel will avoid areas of dense vegetation near breeding sites.	Within 1-2 weeks following highest tides of the month or after significant rain	All personnel
CIPMP-4	Personnel will wear hats, socks, light coloured clothing (where possible) with long pants and long sleeves. Head nets (with 1-1.5 mesh) and gloves might sometimes be worn, if deemed necessary. Sleeves and collars will be kept buttoned and trousers tucked into boots. In severe cases clothing may be impregnated with permethrin.	When outdoors	All personnel
CIPMP-5	Personnel will use mosquito repellents.	As required	All personnel
CIPMP-6	Personnel will be notified if there is a mosquito or biting nuisance insect problem and will be advised to take appropriate personal protection.	As required	EO
CIPMP-7	All on-site accommodation will be air-conditioned and mobile windows shall be screened. Screens will be the correct mesh size, fit tightly and be in good condition. Temperatures for air conditioners of 23 +/- 2 degrees and relative humidity of <55%.	Ongoing	CONTRACTOR Site Manager
CIPMP-8	All doors on buildings will open outward and have automatic closing devices.	Ongoing	CONTRACTOR Site Manager
CIPMP-9	Red or yellow lights will be used in personnel areas, where possible, to prevent attracting nuisance insects. White lights will be used away from non-personnel areas to divert the nuisance insects.	Ongoing	CONTRACTOR Site Manager
CIPMP-10	The site will be visually inspected for all containers and vessels capable of holding water (including bunded areas) to prevent water	Weekly	EO

Reference Number	Response and Management Actions	Timing/ Critical Date	Responsible Person
	pooling. These areas will be drained and treated as required.		
CIPMP-11	Ponds will not be less than 60 cm deep, and batter slopes should not be greater than 1:6.	Ongoing	CONTRACTOR Site Manager/Civil Supervisor
CIPMP-12	Basins and swales will be designed to empty in less than seven days to prevent the completion of mosquito breeding cycles.	Ongoing	CONTRACTOR Site Manager/Civil Supervisor
CIPMP-13	Visual inspections of ponds will be undertaken as per the monitoring program (**Table 7**).	Weekly	EO
CIPMP-14	Sampling will be undertaken of mosquito larvae in ponds as per the monitoring program (**Table 7**).	Monthly	EO
CIPMP-15	Drainage will be designed to prevent the accumulation of silt and debris that may create pooling of water.	Prior to commissioning	CONTRACTOR Site Manager/Civil Supervisor
CIPMP-16	Surface water run-off from non-process/storage areas and building roofs will be directed to the clean water pond to be evaporated.	Ongoing	CONTRACTOR Site Manager/Civil Supervisor
CIPMP-17	Erosion control measures will be installed on drain batters to prevent silting.	Ongoing	CONTRACTOR Site Manager
CIPMP-18	Plant species selected to stabilise slopes will be suitable for the environment and not cause invasion of water bodies and create breeding grounds.	Ongoing	CONTRACTOR Site Manager
CIPMP-19	All maintenance of drains will be conducted in accordance with procedures which ensure that further habitats for mosquitoes or nuisance insects are not created by wheel ruts.	Ongoing	Civil Supervisor
CIPMP-20	Water will not be discharged into mangrove and vegetated wetlands.	Ongoing	CONTRACTOR Site Manager
CIPMP-21	Drains will be maintained free of siltation and debris.	As required	Civil Supervisor
CIPMP-22	Drains will be visually inspected as per the monitoring program in **Table 7**.	Weekly	EO
CIPMP-23	Sampling will be undertaken of mosquito larvae in drains as per the monitoring program (**Table 7**).	Monthly	EO
CIPMP-24	Sewerage systems and wastewater disposal will be operated in a manner to avoid ponding of water.	Ongoing	Civil Supervisor

Reference Number	Response and Management Actions	Timing/ Critical Date	Responsible Person
CIPMP-25	Irrigation rates will be effectively managed to prevent the creation of temporary pools.	Ongoing	Civil Supervisor
CIPMP-26	Temporarily flooded areas will be managed through filling depressions and draining pooling areas.	Ongoing	Civil Supervisor
CIPMP-27	Drainage channels will work the same as ponds so water will be evacuated every 7 days	Ongoing	CONTRACTOR Site Manager/ Civil Supervisor
CIPMP-28	Access roads will be fitted with prevention system where necessary, in order to prevent water ponding upstream.	As required	CONTRACTOR Site Manager
CIPMP-29	All materials taken on or off-site will be inspected for pooled water and will be drained and treated as required.	As required	CONTRACTOR Site Manager
CIPMP-30	Reinstated sites will be re-contoured to the original surface profiles to prevent ponding.	Ongoing	CONTRACTOR Site Manager/ Civil Supervisor
CIPMP-31	Drainage will be designed so that no stagnant ponding occurs during and after construction.	Ongoing	CONTRACTOR Site Manager
CIPMP-32	In the event of rainfall, any pooled water will be pumped out of open trenches and other construction related voids (after any fauna have been cleared) and discharge it via a mesh (to dissipate energy) to adjacent vegetated area.	As required	CONTRACTOR Site Manager
CIPMP-33	Areas that cannot be managed with other management controls will be treated with a control agent (larvicide or adulticide), in consultation with the Shire of Roebourne and DoH.	As required	EO
CIPMP-34	Prior to use of chemical larvicides a full assessment will be undertaken of adverse effects, consideration of the receiving environment and on-site risk/benefit analysis and a management plan prepared for approval by DSEWPAC.	If required, when necessary	EO
CIPMP-35	Vegetation will be removed from proximity to paths and buildings.	Ongoing	CONTRACTOR Site Manager
CIPMP-36	Rubbish will be removed daily from all bins in and around buildings.	Daily	EO
CIPMP-37	Hoppers and bulk bins will be removed and/or emptied regularly.	As required	EO
CIPMP-38	Food will be consumed only in designated areas.	Ongoing	All personnel

Reference Number	Response and Management Actions	Timing/ Critical Date	Responsible Person
CIPMP-39	Food preparation and consumption areas will be kept at a high level of cleanliness. All food will be stored in sealed air-tight containers. Cutlery and crockery will be cleaned and dried after use. All crumbs and any spills will be cleaned immediately.	Ongoing	All personnel
CIPMP-40	Food storage, preparation and consumption areas will be inspected for nests and other signs of pest presence.	Weekly	EO
CIPMP-41	Feeding, or otherwise encouraging, of birds, cats or other wildlife will not be permitted.	Ongoing	All personnel
CIPMP-42	Laydown areas, workshops, stores and offices will be maintained at a high level of cleanliness and will be kept uncluttered and well-ventilated.	Ongoing	CONTRACTOR Site Manager
CIPMP-43	Laydown areas, including pipes and under pallets, will be inspected for nests and other signs of pest presence.	Weekly	EO
CIPMP-44	All discarded or unused material, including pallets and cardboard boxes, will be removed off the site as soon as possible and disposed of at the appropriate facility.	Ongoing	CONTRACTOR Site Manager
CIPMP-45	Water holding systems, including air conditioners will be maintained to prevent water leaks.	Ongoing	CONTRACTOR Site Manager
CIPMP-46	All water leaks, including dripping air conditioners will be reported immediately to the Construction Site Manager.	As required	All personnel
CIPMP-47	Machinery, if left idle, will be regularly checked for any infestation or nests.	Weekly	EO
CIPMP-48	Cockroach baits will be discretely placed in food preparation/consumption areas.	Ongoing	EO
CIPMP-49	Infestation by any invertebrate or vertebrate pest will be treated by a registered pest control contractor.	As required	EO
CIPMP-50	Rodent baits will be placed in storerooms and other suspected locations.	As required	EO
CIPMP-51	Staff will be made aware of any treatment or fumigation program proposed.	As required	EO
CIPMP-52	Identify likely breeding sites and appropriate approaches for control.	Pre-cyclone	EO
CIPMP-53	The site will be visually inspected for all containers and vessels capable of holding water and removed or placed under cover where possible.	Pre-cyclone	CONTRACTOR Site Manager
CIPMP-54	Personnel will be advised of the increased risk from mosquito bites after rainfall and the means	Pre-cyclone	EO

Reference Number	Response and Management Actions	Timing/ Critical Date	Responsible Person
	of avoiding mosquito bites.		
CIPMP-55	Clean up container breeding habitat and remove water-holding rubbish and debris around the site.	Post-cyclone	CONTRACTOR Site Manager
CIPMP-56	Repair or modify damaged infrastructure that may have created mosquito breeding habitat.	Post-cyclone	CONTRACTOR Site Manager
CIPMP-57	Monitor likely breeding sites for larvae (see **Table 7**) to determine whether control measures (including chemical control) are required.	As required following heavy rainfall events	EO

5.4 MONITORING

5.4.1 Mosquitoes

To determine the on-going prevalence and distribution of mosquito and larvae and to enable timely control activities, if required, the following monitoring should be undertaken during the peak breeding season (November to March).

1. Visual inspections – visual inspection of the site for pooled water and larvae.
2. Sampling of mosquito larvae - surveys of mosquito larvae will by sampled using a scoop/ladle.

Standardised collecting techniques to sample adult and larval mosquitoes will be undertaken at fixed sites as detailed below in **Table 7**.

Table 6: Mosquito Monitoring Program

Monitoring Site	Method	Frequency
Bunds and containers around site	Visual inspection	Weekly
Ponds and basins	Visual inspection	Weekly
	Sampling of mosquito larvae	Monthly
Stormwater drainage systems	Visual inspection	Weekly
	Sampling of mosquito larvae	As required following heavy rain events
Low lying areas	Visual inspections	Weekly following heavy rain events
	Sampling of mosquito larvae	As required following heavy rain events
Intertidal wetlands/saltmarshes	Sampling of mosquito larvae	As required following heavy rain events

In addition to this monitoring, close liaison with the DoH Mosquito-Borne Disease Control Branch and the Shire of Roebourne Environmental Health Service will occur to obtain results of any surveys undertaken and to be notified of major mosquito events in the region.

5.4.2 Other Pests

Routine weekly inspection will be undertaken by the EO in areas of high risk for nests or other signs of insect or vertebrate pest habitation. These include:

- food storage, preparation, and consumption areas;
- ablutions blocks;
- in and around garbage bins;
- offices, store rooms, workshops, laydown areas;
- locations of fresh water supply;
- under skid mounted buildings;
- on and in idle machinery; and

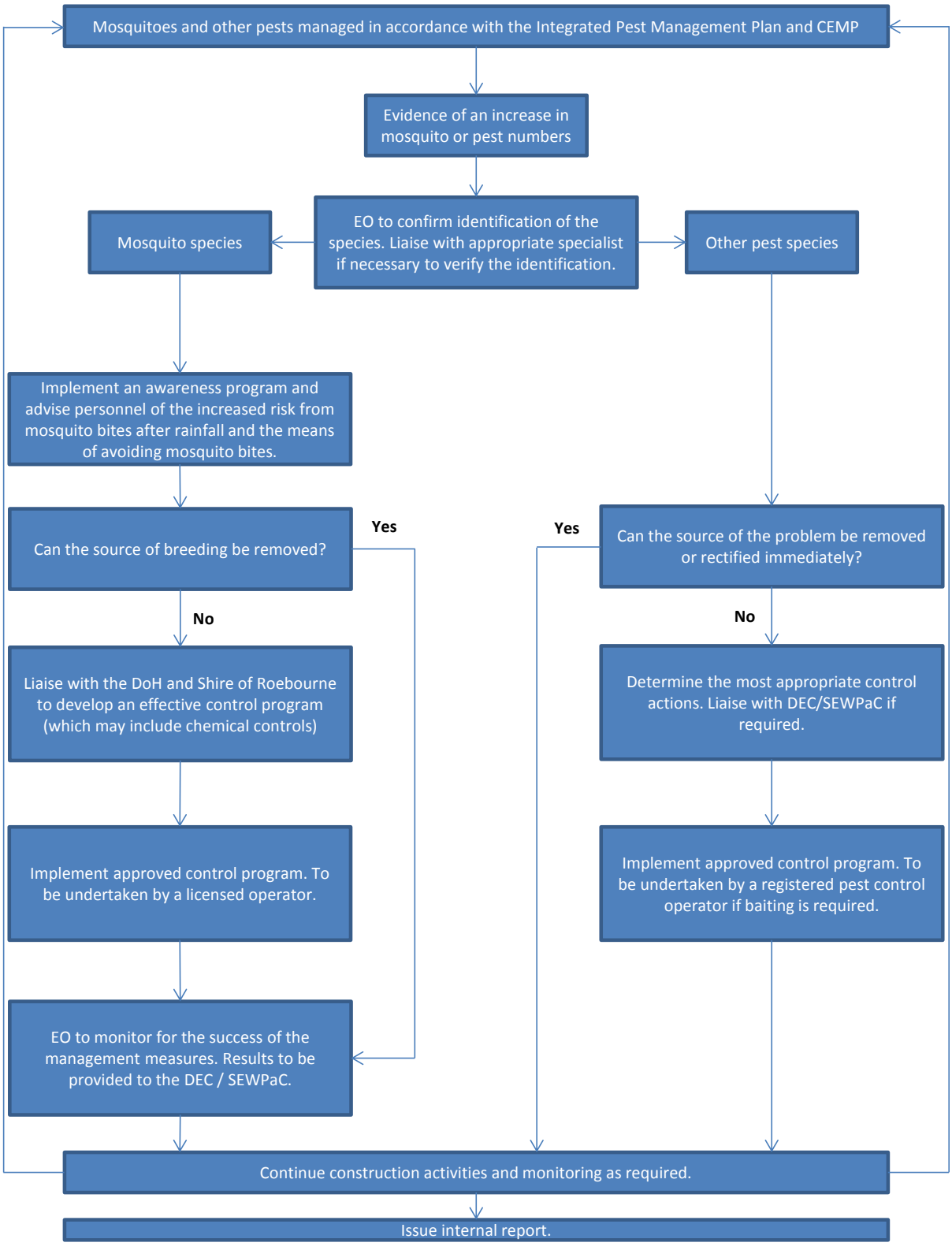
- any location where rodent baits have been laid.

5.5 IMPLEMENTATION

5.5.1 Contingency Response

The following contingency plan (**Figure 2**) will be implemented by the EO in the event of an increase in mosquito or pest numbers within the Site. The CONTRACTOR Site Manager will provide all necessary resources, with all CONTRACTOR Site team members to cooperate as required.

Figure 2: Mosquitoes and Other Pests Contingency Plan.



5.5.2 Management Response

In the event the performance measures and actions provided in **Table 2** are considered to have been exceeded, or are likely to be exceeded, the CONTRACTOR will undertake the following:

- The EO will report immediately HSE Manager and Site Manager for their information and action.
- The EO will report the likely exceedance of the performance indicator as soon as practicable to the relevant agencies as required under the development consent or legislation after becoming aware of the exceedance;
- The EO, together with CONTRACTOR Site Management will identify an appropriate course of action with respect to the identified impact in consultation with appropriate specialists and relevant agencies; and
- The Contractor will review the effectiveness of this CIPMP and performance measures to adequately manage potential construction impacts from pests within the limits of the Project approval.

5.5.3 Reporting

All incidents of non-compliance and corrective actions are to be reported internally by the EO on a monthly basis through the construction period.

In addition, the EO will summarise all incidents in the annual Site Compliance Report (as per Project Compliance Assessment Plan (2-250-329-PRO-TRE-0104)). This report must be submitted to the SEWPaC and DEC/OEPA and published on the YPNPL website within three months of every 12 month anniversary of the commencement of the Project. Reporting will identify opportunities for continuous improvement in mosquito and pest management on the Site.

A final summary report shall also be forwarded to the relevant regulatory agencies on completion of construction.

5.5.3.1 Notification of Vector-borne Disease

Illness symptoms in employees (such as temperature, fever, joint and muscle pain) that may indicate vector borne disease will be monitored, with illnesses assessed for cause where possible. A register will be maintained of any staff member infected by the following vector-borne diseases:

- Barmah Forest Virus
- Ross River Virus
- Murray Valley Encephalitis
- Kunjin Fever

Data on vector-borne diseases numbers for the region can be requested from the DoH if deemed necessary. However, these records are not always indicative of the mosquito

problem as records only show those who have been diagnosed by a doctor and do not link the result to the area of transmission.

5.5.3.2 Community Opinion/Complaint Register

A complaint register will be maintained and each complaint investigated to assess mosquito and other pest prevalence.

5.5.4 Review and Auditing

The correct implementation of all provisions described in this CTVFMP will be monitored by the site HSE team as part of periodic HSE inspections. Periodic inspections will be carried out by CONTRACTOR HSE Team as per Construction HSE Plan (2-250-329-PRO-TRE-0111-att12) using the HSE Inspection Sheet attached to this document (2-250-329-PRO-TRE-0111-tmp 01). Records shall be kept accordingly.

Identified deviations will be reported to all affected and involved personnel and actions follow up will ensure appropriate corrective actions are implemented. Serious deviations or incidents will be reported in writing and included in the Monthly HSE Report.

As part of Project Environmental Management system, compliance of this Construction Integrated Pest Management Plan will be audited during internal HSE Audits performed on a periodic basis by CONTRACTOR HO HSE Team. HSE Internal Audits procedure is described in the Project Construction HSE Plan (2-250-329-PRO-TRE-0111-att12).

This CIPMP may also be audited by relevant government agencies under the scope of any external environmental compliance audits.

An internal review of this CIPMP will be conducted in response to:

- An incident recorded as a result of an impact related to mosquitoes or other nuisance pests;
- A significant change in construction phase that may affect the implementation of this management plan;
- Statutory requirements or directions/conditions of approvals requiring such action; or
- Recommendations as a result of internal or external audits.

5.5.5 Training and Awareness

Environmental management requirements including mosquito and nuisance insect management will be included in an induction and training program for all personnel employed/contracted on the site for the construction phase of the Project. Environmental topics will be included in toolbox talks or other on-going worker training and awareness, as

required. Personnel will be educated on the mosquito and nuisance insect problem on-site and educated in management strategies and responsibilities for their own health through induction, regular communication and posters throughout the construction site.

A register of training for each employee will be maintained and reviewed as required.

6. REFERENCES

6.1 LEGISLATION

See section 4 of this Plan.

6.2 COMPANY SPECIFICATIONS AND PROCEDURES

- Public Environmental Review for Yara Pilbara Nitrates Pty Ltd. (PER)
- Appendix D-6 - HES Requirements during Construction & Fabrication
- YPNPL Works approval (15/07/2011)
- State of WA Statement No. 870 (07/07/2011)
- Commonwealth Approval letter from SEWPaC (14/09/2011)

6.3 PROJECT MANAGEMENT SYSTEM PROCEDURES

Code	Title
2-250-329-PRO-TRE-0104	Compliance Assessment Plan (MS 870)
2-250-329-PRO-TRE-0111	Construction Environmental Management Plan

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ATTACHMENT 12:

Construction Site HSE Management Plan

(CSHSEMP)

INDEX

1. PURPOSE

The purpose of this document is to outline the main preventive and protective measures to be put in place by CONTRACTOR and its SUBCONTRACTORS in order to prevent human injuries, property and environmental damage during Construction, Pre-Commissioning and Commissioning of the TAN Burrup Project. CONTRACTOR is committed to ensure health and safety of all workers and visitors as well as to take all necessary appropriate measures to protect the environment and avoid or reduce to a minimum any inconvenience to the public, both in the site and in the yard.

This document is issued following the Public Environmental Review (PER) commitments and in compliance with the requirements set forth in the Commonwealth Approval, Works Approval and all applicable statutory laws and regulations, COMPANY Corporate and Project requirements and CONTRACTOR standards and procedures. This Plan needs to be read together with the Construction Environmental Management Plans referenced in section 6 of this document.

2. SCOPE

This PROJECT will be executed using an *offsite fabrication strategy in which* works will be performed by means of modular construction. Therefore, this Construction Site HSE Management Plan (CSHSEMP) is applicable to all activities to be carried out by CONTRACTOR and its SUBCONTRACTORS in the construction site at the Burrup Peninsula where the modules are going to be installed, erected and hooked up. Any work performed at yard(s) where modules are being constructed is not subject to this document's requirements.

For those activities under the scope of the project which will be performed on the fabrication yards, Yard SUBCONTRACTOR´s HSE Plan shall be of application. Yard SUBCONTRACTOR(s) HSE Plan shall be in compliance with CONTRACTOR HSE requirements as established in Attachment 01 of the present Plan and will be subject to CONTRACTOR approval.

Mosquito and Other Nuisance Insects Management Plan and Integrate Pest Management Plan as required in the Commonwealth Approval, condition 7 and following the Public Environmental Report commitments are developed and issued as stand alone Plans, with

an independent document code number and as part of the whole set of Construction Environmental Management Plans (see section 6. References).

The overall PROJECT HSE Management Plan consists of an EP HSE Plan covering all HSE issues regarding the engineering and procurement phases of the PROJECT and this Construction Site HSE Plan together with all its Construction Environmental Management Plans (CEMPs), both addressing all HSE management system requirements for Construction, Pre-Commissioning and Commissioning phases of the TAN Burrup Project.

Note. PER commitments and approval conditions refer to H&S Plan and CEMPs as independent documents. Despite this and in addition to the general CEMP and complementary specific CEMPS referred to under section 5 of the present document, this CSHSEMP includes, not only health and safety issues, but also environmental aspects because the site team responsible for ensuring compliance with all applicable requirements is an HSE Team, involving all three disciplines (health, safety and environment). Furthermore, site organization deals together with health, safety and environment during training sessions, meetings, toolbox talks, inspections, reports and any other issue. Notwithstanding this, specific and independent training sessions, toolbox talks topics, inspections or reports can address only environmental aspects or health or safety issues.

3. DEFINITIONS AND ACRONYMS

3.1 DEFINITIONS

COMPANY	Yara Pilbara Nitrates Pty Ltd.
CONTRACTOR	Técnicas Reunidas S.A. (TR).
ACCIDENT	Unintended incident which results in injury to persons and/or damage to property, the environment, third parties or which leads to production loss.
CONFINED SPACE	An enclosed or partially enclosed space large enough and so configured that an employee can bodily enter and perform assigned work, has limited or restricted means for entry or exit or not designed for continuous employee occupancy.

FLYROCK	The fragments of rock thrown and scattered during quarry or tunnel blasting.
HAZARDOUS MATERIAL	Any substance or material that could adversely impact or is capable of posing an unreasonable risk to health, safety, environment and property when stored, used, handled or transported.
INCIDENT	Unintended work related accident which results in – or has the potential for – injury and/or business interruption, and/or damage to property, the environment or a third party.
LEASE AREA	The entire project lease, including the undisturbed area and the TAN Burrup Project Site
LOCK OUT TAG OUT	Safety procedure used to ensure that dangerous machines are properly shut off and not started up again prior to the completion of maintenance or servicing work. It requires that hazardous power sources be "isolated and rendered inoperative" before any repair procedure is started
LOGBOOK	Book that contains the official record of the maintenance and inspections made to the equipment by a qualified person.
LOST TIME INJURY	Unintended incident that causes injury at work leading to absence beyond the day of the accident.
MEDICAL TREATMENT CASE	Injury at work (other than LTI and RWC) requiring treatment by a doctor, or nurse in consultation with a doctor, before the injured person resumes normal work.
MODULES	Means Pre-Assembled structures, including piping, equipment, instrumentation, cabling and prearranged connections, which are built outside the Site and delivered to Site for installation.
NEAR MISS	An unintended incident not leading to injury or damage, but which under different circumstances could have become an accident.
RESTRICTED WORK CASE	Injury at work that does not lead to absence from the next scheduled work period, because of alternative job assignment.
ROOT CAUSE OF ACCIDENTS	Most basic cause of an incident/accident.
SHOTFIRER	Person whose responsibility includes preparing, loading and firing explosives during blasting operations to be carried out as part of site preparation.

SITE	Area within the disturbance boundary.
STICKER	Small piece of paper or plastic on one side and glue or another similar substance on the other side, so that it will fasten to a surface.
SUBCONTRACTOR	Means a Third Party who has entered into a Subcontract with CONTRACTOR. Any requirements, obligations etc. imposed by this Contract on CONTRACTOR in respect of any Subcontractor shall also apply in respect of any sub-Subcontractor, sub-sub-Subcontractor, etc. as though the sub-Subcontractor, sub-sub-Subcontractor, etc. was a genuine Subcontractor.
TAG	Small piece of paper, cloth or metal, on which there is information, fixed into something larger.
TAPPING	Procedure that uses tape, attached around the tool or the equipment.
TIE IN	The physical point where CONTRACTOR shall connect to YPFPL systems.

3.2 ACRONYMS

ALARP	As Low As Reasonably Practicable
AN	Ammonium Nitrate
AS	Australian Standards
YPNPL	Yara Pilbara Nitrates Proprietary Limited
CEMP	Construction Environmental Management Plan
CSHSEMP	Construction Site HSE Management Plan
EPA	Environmental Protection Agency
ERT	Emergency Response Team
HO	Home Office
HSE	Health, Safety and Environment
LOTO	Lock out tag out
MSD	Musculoskeletal Disorders
MSDS	Material Safety Data Sheet
PER	Public Environmental Review

PPE	Personal Protective Equipment
SEWPaC	Department of Sustainability, Environment, Water,
SJA	Safe Job Analysis
SIMOPS	Simultaneous Operations
SPMT	Self Propelled Modullar Transporter
TAN	Technical Ammonium Nitrate
TANPF	Technical Ammonium Nitrate Production Facility
TR	Técnicas Reunidas S.A.
WA	Western Australia
YPFPL	Yara Pilbara Fertilizers Proprietary Limited

4. PROCEDURE

4.1 LEADERSHIP AND COMMITMENT

CONTRACTOR Management are committed to designing, engineering, procuring and constructing the TAN Burrup Project in a manner that is uncompromising on issues of health, safety and environment, including aboriginal matters and heritage issues.

CONTRACTOR Corporate Top Management will personally practice HSE leadership, demonstrate visible commitment to the PROJECT'S HSE Policy and strategic objectives and provide all necessary resources to foster a PROJECT culture that embraces and accepts nothing but optimal HSE behaviour.

4.2 OBJECTIVE AND GOALS

COMPANY is committed to high health, safety and environmental standards that minimize risk to people in terms of loss of life and/or body injuries, the environment, neighbouring operating plant (YPFPL), heritage sites, rock art and adjacent communities. In line with this commitment, CONTRACTOR's Policy is to achieve PROJECT execution in the best HSE conditions: incident and injury free goal.

The main HSE aim to be pursued by CONTRACTOR and its SUBCONTRACTORS is summarized in the zero goal definition, ie: zero injuries, zero occupational illnesses, zero releases or spills to the environment, zero adverse impact to the community and zero

process incidents. In order to achieve these five zeros every person involved in the PROJECT must do their utmost to reach this goal; nevertheless, the maximum injury incident rates for the project are the following:

INJURY RATE	OBJECTIVE
Fatalities	0
Lost Time Injury Frequency Rate (LTIFR) LTIR= Lost time injuries/worked hours * 1,000,000	0
Total Recordable Incident Rate (TRI_{12}) TRI_{12}= (Lost Time Injuries (incl FAT) + Restricted Work Case + Medical Treatment Case)$_{12\ months}$ /worked hours during last 12 months * 1.000.000	1,30
Severity Rate (SR) SR = Number of lost workdays (LTI days) / worked hours * 1.000	0,05
Environmental Breaches (EB) EB = Number of breaches of legal environmental permits	0

4.3 HSE POLICY

CONTRACTOR QHSE Policy is attached below.

TECNICAS REUNIDAS

QUALITY, SAFETY, HEALTH AND ENVIRONMENT (HSE) POLICY

Técnicas Reunidas Group Management holds as Goals:

- The delivery to Clients of products and services that satisfy their expectations, that are safe to operate and maintain, and that respect the Environment.
- The preservation of the health and safety of staff and subcontractors.
- The protection of the environment through correct and responsible conduct in all Company activities.

Consequently, Técnicas Reunidas Group Management commits to:

- Incorporate in an efficient manner Quality and HSE in their Strategic and Business Plans and in all their activities.
- Foster a continuous improvement culture in their work methods and procedures and their application to all activities, promoting a philosophy of prevention before remedy, "do it right the first time".
- Establish objectives in Quality and HSE matters and review them periodically.
- Satisfy all requirements established by Client, current legislation and applicable codes, as well as any further requirements that Company may choose to endorse.
- Provide staff, partners and other collaborators, with adequate and continuous training
- Promote the Quality and HSE knowledge of their staff, partners and other collaborators, encouraging their awareness.
- Create lines of communication with staff and other interested parties.
- Know and evaluate their Clients' level of satisfaction and introduce practical and appropriate improvements .
- Take into account the efficient use of energy, protection of the Environment and prevention of pollution in all Company activities.
- Foster a philosophy of accident prevention in order to provide all staff with a safe and healthy work environment.

TR Group declares that its Quality, Health, Safety and Environmental Policy is understood, implemented, continuously updated and communicated at every level of the Organization.

October 2009

JUAN LLADÓ ARBURUA
CEO- Chief Executive Officer

CONTRACTOR QHSE Policy particularized for this PROJECT can be summarized as follows:

- Full compliance with statutory requirements, WA and other applicable regulations as well as COMPANY HSE requirements, AS where applicable and environmental permitting approvals process conditions.
- Implementation of this Construction Site HSE Management Plan (the present document) to determine:
    - Health, Safety and Environmental roles and responsibilities.
    - Hazard and risk identification & assessment.
    - Health, Safety and Environmental requirements for all phases.
    - Procedures and methods to prevent accidents by means of complete and detailed information and training of all employees.
    - Workers and management HSE motivation and awareness program to prevent unsafe working habits and conditions.
    - Required vigilance to ensure that HSE measures are put in place on site at the right time and following the established procedures, including corrective actions' implementation and follow up.
    - Emergency action procedures.
    - Employee sanitary facilities and medical assistance facilities for injured persons.
- Preparation of a Construction Health, Safety and Environmental Plan by each SUBCONTRACTOR, prior to start site works, that shall include COMPANY and CONTRACTOR requirements. This SUBCONTRACTOR Plan shall be subject to CONTRACTOR prior written approval.
- Compliance with all CEMPs to ensure PROJECT execution meets all environmental and heritage conditions set forth as a result of the environmental permitting approvals process.

4.4 SITE AND PROJECT INFORMATION

COMPANY is going to develop Technical Ammonium Nitrate (TAN) plant facility which, when completed, will produce (circa) 350,000 TPA of TAN to be sold to the local Pilbara and Western Australian (WA) market.

The PROJECT comprises a turnkey delivery of the TAN Burrup plant facilities. Which will contain three major process units, each producing a separate product in the manufacturing process:

- A Nitric Acid (NA) plant to convert ammonia and atmospheric air into Nitric Acid (NA). The NA unit with capacity of 760 metric ton per day (mtpd) as 100% weight (wt).
- An Ammonium Nitrate (AN) Solution plant to convert ammonia and NA into AN solution. This Ammonium Nitrate wet section with capacity of 965 mtpd in balance with nitric acid production capacity level; and
- A TAN plant to convert AN solution into TAN prills (final product). This is a dry section for production of Technical Ammonium Nitrate prills (0.7 and 0.8 kg/l density) with a capacity of 915 mtpd. Surplus ammonium nitrate solution shall be sold as hot liquid.

In addition to these three plants, other facilities are required as part of the project and include:

- Storage, loading and transport facilities
  - Liquid Ammonia pipeline between YPFPL and YPNPL plants;
  - Bulk and Bagged TAN storage buildings;
  - Bulk loading system, bagging unit, truck loading;
  - Storage for intermediate product (nitric acid) and finished products: 12000 tons (t) bulk storage, 1800 t storage for big bags, 500 t storage for ammonium nitrate solution.
- Required off-sites
- Necessary infrastructure

The main feedstock, ammonia, shall be delivered from the adjacent YPFPL ammonia plant.

4.4.1 Location

The TAN Burrup Project site is located in Burrup approximately 13 Km northwest of Karratha and 1,300 Km north of Perth, on the Burrup Peninsula, Western Australia, within the Shire of Roebourne.

The Plant, a downstream Technical Ammonium Nitrate (TAN) production facility is located adjacent to the existing YPFPL ammonia production facility from where ammonia and certain utilities will be provided. The TAN Burrup Project will require a maximum of up to 35 Ha (including all permanent and temporary construction lay-down areas) of the 49 Ha project lease area and will be accessed from Village Road.

The site is located in an area with well established infrastructure due to existing industrial operations. Attachment 02 includes the location of the TAN Burrup Project site area and a plot plan.

The work categories involved for the execution of these units at the Burrup construction site are:

During the Construction Phase

- Site preparation and blasting
- Earth Moving
- Excavation and Trenching
- Building Erection.
- Civil Works.
- Landing of modules
- Road transport of modules
- Heavy equipment operations (including heavy lifting)
- Modules hook-up
- Insulation works.
- Painting works.
- Pressure Testing (i.e. hydrotesting)

During the Pre-Commissionning

- Piping cleaning (water flushing will be performed at yard and at site).
- Motor running test
- Electrical Pre-Commissioning tests
- Equipment box-up (at yard & at site)
- Instrumentation Pre-Commissioning (i.e. loop test and a pre-loop test that shall be performed in the yards; functional test; control valve and safety valve calibration).

Commissioning Phases

- Piping integrity tests (Tightness and leak tests)
- Chemical cleaning in some critical lines

- Equipment runs (i.e. pump runs, compressors run)
- Catalyst loading
- ESD testing (emergency shut down).

4.4.2 Manpower

It is estimated that about 715.000 direct man-hours will be spent during a period of 31 months to perform Construction and Erection works at Site and 45.700 indirect man-hours (i.e. supervision). Manpower at site shall be around 400 people (including 30 of indirect manpower).

The “offsite fabrication strategy” of the PROJECT is the reason for the relatively low number of installation hours at site.

Site works including Construction, Pre-Commissioning and Commissioning phases of the PROJECT will last about 31 months, including site preparation and temporary facilities.

4.5 Site HSE Organization

It is CONTRACTOR and its SUBCONTRACTORS responsibility to establish and maintain an HSE Management System aiming incident prevention and environment protection. This HSE Management System shall provide capable and responsible HSE Teams who will be responsible for its correct implementation on site and who will report deviations of HSE requirements or unsafe practices to ensure corrective actions are established.

Every reasonable effort shall be made to ensure workers’ health and safety as well as environmental protection at any moment. This will only be achieved by means of a well structured and composed HSE organization.

4.5.1 HSE Field Organization

The following organizations shall be created in order to implement the Health, Safety and Environmental Management System on site:

- COMPANY shall designate one COMPANY HSE Representative to deal with every HSE issue together with CONTRACTOR. This designated person may attend any meeting held and/or activities performed on site regarding health,

safety and environment whenever he/ she considers necessary. He may be supported by additional personnel as deemed necessary by COMPANY.

- CONTRACTOR main staff members in charge of the CSHSEMP application are the following:
  - Project Director
  - Site Manager
  - Construction Manager
  - Commissioning Manager
  - Site HSE Manager
  - Site HSE Supervisor(s)
  - Site Environmental Coordinator

See CONTRACTOR Site HSE Organization Chart in Attachment 03.

- SUBCONTRACTOR main staff members in charge of the Site HSE Plan application are:
  - Field Representative
  - HSE Representative
  - HSE Officer(s)
- SUBCONTRACTOR shall assign a qualified and authorized HSE Representative, provided with all means necessary to perform the job.

  The number of HSE Officers to support SUBCONTRACTOR HSE Representative will be, as a minimum, in a ratio of 1 to 50 people or portion thereof, to the total number of workers. When the number of employees is under 25, SUBCONTRACTOR shall appoint a HSE Representative who may also perform other tasks. When the number of employees is between 25 and 50, the HSE Representative shall be assigned exclusively to this work and not perform any other functions. Additional HSE Officers shall be assigned for every further 50 workers or portion thereof.

  This ratio includes personnel working in offices on the site, lay-down facilities and warehouse. Safety administrative personnel, fire-watchers, confined space attendants, perimeter guards and excavation watchers and other employees supporting HSE shall not to be regarded as HSE Officers.

The ratio for live and/or dangerous specific activities such as: elevated work activities, confined space, night works or others to be defined by CONTRACTOR Management may change from 1 HSE Officer every 50 workers to 1 HSE Officer per 25 or 15 workers as so established by Site Manager or HSE Manager depending on risk, context and / or HSE concern & necessities.

Blasting activities will always be performed with the presence of a dedicated HSE Officer during the explosive activities, no matter how many workers there are on site.

SUBCONTRACTOR shall provide designated HSE Representative CV to CONTRACTOR for approval, prior to start site works. His presence will be required on site anytime works are being performed by SUBCONTRACTOR and who will be responsible for managing and applying SUBCONTRACTOR Construction HSE Plan and this CONTRACTOR CSHSEMP.

4.5.2 Responsibilities of CONTRACTOR Project Director

As the ultimate responsible of all activities carried out by CONTRACTOR and its SUBCONTRACTORS, Project Director shall promote HSE awareness and accountability at all levels during the whole PROJECT cycle but, in particular, during site works performance.

He shall provide all necessary resources (both human and material) to ensure CONTRACTOR meets all statutory requirements and applicable standards to avoid all health, safety and environmental impact due to PROJECT activities.

4.5.3 Responsibilities of CONTRACTOR Site Manager

CONTRACTOR Site Manager is responsible for ensuring that commitment to HSE is evident in the workplace and has overall responsibility and accountability for the effective implementation and administration of the field HSE management system. He has the daily responsibility of ensuring that all HSE activities according to this HSE Plan are correctly implemented.

In the performance of his duties, he shall support HSE Manager in the implementation of this Plan by providing all personnel and material required for this purpose. In addition to

this, he shall make sure Construction Manager and all his supervisors also comply with their HSE duties and stay vigilant while on site at all times. Find below a summary of his main HSE responsibilities:

- Allocating responsibilities for all personnel employed in his owned staff.
- Establishing together with CONTRACTOR Construction Manager, line supervisors and HSE Manager a clear understanding of each member's responsibilities and specific duties.
- Be aware of all applicable requirements and ensure compliance.
- Verify the set up facilities for first aid, fire fighting and emergency procedures and ensure compliance with project requirements and relevant authorities requirements in all construction areas.
- Ensure appropriate and continuous monitoring is carried out to measure HSE performance and make sure follow up of established corrective actions is done.
- Promote compliance with all environmental requirements and measures set forth in all Construction Environmental Management Plans.
- Ensure SUBCONTRACTOR provides evidence of the experience, training and proficiency of employees prior to starting work on site.

4.5.4 Responsibilities of CONTRACTOR Construction Manager

Construction Manager has overall responsibility for facilitating implementation of the Construction Site HSE Management Plan on all construction areas. This includes:

- Actively support CONTRACTOR and SUBCONTRACTOR HSE team members.
- Promote HSE awareness amongst his Supervisors.
- Keep the workplace well organized and tidy by ensuring at the early stages correct lay-down areas and waste disposal areas.
- Encourage worker participation in reporting hazards/incidents and with suggestions to reduce accident potential.
- Ensure all accident/incidents are investigated and reported in accordance with PROJECT requirements.

- Investigate alternative construction methods which minimize hazards at the workplace and promote interest in hazard identification and control strategies.
- Encourage all employees to maintain acceptable standards of HSE and foster an awareness of health, safety and environmental matters.

4.5.5 Responsibilities of CONTRACTOR Site HSE Manager

CONTRACTOR Site HSE Manager's main role is to ensure HSE Management System is properly implemented so as to achieve PROJECT HSE goals. His main responsibilities are, but not limited to, the following:

- Assert overall responsibility and accountability for the technical and professional integrity, plan content, staffing, execution, and integration of the CSHSEMP.
- Integrate Health, Safety and Environmental procedures, standards and processes into the planning and execution of the work.
- Attend SUBCONTRACTOR kick-off meeting to ensure that SUBCONTRACTOR is informed and aware of all Health, Safety and Environmental requirements.
- Promote and take part in CONTRACTOR or COMPANY scheduled audits or inspections, implement and document required corrective actions.
- Analyze and approve SUBCONTRACTOR Construction HSE Plan.
- Ensure the correct location of SUBCONTRACTOR within its assigned work area and in particular that hazardous materials are rationally and safely stored, with the necessary permits from the competent authorities, according to the applicable regulations and to its Construction HSE Plan.
- Request the proper installation of an adequate number and type of fire fighting equipment, according to the SUBCONTRACTOR Construction HSE Plan.
- Together with SUBCONTRACTOR HSE Officer pay special attention to the specific risks of activities that have to be carried out in hazardous areas or in presence of harmful substances.
- Carry out risk assessment in order to take the necessary measures to prevent risks at work.
- In the event of an accident prepare accident reports and investigations, both for site and governmental bodies.
- Promote motivation activities to increase Health, Safety and Environmental awareness on site.

- Attend scheduled HSE Meetings and organize jointly with COMPANY and SUBCONTRACTOR Representatives all HSE meetings required to discuss particularly important topics on Health, Safety and Environment.
- Issue permits to work.
- Have available copies of all permits to work required in order to guarantee compliance with their conditions and regulations.
- Ensure SUBCONTRACTOR understands and implements correctly all Construction Environmental Management Plans.
- Ensure compliance with all environmental requirements included in the abovementioned CEMPs by means of adequate monitoring and inspection activities.
- Support Environmental Coordinator in any activity he might need or require.
- Ensure actions' follow up is performed in a timely and effective manner.
- Establish and maintain all safety, health and environment record-keeping systems.
- Distribute minimum of 24 hours in advance, notices advising all interested parties of tests that are being performed or warning them about possible new risk conditions.
- Prepare Final HSE Report.

4.5.6 Responsibilities of Contractor Site HSE Supervisor

- Assist the Site HSE Manager in any duty he/ she shall perform.
- Attend SUBCONTRACTORS' kick-off Meeting if required.
- Prepare layout for the site and clearly indicate all underground systems such as electrical network.
- Prepare layout that clearly indicate the arrangement of firefighting equipment.
- Inspect all equipment or ensure all equipment is inspected before entering the site and provide agreement to its documents and certificates.
- Attend periodical or special HSE meetings as required.
- Assist in the performance of risk assessment.
- Participate in CONTRACTOR or COMPANY scheduled work area audits or inspections and implement and document required corrective actions.

- Check and give agreement to all HSE equipment before it is being used (i.e. lifting equipment, scaffolds).
- Check that Personal Protection Equipment is suitable for the use for which it is intended.
- Distribute to SUBCONTRACTOR standards, procedures or any other document that may be required to organize works safely.
- Carry out inspections to ensure compliance with SUBCONTRACTOR Construction HSE Plan, CONTRACTOR Site HSE Plan, COMPANY requirements and Statutory Requirements and Australian Regulations.
- Prepare periodic HSE reports, ensuring their distribution in a timely manner.
- Ensure workers' welfare is maintained

4.5.7 Responsibilities of CONTRACTOR Site Environmental Coordinator

An experienced skilled Environmental Coordinator will be appointed to ensure appropriate environmental issues management and compliance with all environmental requirements and commitments set forth in all CEMPs and, in particular, to:

- Implement all CEMPs on site.
- Promote environmental awareness at all levels (amongst CONTRACTOR and its SUBCONTRACTORS).
- Ensure SUBCONTRACTOR understands and implements correctly the Construction Environmental Management Plans and any other environmental documents.
- Prepare induction talks and organize specific environmental training programs whenever deemed necessary.
- Carry out inspections to ensure compliance with all environmental requirements and continuous improvement.
- Follow up of all established corrective actions.
- Make sure waste management and disposal is being carried out according to established procedures.
- Provide all environmental information to prepare monthly HSE reports.
- Provide all environmental information required by COMPANY or authorities upon request.

4.5.8 Responsibilities of SUBCONTRACTOR Field Representative

The SUBCONTRACTOR Field Representative is responsible for ensuring that the commitment to HSE is evident in the workplace and has overall responsibility and accountability for the effective implementation and administration of the field HSE management according to all requirements of the PROJECT.

4.5.9 Responsibilities of SUBCONTRACTOR HSE Representative

Duties of SUBCONTRACTOR HSE Representative shall be clearly specified in SUBCONTRACTOR Construction HSE Plan, including among others:

- Be present at worksite anytime SUBCONTRACTOR is performing any work.
- Attend periodical or special HSE meeting as required.
- Carry out daily and weekly inspections to ensure compliance with all HSE requirements.
- Carry out task risk analysis to take necessary measures to prevent them.
- Issue all HSE, accident reports, etc.
- Prepare motivation program.
- Take part in any incident investigation as required.
- Assist CONTRACTOR Site HSE Manager as required.
- Request permits to work.
- Ensure good housekeeping, debris and waste removed safely and promptly.
- Ensure environmental requirements are followed.
- Provide CONTRACTOR all required information to prepare monthly HSE reports.

4.5.10 Responsibilities of SUBCONTRACTOR HSE Officer

- Assist CONTRACTOR Site HSE Manager, Site HSE Supervisor and SUBCONTRACTOR HSE Representative as required.
- Be present at worksite anytime SUBCONTRACTOR is performing any work.
- Carry out daily field monitoring of assigned area
- Check PPE is being adequately used.

- Inspect the site in order to identify unsafe or hazardous conditions, incorrect behaviors and environmental risks and take immediate corrective action.
- Attend periodical or special HSE meetings as required.

4.5.11 Responsibility of Each Employee

All personnel have an obligation to work in safe and health working conditions. Not just to work with care and consideration for their own health and safety, but also for the heath and safety of others and the environmental protection. In particular they must:

- Comply with all HSE working practices and procedures that are adopted, developed, designed or otherwise implemented at his workplace.
- Report to their immediate supervisor any potential workplace hazard or any mishaps, incidents or injuries that may occur during the course of work.
- Use as instructed all equipment that is provided for personal protection.
- Notify and report any identified emergency scenario.

All CONTRACTOR employees, including SUBCONTRACTORS, must comply with COMPANY and CONTRACTOR safety, health and environmental standards. Total commitment to safety, health and environmental goals is a condition of employment.

4.6 HSE MEETINGS

HSE meetings are very useful to encourage the workforce to take active part in worksite accident prevention. Meetings shall be held in a comfortable place where every attendant may be seated and the adequate time shall be spent for each meeting. An attendance roster shall be issued and kept for all meetings. Written minutes of all meetings shall be taken and handed over to all participants for comments and signature. Records shall be kept during the whole life of the PROJECT.

HSE meetings foreseen during construction phase are:

4.6.1 Kick-Off Meeting

Kick-off meeting shall be held before any new SUBCONTRACTOR starts performing any activity in the site. It shall be attended, as a minimum, by CONTRACTOR Site Manager (or his designee) and HSE Manager, SUBCONTRACTOR Field Representative and HSE Representative.

During this meeting SUBCONTRACTOR shall provide a complete description of its organization and declare in writing that it knows and complies with the content of this Construction Site HSE Management Plan and all additional CEMPs. To reinforce this, all HSE requirements, as well as specific heritage and aboriginal conditions, shall be reviewed during the meeting so as to ensure that SUBCONTRACTOR is fully aware of them.

4.6.2 HSE Meetings

Daily coordination HSE meetings shall be held between CONTRACTOR HSE Team and SUBCONTRACTOR HSE Team with construction supervisors attendance. All SUBCONTRACTORS shall explain briefly what activities are going to be carried out for the day so that interferences are managed and coordinated.

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In addition to this, all identified hazard conditions and unsafe acts during site inspections will be reported and reviewed and measures to correct and prevent them in the future will be established.

4.6.3 CONTRACTOR HSE Meeting

Weekly internal CONTRACTOR HSE Meetings shall be attended by CONTRACTOR Site and Construction Manager, HSE Manager and HSE Supervisors and discipline/ areas supervisors. This meeting is to hold top and middle Site Management accountable on all HSE issues regarding their disciplines/ areas of work on site and to ensure continuous awareness.

These meetings will also be held to coordinate HSE aspects and reinforce HSE awareness among CONTRACTOR Construction Management team.

Compliance assessment regarding all environmental issues will be dealt with and actions followed up.

4.6.4 Weekly Progress Meeting

Weekly progress meetings shall be attended by CONTRACTOR Site/ Construction Manager and discipline/ area Supervisors, CONTRACTOR Site HSE Manager, SUBCONTRACTOR Field Representative and HSE Representative.

The weekly progress meeting is an opportunity to review and follow up the progress of SUBCONTRACTOR'S work pointing out every aspect including HSE matters.

During these meetings, HSE issues shall be dealt with as the first item on the agenda so, as a minimum, the following topics shall be reviewed:

- Daily inspection results
- Incident/accident investigation
- Follow-up of corrective measures
- Checking of training activities
- Procedure and risk analysis
- Topics for toolbox meetings
- Working at interfaces planning
- Work Permits
- Planning and scheduling of activities in order to minimize the number of SUBCONTRACTORS working above one another at the same time.

All other PROJECT follow up meetings, either scheduled or not, shall always address HSE matters so as to achieve leadership and support from all levels of the organization and PROJECT entities.

4.6.5 HSE Monthly Meeting

A monthly HSE meeting shall be organized and be representative of the workforce.

Members attending the HSE meeting:

- CONTRACTOR Site Manager or Construction Manager, who will chair the meeting.
- CONTRACTOR Site HSE Manager, as secretary.
- CONTRACTOR Environmental Coordinator
- SUBCONTRACTOR Field Representative.
- SUBCONTRACTOR HSE Representative.

Occasionally, CONTRACTOR HSE Supervisors may be summoned and COMPANY HSE Representative(s), if he wishes, can also attend the meeting.

All Health, Safety and Environmental aspects shall be reviewed at this meeting, where the following issues will be discussed:

- Review progress on any HSE activities.
- Decide best methods to improve weak areas.
- Review results of HSE Inspections and any issues arising from these.
- Review all health, safety and environmental incidents/ observations that have occurred and ensure that any learning from these is clearly understood and actions taken.
- Review environmental requirements and conditions compliance.

Written minutes shall be taken and handed over to all participants and recorded on file.

4.6.6 Toolbox Talks

The toolbox talks are used as primary channels of two-way communication between SUBCONTRACTOR management and employees regarding project HSE requirements.

4.6.6.1 Daily Toolbox talks

Daily Toolbox Meeting shall be carried out each morning to discuss the safety measures of the work and duties to be programmed for the day. These meetings shall be held in the work area and shall be conducted by the foremen and/ or crew supervisor with the attendance of SUBCONTRACTORS´ employees who will be involved in the activity. Attendance sheets shall be recorded and signed off by all participants.

4.6.6.2 Weekly Toolbox Talks

Weekly toolbox talks shall be attended by SUBCONTRACTOR employees involved in the works and shall be carried out by the foremen and/ or crew Supervisors. CONTRACTOR shall attend some of these meetings to ensure hazard communication is effective and HSE topics are dealt with in an appropriate manner.

Topics discussed at this meeting will refer to care and use of respiratory equipment, work permits if necessary, ensure proper training of employees prior to starting the tasks, inform about the new risks/hazards due to coming activities, inform about accidents causation, recommendations and lessons learnt as a result of any accident or incident, make sure all employees know how to prevent and fight fire.

A record shall be kept to show the subjects discussed along with an attendance sheet with signatures.

4.7 INDUCTION AND TRAINING

To a large extent, the success of accident prevention and environment incidents avoidance depends upon educating employees about their work and site conditions. Each employee must be made aware of his responsibilities, regulations and procedures relevant to their tasks, the hazards of his work, HSE rules, environment considerations and what to do in emergency situations.

CONTRACTOR's proposed training program shall ensure the following objectives are met:

- ✓ Acquaint the employee with the site, the nature of the job, the hazards that he may encounter & the equipment and main practices to be used to minimize accidents.
- ✓ Make him understand actions to take in the event of an emergency.
- ✓ Be familiar with security arrangements.
- ✓ Be aware of the importance of HSE matters in order to ensure a safe working environment.
- ✓ Review the contents of HSE procedures and plans, stressing the sections applicable to the employee and his job.
- ✓ Advice of the requirements for working safely and that failure to follow the safe practices may result in disciplinary action including dismissal (behavior based safety).
- ✓ Environmental requirements and conditions are clearly understood.

Prior to commencing any site work, SUBCONTRACTOR shall ensure that employees have been trained to ensure competence and safe performance of their work, and this training shall be appropriate to their type of work. This training shall be based in general and task specific training for their particular works and HSE Training relevant to their job.

To carry out tie-in work within the YPFPL Site, employees shall undergo a specific induction as well as Permit to Work training performed by YPFPL before commencing the job. Only properly trained and approved personnel will be allowed to enter and carry out works inside the currently operating plant (YPF Plant).

A training matrix shall be prepared on site summarizing all training requirements (and equivalent) applicable to the PROJECT including all foreseen training courses and sessions in order to ensure appropriate Training Program organization.

The efficiency and effectiveness of all training sessions shall be proved by means of job skill competency testing as part of the courses personnel are undertaking. For all training activities a written record will be kept of all participants. This form will be signed by all attendants and training instructor and shall include a brief summary of topics dealt with.

4.7.1 Induction

The first step towards HSE workers' training shall be the statutory Construction Industry Induction which shall be undertaken by every worker prior to entering the site and evidenced by providing CONTRACTOR a copy of the white card. This basic construction HSE training will be conducted by authorized entities as per WA requirements.

In addition to this, it is mandatory for all construction employees to attend the CONTRACTOR HSE Induction Session prior to entry to the worksite. No employee will be permitted to work on site or allowed access to the site without first attending the HSE Induction Session which shall be carried out by qualified personnel and directed to all employees. Submitted identification card form of employee will be signed by CONTRACTOR Site HSE Manager to assure solicitors have attended the HSE Induction Session.

The HSE Induction Session shall include but not be limited to:

- HSE Policy
- Construction Site HSE Management Plan main elements' explanation
- Environmental management most relevant issues as defined in the PROJECT CEMP (2-250-329-PRO-TRE-0111), including land access restrictions, aboriginal heritage sites, air quality and dust management, waste management identification of weeds, flora, vegetation and fauna conservation, protection and reporting requirements.
- Project Standards and Regulations
- Emergency and First Aid procedures.
- Project site rules
- Prohibition of vehicular or pedestrian activity in so specified areas.
- Working and safety procedures and Standards (PPE, inspections, meetings, work permits, etc)

- Critical activities due to construction modularization approach such as heavy lifting, modules hook up, etc.
- Fire prevention and protection.
- Use of Personal Protective Equipment and clothing requirements;
- Incident/ injury reporting
- Miscellaneous.

At the end of the Induction Training Session, a HSE basic booklet shall be handed over to all construction employees for them to consult whenever necessary.

An attendance sheet will be signed by employees for the record keeping of participation and successful completion of the HSE training prior to entering into any assigned construction activities.

4.7.2 Training

All construction employees shall be already educated and trained in all the standard HSE aspects of their specific tasks during construction.

Nevertheless, SUBCONTRACTOR HSE Representative, in agreement with CONTRACTOR Site HSE Manager, shall organize regular HSE refreshing courses/sessions. To organize refreshing training courses a matrix or similar with general and task-specific HSE related training, frequency, designated workers, etc. shall be established on site.

Attendance of designated workers shall be mandatory. These sessions shall be conducted by qualified personnel.

List of safety refreshing courses may include but not be limited to:

- Environmental requirements
- Permit to work
- Confined Space Permit
- Hot Work Permit
- Scaffolding
- Safety instructions for handling of materials and chemicals
- Hazard communication

- Lock out/tag out training
- Fire Control
- Radiation NDT Hazard/controls
- Excavation
- Electrical Inspection
- Equipment inspection
- Powdered Portable Hand tools
- Working at height
- Lifting and Rigging
- Special Heavy lifting
- Forklift operation/inspection
- Incident/Accident Reporting
- Emergency Response
- Personal Protective Equipment

Supervisors and foremen shall be trained in the operations that they are responsible for, and they must be aware of Site HSE regulations, emergency procedures and their responsibilities thereunder.

For all training activities a written record will be kept of all participants including information of the time, place, attendance and topics discussed shall be documented and recorded. This form will be signed by all participants. Training activities shall be complementary to daily and weekly toolbox talks.

4.8 RISK MANAGEMENT

In addition to all communication procedures established to ensure all workers and involved personnel are aware of the hazards they are exposed to while working or inspecting the site area, an appropriate risk management will reinforce health, safety and environmental protection as well as minimizing environmental impact.

The first step towards a safe PROJECT execution is an adequate planning of all construction works and activities, from the very beginning of PROJECT performance: construction methods, sequence, modular strategy and tools and equipment to be used have been assessed to promote and guarantee best HSE practices and meeting of international standards during construction phase.

4.8.1 Critical Operations and Risk Assessment

A preliminary list of critical operations is included in attachment 4 in accordance with COMPANY procedure YARA-TOPS 1-02.

These critical operations will be subject to a risk assessment to establish the criticality of the job and measures to reduce the hazard to ALARP level. The level of the analysis, documentation requirements and the necessary control measures depend on the criticality of the operation.

Furthermore during site activities the list of critical operations shall be updated on a weekly basis acknowledging more in detail the specific activities to be performed and exact procedure, specific resources for carrying out such activity, weather conditions and other special circumstances of the site and work to be carried out because the particular conditions at each moment may result in the appearance of new hazards that necessarily have to be under control at all times.

4.8.2 Safe Job Analysis (SJA)

In order to ensure safe working conditions for all personnel CONTRACTOR HSE Manager may consider necessary, based on the risk assessment, to perform further safety analysis such as SJA for critical operations or other operations whenever necessary. These SJA are intended to reduce the risk of undesirable events that may have negative consequences for people, assets or the environment.

Some works which may be critical and require a further SJA are working at heights, confined spaces, heavy lifting operations, modules hook up, excavations, chemical cleaning, lock out and tag out, electrical works and blasting among others.

Each activity is split step by step identifying its potential hazards and the measures to be taken to eliminate or control them.

The execution of the SJA consists of four phases:

- Detailed description of the work, split step by step
- Identification of potential undesirable incidents for each step
- Consideration of consequences and probability

- Decision on measures

This analysis shall be carried out according to COMPANY procedure YARA-TOPS-1-02.

The participants shall include all workers performing the operation, their line supervisor and discipline manager as needed. HSE Officer or other personnel that can contribute to the review may also be asked to be involved.

The SJA shall be submitted to and approved by CONTRACTOR HSE team. The SJA form shall be signed by all crew executing the activity analyzed to confirm full understanding. A copy of the SJA shall be available at the place of work. In most cases, this SJA will be attached to the work permit as applicable according to Permit to Work Procedure.

Employees shall not start work until the site has been inspected by SUBCONTRACTOR HSE Team to ensure that it is safe to start work and that all the requirements contained in the SJA have been complied with.

For non critical operations a simplified review shall be carried out between two or more persons where one shall be an experienced operator. The procedure shall be carried out just before starting a job based on a checklist as established in COMPANY procedure YARA-TOPS 1-02.

4.8.3 General Hazards in Construction & Commissioning Works

Hazards that are foreseen and normally involved in construction activities which are going to be carried out during TAN Burrup project execution are, but not limited to, the following:

- Fall at same level.
- Fall at different level.
- Fall of materials and tools.
- Bruises, cuts or burns derived from tools, equipment or materials handling.
- Injuries by sharp elements.
- Particle projection and liquid splashing.
- Accidental electrical contacts.
- Trapping in equipment provided with moveable parts.
- Accidents, collisions or overturning of wheeled equipment and vehicles in general.
- Earth or structures cave-in.
- Fire and explosions.
- Blasting operations.

- Noise and vibrations.
- Heat stress and heat exhaustion
- Hazardous material handling, use and storage.
- Hazards from heavy lifting operations (works in the same vertical; detachment of load; wrong maneuver of loads)
- Hazards due to defective/poorly maintained tools (hand and powered)
- Hazards due to defective/poorly maintained equipment
- Hazards due to riding on moving equipment
- Hazards due to unauthorized operation of heavy equipment
- Hazards coming from repairing, adjusting, servicing moving or energized equipment.
- Radiographic works

In addition to the hazards involved in construction activities, the special tasks performed during Pre-Commissioning and Commissioning phases imply the appearance of some other risks and hazards that shall also be controlled and minimized to be reduced to ALARP level such as:

- Leakage of equipment, pipes or valves.
- Those associated with pressurized lines
- Gas/vapor inhaling
- Electrical contacts
- Explosions
- High temperatures

4.8.4 Hazards associated with neighboring operating plant

The YPFPL neighboring plant produces ammonia during normal operation and so therefore the construction site may be exposed to discharges including natural gas, SO_2, H_2S and NH_3. Relevant instructions/procedures from YPFPL shall be followed to avoid nuisance or any additional risk of exposure to these gases. In case gas release is detected, emergency procedures shall be immediately followed. In any case, close coordination between existing operating plant ERT and construction ERT will be

necessary to control the emergency successfully and with no personal nor environmental damage.

On the other hand, blasting vibration shall be controlled in order to ensure no impact will be generated on neighbouring plant due to PROJECT blasting operations during site preparation works' performance.

4.9 MOTIVATION AND INCENTIVE PROGRAM

Appropriate HSE communication allows CONTRACTOR HSE Manager to perform its role in increasing worker vigilance and management motivation with respect to attaining HSE objectives, preventing the development of poor working habits that always result in an injury rate increase and a quality and productivity decline.

To this purpose all SUBCONTRACTORS shall include in their HSE Plan a Communication and Motivation Program intended for keeping employees aware of the health, safety and environmental issues. The system adopted shall remind workers of the HSE basics and motivate them regarding the high level of HSE performance required by CONTRACTOR and COMPANY.

The Program's objective is to promote site safety and reduce HSE incidents by means of proper behaviour amongst labour force. This Communication and Motivation Program shall lie upon rewarding employees for positive behaviours and actions performed out of their normal scope of work, always related to incident or injury prevention. Its effectiveness shall be guaranteed by means of frequent reinforcement and appropriate program communication and promotion: safety signs, posters, posting of information on bulletin boards, giving symbolic awards to workers and SUBCONTRACTORS as a team for excellent performance or behaviours.

Communication and motivation means foreseen for the current project are:

- ✓ Spoken communication by means of training, toolbox talks and meetings, among others. This spoken communication may sometimes be sufficiently informal so as to promote dialogue.
- ✓ Written communication such as bulletins, posters, slogans, newsletters or flashes, information sheets and all other motivation resources together with visual means such as banners or video films. Permit to work system implementation shall also be understood as an efficient means of communication but will be described and dealt with in an independent section.

- ✓ Symbolic award system to reward the worker for excellent performance in the execution of his tasks and disciplinary actions in case of non-observance of applicable HSE rules.

CONTRACTOR shall ensure all relevant information concerning HSE matters is properly handed over from shift to shift and at the time of periodical reliefs and formally recorded. CONTRACTOR shall ensure that all personnel in the construction site are properly informed of all HSE rules to be adhered to, all risks and hazards present in their working environment and all the preventive and protective measures available to avoid incidents happening.

Therefore, the overall objective of this Communication and Motivation Program is:

- ✓ Prevent and control unsafe acts and situations.
- ✓ Anticipate the professional risks and be vigilant at all times.
- ✓ Increase the awareness of all personnel regarding coordination and prevention.
- ✓ Improve risk management.
- ✓ Improve the efficiency of the preventive measures.

4.10 WORK PERMITS

CONTRACTORS´ site area for the Construction of the TAN Burrup Project shall be subject to CONTRACTOR Permit to Work System.

Any work within the YPFPL´s fence or that may affect the operation of the existing YPFPL shall be governed by the YPFPL Permit to Work System (YPFPL Permit to Work Procedure, 650-508-PTW-000-0004) and other relevant YPFPL procedures applicable for the work. YPFPL's permit officers will control all works to be undertaken within the YPFPL site

After introduction of feed stock (ammonia), COMPANY'S "Permit to work Procedure" shall be used exclusively regardless the area where activities are being performed.

CONTRACTOR Permit to Work procedure shall cover the following activities:

- Blasting operations
- Confined space entry
- Hot work
- Radiographic works

- Lifting operations (heavy lifting).
- Trenching and excavations (under certain circumstances)
- Grating & handrails removal
- Road closure
- Electrical works
- Night works
- Lock out and tag out (LOTO)

In case it is so deemed necessary by CONTRACTOR HSE Team, depending on the kind of work activity to be performed, the particular conditions of the activity and working scenario and all other aspects that may represent a special hazard for personnel safety, health or the environment, other activities not included in the above list may be subject to permit to work system.

All the permits are issued for a certain period of validity and new permits shall be issued or validity period shall be extended if the work is not completed in this period.

COMPANY and CONTRACTOR reserve the right to proceed to Work Permits withdrawal within their respective areas and without prior notice, for safety reasons. Under these circumstances, works will be stopped immediately, machinery will be disconnected and all personnel will be evacuated from said area, if necessary. Workers who do not observe safety regulations may be requested by their companies to leave the worksite.

A detailed PROJECT Permit to Work Procedure will be developed in a later stage of the PROJECT.

4.11 PERFORMANCE MONITORING

Monitoring HSE performance aims checking that all HSE rules are respected and it is an effective way of maintaining the required HSE level. This monitoring shall be performed by means of two main elements:

- ✓ Site HSE Inspections

- ✓ Formal HSE Audits

The aim of site inspections is to provide a snapshot of what HSE performance at the construction site is like and to flag up the positive points, points to be improved and points requiring preventive action. An HSE inspection consists firstly of a checking activity carried out by site personnel to measure, record, track and report HSE performance against targets set in this Construction Site HSE Management Plan, subsequent SUBCONTRACTORS´ Construction HSE Plans and all CEMPs. Furthermore, it pursues maintaining control of HSE – critical activities in order to check that works are being executed in compliance with PROJECT health, safety and environmental standards.

Monitoring inspections are continuously carried out by CONTRACTOR and SUBCONTRACTOR HSE Teams collecting observational data during everyday walkarounds or observational tours and managing workforce involvement to help in the identification of non-compliance situations, unsafe acts and/or conditions and improvement actions at any time. CONTRACTOR in-house tool for recording HSE observations of any unsafe act or condition will be used to manage findings and corrective actions follow up in an effective manner.

Despite the fact that CONTRACTOR and SUBCONTRACTORS HSE Team shall be leading these site inspections, all CONTRACTOR and SUBCONTRACTOR supervisory personnel will be responsible for:

- Pointing out and recording any unsafe act or condition identified.
- Requesting that unsafe acts or conditions are corrected and actions properly followed up.
- Notifying HSE Manager of any unsafe situation.
- In the event of serious and imminent hazard, immediately stop the activity.

Inspections foreseen during the Construction, Pre-Commissioning and Commissioning phases are described below.

4.11.1 Daily HSE Inspection

Daily HSE Inspections shall be carried out by CONTRACTOR HSE Team and SUBCONTRACTOR HSE Officers to point out unsafe situations or hazardous conditions in order to ensure that no safety nor health problems exist and there are no environmental

non-compliances. CONTRACTOR and SUBCONTRACTOR may perform inspection walkarounds together or separatedly.

All identified observations (unsafe acts and conditions) shall be documented and recorded using CONTRACTOR in-house tool or an equivalent system. All observations shall be notified to SUBCONTRACTOR during HSE meetings for the correction of the deviations. Moreover, this observations log and actions follow up will be reported on the monthly statistics report.

4.11.2 Weekly HSE Site Walk Inspections

Weekly HSE Inspections shall be carried out by CONTRACTOR Site HSE Manager and HSE Supervisor jointly with SUBCONTRACTOR HSE Representative and HSE Officer.

These inspections records shall be kept including all established corrective actions and its follow up. These issues will be addressed in the weekly meetings.

Find attached the proposed HSE Inspection Sheet to be used on site (attachment 05).

4.11.3 Management Walkarounds

CONTRACTOR Management team (Site or Construction Manager, Construction Supervisors and HSE Manager) shall conduct regular walkarounds to observe unsafe acts and/or conditions. These observations and corrective actions are recorded and issued to the responsible supervisors for action as well as addressed in HSE meetings.

HSE deviations identified during these inspections shall be recorded and notified in writing as per the following criteria, depending on the severity of the deviation and, therefore, the hazard to which workers are exposed:

- Minor deviations → for hazards that do not result in fatality or personal injury but affect employee health and safety, SUBCONTRACTOR shall be notified in writing.
- Major deviations → for hazards that may cause fatality and/or serious damage to persons or property, SUBCONTRACTOR shall be notified verbally and in writing including the recommended actions to be taken.
- Serious and imminent hazard → in case of immediate accident hazard that may result in fatality or damage to persons or property, the activity shall be promptly stopped and SUBCONTRACTOR shall be notified verbally and in writing.

Find attached the proposed form for Deviations' notification (attachment 06).

Disciplinary actions directed to an individual employee are described in section 4.22 "Disciplinary Actions".

4.11.4 Formal HSE Audits

Formal HSE Audits will be performed on a quarterly basis by CONTRACTOR HO Construction HSE team in order to inspect the implementation of this CSHSEMP, Construction Environmental Management Plans and PROJECT Standards so as to ensure satisfactory compliance with of PROJECT HSE Standards and requirements during all site activities:

- Access control
- Compliance with all applicable standards, procedures and regulations
- Personal Protective Equipment
- Excavation and trenching
- Civil works
- Steel erection and hole openings
- Hot works
- Electrical installations
- Compressors, hoses and compressed air tools
- Signs, signals, barricades
- Scaffolding, ladders and elevated work platforms
- Fire prevention and protection
- Equipment operations
- Hazardous materials
- Confined spaces
- Hand and powder actuated tools
- Housekeeping
- Health and hygiene
- Temporary facilities
- Site, employees and mobile equipment documentation

- Emergency preparedness
- Hazard communication program
- Work permits
- Inspections
- Education and training
- Motivation and disciplinary actions
- Accident / incident investigation
- Environment and waste management
- Site reports
- Health & hygiene auditing of all Site areas including Temporary Facilities
- Environmental management and compliance assessment

These inspection audits will help to successfully reach the HSE targets of the Project.

All findings, actions, recommendations and positive points shall be communicated immediately and results and conclusions agreed during the debriefing meeting at the end of the audit. Furthermore, a final HSE audit report shall be issued including a HSE action plan with the list of deficiencies, corrective actions, date and responsible person for their implementation and follow up for closure of those actions.

4.12 HSE REPORTS & RECORDS

The provisions established in YARA-DIR-01-P01 “Reporting of accidents, near-miss incidents, sick leave, environmental incidents, and security breaches” and Yara-DIR-01-P02 “Investigation and follow up of accidents and near-miss incidents” and other Statutory requirements related with HSE reports and accident/ incident investigation shall be followed.

The following HSE Reports & Records shall be issued on site:

4.12.1 Inspection Reports

Results of HSE Inspections carried out as per section 4.11 of the present CSHSEMP shall be recorded in writing by using the form foreseen to this purpose (see Attachment 05).

CONTRACTOR in-house tool will provide HSE complementary reports on SUBCONTRACTOR HSE performance resulting from these inspections, including:

- ✓ Total observations identified during a certain period.
- ✓ Observations classification (by type, by risk rate)
- ✓ SUBCONTRACTOR's progress along the time.
- ✓ SUBCONTRACTORS comparison.

4.12.2 Monthly HSE Report

Every month, CONTRACTOR shall issue and submit to COMPANY a Monthly HSE Report no later than the 5th of the following month. Main information that it shall contain is, as a minimum:

- Monthly HSE activities: meetings, monitoring reports, induction & training sessions, audits, motivational activities, etc.
- Key HSE Highlights.
- Accident and investigation reports, infractions, disciplinary actions.
- Monthly and cumulative observations and findings (unsafe acts and unsafe conditions).
- Emergency drills.
- Compliance assessment with all environmental requirements
- Accident Statistics and incident rates with the following specific information:
  - Manpower
  - Monthly and cumulative man-hours split by direct and indirect hours (separately for TR and all its SUBCONTRACTORS)
  - Non injury incident
  - Number of Lost Time days
  - Medical Treatment Case (MTC)
  - Restricted Work Case (RWC)
  - Lost Time Injury
  - Fatality
  - First Aid Cases (FAC)
  - Near Miss (NM)

- Road Traffic Incident/ commuting (RTI)
- Environmental Breach and / or incident (EI)
- Asset Damage (AD)
- Social Impact Incident (SII)
- Training rate (hours trained/ worked hours)

Furthermore, Monthly HSE Reports shall include the following statistics and cumulative data:

Statistics rates as per AS 1885
Lost Time Injury Frequency Rate (LTIFR) LTIR= Lost time injuries/worked hours * 1,000,000
Medical Treatment Injury Frequency Rate (TIFR) TIFR = Medical treatment injuries / worked hours *1,000,000
Serious Injury Frequency Rate (SIFR) SIFR= (Lost time injuries + Medical treatmt. Injuries) / worked hours * 1,000,000
Statistics rates as per YARA requirements (TOPS 0-01 / Yara-DIR-01-P01)
Total Recordable Incident Rate (TRI_{12}) TRI_{12}= (Lost Time Injuries (incl FAT) + Restricted Work Case + Medical Treatment Case)$_{12\ months}$ /worked hours during last 12 months * 1.000.000
Sickness Rate (SR) SR(%) = hours away from work due to sickness / (hours worked + hours away due to sickness) * 100 (*)Absence in excess of one calendar year shall not be included.
Environmental Breaches (EB) EB = Number of breaches of legal environmental permits
Statistics rates as per CONTRACTOR requirements (OSHA criteria)
Total Recordable Incident Rate (TRIR) TRIR = Recordable cases/worked hours * 200.000 Recordable cases = MTC+RWC+LTA+FAT
Severity Rate (SR) SR = Number of lost workdays (LTI days) / worked hours * 1.000

SUBCONTRACTOR shall provide all necessary information to elaborate the Monthly HSE Report.

4.12.3 Incident / Accident Report and Investigation

All incidents and near misses shall be investigated until root causes are identified so that appropriate corrective and improvement measures are established.

In order to take the adequate actions following the incident, SUBCONTRACTOR shall verbally and immediately notify CONTRACTOR Site HSE Manager of any incident/accident occurred within his work area. Subsequently and within 24 hours, SUBCONTRACTOR HSE Officer shall complete a written report on the incident/accident form (see Attachment 07) that will be submitted to CONTRACTOR Site HSE Manager. If any injury to personnel occurs a medical report shall be obtained and included with the written report or submitted immediately afterwards.

Once the incident has been reported and action adopted to control consequences, CONTRACTOR shall promptly notify COMPANY of any incident occurred in the site. A Preliminary Report will be submitted within a few hours of the incident and a full Incident Report including all investigation conclusions shall be submitted to COMPANY within 3 days. Copies of all statutory notices sent to the enforcing authorities shall be attached to the Final Incident Report provided to COMPANY. CONTRACTOR Site HSE Manager shall record and hand over copies of the report to all interested parties.

COMPANY procedure for reporting accidents, near-miss incidents, sick leave, environmental incidents and security breaches (Yara-DIR-01-P01) as well as Statutory Requirements for reporting of incidents shall be followed.

COMPANY shall be immediately notified in all incidents involving:

- Fatal injuries and occupational illness.
- Any Lost Time Injury (LTI)
- All incidents with a potential for fatal injury or LTI with serious injury consequence (resulting in permanent or long lasting disability)
- Damage to COMPANY'S equipment or property.
- Significant damage to CONTRACTOR property.
- Environmental Breaches and/or Incidents

Any serious incident investigation team shall be organized and chaired by the CONTRACTOR Site Manager and will involve HSE Manager, Supervisors and COMPANY representatives upon request.

Investigations shall be organized and carried out according to COMPANY procedure Investigation and follow up of accidents and near-miss incidents (YARA-DIR-01-P02) depending on the severity of the incident and the consequences.

Information on the cause of the accident and corrective actions to be taken will be communicated to site personnel through postings, HSE meeting or toolbox talks.

A record of all first aid treatments shall be kept where, in addition to accident data, it shall be specified if the accident/ incident investigation has been initiated.

4.12.4 Final HSE Report

After works completion, a Final HSE Report shall be issued and included in the TAN Burrup Project Construction Final Report. This report will include a summary of every issue occurred during the Construction, Pre-Commissioning and Commissioning phases: whole statistics, incidents and/or accidents explanation, best practices implemented, objectives and targets achieved, lessons learned, compliance with environmental issues, etc.

4.13 STOP OF WORKS

In the event of a work stoppage based on HSE deficiencies, SUBCONTRACTOR shall immediately remove the workforce from the work area and correct the HSE deficiencies by allowing only the people in the area that are competent to make the area safe.

SUBCONTRACTOR shall ensure no other work is being performed during this time. If the estimated time to make the area safe shall be long according to CONTRACTOR HSE Manager where life threatening/imminent danger situations exist, then the area will be barricaded or roped off and a sign placed with the wording “unsafe area – unauthorized access”.

Before the workforce is allowed back in the area, it shall be re-inspected by CONTRACTOR and if necessary COMPANY HSE Team to declare the area safe for work. A report of the situation and corrective actions shall be written.

In case any archeological artefact or remain is discovered during works’ performance, the activities in such area will be immediately stopped and affected area signaled and barricaded if necessary. Appropriate measures as per Aboriginal Management Plan and indigenous hired workers criteria will be undertaken to ensure aboriginal heritage is protected and preserved. Any action following the discovery will meet requirements described in the PROJECT Aboriginal Management Plan.

4.14 SITE SAFETY

Under this section, specific HSE requirements to be complied with while working at site are described.

4.14.1 General Safety Rules

The following general safety rules, among others, shall be fulfilled at all times:

- Use or possession of drugs, alcoholic beverages, and firearms is prohibited.
- Possession of weapons of any type or introduction of explosives other than those authorized for blasting operations to the site is prohibited.
- Use of cameras, film or video cameras is not allowed, unless COMPANY written approval is obtained.
- Do not alter any traffic or safety signal, or exceed speed limits.
- Sleeping in worksite facilities is forbidden.
- Do not block accesses to fire fighting equipment or emergency exit routes.
- Do not handle equipment without specific authorization.
- Smoking is not permitted unless in designated areas appointed by CONTRACTOR.
- Restricted areas will only be accessed by so authorized personnel. No exceptions will be made to this rule.
- No pets will be allowed access to the site so as to protect rare fauna and habitat.

4.14.2 Collective Protection Means

Collective protection means provide common protection for all workers within a specific work area. Construction strategy and planning shall take into consideration defining methods that provide collective protection rather than worker personal protection. For instance, safety nets, barricades, railings and ventilation systems shall be established where feasible.

Collective protection means may be permanent or otherwise only used during the execution of a specific work.

4.14.3 Personal Protective Equipment (PPE)

There are several hazards related to construction activities that cannot be suppressed not controlled by collective protection means and so, Personal Protective Equipment (PPE) shall be individually worn by each worker, according to the type of activity to be performed.

SUBCONTRACTOR shall be fully responsible for adequately selecting and providing this PPE to their employees and checking on a regular basis their effectiveness and maintenance in satisfactory conditions. It is also SUBCONTRACTOR responsibility to ensure that Personal Protective Equipment is properly used and that his employees have received adequate training for this purpose.

The minimum PPE for personnel outside a purely office environment are: hard helmet, safety glasses with rigid side shields, gloves, safety-toed shoes/ boots, full length trousers/ long sleeve shirt. All work clothes shall be clearly marked with CONTRACTOR and/or SUBCONTRACTORS name accordingly.

Special protective equipment shall be available in certain hazardous situations when necessary, in accordance with the risk evaluation, such as any operation involving excess of noise exposure, respiratory hazards (i.e. dust, fumes, vapors, mist), chemical handling, abrasive blasting, painting/coating or other hazardous/toxic material; some of these special PPE are: ear plugs/ muff, face shields, evacuation gas mask, eye wash facilities, emergency showers, specialty clothing determined by the hazard and fall arrest equipment.

The following general requirements shall be taken into account so as to ensure proper use of Personal Protective Equipment:

- All Personal Protective Equipment shall comply with design and construction provisions established in Statutory Requirements, Australian Regulations and COMPANY requirements. Also Personal Protective Equipment shall comply with BS EN 166, BS EN 397 and other requisites when applicable.
- All personnel shall wear the Personal Protective Equipment specified for each work area or activity.
- Use of Personal Protective Equipment for a purpose different from that for which they have been approved is not permitted.
- Any defective PPE must be repaired or removed from the site and replaced by a new one.

- Protective equipment will be provided by SUBCONTRACTOR to his employees absolutely free without any reimbursable back charge.

Evidence of workers receiving required PPE shall be kept by SUBCONTRACTOR and provided to CONTRACTOR or COMPANY upon request.

4.14.4 Fall Prevention and Protection

Primary fall prevention is the elimination of all exposures by means of guardrails systems, scaffolds or alternate work methods such as pre-assembly at ground level. Fall protection systems shall be installed, inspected and maintained by a competent person.

Secondary fall protection is the utilization of personal fall arrest equipment as a backup to primary fall prevention systems or in the absence of them.

All materials, equipment and tools used at heights shall be secured from falling when not in use.

General guidelines set forth in the WA Prevention of Falls at Workplaces Code of Practice shall be followed.

4.14.4.1 Scaffolds

Scaffolds shall be designed, built and maintained so as to prevent them from accidentally falling or moving, especially during the cyclone season, and shall be erected and dismantled in accordance with requirements of the PROJECT and applicable statutory regulations.

Scaffolds shall be assembled, erected, moved, dismantled or altered only under the supervision and direction of a person qualified in scaffold erection, moving, dismantling, or alteration. Only experienced and trained employees selected for such work by the competent person shall perform such activities.

Before using a scaffold, employees shall check that it is provided with a GREEN TAG.

Working levels will not be accessed by climbing the scaffold. A safe and convenient access to the working level must be provided.

Alteration of a scaffold via welding, burning, bending, etc. is prohibited.

Riding on mobile scaffolds is prohibited.

Scaffolds shall be inspected by competent personnel:

1st Before use

2nd At weekly base, once they have been used

3rd After any modification, period of no use, weathering or any other circumstance that could have affected their resistance or stability

Scaffolds shall be inspected by CONTRACTOR appointed personnel. Nevertheless scaffolds should be inspected and tagged safe prior to the use in a weekly basis by a SUBCONTRACTOR qualified scaffold inspector. For this, a proper scaffold inspection and tagging system, shall be utilized and maintained as described below.

All scaffolds that are not cyclone assessed prior to cyclone season shall be reinforced and re-inspected two months prior to season starting. In case they are not proved to be cyclone assessed, they shall be dismantled immediately. In cyclone prone areas all planks should be secured against uplift during cyclone season.

During scaffold assembly and until its inspection and approval by the SUBCONTRACTOR qualified personnel, the scaffold shall be tagged with a RED TAG saying “DO NOT USE”.

Once the scaffold has been approved by the SUBCONTRACTOR qualified personnel, the red tag shall be replaced by a GREEN TAG saying “APPROVED FOR USE”.

YELLOW TAG shall be used whenever all guardrails, planks or other elements cannot physically be installed or must be temporarily removed. In this case the scaffold may be used only by workers wearing and properly anchoring, personal fall arrest system, including full body harness and lanyard. Only competent scaffold builders are allowed on unsafe or incomplete scaffolds for the purpose of completing the scaffold, making it safe or the dismantling thereof.

Any scaffold that is not being used and is waiting for the next phase of works, will be RED TAGGED and re-inspected prior to resumption of works.

Employees are not permitted to work or to access on a RED tagged scaffold. Any scaffold that is not tagged, regardless of reason, shall be assumed to be "UNSAFE FOR USE." Scaffolds not being tagged and declared safe for use are not to be used. People using such incomplete scaffolds or scaffolds not specifically declared safe, may be removed from the jobsite.

In any case. AS-NZS 4576-1995 Guidelines for scaffolding shall be followed.

4.14.4.2 **Ladders**

Ladders shall only be used for ascent or descent purposes with the exception of particular short term works where a ladder may be used only if the worker is anchored with an appropriate lanyard to a fixed point external to the ladder.

All ladders shall comply with PROJECT requirements and legislation and furthermore:

- Only approved step ladders shall be used in the PROJECT.
- When not secured at the top, either ladders will be properly anchored at the base to prevent the footings from slipping or a second person will hold the ladder firm in place while being used. Ladders must have non-slip footing.
- When ladders are being used for accessing at the same point more than once, it shall be properly secured at the top and extend at least one meter above the landing or work surface.
- No straight ladder longer than 5 m. which is not provided with full resistance guarantee shall be used.
- Use of job-made ladders is prohibited. Use of painted wooden ladders is prohibited.
- Straight ladders shall be installed so as to form an angle of approximately 75º from horizontal, wherever possible.
- Bridgeboards shall extend at least 1 m. above access point securing ladders to it.
- Face the ladder while ascending or descending it.
- Load transport and handling through or from straight ladders is not allowed.
- Straight ladders shall not be used by two or more persons simultaneously.
- Ladders shall be inspected before use by a competent person. Ladders shall be tagged and with the same tags used for scaffolds.

4.14.4.3 **Openings**

Floor or wall openings shall be protected by using one of the following methods:

- Hole covering by plates of wood, metal or other resistant material so as to prevent them from slipping and exposing the hole. The covering shall be strong enough to support the loads to be imposed upon them and clearly labeled “Floor opening, do not remove” and shall be secure to prevent accidental displacement.

- Handrails located at about 1 m. height with midrail at 50 cm height and toeboard shall be used for vertical holes.
- Structure embedded mesh provided with a clearance preventing foot from passing through it.

All grating removal work shall only be allowed on an approved Open Hole/ Grating removal Permit and working at heights permit.

4.14.4.4 Suspended Works Basket/ Platform

This method shall be used only when other means of access to the work are extremely hazardous or are not possible because of structural design or site work conditions. Alternate methods and safety requirements shall be investigated before using the workbasket/ platform as an option.

The use of a crane or derrick to hoist employees on a personnel basket/ platform is prohibited, except when the erection, use and dismantling by conventional means of reaching the work site, such as a personnel hoist, ladder, stairway, aerial lift elevated work platform, or scaffold, would be more hazardous or is not possible because of structural design or work site conditions.

The use of a suspended works basket/ platform requires the CONTRACTOR Construction Manager approval and the task supervised by a Competent Person to safeguard personnel while working in a crane suspended work basket/ platform. These activities will require a work permit and additional SJA.

4.14.4.5 Safety Harness

In addition to helmet, safety shoes and the specific Personal Protective Equipment required for the activity to be performed, all personnel exposed to fall hazards higher than 2 m who is not protected by collective protection means, shall wear and use properly a safety harness with lanyard. Two lanyards will be used if the employee has to tie off and on to change position.

Safety harness, lanyards and life lines shall be inspected monthly by a competent person by means of an established checklist, and an appropriate tagging system (label) shall be applied for the inspected equipment to guarantee it is safe for use.

4.14.5 Signs, Signals and Barricades

Physical barriers will be erected to provide protection against hazards and dangers, hazardous work areas and hazardous work in all cases. The barrier shall be constructed

to withstand adverse weather conditions and construction traffic and controlled by SUBCONTRACTOR.

It is mandatory to post/erect signs, signals or barricades necessary to advise personnel of hazardous conditions in work areas. Safety signs shall be in compliance with AS 1319 "Safety Signs for the Occupational Environment" and other applicable requirements. Signs and warnings shall be in the local language when required and/or use pictograms to communicate hazard.

Signs, signals and barricades shall be visible at all times where a hazard exists and shall be removed when the hazard no longer exists. Special activities or areas that shall be clearly identified and signaled include: noisy areas, NDT, blasting, lifting operations, hazardous materials.

If the hazard is of a magnitude, which requires additional protection, it shall be the SUBCONTRACTOR responsibility to provide the so referred additional protection.

Barricade tape will be used:

- With physical barriers to increase the visibility of the barrier and to indicate the type of hazard that exist.
- To rope off low risk hazards and removed it when the hazard does no longer exist.
- Where people are stationed outside the hazardous work area to help control accidental entrance into that area while performing short duration work.

The barricade tape shall be erected far back enough from the hazard to allow adequate warning and protection from the hazard. It will be the responsibility of the SUBCONTRACTOR erecting the barricade tape to maintain it as long as the hazard is present.

Different types of barricade tape will be utilized to indicate Warning /Caution (i.e. Yellow/ black); Danger (i.e. Red Tape) or Radiation (i.e. Magenta (purple)/ yellow).

Signs of at least 1 m^2 in size will be attached to fencing at the entrance of the PROJECT site and at no less than 50 metre intervals along the fence. These signs shall indicate clearly no construction personnel is allowed access to areas surrounding PROJECT area unless their work specifically requires them to do so and provided permission from Site Manager and PROJECT Archeaologist so as to protect manmade structures, engravings, standing stones and/or archeaological material mentioned in Dampier Archipielago National Heritage Gazette Notice.

4.14.6 Air quality

The expected impact of PROJECT construction activities on the air quality will be mainly due to two effect: dust and gas emissions. The most significant potential sources of these air emissions for the TAN Burrup Project during this construction phase are the result of the following:

- ✓ Blasting operations
- ✓ Traffic movement on unmade roads
- ✓ Movement of materials
- ✓ Wind erosion from stockpiles
- ✓ Engines normal operation

Even though there are no residential sensitive receptors located close to the PROJECT boundary, exposed workers have to be protected against this effect as well as nearby rock art or flora and fauna. Management of dust and emissions impacts from construction activities will be therefore undertaken through the use of on-site management measures which will form the basis for control and reduction of dust generation from site activities to ensure impacts are minimised. Continuous control of dust generation and gas emissions at source will assist with compliance with the applicable standards at off-site locations and ensure, as far as possible, that workers' health is not affected.

Details on air quality management and mitigation and protection measures are described in the Project Construction Air Quality Management Plan.

4.14.7 Noise protection

Normal construction activities will not generate excessive noise so as to be harmful for exposed workers. In any case, all workers will be provided ear protection for use when working in especially noisy areas or while using noisy equipment.

- All vehicles and mobile equipment entering the site area shall be regularly inspected and maintained according to manufacturers' specifications and recommendations and always in compliance with applicable legislation so as to ensure noise levels are upon admissible limits.

- All machine engines that generate excessive noise level shall be fitted with acoustic hoods, whenever practical.
- Noise generating equipment shall be throttled down or switched off when not in use.
- Any tool, vehicle or equipment found to be noisier than expected shall be removed from the site until repaired and re-inspected.

For those works and activities such as blasting operations or pipe blowing which generate high noise levels, CONTRACTOR shall implement specific measures to control and mitigate construction noise in order to ensure workers protection and to comply with environmental permits' requirements. Activities which are potentially noisy will be performed during normal day-hours so as to avoid noise disturbance to nearby population. Blasting noisy operations will be carried out when no workers other than those directly involved are not present at site. The Construction Noise Management Plan (CNMP) lays down these detailed measures to be adopted to minimise noise generation during the construction of the TAN Burrup Project so as to ensure that noise impact does not affect workers, the nearby public and/or amenities and that it complies with applicable statutory regulations.

4.14.8 Blasting operations

Blasting operations shall be carried out by an experienced SUBCONTRACTOR who shall provide a blasting risk assessment and detailed Blasting Management Plan addressing all HSE measures to be adopted while performing the works. The most significant hazards associated to these activities are:

- ✓ Handling and use of explosives.
- ✓ Drilling equipment used
- ✓ Noise and dust generated
- ✓ Vibration
- ✓ Explosion
- ✓ Flyrock

Main preventive measures to protect workers and the environment from blasting activities' impact shall include but not be limited to:

- Only authorized and skilled personnel shall be allowed to enter to the site or affected area during the blasting and drilling activities.
- The shotfirer shall hold a current WA shotfirers licence and WA Dangerous Goods Security Card.
- Blasting operations shall only be carried out outside normal working hours, when no other worker is present in the site.
- During explosion, a dedicated HSE Officer shall be present to check all precautions are adopted.
- Barricades and signaling will be posted to prevent unauthorized access including temporary fencing.
- The checking and clearing of drill and blast areas before starting works.
- The checking of underground and aboveground services to be protected, closed or removed before starting works.
- A water tank truck will be present full time to prevent fire and to manage dust suppression.

Explosive material used will not be stored in the site but in SUBCONTRACTOR's own facilities. Non exploded material shall be removed from the site and dealt with by blasting SUBCONTRACTOR according to all legal procedures and requirements.

During blasting, a vibration monitoring shall be put in place at YPFPL battery limit to identify possible consequences and to ensure YPFPL normal operation is not affected by blasting operations.

A complete Blasting Management Plan describes in detail all mitigation measures to be implemented so as to minimize risks to ALARP level.

4.14.9 Excavations

Any excavation or trenching work will be subjected to the Work Permit Procedure as per established procedures. General measures to be implemented on excavation works are:

All open excavations shall be surrounded with solid barriers at all times and suitably lit during hours of darkness. Where excavations have to be crossed, a fully boarded and guarded scaffold bridge shall be provided and inspected on a periodic basis.

Excavation slopes shall be stable, close to soil natural slopes, otherwise benching or shoring will be used. No load, equipment, material or removed earths shall be permitted within one (1) meter of excavation edge. Excavations and trenches 1.5 meters or more in depth shall be shored or sloped to suit soil conditions in an approved manner.

Access to excavation shall be by using straight ladders surpassing at least 1 meter from the edge, at intervals not exceeding 15 meters. Where excavations have to be crossed, a fully boarded and guarded scaffold bridge shall be provided. Passageways for personnel provided with railing shall be installed above trench excavations.

Excavations by mechanical equipment are prohibited within two meter of underground utilities.

Those excavations in which people are working shall be inspected by the competent person every day before work starts with the use of a checklist. Whenever deemed necessary, atmosphere in the excavation shall be tested and results recorded so as to ensure safe and respirable condition.

Excavations activities will follow guidelines referred to in Excavation Code of Practice issued by WA Commission for Occupational Safety and Health.

4.14.10 Formwork

Formwork shall be designed, erected, supported, braced and maintained so that it will safely support all vertical and lateral loads that may be imposed upon it during placement of concrete.

CONTRACTOR shall ensure that all formwork supports are constructed according to PROJECT requirements and legislation. As far as practicable, steel units shall be used.

Where the work requires a timber supporting structure, the timber used shall be of suitable quality and adequate strength.

Personnel not engaged in the pour operation shall stay clear of the pour area and personnel engaged will not be under or in proximity of form work.

4.14.11 Module Erection and Hook Ups

Modularization approach of the TAN Burrup Project involves three construction techniques:

- ✓ Prefabrication, generally performed at a specialized facility where materials are joined to form a component or part of a final installation.
- ✓ Preassembly, process by which various materials, prefabricated components and/or equipment are joined together at a remote location from the construction site for subsequent installation as a unit.
- ✓ Module erection and hook up at site after its transportation.

HSE considerations regarding modules transportation from the yards where they have been constructed to the site are described and covered in the Traffic and Logistics Plan are not scope of this document.

Once the module arrives at the site, HSE management is of application to the transport of modules by means of SMPT and to lifting operations required to manage the module erection in its final position.

This module erection activity consists mainly of lifting operations and hook ups between modules and existing pipes and/or structures. Therefore, basic HSE considerations that need to be taken into account during module erection and hook ups are ensuring safe lifting operations based on proper organizational, operating and technical methodologies. In this sense, safe system of work is implemented through the following key issues:

- Planning of the operations
- Selection, provision and use of suitable lift / haul equipment
- Maintenance, examination and necessary testing of equipment
- Provision of properly trained and competent personnel
- Ensuring of all necessary test certificates and other documents
- Operation procedures for safe execution

Further details are outlined in section 4.15.16 Lifting Operations where the general approach proposed to face and assure safe lifting operations during the TAN Burrup Project execution is described.

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4.14.12 Steel Structure Erection

Even though some modules will arrive to the site with steel structure already erected and assembled, some additional structure shall be erected on site and therefore the following HSE considerations shall be taken into account while performing these tasks.

Assembly of steel structure components shall be performed at ground level as far as possible, according to structure configuration and lifting equipment capacity.

Execution of works at heights requiring use of safety harness shall be minimized as much as possible. Work progress shall be planned so as to permit the installation of adequately protected work platforms.

Holes shall be protected as per section 4.15.4.

Before installation of enclosure, a perimeter protection shall be provided in slabs, consisting of handrails located at (1) m. height, midrail and toeboard. Likewise, safety nets equipped with forks or cantilevers shall be used for elevated floors under construction.

Lifting operations should be according to section “lifting operations”, nevertheless the following requirements should be complied with:

- All bolt bags, tool, drift-pins, water kegs and other material and equipment used at elevated work areas shall, at all times be positively secured and prevented from falling to levels below.
- A safe means of access to the level being worked at shall be foreseen. Climbing and sliding columns are not considered safe access and not allowed.
- The area below the steel erection work shall be cordoned off and standby-man/men assigned to prevent personnel from crossing the barricaded area. In addition appropriate safety warning signs must be posted to create safety awareness on hazards associated with steel erection works.

4.14.13 Competent / Qualified Person List

A competent person is one who, because of training and experience:

- is capable of identifying existing or potential hazards in the job being performed;
- is capable of identifying working conditions that are unsanitary, hazardous, or dangerous to the safety and health of the employee, and;
- has the authorization to take prompt corrective measures to eliminate the above conditions.

A list of competent persons shall be handed over by SUBCONTRACTOR to CONTRACTOR Construction Manager. The list will include:

- Workers performing blasting operations
- Receivers of work permits
- Excavation competent persons
- Scaffolders
- Riggers
- Crane and lifting equipment operators
- Mechanical equipment operators
- Electricians
- Ionizing/ non-ionizing apparatuses operators
- First aiders
- Emergency response team members

4.14.14 Equipment Management and Inspection

SUBCONTRACTORS shall provide a list of all equipment and vehicles to be used, their maintenance log and appropriate certificates and access passes as well as periodic maintenance inspections to be undergone.

All equipment shall only be used for the purpose it was designed for and in the specific conditions for which it was intended.

Any deficiencies affecting safe operation must be corrected before the equipment is placed in service.

An equipment record will be maintained to ensure all equipment entering the site is registered, adequately selected, maintained and therefore safe for being used.

All maintenance operations required shall be performed and a maintenance log shall be kept.

Equipment operators as cranes and motorized equipment shall be in possession of the Government obligatory license valid for the class of vehicle being driven and shall have successfully completed required medical examinations.

Initial, periodic and daily inspections shall be performed by a competent person to assure that all parts, equipment and accessories that affect safe operation are operating properly.

Daily inspections of all vehicles and equipment shall be performed by a competent person with the use of an established checklist.

Crane inspections must be conducted by a Competent Person and documented Certification and other test/inspection documentation must be available for review upon request. Cranes and operations with cranes shall comply with AS 1418 Cranes, hoists and winches and AS 2550 Cranes, hoists and winches. Safe use.

All of the following: fuel driven construction equipment, hand and power tools, electrical equipment, electrical man-lifts, man-baskets, gas cylinder cradles used for lifting, lifting equipment including slings, spreader bars and shackles, cranes, hoists, temporary electrical distribution boards, welding and cutting equipment, ladders, fall protection devices such as full body harnesses and inertia real fall arrest systems, shall be inspected periodically by competent persons and color coded for each period.

All equipment shall bear color coded sticker/ label with the SUBCONTRACTORS´ name, SUBCONTRACTORS´ own equipment identification/serial number or manufacturer's model or serial number, date of inspection and the signature of the competent person inspecting the equipment. Tape shall be provided for color coding in the case of tools or small items and tag for scaffolds as shown in the chart below. Equipment without a valid inspection by a competent person and valid color-coding shall not be used and removed from the site and the access pass cancelled.

If SUBCONTRACTOR still needs to use the equipment on the PROJECT then SUBCONTRACTOR has to start over the process of obtaining access for that equipment.

To summarize the inspections and tagging system to be carried out by SUBCONTRACTOR as the Equipment Inspection Program are the following:

TOOL, EQUIPMENT OR MACHINERY TO BE INSPECTED	RECURRENCE	TAGGING SYSTEM
Scaffolds, pedestrian crossing for trenches	Weekly	Tag
Safety Harness, Lanyards, Life Lines, safety nets	Monthly	Checklist + Taping
Rigging equipment		Checklist + Taping
Electrical tools		Checklist + Stickers
Manual tools		Checklist + Taping
Cage/ cradles for hoisting compressed gas cylinders		Checklist + Stickers
Welding tools		Checklist + Taping
Equipment, machinery and motor vehicles	Daily	Checklist performed by driver
	Monthly	Checklist + Sticker
Electrical equipment and systems	Monthly	Checklist + Sticker
Fire extinguishers		Checklist + Sticker
Elevated Platforms		Checklist + Sticker
Cranes	Monthly	Checklist + Sticker
	Annual or as required by Legislation	Certificate by Third Party

4.14.15 Rigging Equipment

All manufactured rigging equipment including, but not limited to: slings (nylon and wire), chokers, wire rope lashing, come-alongs, chain falls, etc., shall comply with the following requirements.

SUBCONTRACTOR shall ensure all rigging equipment is free from defects, in good operating condition and maintained in a safe condition and shall bear the serial number of the manufacturer and the Safe Working Load (SWL) capacity marked on it. Inspection to these lifting accessories will be carried out as per section 4.15.14 Equipment Management and Inspection, by Colour Coding Program implementation. All rigging equipment will also be accompanied by the manufacturer's certificate indicating the serial number and capacity. In addition to periodic inspections, riggers shall visually inspect all elements prior to using them to ensure no defects exist that may lead to an incident.

The Rigging Supervisor or his designee shall ensure that any item found to be defective is removed from service immediately. These items, if found to be unacceptable, will be tagged out of service, "DO NOT USE" (color coding or other), and returned to the tool room/warehouse.

Other safe working practices are the following:

- Rigging and lashing should be protected from damage by softeners or other active means while in place.
- Nylon, rope, or other slings subject to damage by sharp edges shall be protected during the lift.
- The chains or ropes of a come-along or chain fall shall not be used as chokers.
- Lifting bays used to make lifts will be barricaded at ground level to protect employees from walking under loads.
- Buckets, barrels, tub, etc. used to lift smaller objects shall be effectively covered and secured during lifting to prevent accidental spillage of their contents.
- Rigging equipment will not remain in the elements longer than necessary to do the work, protected from mud, dirt and chemical exposures.
- No hand spliced slings will be accepted or used on the Project. Wire rope sling with aluminum ferrule is not allowed on the Project.
- Nylon slings are not allowed for hoisting structural steel.

- Single sling lifts are not allowed.
- SUBCONTRACTOR will ensure all spreader bars have an engineered design and a test certificate for the Safe Working Load (SWL) capacity clearly marked on it.
- Only inspected rigging equipment bearing the correspondent colour coding shall be allowed to be used.
- SUBCONTRACTOR will keep relevant documentation on record and make it available upon request to CONTRACTOR and COMPANY. Lifting hooks when mobilized to the Project must carry the manufacturer's certificate and inspected. Homemade or job-built hooks are not allowed on the Project.

4.14.16 Lifting Operations

The hazards associated to lifting operations may result in serious incidents or accidents if these are not performed safely and not properly planned. This section outlines the main issues to be taken into account so as to contribute to the establishment, maintenance and further development of an acceptable safety level for personnel, the environment and material assets during the performance of lifting operations.

In addition to normal lifting operations associated with traditional construction activities, the PROJECT modular strategy approach requires special heavy lifting operations due to modules erection. These operations are described in detail in the following specific PROJECT documents referenced in section 5 of the present document:

- Constructability Plan (2-500-329-PRO-TRE-0002)
- Heavy Lift Plan (2-500-329-PRO-TRE-0006)
- Project Execution Plan (2-250-329-PRO-TRE-0000)
- Modularization Concepts and Construction Strategies (2-250-329-PRO-TRE-0011)
- Modules Loading Charts to Ships Study (2-250-329-PRO-TRE-0013)

Due to the amount of aspects involved, the success of lifting operations relies upon an adequate performance at every organizational level. Division of responsibilities is to be clearly established, likewise required functions and qualifications.

SUBCONTRACTOR shall be fully responsible for the execution of all lifting operations but CONTRACTOR shall ensure they are carried out according to all applicable standards, regulations and particular requirements.

Major lifting operations at the PROJECT are to be performed by specialized Companies. The selection of these companies essentially responds to an homologation procedure in which quality and safety certificates, accredited experience and accident statistics are the main criteria analyzed and assessed.

Preventive and protective means to be put in place to ensure safe lifting operations performance depend on the nature and characteristics of the load to be lifted, the area where the lifting is being performed and the concurrent activities that may be affected by it. Nevertheless, main prevention measures that apply to any lifting are listed below:

- All involved parties shall coordinate every operation and activity by means of as many meetings as deemed necessary in order to ensure workers and asset safety at all times.
- All workers involved on a lift operation shall be properly trained.
- All equipment and accessories used will be in safe working conditions.
- SUBCONTRACTOR shall keep a record of all lifting and rigging equipment with their corresponding inspection certificates. This record will be at CONTRACTOR disposal.
- Visual inspection of any lifting device shall be done before lifting operation starts.
- At all times there shall be adequate communication between all personnel who are involved in the lifting operation.
- The lifting operation shall cease immediately if safety is jeopardized, when instructions are unclear, or in the event of loss of communication.
- Lifting areas shall be barricaded.
- Taglines will be used to handle loads.

Two different lifting scenarios shall be considered to establish HSE required measures:

- ✓ Standard lifts: are those considered normal or ordinary and therefore those which are not classified as critical lifts or heavy lifts.
- ✓ Critical or heavy lifts: are those performed in high risk work environments or those which require special training, rigging and/or boom attachments.

For **Standard Lifts**, the following shall be considered:

- SUBCONTRACTOR shall notify the lift to CONTRACTOR specifying:
  - ✓ Weight and sizes of the load to be lifted.
  - ✓ Selected crane, capacity and largest possible radius.
  - ✓ Rigging equipment list.
  - ✓ Licensed and certified operator.
  - ✓ Cranes safety sticker.
- All workers involved on a lift operation shall be properly trained.
- SUBCONTRACTOR shall keep a record of all lifting and rigging equipment with their corresponding inspection certificates. This record will be at CONTRACTOR disposal.
- Use of lifting or rigging equipment with no valid inspection certificates is not permitted.

Heavy lifting operations are considered whenever one of the following circumstances occur:

a. Performed in high risk work environments, such as:
   - ✓ Proximity of energized aerial lines or equipment.
   - ✓ Working around hydrocarbons and pressurized piping areas or suspending load over vessels, piping and equipment containing either hydrocarbons, steam or other pressurized liquids.
   - ✓ Working around populated/ traffic areas.

b. Special critical crane lifts which require special training, rigging and/or boom attachments.
   - ✓ Operations involving two (2) or more cranes.
   - ✓ Personnel Platforms (Manbaskets).
   - ✓ High Level or Long Reach Crane.

c. Lifts above 25 tons.

Requirements for these heavy lifts will be the same as those for standard lifts plus an approved Lift Plan which shall be issued and handed over to CONTRACTOR, at least one week before lifting operation. CONTRACTOR will then add any comment or return it within

forty-eight (48) hours before lifting operation. This Lift Plan will be reviewed and modified as required by specific conditions.

This Lift Plan will consist of information necessary to make a good risk analysis of the lifting operation; it will be signed by originator and crane operator and approved by competent person and it shall include:

- Project name and details.
- Cranes, lifting mechanisms and rigging equipment description (identification number, brand and type of crane).
- Plant and top view and side views showing operation lifting details.
- Maximum operating radius.
- High and low degree of boom angle operations limits.
- Used counterweights.
- Accurate load drawings (sizes, weight, position, center of gravity, slinging method).
- Total weight of all rigging devices and boom attachments.
- Supplier recommendations and instructions.
- Prior checking of all items, including lifting lugs and shackles.
- Definition of all operations from load reception to final positioning including all prior provisions required.
- Ground conditions.
- Requirements and instructions for safe use of lifting equipment.

Heavy lifting operations shall always be carried out with a minimum of three persons / roles involved: the lifting operator, signaler and slinger. In case indications against, a risk analysis defining the minimum number of staff required to perform lifting operations must be available and approved. Whether extra personnel is required in addition to the minimum number it must be considered during the planning of lifting operations and so included in the Lift Plan and PTW. In operations where both the signaler and slinger are needed, these two must not change roles during the performance of a lifting operation. In some cases, more than one dogger may be required to handle taglines locates to apply counter-reacting forces, to prevent the load swinging in the direction of tension of one of the taglines.

In addition to the Plan, the following requirements shall be complied with:

- For lifts carried out close to buildings, operating YPFPL Plant or roads, the load shall not exceed 66% of the approved safe working load at operating radius".
- For major equipment erections, specific procedures or method statements shall be developed in order to ensure safe working conditions.
- Any lifts that exceed 95% of the load chart for any given configuration of the crane is not permitted.
- Night hours lifting operations are restricted. This operation may only be performed in duly justified situations which require special authorization.
- No lift will be carried out if signaler is not present.

4.14.17 Sand Blasting and Painting

Sand blasting and painting operations shall be performed so as to avoid disturbance to personnel who are not involved in such operations.

Workers exposed to hazards derived from blasting and painting operations shall wear the following Protective Equipment:

- Coveralls closed at the neck, wrists and ankles.
- Work gloves.
- Helmet with incorporated visor for blasting operations.
- Helmet with safety goggles for painters.
- Anti-dust masks for blasters and painters according to contamination level.

If applicable, abrasive blasting operations shall follow Abrasive Blasting Code of Practice issued by WorkSafe WA Commission.

4.14.18 Material and Equipment Storage

Materials and equipment are stored in covered warehouses, yards, laydown areas (fenced and free) and in construction site for immediate use or installation. No materials and equipments shall be offloaded and left in a location not dedicated for the purpose.

All storage areas will be periodically inspected in order to ensure appropriate material storing is being done and no hazards exist. Material handling shall be done adopting all

necessary precautions to avoid additional hazards or risk posed on exposed workers (appropriate load handling, adequate equipment use, etc).

Materials shall be stored in accordance with the following rules:

- Materials shall be piled so as to ensure safe accessibility to them.
- If stored on shelves, they shall be provided with adequate resistance.
- Fire prevention and fire-fighting equipment shall be provided when necessary.
- Materials shall not obstruct temporary or existing emergency roads/exits.
- Materials shall be stored and piled in a safe manner to avoid them from falling over for any reason. All material should be piled in the place set aside for it and choked or tied to prevent rolling or falling.

Before stacking or piling material, it must be considered how the material will be taken out of the pile. If it's going to be a fast moving operation with a big tonnage being unloaded in a short time, be sure to leave space for workers and the equipment that will have to do the work.

Never pile material in such a way that it will endanger anyone who has to work on it or will make a backbreaking job for the worker who breaks down the pile. Other issues to consider are:

- The strength of the support to pile material on a floor or platform.
- The stability of the ground to pile a heavy load.
- The height of the pile so it won't topple.
- The need for building racks to stack pipe or rods.
- The necessity of waiting for the proper equipment to handle structural steel and other heavy material.

Chemicals or hazardous materials' storing conditions and requirements are outlined in the next section (4.15.29 Chemicals Handling) and described in detail in the Construction Hazardous Materials Management Plan (2-250-329-PRO-TRE-0122).

4.14.19 Chemicals Handling

SUBCONTRACTOR shall provide CONTRACTOR a copy of the Material Safety Data Sheet(s) in English (MSDS) for the chemical(s) or substance(s) intended for use on the

site. Any chemical to be introduced on site shall be notified to CONTRACTOR and not be allowed access until written approval is provided.

SUBCONTRACTOR is responsible for maintaining a copy of Material Safety Data Sheet(s) of all chemicals on site for CONTRACTOR'S own reference and employee training. CONTRACTOR shall also maintain a set of MSDS copies. A complete set of MSDS copies shall be available where the chemicals/ materials are intended to be used and also be kept at the first aid facilities. The medical staff must be fully familiar with the contents thereof.

The legal storage, use and disposal of wastes of any hazardous chemicals or substances are SUBCONTRACTOR responsibility but CONTRACTOR shall ensure that hazardous materials are handled, stored and disposed of in a manner that will not cause harm to personnel and the environment, ensuring compliance with applicable statutory requirements.

Furthermore, introduction and use of chemicals shall be subject to the following prior requirements:

- Provide and follow recommendations of chemicals Material Safety Data Sheets (MSDS): identification; composition; hazard degree; fire fighting measures; spilling measures; handling and storage procedures; exposure controls and personal protection; physical, chemical and toxicological properties; transportation; regulation, etc.
- Availability of the necessary protective equipment and control measures and use them properly.
- Stocks of substances should be kept to a minimum. Only small quantities in frequent use should be kept at the point of use, otherwise stored in closed chemical cupboards.
- Care should be taken to separate incompatible substances, for example flammable substances and oxidizing agents.
- Cleaning fluids, paints, paint thinners, naphtha, etc. that produce vaporous fumes shall be stored in an enclosed and well ventilated storage building away from spark and flame producing activities and actions.
- Fuels, oil, grease and chemicals shall be stored appropriately with arrangements for containing accidental leakage and spills.

- Flammable materials shall be stored in a way that a fire in one area will not spread to other flammable materials stored or to the Plant.
- Control disposal of chemical containers, subject to Regulations and CONTRACTOR approval. Chemical containers shall not be re-used. Containers shall be checked for leaks, loose stoppers, lids, caps, etc. before handling.
- Containers for transportation and use of chemicals have to be safe. Container must be labeled with appropriate hazardous material label to indicate the actual contain.
- All chemicals shall be stored according to manufacturers' instructions and standards.
- All products shall be identified and labeled as per National Code of Practice for the Labelling of Workplace Substances (NOHSC:2012 (1994))

Chemicals and hazardous storage areas will be subject to periodic inspections carried out by CONTRACTOR HSE Team in order to ensure their integrity.

Whenever chemicals or hazardous materials with potential to contaminate groundwater, soil or terrestrial vegetation are going to be used, CONTRACTOR shall ensure working conditions and mitigation measures are in place to avoid the effect of any possible spillage or leak. Remediate spill kits will be made available in case they are needed. Additional provisions are outlined in PROJECT Construction Hazardous Materials Management Plan.

In any case, should a spill or leak take place, response action shall be as per described in the Construction Emergency Response Management Plan (2-250-329-PRO-TRE-0113).

4.14.20 Welding and Cutting

Welding and hot work activities are subject to Work Permit System.

Welding and cutting equipment shall comply with highest industry standards and be maintained in satisfactory conditions.

The following prescriptions for compressed cylinder and welding material shall be observed:

- Cylinders shall be kept away from sparks, hot slag and flames or be adequately protected.

- Gas and oxygen cylinders shall be placed and secured in an upright position and away from sunlight. They shall never be introduced inside confined spaces.
- Oxygen cylinders in storage shall be separated from fuel gas cylinders or combustible materials a minimum of 6.0 meters, or by a non combustible barrier at least 2.0 meters high having a fire resistant rating of at least one half hour.
- Empty cylinders shall be separated as above from full cylinders and stored with like cylinders. Empty cylinders and cylinders that are not in use must be provided with valve caps.
- Between the regulator and hose, and ideally between hose and torch on both oxygen and fuel lines, a flashback arrestor and/or non-return valve (check valve) should be installed to prevent flame or oxygen-fuel mixture being pushed back into either cylinder and damaging the equipment or making a cylinder explode.
- Cylinders shall be labeled as to the nature of their contents.
- All hose in use, carrying acetylene, oxygen, or any gas which may ignite or enter into combustion or in any way harmful to employees must be inspected thoroughly at the beginning of each shift.
- Adequate fire extinguishers shall be provided where welding activities are being carried out and where cylinders are stored.
- Welding set shall be fed by a switchboard equipped with differential protection devices.
- Welding and hot work shall be protected so do not constitute a danger to persons in the vicinity, by the provision off shield, sheeting, blankets.
- Used electrodes shall not be left on floor but placed on a container.
- Grounding cable shall be as close as possible to the element being welded, and far from any other existing equipment or installation.
- All surrounding workers shall be made aware of the hazards they are exposed to and the preventive and protective measures to be implemented.
- No combustible materials should be used or stored nearby hot work.
- Continuous gas monitoring shall be conducted for critical hot work activities in restricted areas.
- A fire watch will be required when hot work is to be performed where potential exists for presence of combustible materials or a fire may develop

- At no time shall pliers, wrench or hammer or any other tool be used to open or close the valve on the cylinder. Only the provided key shall be used to open and close the valve.
- Cylinders shall not be hoisted by magnets or choker slings. Valve protection caps shall not be used for hoisting cylinders. Cylinders may only be hoisted in engineered designed cage/cradles bearing the Safe Working Load (SWL) capacity of the cage/cradle.
- Welding tools shall be inspected monthly with an established checklist and appropriately tagged to ensure it is safe for use.
- If high visibility vests are normally worn, works shall take them off while welding.

4.14.21 Confined Spaces

Confined spaces include storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, sewers, manholes, tunnels, pipelines, open-topped pits and basements.

Confined spaces shall be identified and signs shall be posted at the entrance to the confined space to alert employees of areas that have been classified as confined spaces.

All confined spaces will be treated as “Permit Required Confined Spaces” and therefore a confined space where atmospheric evaluation shall be performed, if necessary. Prior to entrance, confined spaces shall be properly emptied, cleaned and ventilated so as to eliminate toxic gases or vapors. Furthermore, the following shall be checked:

- Concentration of flammable gases/vapors as tested by an authorized gas tester with a calibrated flammable gas test meter is below 5 % of LEL (Lower Explosive Limit)
- Concentration of oxygen as tested by an authorized gas tester with a calibrated oxygen gas test meter is within 19.5-23,5% volume.
- Concentration of toxic vapors is not higher than half of the maximum permissible concentration.

There will be always involved in the works at least:

- Responsible Supervisor.
- Safety watcher standing next to the confined space access and in contact with the Responsible Supervisor, with strict entrance prohibition to the confined space. The safety watcher shall inspect and monitor the confined space for the presence of gases and other hazards.
- Emergency rescue team.

Any person, who will perform the job inside the confined space, shall be permanently observed by the safety watcher who will notify the Responsible Supervisor of any irregularity. No person shall enter a confined space unless all emergency and rescue precautions have been taken and at least a watcher is outside and in constant communication with the worker.

Employees required to enter confined areas or spaces shall be instructed as to the nature of hazards involved, necessary precautions to be taken and in the use of protective and emergency equipment required.

Any person carrying out works inside a confined space shall wear, in addition to the protective equipment required, a safety harness with lifeline connected to a lifting mechanism that can be operated by the safety watcher.

When welding, cutting, heating, painting or any other work is performed in confined spaces then ventilation shall be provided. When sufficient ventilation cannot be provided SUBCONTRACTOR employees shall be protected by airline respirators or self contained breathing apparatus, operating in positive pressure mode, to supply breathing air. Employees needing to use this type of equipment shall be properly trained and certified to use the equipment.

Provisions on Confined Space shall follow Australian Standard AS 2865, Confined Spaces and will be subject to PTW Procedure.

4.14.22 Radioactive Sources

The use of radioactive substances and X-ray equipment on COMPANY´ Site is not permitted until CONTRACTOR has obtained written instructions from COMPANY as to their agreed use and has undertaken to strictly comply with all such detailed instructions and to any statutory regulations that may apply.

X-Ray work will need to be performed in restricted area not to disturb the other adjacent works. CONTRACTOR shall validate the coordination done by the SUBCONTRACTOR for X-ray work, among the concerned parties, for the following issues:

- X-ray schedule
- Timing of X-ray taken
- Clear notice of restriction areas (locations, isolation, etc.)
- When necessary, Small Containment Area Radiography – SCAR technology should be utilized to minimize the restricted area.

Use of equipment containing radioactive sources shall be strictly limited to qualified personnel duly authorized by the competent official authority.

Areas where radiation activities are to be performed shall be duly delimited and identified. Personnel not directly involved in these activities shall remain outside the delimited area. Wherever possible, these activities shall be scheduled for performance outside normal working hours as mentioned before.

X-Ray works involving ionizing radiation occurring by natural decay of radioisotopes (nuclides) and / or x-rays as produced by electrical means from portable or static equipment shall be subject to Work Permit.

The following issues shall be inspected prior to the start of ionizing radiation work to ensure:

- People that are performing the work are licensed and authorized by the competent Australian Authority.
- Each person involved in the work has a monitoring film badge and a pocket dosimeter.
- A survey meter with audible and visual alarms is in the area for radiation area monitoring and shall accompany the source each time.
- All inspections and certification of equipment are current and complies with applicable Australian Standards.
- An accurate accounting system is kept for each source coming onto the project and shall include the serial number, receipt date, decay chart and projector or transit container used.
- The work areas in which ionizing radiation work is to be performed are barricaded, warning signs and lights posted, perimeter guards posted and all workers removed from the area before the work starts.
- A safe access and egress are being provided to the work location with adequate lighting.

4.14.23 Lock Out and Tag Systems

All persons performing services in machines or live equipment shall be fully protected from unexpected energization, startup or the uncontrolled release of energy, which could cause injury to those persons and/or equipment. Source of energy could be chemical, mechanical, electrical, thermal, pneumatic, electromagnetic or other. For this purpose a LOTO procedure shall be followed.

Lock out and Tag out system will be used as additional requirement of Work Permit system to avoid workers being injured while working on equipment (when controls have not been locked and tagged in the off position).

Employees shall receive training in the recognition of hazardous energy source, type and magnitude of energy available, methods and means necessary for energy isolation and control. The training shall include tagging requirements, limitations and employee roles and responsibilities.

The manufacturer and or established start up or shut down procedures are to be followed to avoid any additional or increased hazard(s) to employees or equipment as a result of equipment start up or shut down.

4.14.24 Electrical Equipment and Systems

Apart from load handling hazards, no specific hazards are considered for electrical equipment and systems erection, which will basically consist of cables located in supports or cable trays, electrical boards, transformers, etc. But when work is performed near or on energized circuits or equipment, safe work practices must be used in order to prevent electric shock or other injuries resulting from either direct or indirect contact.

All temporary electrical facilities and equipment to be used shall comply with applicable Standards and their design shall be reviewed by CONTRACTOR prior to erection.

Lock out and tag out system shall be followed for any work or inspection in electrical equipment or systems.

Electrical supply shall be performed by outdoor type switchboard and outlet, both provided with minimum protection IP-45. Switchboards shall be equipped with general input switch and short circuit set for each foreseen output, with protected switch and maximum circuit breakers protected by adequate differential protection devices (minimum sensitivity 300 mA).

Electrical cables section shall be suitable for the electrical supply foreseen. Conductors shall be provided with high quality plastic insulation or similar of at least 1000 V rated voltage.

Standard manufactured elements shall be used for connection to distribution points and conductor splicing. Use of makeshift connections is prohibited.

Current voltage and circuit shall be clearly shown in switchboard.

Only qualified persons may work on electric circuit parts or equipment that have not been de-energized and / or perform high voltage tests. SUBCONTRACTOR shall appoint in writing one or more suitably qualified employee as their ‘competent persons’. Such persons shall be capable of working safely on energized circuits and shall be knowledgeable with the proper use of precautionary techniques, Personal Protective Equipment, insulating and shielding materials and insulating tools.

Employees who face a risk of electrical shock but who are not qualified persons shall be trained and familiar with electrically related safety practices.

Entry into high voltage areas and sub-stations shall be restricted.

Inspections shall be carried out in a monthly basis by means of a checklist for electrical equipment and systems which shall be tagged accordingly after such inspections. Defective tools shall immediately remove from service, tagged “Defective- Do Not Use”, until repaired.

4.14.25 Portable Tools

Portable tools shall be used only in applications for which they were designed. Tools shall only be used by qualified and experienced personnel.

Tools protections and safeguards shall be properly installed before use. Protection removal or alteration is strictly forbidden. Likewise, portable lamps shall be equipped with insulating holders and metallic protection and voltage shall be equal to or lower than 24 V.

All grinding machines and power hand tools (cutters, circular saw, drills, and planers, among others) shall conform to applicable requirements. Hand held grinders such as angle grinders, surface grinders, and pencil grinders among others, shall be equipped with a dead-man switch. All electrically operated hand tools, temporary electrical installations and plants and power supply from gen-sets including welding generators must not exceed 220-240 Volts.

Hand electrical power tools must be properly grounded or double insulated (bears the Underwriters Laboratories “double-insulated” label) and electrical circuits protected by GFCI (Ground Fault Circuit Interrupters).

Fixed and permanent electrical installations or plants (such as air-conditioning units, water coolers, tower lights or flood lights, bending machines, rebar cutters, pipe threads, table saw, electric winch, etc.) shall be properly grounded in accordance with the assured equipment grounding conductor. The equipment must be ground fault protected by ELCB (Earth Leakage Circuit Breaker).

Pneumatic power tools shall be secured to the hose or whip by some positive means such as tied off with stainless steel wire or clips. Couplings of pneumatic hoses will be properly secured and in addition all pneumatic hoses will be fitted with a whiplash arrestor across couplings.

Cords, leads and hoses shall be kept off the ground to be protected from traffic and prevent tripping hazards. When cords are elevated, these must be flagged off for visibility. Cords must be secured to a pole by means of non conductive material.

Electrical power and extension cords and welding cables/leads and hoses shall not be coiled while in use.

All portable hand and power actuated tools shall be inspected and tested prior to each daily use of the tool by the operator to ensure the device is proper for use, according with

manufacturer's specifications. Any tool that is not in proper working order, or that develops a defect during use, shall immediately be removed from service, tagged "Defective- Do Not Use" until repaired by a qualified person. Furthermore, tools shall be subject to monthly inspections with an established checklist and tagged to guarantee it is safe for use.

4.14.26 Test Procedure

In general, prior to performance of any test regarding pressure (hydrostatic test), motor start-up, works under electrical voltage, etc. a test procedure shall be prepared and subject to CONTRACTOR approval.

As a general rule, test procedure shall include:

- Adequate area barricading.
- Wherever possible, performance outside normal working hours.
- Withdrawal from projection hazardous areas.
- Definition and proper use of collective and Personal Protective Equipment.

Additionally, all Pre-Commissioning and Commissioning procedures include a section that refers to specific HSE considerations to perform activities in a safe manner. Appropriate implementation of these requirements and continuous inspection and performance monitoring will ensure safe operating conditions.

4.14.27 Pre-Commissioning and Commissioning

Prefabricated modules will include the mechanical completion and, where appropriate, the Pre-Commissioning and partial Commissioning. Despite this, additional Commissioning activities foreseen to be performed on site include the cleaning of the piping lines connecting modules. The most important common aspects that shall guarantee compliance with all HSE requirements during these phases are the following:

- Adequate, flexible and well thought Plan for all activities as well as analysis of possible simultaneous operations has to be carried out.
- A competent team shall be appointed to follow on from Construction through to Commissioning and Start Up. Integration between teams and fluent and continuous communication to prevent repetition of work and / or interferences is of the utmost importance.
- Applying appropriate strict Permit to Work procedures and conditions.

- Clearly defining systems and subsystems, their boundaries and the special considerations that have to be taken when performing any activities in or near the area.
- Having systems and/or areas under commissioning team control well delimited and identified by signs and hard barriers with restricted access to essential and trained personnel.
- These systems and subsystems shall be under Commissioning team control and all activities will be subject to Commissioning specific Work Permit System administered and controlled by the CONTRACTOR Commissioning Manager, who will sign all work permits, but always monitored and helped by the HSE Team.
- Physical barriers will prevent non commissioning workers entering specific areas (Commissioning Islands) where Commissioning activities are being performed on Site. For Construction punch list completion to be performed, Construction team shall be subject to Commissioning permitting system and specific approval that allows them entering these Commissioning Islands.
- Specific Lock out – tag out procedure implementation to prevent accidental or sudden unexpected energization of equipment or systems causing any asset or personal damage.
- All Commissioning team members shall be specially trained and prepared for the works to be performed and special preventive and protective measures are to be implemented.

New activities not normally encountered during the Construction phase that shall be thoroughly studied to identify all new risks and hazards arisen from their performance.

As a result of mentioned Risk Assessments, work permits mostly used shall be: hot work permit, cold work permit, confined space entry permit and electrical work permit.

4.14.28 Live Lines

When steam blowing, chemically cleaning, hydro-testing or pressure testing pipelines or putting any product into pipelines, SUBCONTRACTOR shall ensure people engaged in the work are properly trained in their tasks and the dangers of the work and the safety precautions to be taken.

SUBCONTRACTOR shall ensure an approved permit is obtained from CONTRACTOR for the work and that the activities are coordinated with other project participants.

SUBCONTRACTOR shall mark all live lines, lines carrying product, lines being tested and lines under pressure with stickers bearing the wording “LIVE LINE”.

Barricades shall be placed at a minimum 20-metre safe distance around the areas in which such work is being performed and signs posted. Access into the area shall be controlled to allow only the people directly involved in the work. Perimeter guards shall be installed for access control.

All flanges, gaskets and valves shall be checked prior to testing, valves and blinds locked in the correct open or close position, and tested for leaks once the work started and periodically thereafter.

SUBCONTRACTOR shall ensure an Emergency Response Team and proper communication channels are established.

4.14.29 Housekeeping

Housekeeping is aligned closely to HSE because it is fundamental so as to keep a safe working area. Prior to the start of work on site, SUBCONTRACTORS will clean their area to a high standard so that all operations shall be carried out safely. Each SUBCONTRACTOR will be responsible for his own housekeeping where each person is responsible for keeping his own area clean and tidy.

Housekeeping problems shall be identified and action shall be taken on a continuous basis as part of the inspection responsibilities of Site Supervisors and HSE personnel. Issues that shall be taken into account to guarantee a correct housekeeping are the following:

- Work locations, equipment and facilities are to be kept clean and tidy at all times: all work areas shall be free of obstructions, projections, rubbish, oil, water or any unwanted substances and loose materials shall be stored in a clean and tidy manner.
- Work areas shall be provided with and personnel shall be required to use, adequate waste containers for the proper disposal of all scrap, construction debris, trash, etc.
- Trash and waste receptacles shall be in close proximity to the work area; shall be emptied as needed but not less than daily and; shall be properly labeled to identify waste contents and to facilitate waste segregation.
- Cables, hoses and pipe-work supplying power to work areas shall be neatly laid and hung so as not to interfere with access or be a trip hazard.
- All platforms shall be kept free of loose materials.

- Scaffolding platforms must be kept clear of debris with all material stored in suitable containers.
- Machine tools in the worksite will be cleaned at the end of each working day. Electrical supplies must be switch off at the end of the daily work.

4.14.30 Traffic and Transportation

Motor vehicle drivers and equipment operators shall be qualified and licensed in accordance with WA regulations. Vehicle drivers will be in possession of a valid Australian driver's license and equipment operators will be in possession of a valid Australian equipment operator license specific to the type of equipment operated.

All use of vehicles shall be in accordance with PROJECT Construction Traffic Management Plan.

It is the responsibility of the driver to ensure that his vehicle meets all conditions required for safe driving.

No vehicle shall enter the construction premises without an entry permit issued by the control access. An identification badge/ sticker shall be displayed on the vehicle operating within the site.

Speed limit, parking regulations and other traffic rules as specified by CONTRACTOR shall be respected. Signs shall be erected on all access routes.

Vehicles that haul materials which can generate dust emissions and other nuisance shall be properly secured to avoid loss of material and dusting.

All traffic signs and signals, whether fixed or portable, shall be obeyed and drivers shall cooperate with representatives appointed to direct traffic.

All personnel will use only designated walks and roadways facing on-coming traffic, when entering or leaving the job site, when moving from one area to another, or when obtaining material. The use of short cuts or undesignated pathways is prohibited. All these routes will be adequately marked for that purpose. Pedestrians have right of way over motorized traffic.

Parking will be restricted to the designated parking area, being strictly prohibited to block any fire-fighting equipment, evacuation routes or assembly points.

Reckless driving or other non observance of these instructions will be cause for withdrawal of driving privileges on the Project.

SUBCONTRACTOR employees working in an area of potential traffic hazard shall wear approved reflective type vests.

Vehicles used within YPFPL will be subject to their existing procedures and rules, already in place as well as established speed limits and identified and available parking areas.

Further details on traffic inside the site are addressed to in Construction Traffic Management Plan (2-250-329-PRO-TRE-0111-att05).

4.14.31 Working Outside Normal Hours

Working outside normal hours refers to those periods of work not included in the normal shifts such as night shifts and weekend operations that might be necessary at some time.

The necessary permits shall be acquired for works outside normal hours. Works at night is not permitted without written approval of COMPANY and CONTRACTOR.

The activities and works during these periods shall be performed in identical HSE conditions as in normal working hours. To achieve these, the same tasks regarding supervision, monitoring and observing as while working during normal hours will be carried out. In particular:

- Enough artificial illumination shall be installed according to location and specific activity requirements to achieve a safe working conditions worksite.
- First aid station will be operating normally and fully equipped as long as there is workforce in the site.
- As many members of the HSE Team as necessary to guarantee appropriate safety conditions will be present at worksite any time works are being performed.

4.15 OFFICE SAFETY

Site temporary offices shall comply with the following rules:

- All personnel shall be familiar with the location and operation of fire extinguishers, evacuation procedures, escape routes and safety exits.
- No electrical office equipment shall be used in faulty or unsafe conditions. Repair shall be made by qualified personnel.
- All flammable materials (e.g.: toner for photocopiers) shall be stored in minimum quantities in the shade and away from any flame or heat source.
- Avoid slips and trips with good housekeeping
- Avoid hazards from the mismanagement of office equipment

- Personnel shall not run in corridors, block entries and they shall enter or leave offices by the designated doors.
- A first aid box shall be available in each office.

4.16 HEALTH AND WELFARE OF WORKERS

CONTRACTOR and SUBCONTRACTOR facilities shall meet HSE COMPANY and CONTRACTOR requirements as well as statutory laws and regulations.

SUBCONTRACTOR shall provide the following facilities:

- Changing rooms of sufficient size provided with lockers where workers can leave their clothes and possessions under lock and key (lock and key will be provide by SUBCONTRACTOR), as well as sufficient number of seats.
- Premises with showers in adequate number and size, so as to permit workers to have showers free of obstacles and under satisfactory hygienic conditions.
- Premise with sufficient number of toilets and washbasins, located in the vicinity of work and resting area.
- Canteen where workers can have their daily meal.
- Drinking water shall be supplied and in some cases, a suitable non-alcoholic drink can be provided as well, in sufficient quantity.

SUBCONTRACTOR will be assigned a specific area for installation of sanitary facilities, but water and electricity supplies and waste water treatment shall be foreseen by SUBCONTRACTOR.

All premises shall be kept by SUBCONTRACTOR under clean and tidy conditions.

4.16.1 First Aid Treatment and Hospital

A First Aid Medical Centre shall be created and equipped for all employees with the necessary installations including a cardio respiratory animation system and materials and with qualified personnel capable of providing first aid treatment.

SUBCONTRACTOR shall foresee the hospital where his personnel will be transported in case of requiring more than first aid treatment.

All CONTRACTOR employees and SUBCONTRACTORS are to ensure that their employees are aware and conversant with the medical and first aid arrangement. Information and instructions shall be given to all workers prior to working on site.

All employees shall have received basic first aid training. Nevertheless, sufficient personnel shall be trained as Advanced First Aiders to provide immediate medical assistance to injured staff. The Advanced First Aiders shall be trained in the use of the trauma response kits.

Signs containing emergency telephone numbers for ambulance, first aid treatment, medical centers, public fire brigades, etc., shall be posted in visible locations.

4.16.2 Work Station Ergonomics and Hygiene Aspects

Ergonomics and other human engineering principles shall be used to allow people to work within their individual strength and movement limitations:

- Computer workstations must be selected to fit the individual using them.
- The brightness and glare control must match to the needs at the workstation.
- Ventilation and temperatures must be controlled within an acceptable comfort range
- Whenever heat stress, cold or wet conditions are such that they can lead to impairment of health or extreme discomfort, preventive measures should be taken, such as: proper design of the workload and workstation, with special regard to workers in cabins, and command or driving operations; supply of protective equipment; routine medical surveillance.
- Protection shall be provided from the harmful effects of noise and vibration from machines and work processes, by measures including: replacing hazardous machines and processes by less hazardous ones; reducing the exposure of workers; lastly, providing personal hearing protection.
- The correct equipment and safe work practices must be selected to minimize the risk of repetitive motion trauma or other strains and sprains.

- Musculoskeletal disorders (MSDs) include problems such as low back pain, joint injuries and repetitive strain injuries of various sorts. Some measures that shall be established in order to avoid MSD:
    - Ensure workers take regular breaks
    - In case of works performed in a sitting position, employers shall get up and stretch when possible;
    - Sit up comfortably in a chair that supports the lower back;
    - During computer work, ensure that the chair height is adjust so that the forearms are comfortably resting on the desk and elbows are roughly at right angles;
    - Provide when possible for the variation of tasks to avoid the same movements for prolonged periods using the same part(s) of the body.

4.16.3 Medical Examinations

All employees shall undertake routine medical examinations prior to commencement of work on the PROJECT. Nevertheless, SUBCONTRACTOR shall ensure that his employees are in good health conditions suitable for the work to be performed.

Any worker found to be under drugs or alcohol effects will not be allowed access to the site or, if tested during normal working hours, removed from the site immediately.

4.17 EMERGENCY RESPONSE AND EVACUATION PROCEDURES

The Construction Emergency Response Management Plan is included as part of the CEMPs and it addresses the emergency response organization and procedures to be followed in case of any emergency situation at the TAN Burrup Project site. It aims to protect the people, assets and environment and to limit the consequences of and recover from any emergency situation should it occur. Its compliance shall be mandatory for all personnel present on the site when the emergency scenario arises: COMPANY and CONTRACTOR personnel, SUBCONTRACTORS, visitors and vendors under CONTRACTOR responsibility.

This Plan describes how to proceed and how CONTRACTOR shall deal with any of the following unplanned events in case they take place:

- ✓ Fire and/or explosion on site

- ✓ Accident on site (medical evacuation)
- ✓ Chemical spills and/or unplanned releases
- ✓ Traffic accidents
- ✓ Damage to production facility infrastructures (referred to neighboring operating plant)
- ✓ Neighbour operating plant emergency
- ✓ Security threat
- ✓ Strike
- ✓ Tropical cyclonic events
- ✓ Lightning strike
- ✓ Dangerous goods on site
- ✓ Mechanical damage to equipment and infrastructure

Anyone who identifies witnesses or is the first person to see an emergency scenario shall proceed to immediately report it to its supervisor or closest ERT member personally or by using the established means (radio channel or mobile phone numbers).

The Construction Emergency Response Management Plan shall focus on the preparedness of the organization to handle an unwanted event effectively by containing and controlling incidents so as to minimize its effects. It includes:

- Organization: Roles and Responsibilities of key personnel
- Emergency Scenarios
- Communication During an Emergency
- Actions to be Taken “In Case of an Emergency”
- Emergency Resources
- Evacuation Procedure
- Training

- Drills
- Emergency Report
- Emergency Contact Numbers

All workers shall be properly trained and acquainted with general response action arrangements for dealing with emergencies. A copy of the main instructions shall be posted by COMPANY and CONTRACTOR in their offices and change rooms and issued to each employee.

In the majority of the possible environmental emergency situations, evacuation will not be necessary but quick action to prevent a major disaster is of capital importance.

CONTRACTOR and COMPANY should be immediately notified of any emergency situation.

4.18 GENERAL SAFETY MEASURES DURING CYCLONE SEASON

According to site location, the expected cyclone season goes from November to May and, during those months, several preventive measures shall be put in place so as to ensure no additional risks or hazards other than natural ones, arise. Emergency response actions for cyclone events are described in detail in the Cyclone Management Plan.

4.19 FIRE PREVENTION

SUBCONTRACTOR shall be responsible 24 hours per day, 7 days per week for fire protection in its work and operational areas, including offices, tool rooms and storage areas.

Fire extinguishers suitable for the various classes of fire shall be used during construction works. Fire extinguishers should be placed at:

- At least one fire extinguisher should be provided in each temporary building (temporary facilities and finished project buildings) near the door, in every floor of a multi-stored building and additionally at every stairway. Additional extinguishers shall be mounted as required.

- In open storage yards.
- Extinguishers shall be located in the proximity of any point on the perimeter of material stored in fuel or flammable materials storage areas.
- In workshops.
- Near each temporary electrical panel.
- On each item of mobile industrial equipment having a diesel or gasoline engine.
- In the proximity of non-mobile industrial equipment having a diesel or gasoline engine.
- Portable or permanently mounted extinguishers should be available for the workforce involving welding, burning or the use of an open flame (any activity subject to Hot Work Permit).

Monthly inspections shall be performed and used fire extinguishers shall be replaced by new ones. Tags shall be used to indicate condition and date of inspection of fire extinguishers. Damaged, malfunctioning or empty fire extinguishers shall be repaired or refilled in a timely manner.

Any person discovering a fire shall report it immediately to his supervisor and, if properly trained to do so, he shall try to fight the fire using the fire fighting devices present on the area. Supervisor shall immediately notify CONTRACTOR Construction Manager and HSE Manager who shall raise the local stop work alarm and the onsite fire team shall fight the fire using the equipment available at the scene. It shall also be immediately communicated to COMPANY. Evacuation of the zone and use of other emergency responses actions will be evaluated and carried out as per the PROJECT Emergency Response Management Plan.

The following fire prevention prescriptions shall be followed:

- Flammable Materials. Approved containers shall be used, which shall not be stored in or near entries, exits, stairs and passageways.
- Refueling. Equipment motors shall be shut off during refueling. Refueling area shall be free of ignition sources, gases, combustible material, etc. and shall be duly identified by means of signs prohibiting smoking or opening flames. Any spill shall be immediately cleaned up.

- Cutting and Welding. All combustible and flammable materials shall be moved to a safe location prior to start cutting and welding activities. In the event of not being possible, fire-resistant wool shall be provided and workers shall be provided with fire fighting equipment for immediate use.

Properly trained and instructed fire wardens will be nominated among CONTRACTOR and SUBCONTRACTOR personnel on an adequate number according to total workers on site. Refreshing training shall be organized as deemed necessary.

There shall be written reports of all emergency and fire drills as well as site evacuation drills.

Established provisions for action in case of fire such as evacuation routes, fire fighting equipment location and phone numbers will be displayed where clearly visible at different site posting areas, in all site offices, changing rooms, canteens and access.

4.20 SITE SECURITY PLAN

A Site Security Plan shall be developed and updated for the protection of property from fire and theft as well as prevention of unauthorized personnel from entering the construction site. CONTRACTOR shall be responsible all objects, tools, materials, temporary offices, warehouses and laydowns areas while site area remains under CONTRACTOR control.

CONTRACTOR will place fence and access control with trained security personnel, if necessary, on its controlled worksite and facilities under his responsibility.

Basic security rules that shall be observed by anyone entering the site area under CONTRACTOR control can be summarized as follows:

- Gambling in any way is prohibited.
- Intoxicating or illegal substances such as liquors, alcohol or drugs are strictly forbidden.
- Smoking is strongly discouraged. Designated smoking areas will be identified and smoking will only be allowed in these designated areas.

- No pictures shall be taken without the written consent of COMPANY/ CONTRACTOR.
- Restricted areas will only be accessed by so authorized personnel. No exceptions will be made to this rule.
- Entry and exit of all personnel and vehicles shall be through designated gates.
- Firearms introduction in the site is completely forbidden.
- No pets will be allowed access to the site so as to protect rare fauna and habitat.

CONTRACTOR employees including that of his SUBCONTRACTOR shall follow the gate instructions/ site access rulings. Disciplinary action may be taken against any person found entering or leaving or attempting to enter or leave the site otherwise than by recognized gates or entrances. After undertaking successfully CONTRACTOR HSE Induction training session and after having provided all required documents, each worker will be issued an individual *work site pass* which will specify which areas the employee shall have access to. These identification badges shall be visibly displayed at all times and presented to COMPANY/CONTRACTOR upon request.

All material and equipment other than trash that is removed from the project must be accompanied by a material exit pass. All trash that is removed from site will be checked by security to verify the content.

SUBCONTRACTOR shall immediately notify CONTRACTOR of all thefts or other security violations at the jobsite or PROJECT. SUBCONTRACTOR shall also submit to CONTRACTOR a monthly summary of thefts or other security breaches.

All individuals and/or vehicles may be stopped and searched at any time while entering, being on, or leaving the site. It will be a condition of employment to agree to such searches for all persons employed on the project.

Visitors shall be given adequate information on HSE and Security requirements.

Within YPFPL site all their security requirements shall be complied with. All employees shall be fully aware of these requirements and that employees are liable to spot checks by YPFPL Security personnel.

4.21 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

The Construction Environmental Management Plan (CEMP) provides the framework to ensure all commitments set forth in the Public Environmental Review (PER) and the conditions resulting from Commonwealth and Works approvals are summarized and described in detail for appropriate implementation on site. The purpose of this document is therefore to outline the main mitigation measures to be put in place during Construction, Pre-Commissioning and Commissioning phases of the TAN Burrup Project so as to minimize the risk of potential environmental adverse impact derived from the construction works and, therefore, to reduce the effects of the PROJECT execution on the environment to ALARP level.

The environmental objective of the project is to ensure no contamination or disruption of the surrounding environment occurs as well as to comply with all established approvals permitting requirements.

To achieve this, the following practices shall be followed:

- Workforce information, instruction and awareness training on environmental importance.
- Continuous monitoring and supervision of environmental issues compliance and management.
- CONTRACTOR, SUBCONTRACTOR and COMPANY Environmental Representatives shall always be in contact and aware of any environmental risks or issues happening on site.
- All actions to mitigate environmental risks will be recorded, followed up and tracked.
- All waste shall be disposed of in appropriate containers, avoiding mixing of non compatible substances and always according to established waste management procedures.
- An authorized waste management dealer shall be responsible for managing and disposing all waste generated on site. Site temporary containers shall be dumped in a daily basis to the appropriate waste storage area.
- Proper material for cleaning up a spill shall be available on site.

- Avoid or minimize any impact on Aboriginal Heritage sites within the lease area.

The general CEMP shall be further developed in more specific CEMPs that will address all environmental commitments and conditions resulting from the environmental permitting approvals process:

- ✓ Construction Terrestrial Fauna Management Plan
- ✓ Construction Flora and Vegetation Management Plan
- ✓ Weed Management Plan
- ✓ Erosion Control and Stormwater Management Plan
- ✓ Water Quality Management Plan
- ✓ Construction Air Quality Management Plan
- ✓ Construction Noise Management Plan
- ✓ Construction Waste Management Plan
- ✓ Construction Traffic Management Plan
- ✓ Aboriginal Heritage Management Plan
- ✓ Hazardous Materials Management Plan
- ✓ Construction Emergency Response Management Plan
- ✓ Blasting Management Plan
- ✓ Integrated Pest Management Plan

All requirements and mitigation measures described in these Management Plans will be observed during all activities to be carried out in the TAN Burrup Project site area.

4.22 DISCIPLINARY ACTIONS

SUBCONTRACTORS are required, in accordance with Project HSE regulations, to comply with all HSE requirements described in this Site HSE Plan. It is imperative that employees at all levels comply with the provisions and directives of the HSE requirements at all times while working.

First single deviation of PROJECT Health, Safety and Environmental requirements will lead to immediate notification to the employee.

Second deviation of employees lead to repeat safety course related to the subject of violation. A written warning must be given to the employee requiring his signature.

Third deviation, lack of co-operation or dangerous violations with regard to any HSE requirements lead the employee to be removed from the work. Documentation of this incident is mandatory and does not require the signature of the employee. Depending on the deviation instant-dismissal is possible.

5. REFERENCES

5.1 COMPANY SPECIFICATIONS AND PROCEDURES

- Public Environmental Review for Yara Pilbara Nitrates Pty Ltd. (PER)
- YPNPL Works approval (15/07/2011)
- State of WA Statement No. 870 (07/07/2011)
- Commonwealth Approval letter from DEC (14/09/2011)
- Appendix D-6 - HES Requirements during Construction & Fabrication
- Yara-TOPS 1-02 Work permits
- Yara TOPS 1-07 Fire Prevention
- Yara-POL-01 Health, Environment, Safety, Quality and Product Stewardship
- Yara-POL-03 Corporate Social Responsibility Policy and Code of Conduct
- Yara-DIR-01 Health, Environment, Safety, Quality, Product Stewardship and Security
- Yara-DIR-01-P01 Reporting of accidents, near-miss incidents, sick leave, environmental incidents, and security breaches
- Yara-DIR-01-P02 Investigation and follow-up of accidents and near-miss incidents
- Yara-DIR-01-P08 Yara Emergency Response Plan
- 650-508-PTW-000-0004 Permit to Work Procedure - Burrup Fertilizers Pty Ltd, Australia

5.2 LEGISLATION

- Environmental Protection Act 1986
- Occupational Safety and Health Regulations, 1996, version 07-f0-00 of 26 may 2010 (WA)
- Dangerous Goods Safety Act 2004 (WA)
- AS 2865 Confined Spaces
- AS 1319 Safety Signs for the Occupational Environment

- AS 1418 Cranes, hoists and winches
- AS 2550 Cranes, hoists and winches. Safe use
- BS EN 397 Specification for industrial safety helmets
- BS EN 166 Personal eye protection. Specifications
- BS EN 50144 Safety of hand-held electric motor operated tools. General requirements
- AS 1576 Scaffolding

5.3 PROJECT RELEVANT HSE DOCUMENTATION

2-250-329-PRO-TRE-0100	EP HSE Plan
2-250-329-PRO-TRE-0111	Construction Environmental Management Plan
2-250-329-PRO-TRE-0113	Construction Emergency Response Management Plan
2-250-329-PRO-TRE-0122	Hazardous Materials Management Plan
2-250-329-PRO-TRE-0126	Cyclone Management Plan
2-500-329-PRO-TRE-0002	Constructability Plan
2-500-329-PRO-TRE-0006	Heavy Lift Plan
2-250-329-PRO-TRE-0000	Project Execution Plan
2-250-329-PRO-TRE-0011	Modularization Concepts and Construction Strategies
2-250-329-PRO-TRE-0013	Modules Loading Charts to Ships Study

6. ATTACHMENTS

Attachment 1	HSE Yard considerations at Yard
Attachment 2	Project location and plot plan
Attachment 3	Site HSE Organization Chart
Attachment 4	List of Critical operations
Attachment 5	HSE Inspection Sheet
Attachment 6	HSE Deviations Notification
Attachment 7	Accident/ incident Report

Attachment 01. HSE Yard Considerations

The TAN Burrup Project will be performed by means of modular construction and therefore, these HSE Requirements are applicable to all activities to be performed by SUBCONTRACTOR and any of its SUBCONTRACTORS as part of the activities to be carried out in the yard where modules are being constructed.

A different independent CONSTRUCTION HSE PLAN will set out all HSE Requirements to be complied with while working inside TAN Burrup Project site area at the Burrup Peninsula where the modules are going to be installed, erected and hooked up.

Modules construction will be performed in a currently existing and operating yard which shall be ruled and managed by a Qualified SUBCONTRACTOR. Prior to awarding yard works to any SUBCONTRACTOR CONTRACTOR shall assess its HSE Management System and normal performance in order to recommend its qualification or not recommend it. Final proposed Yard SUBCONTRACTOR shall be subject to COMPANY approval.

The module fabrication SUBCONTRACTOR will execute the following scope of work in the yard:

- Steel structure supply and erection
- Detail engineering and calculation of connections
- Piping prefabrication & erection
- Equipment erection
- Supports supply, prefabrication & erection
- Issue of workshop / erection drawings
- Purchase of raw material
- NDT activities

- Hydrotest test total or partially of pipe executed in yard
- Supply and application of painting
- Supply and execution of insulation works
- Supply and execution of module fireproofing
- Aboveground grounding
- Module lighting
- Instruments erection
- Cable connecting and loop testing from instrument to junction box
- Performance of any Pre-Commissioning works that can be completely total or partially executed in the module in yard, including flushing and drying
- Finish the module to ready to transport (cover equipment and structures, piping ends covered, temporary structure, etc.)

Awarded module fabrication SUBCONTRACTOR will be committed to ensure health and safety of all workers and visitors as well as to take all necessary appropriate measures to protect the environment and avoid or reduce to a minimum any inconvenience to the public.

SUBCONTRACTOR shall have an adequate HSE Management System implemented as per international standard OHSAS 18001 or equivalent. Therefore, qualified SUBCONTRACTOR will be used to performing activities under a corporate HSE Policy which shall be the basis upon which the whole HSE Management Manual and procedures will be developed and implemented. Qualified and experienced personnel will be assigned as HSE Supervisors who will be in charge of ensuring adequate HSE performance at all times and compliance with all applicable rules and standards. The ratio of HSE personnel to workers will be of 1 HSE Supervisor to every 50 workers, unless otherwise required by CONTRACTOR.

CONTRACTOR will appoint a HSE Supervisor assigned full time to the yard who will be responsible for ensuring compliance with Project HSE requirements and appropriate HSE performance while carrying out every activity.

This HSE Management System in place shall be applicable during the Project modules construction and, therefore shall be in compliance with all national and local regulations as well as with CONTRACTOR specific requirements. The HSE Manual and Procedures will be submitted to CONTRACTOR for comments and approval and any document shall be modified and re-issued by SUBCONTRACTOR as per CONTRACTOR requirements for the performance of the works regarding the construction of modules for the TAN Burrup. All these HSE documents shall be submitted to COMPANY upon request.

Monthly HSE Reports including HSE performance statistics and monthly HSE highlights shall be prepared by SUBCONTRACTOR and submitted to CONTRACTOR on a monthly basis, who shall provide them to COMPANY upon request.

Periodic HSE audits will be carried out by CONTRACTOR HO HSE team to the yard where activities are being performed in order to ensure appropriate HSE performance at all times. COMPANY will be informed in advance of these audits' performance so that any COMPANY representative may participate in such audits as deemed necessary. As a minimum, the following HSE issues shall be audited:

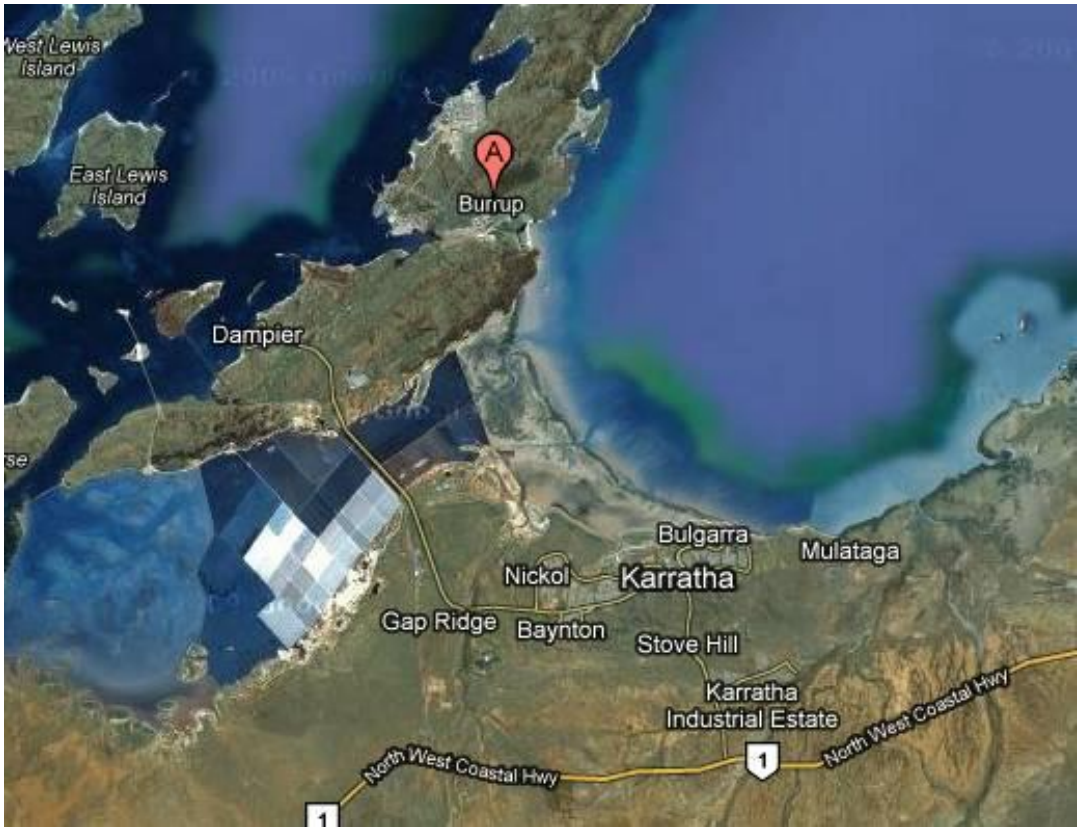
- Compliance with all applicable standards, procedures and regulations
- Personal Protective Equipment (use, condition and inspection).
- Steel erection and hole openings
- Hot works
- Electrical installations
- Compressors, hoses and compressed air tools
- Signs, signals, barricades

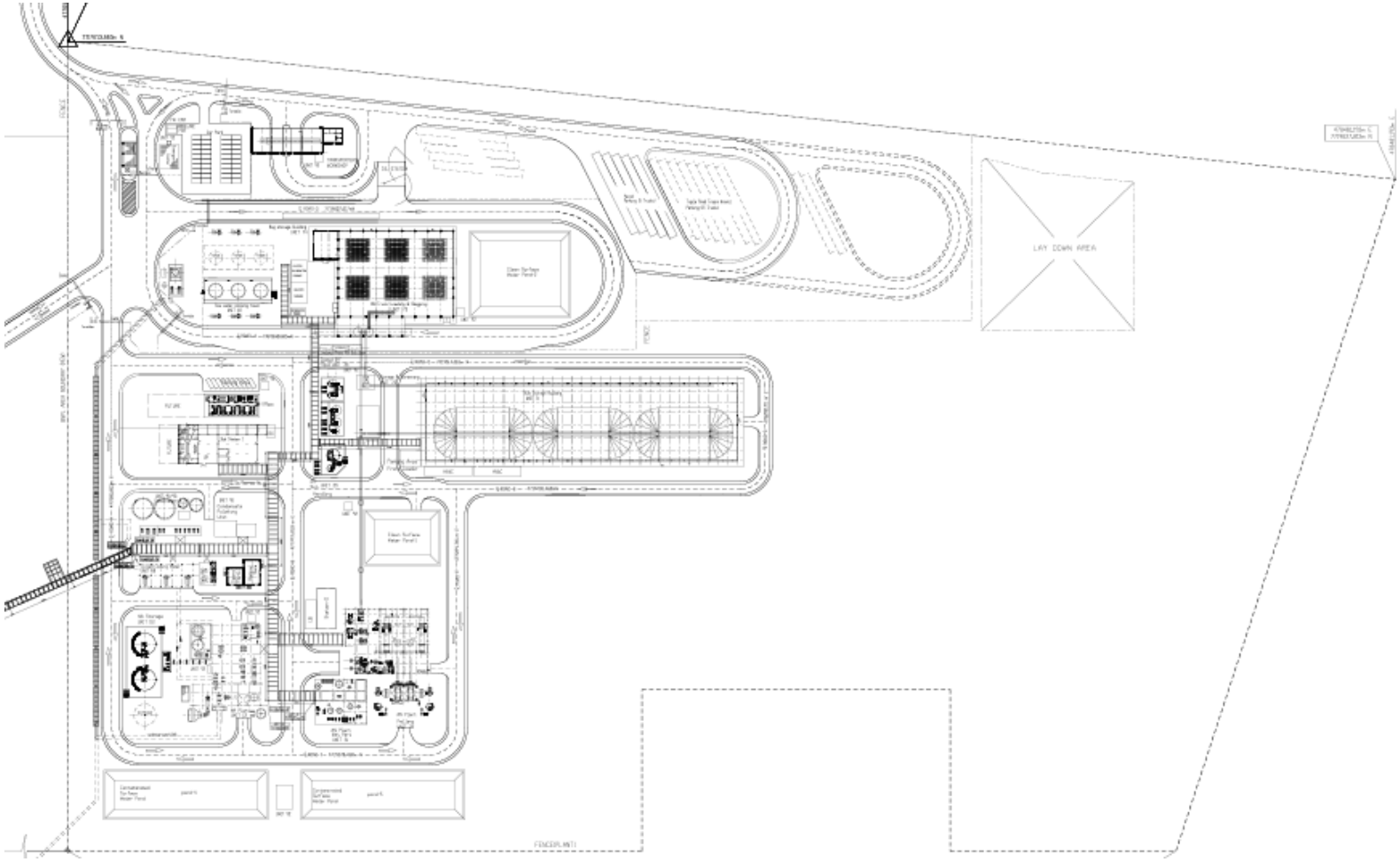
- Scaffolding, ladders and elevated work platforms
- Fire prevention and protection
- Equipment operations
- Hazardous materials
- Confined spaces
- Hand and powder actuated tools
- Housekeeping
- Health and hygiene
- Emergency preparedness
- Hazard communication program
- Work permits
- Inspections
- Education and training (personnel qualification and habilitations as applicable)
- Motivation and disciplinary actions
- Accident / incident investigation
- Environment and waste management

All findings shall be dealt with by means of proposing corrective measures that shall be put in place as soon as possible. The effectiveness of these measures will be assessed by yard SUBCONTRACTOR and evidenced to CONTRACTOR upon request.

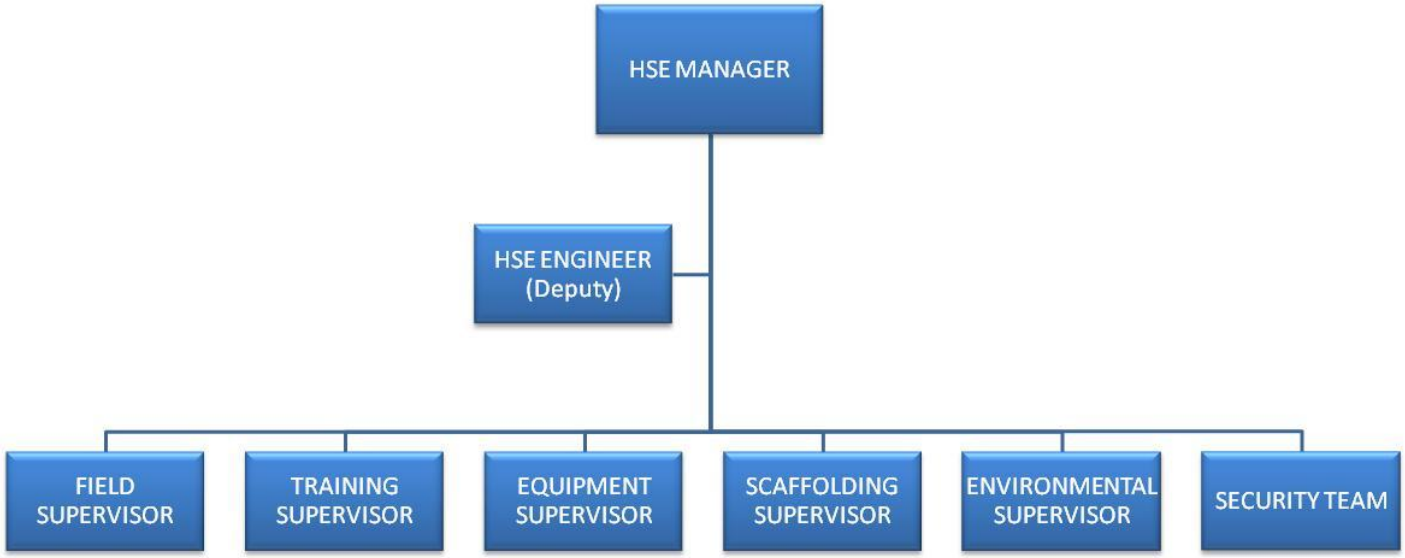
COMPANY may require additional audits to be performed to the yard. CONTRACTOR and yard SUBCONTRACTOR shall collaborate during such audits as required.

Attachment 02. Site location and plot plan





Attachment 03. HSE Organization Chart



Attachment 04. List of Critical Operations

The following is a list of Critical Operations concerning works on Site for the Tan Burrup Project:

- Heavy lifts above 5 tones (i.e. lifting of process modules, pipe rack modules, equipment, landing of prefabricated modules, etc.)
- Modules Road transportation with SPMT
- Blasting operations
- Connections to medium voltage lines
- Working at heights
- Work in Confined Spaces
- Hot works (i.e. tie-ins and others)
- Works inside YPFPL operating plant.

The list of critical operations shall be updated on a weekly basis during the construction phase of the project.

Attachment 05. HSE Inspection Sheet

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WEEKLY HSE INSPECTION SHEET

Week:		Time:	
Company:		Date	
Work Area:			
Work Type:			
Subcontractor HSE Manager:			X<o=8,5 UNACCEPTABLE
TR HSE Supervisor:	Overall Score		8,5<X<9,5 ACCEPTABLE
TR Area Superintendent:			X>O=9,5 EXCELLENT
TR HSE Superintendent:			

CONTROL	E	A	U	S	CONTROL	E	A	U	S
General					**Tool & Device**				
Order & Cleanliness					Elevation & Traction				
Material Handling					Manual Tool				
Material Storage					Rope, Cable & Chain				
Scaffold, Stairs & Ladder					Lifting Procedure				
Platform & Ramp					Hyd. & Pneumatic Test				
Lighting					Electrical Tools				
Equipment Access					Earthing				
Hygienic Installations									
					Collective Protection				
Personnel					Trench & Excavation Protection				
ID card					Warning Signal				
Uniform					Mach. Protection Guard				
Behavior					Electrical Run				
					Fire Fighting Equip. (Required by Permit)				
Machine (Descrip-Place)					Excavation with Explosive				
Cranes									
Compressors/Diesel Electical Generators					**Personal Protection**				
Welding Equipment					Head				
Radiography Equipment					Face				
Sandblasting Equipment					Eyes				
Painting/Coating Equipment					Hand				
Water Pressure Equipment					Leg				
Chemical Cleaning Equipment					Foot				
Man Lift machines					Respiratory				
Civil Works Heavy Machinery					Against Fall				
					Special				
Vehicle					Required Permission				
Personal									
Bus					**Enviromental issues**				
Truck					Segregation and storage of wastes				
Dump Truck					Spill prevention				
Trailer					Heavy equipment combustion gases monitoring				
Speed Control					Noise Management				
					Chemical MSDS provided				
System					Housekeeping				
Training									
Meeting									
Permit to Work					**Safety Miscellaneous**				
Emergency Response									
Fire protection					Standards				
Field Inpection					Work Permission				
Incident/ Accident Investigation					Extinguishers				
Record Keeping					Alarm & Evacuation				
					Accident Procedure				

Remarks:	

Qualification Form: Safety Index	Ponderate Safety Total $= P = \sum_{1}^{N} S = \sum_{1}^{N} Value \times K =$	0
Control Index: Excellent(E) = 10 Acceptable (A) = 5 Innaceptable (I) = 0	Safety Maximum Total $= M = \sum_{1}^{N} 10 \times K =$	0
Remark Ponderate Safety = S = Value x K	Safety Index $= I = \frac{P}{M} \times 10 =$	

ATTACHMENT 06. - HSE Deviations Notification

HSE DEVIATIONS NOTIFICATION

REPORT Nº.:
TO:
COMPANY:
DATE:
WORK AREA:

DEVIATIONS
DETECTED DEVIATIONS:
PROPOSED SOLUTIONS:

REMARKS:

HSE MANAGER:

ATTACHMENT 07. Accident/ incident Report

INCIDENT/ACCIDENT REPORT

GENERAL INFORMATION:

INCIDENT DATE: _____ PLANT: _____
INCIDENT TIME: _____ AREA: _____

INCIDENT/ACCIDENT CONSEQUENCE: (Put a cross in the right answer)

☐ Cuasi-accident _____
☐ Personal Injury _____

Name of Injured Person (s): _____

Company: _____
Injured Body Part: _____
Injury Type: _____

☐ Product _____
Spill/Release: _____
Quantity: _____

☐ Fuel _____
Fire/Explosion: _____
Fire equipment used: _____

☐ Material Damages: _____

Medical assistance required: YES ☐ NO ☐
Lost Work: YES ☐ NO ☐
Notification to Official Authorities? YES ☐ NO ☐

INCIDENT/ACCIDENT DESCRIPTION: _____

WITNESS REPORT: _____

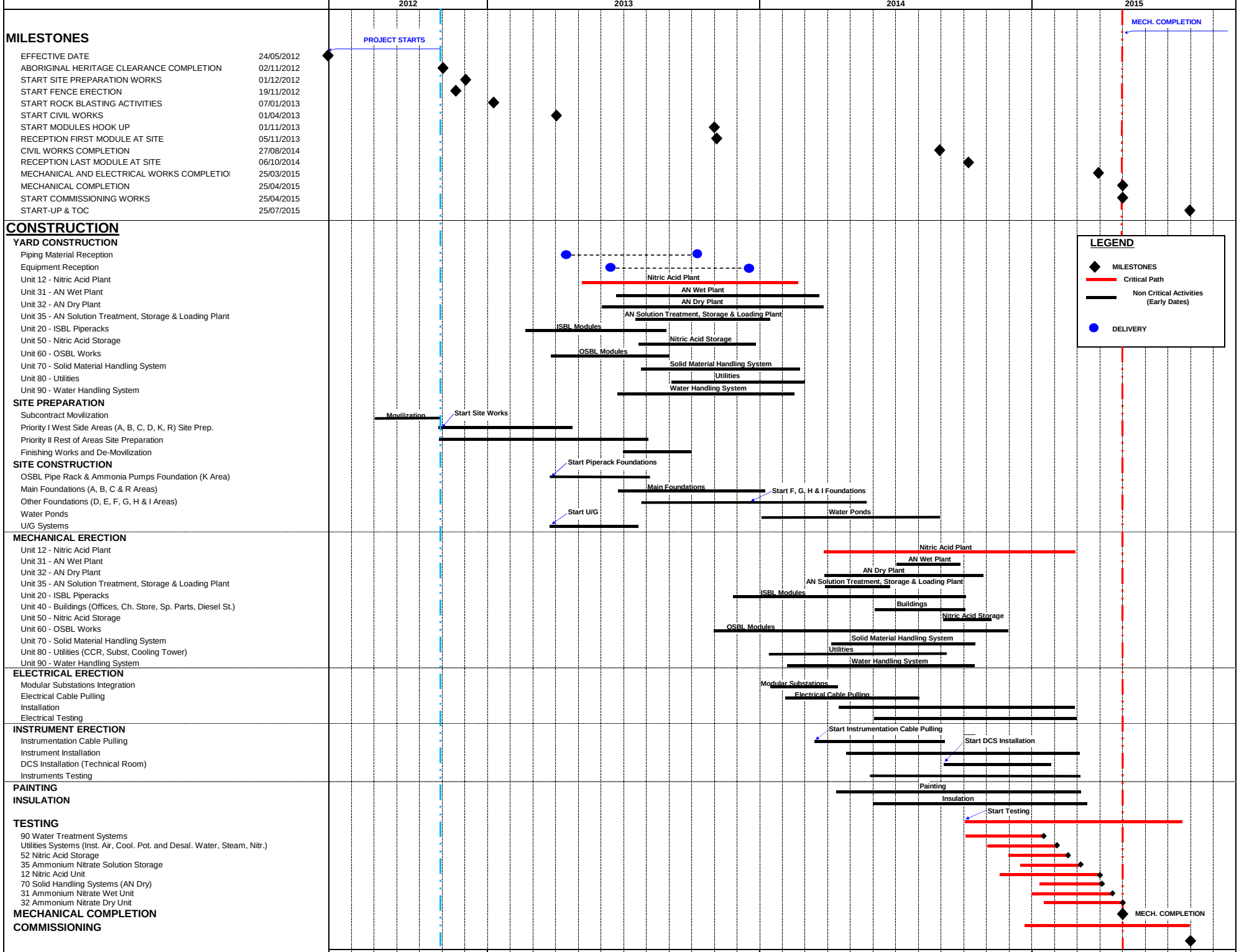
INCIDENT/ACCIDENT POTENTIAL CAUSES: _____

CORRECTIVE ACTIONS TAKEN: _____

CORRECTIVE ACTIONS FOLLOW-UP: _____

* Attach additional sheets if required

Signed by SUBCONTRACTOR



LEVEL1

PROJECT MASTER SCHEDULE

CLIENT: BNPL

SITUATION: TAN BURRUP

PROJECT: 02080

TECNICAS REUNIDAS

YARA

2-250-329-PRO-TRE-0111-tmp.01

WEEKLY HSE INSPECTION SHEET

Week:		Time:	
Company:		Date	
Work Area:			
Work Type:			
Subcontractor HSE Manager:			X< o =8,5 UNACCEPTABLE
TR HSE Supervisor:	Overall Score		8,5<X<9,5 ACCEPTABLE
TR Area Superintendent:			X> O = 9,5 EXCELLENT
TR HSE Superintendent:			

CONTROL	E	A	U	S	CONTROL	E	A	U	S
General					**Tool & Device**				
Order & Cleanliness					Elevation & Traction				
Material Handling					Manual Tool				
Material Storage					Rope, Cable & Chain				
Scaffold, Stairs & Ladder					Lifting Procedure				
Platform & Ramp					Hyd. & Pneumatic Test				
Lighting					Electrical Tools				
Equipment Access					Earthing				
Hygienic Installations									
					Collective Protection				
Personnel					Trench & Excavation Protection				
ID card					Warning Signal				
Uniform					Mach. Protection Guard				
Behavior					Electrical Run				
					Fire Fighting Equip. (Required by Permit)				
Machine (Descrip-Place)					Excavation with Explosive				
Cranes									
Compressors/Diesel Electical Generators					**Personal Protection**				
Welding Equipment					Head				
Radiography Equipment					Face				
Sandblasting Equipment					Eyes				
Painting/Coating Equipment					Hand				
Water Pressure Equipment					Leg				
Chemical Cleaning Equipment					Foot				
Man Lift machines					Respiratory				
Civil Works Heavy Machinery					Against Fall				
					Special				
Vehicle					Required Permission				
Personal									
Bus					**Enviromental issues**				
Truck					Segregation and storage of wastes				
Dump Truck					Spill prevention				
Trailer					Heavy equipment combustion gases monitoring				
Speed Control					Noise Management				
					Chemical MSDS provided				
System					Housekeeping				
Training									
Meeting									
Permit to Work					**Safety Miscellaneous**				
Emergency Response									
Fire protection					Standards				
Field Inpection					Work Permission				
Incident/ Accident Investigation					Extinguishers				
Record Keeping					Alarm & Evacuation				
					Accident Procedure				

Remarks:

Qualification Form: Safety Index

Control Index:
Excellent(E) = 10
Acceptable (A) = 5
Innaceptable (I)= 0

Remark Ponderate Safety = S = Value x K

Ponderate Safety Total $= P = \sum_{1}^{N} S = \sum_{1}^{N} Value \times K =$ 0

Safety Maximum Total $= M = \sum_{1}^{N} 10 \times K =$ 0

Safety Index $= I = \frac{P}{M} \times 10 =$

TECNICAS REUNIDAS

YARA

Template 02 (2-250-329-PRO-TRE-0111-tmp02) Rev. 0

INCIDENT/ACCIDENT REPORT

GENERAL INFORMATION:

INCIDENT DATE: _____ PLANT: _____

INCIDENT TIME: _____ AREA: _____

INCIDENT/ACCIDENT CONSEQUENCE: (Put a cross in the right answer)

☐ Cuasi-accident _____

☐ Personal Injury _____

Name of Injured Person (s): _____

Company: _____

Injured Body Part: _____

Injury Type: _____

☐ Product _____

Spill/Release: _____

Quantity: _____

☐ Fuel _____

Fire/Explosion: _____

Fire equipment used: _____

☐ Material Damages: _____

Medical assistance required: YES ☐ NO ☐

Lost Work: YES ☐ NO ☐

Notification to Official Authorities? YES ☐ NO ☐

INCIDENT/ACCIDENT DESCRIPTION: _____

WITNESS REPORT: _____

INCIDENT/ACCIDENT POTENTIAL CAUSES: _____

CORRECTIVE ACTIONS TAKEN: _____

CORRECTIVE ACTIONS FOLLOW-UP: _____

* Attach additional sheets if required

Signed by SUBCONTRACTOR