Yara Pilbara Nitrates

2017 Annual Compliance Report

EPBC 2008/4546

18 February 2016 – 17 February 2017

Technical Ammonium Nitrate Plant

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Declaration of Accuracy

Yara Pilbara Nitrates Pty Ltd (YPN) is pleased to submit this Annual Compliance Report as per condition 3 of the EPBC 2008/4546 Approval Decision (dated 14 September 2011).

In making this declaration, I am aware that sections 490 and 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) make it an offence in certain circumstances to knowingly provide false or misleading information or documents. The offence is punishable on conviction by imprisonment or a fine, or both. I declare that all the information and documentation supporting this compliance report is true and correct in every particular. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed	.....
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1 Introduction

1.1 Purpose

The purpose of the Annual Compliance Report (ACR) is to annually report compliance with all conditions of EPBC 2008/4546 Approval Decision, issued on 14 September 2011, as per Condition 3:

> *"Condition 3 Within three months of every 12 month anniversary of the commencement of the action, the person taking the action must publish a report on their website addressing compliance with each of the conditions of this approval, including implementation of any management plans and monitoring programs as specified in the conditions. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the Department at the same time as the compliance report is published."*

This ACR is prepared in accordance with the Annual Compliance Report Guidelines (Commonwealth of Australia, 2014) and is due to be submitted to the Commonwealth Department responsible for administrating the *Environmental Protection & Biodiversity Conservation Act 1999* (EPBC Act) annually by 18 May.

1.2 Scope

This ACR (hereinafter referred as "2017 ACR") applies to the Project being developed by Yara Pilbara Nitrates Pty Ltd (YPN) to construct and operate a Technical Ammonium Nitrate (TAN) production facility (TAN Plant) located on Lot 3017 within the Burrup Strategic Industrial Area on the Burrup Peninsula, Western Australia. The TAN Plant is located approximately 13 kilometres (km) north-west of Karratha.

Implementation of the proposal is subject to the conditions of EPBC 2008/4546 Approval Decision, as amended. YPN as the Proponent must ensure implementation of EPBC 2008/4546 Approval Decision conditions. The conditions to EPBC 2008/4546 have been varied by two separate variations of conditions of approval made under Section 143 of the EPBC Act:

- Variation to conditions 8(d), 10 and 11, dated 18 December 2013; and
- Variation to condition 10(c)iv, dated 10 February 2014.

The 2017 ACR assesses compliance against the conditions for works carried out during the reporting period 18 February 2016 to 17 February 2017.

1.3 Project Details

The TAN Plant will have a production capacity of 350,000 tonnes per annum (TPA) or 915 tonnes per day (TPD) of TAN. The project comprises three major process units, each producing a separate product in the manufacturing process:

1. Nitric Acid plant to convert ammonia and atmospheric air into Nitric Acid (NA). The NA unit has a capacity of 760 TPD as 100% weight. The main feedstock, ammonia, shall be delivered from the adjacent ammonia plant.
2. Ammonium Nitrate (AN) Solution plant to convert ammonia and NA into AN solution. This AN wet section has a capacity of 965 TPD in balance with nitric acid production capacity.
3. TAN plant to convert AN solution into TAN prills (final product). This is a dry section for production of TAN prills (0.7 and 0.8 kg/L density) with a capacity of 915 TPD. Surplus AN solution shall be sold as liquid.

The project also has storage, loading and transport facilities, including an incoming liquid ammonia pipeline, bulk and bagged TAN storage, bulk loading system, bagging unit and truck loading.

1.4 ACR Public Availability

This 2017 ACR is to be placed on the yara.com.au website, or an equivalent website, for the life of the Project. At the time of publication of this 2017 ACR it is publically available at:

http://yara.com.au/about-yara/about-yara-local/yara-pilbara/nitrates/

A URL link to the uploaded report will be sent to the Compliance and Enforcement Branch through the post.approvals@environment.gov.au email address.

2 Current Status

During the reporting period construction of the Project has been completed and commissioning has substantially progressed. The Project was formally opened on 25 August 2016.

Significant milestones achieved during the period include pre-commissioning of major process units, commissioning of most utilities and services and mechanical completion of the outstanding plant and facilities.

The Commissioning Environmental Management Plan (EMP), approved by the Western Australian Department of Environment Regulation (DER) (as a requirement of Works Approval 4701/2010/1) remains in effect along with the approved Construction EMP. An Operational EMP (including Hazardous Materials Management Plan) and updated Emergency Response Management Plan for the TAN plant has been submitted to the Department of the Environment and Energy (DEE) for review.

Environmental monitoring and reporting has continued during the reporting period, as YPN has continued transitioning the TAN plant site from the Engineering Procurement Construction (EPC) contractor to YPN operational control. Under the terms of the EPC contract resourcing environmental management and reporting are the responsibility of the contractor. During the reporting period Yara Pilbara assumed responsibility for these functions.

During the reporting period YPN continued to financially contribute through the Burrup Rock Art Technical Working Group (BRATWG) to the DER rock art monitoring program. YPN have been informed that the 2015 and 2016 monitoring was completed in August of each year with a draft report issued to BRATWG. However, this monitoring report has not been published on the DER website nor has YPN been provided a copy, though YPN understands that the draft report has been made available to third parties for review.

YPN supports the ongoing operation of BRATWG, even though BRATWG completed its five (5) year term of engagement on 30 June 2016. It is YPN's preference that the ongoing program of monitoring Aboriginal rock art and air quality surrounding the TAN Plant be undertaken within the BRATWG framework and is coordinated with other Burrup industry monitoring efforts.

During the reporting period, on 28 September 2016, two DEE offices attended site for a compliance monitoring inspection of EPBC (2008/4546).

On 30 November 2016, the Parliament of Australia's Senate referred an inquiry into the protection of Aboriginal rock art of the Burrup Peninsula to the Senate Environment and Communications References Committee for inquiry and report by 21 March 2017. On 20 March 2017 the Senate granted an extension of time to report until 10 May 2017. Yara Pilbara was invited to provide a submission (which was submitted on 27 January 2017) and attend the Public Hearing held in Canberra on 17 February 2017.

3 Compliance

3.1 Statement of Compliance

The results of the assessment of compliance with EPBC2008/4546 approval conditions are shown in Table 1.

A total of 15 items were assessed. The assessment found the following:

- 11 items were found as compliant;
- 2 items were found as potentially non-compliant; and
- 2 items were found as not applicable.

As reported in the 2016 ACR, in preparation of this 2017 ACR YPN has identified some gaps in evidence, specifically with reference to historic correspondence between YPN and various regulators that has been cited as evidence in previous ACRs. Where YPN does not currently have the original or a copy of the evidence, but reference to the evidence has been previously made, the evidence has been flagged as "not sighted". A full list of "not sighted" evidence is provided within Section 6.

In assessing compliance the following definitions have been used:

Designations	Definition
Compliant	'Compliance' is achieved when all the requirements of a condition have been met, including the implementation of management plans or other measures required by those conditions.
Potentially Non-compliant	A designation of 'potentially non-compliant' is given where the requirements of a condition or elements of a condition, including the implementation of management plans and other measures, have not been met.
Not applicable	A designation of 'not applicable' is given where the requirements of a condition or elements of a condition fall outside of the scope of the current reporting period. For example a condition which applies to an activity that has not yet commenced

3.2 EPBC2008/4546 Compliance Table

Table 1 EPBC2008/4546 Compliance Table

Condition Number	Condition	Is the Project compliant with this condition?	Evidence / Comments
1	Within 30 days after the commencement of the action, the person taking the action must advise the Department in writing of the actual date of commencement.	Compliant	Letter sent to SEWPaC on 17 February 2013 (not sighted).
2	The person taking the action must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement the plan(s) and program(s) required by this approval, and make them available upon request to the Department. Such records may be subject to audit by the Department or an independent auditor in accordance with section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the Department's website. The results of audits may also be publicised through the general media.	Compliant	Documentation is available upon request by the Department.
3	Within three months of every 12 month anniversary of the commencement of the action, the person taking the action must publish a report on their website addressing compliance with each of the conditions of this approval, including implementation of any management plans and monitoring programs as specified in the conditions. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the Department at the same time as the compliance report is published.	Compliant	This report "2017 Annual Compliance Report " meets the requirement for the report.
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 (MUBRL).	Compliant	Discharge of cooling tower blowdown water commenced during the reporting period. Daily water samples were taken and compiled into weekly composite samples. These samples were analysed by a NATA accredited laboratory. Water quality results are reported to Water Corporation (proponent for Statement 594) and YPN participates in regular MUBRL User Group meetings.
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 (Attachment 1) 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 the management plan.	Compliant	No mosquito larvicide or adulticide has been applied within the TAN Plant site during the reporting period.

Condition Number	Condition	Is the Project compliant with this condition?	Evidence / Comments
6	To ensure the protection of listed threatened species and listed migratory species, the person taking the action must: a) Employ such structures and apparatus as are necessary and agreed by the Western Australian Department of Environment and Conservation to deter birds from entering the contaminated water pond, clean water pond, and sewage wastewater treatment station evaporation pond, as per Condition 7.1 (Appendix 4) in the Environmental Protection Authority's recommendation report; and b) Ensure these structures and apparatus are in place prior to commissioning.	Compliant	a) Bird deterrent systems were assessed and the preferred option agreed by Department of Parks and Wildlife as appropriate for the site (Attachment 6A). b) Bird deterrent wires have been installed over contaminated water ponds, clean water ponds, and sewage wastewater treatment evaporation pond, as described in the Bird Deterrent Systems Assessment Report (Attachment 6B) and photograph (Attachment 6C).
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 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) 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). b) Operational Environmental Management Plan (OEMP), must be submitted to the Department at least two (2) months prior to operation and must include, but not be limited to, management measures for the following: • Erosion Control and Storm Water; • Water Quality; • Air Quality and Dust; • Waste; • Traffic; and • Blasting (if required). c) Additional management plans, including those covering both construction and operation, must be submitted to the Department at least two (2) months prior to construction, including: • Aboriginal Heritage Management Plan; • Hazardous Materials Management Plan; and • Emergency Response Management Plan. Construction and operation cannot begin until the management plans mentioned above have been approved by the Minister. The contents of these management plans, and any other construction or operation management plans required for the project, must not contain management actions that are inconsistent with these approval conditions or the National Heritage management principles.	Compliant	Construction Environmental Management Plan (CEMP), Hazardous Material Management Plan (HMMP) and Emergency Response Management Plan (ERMP) were sent to SEWPaC on 22 September 2012 and approved on 22 November 2012 (Attachment 7A). The Aboriginal Heritage Management Plan (AHMP) was approved by SEWPaC on 24 October 2012 (Attachment 7B). During the reporting period the following management plans were implemented: Construction Environmental Management Plan (CEMP) including management measures for: • Air Quality and Dust; • Water Quality; • Erosion Control and Storm Water; • Waste; • Traffic; Additionally, the following management plans were implemented: • Aboriginal Heritage Management Plan; • Hazardous Materials Management Plan; and • Emergency Response Management Plan: An Operational Environmental Management Plan (650-200-PLN-YPN-0001) (OEMP) and revised Emergency Management Plan (250-500-PLN-000-0003) was submitted to DEE for review on 6 December 2016 (Attachment 7C). Neither the OEMP nor the Emergency Management Plan was approved by DEE during the reporting period.

Condition Number	Condition	Is the Project compliant with this condition?	Evidence / Comments
8 *Note: modified as per variation 18/12/2013*	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 ensure that: a) Chain mesh fencing of at least 2.5 metres in height is installed around the perimeter of the project site prior to construction. b) Signs of at least 1m^2 in size are attached to fencing at the entrance to the project site and at no less than 50 metre intervals along the fence. These signs must clearly indicate that no construction and operation staff are permitted to enter areas surrounding the project site that contain manmade structures of a type mentioned in the Dampier Archipelago (including Burrup Peninsula) National Heritage Place Gazette notice and/or engravings and/or standing stones and/or archaeological material associated with any of the afore mentioned items unless their work specifically requires them to do so, and they have received permission from the construction manager and project archaeologist. c) The relevant supervisor records the names of all those required to access areas containing rock art sites inside the National Heritage boundary and is able to provide these records if asked to do so by the Department. Unauthorised access to areas containing rock art sites inside the National Heritage boundary must be reported to the Department in writing within 72 hours. *Note: 8d) has been deleted as per variation 18/12/2013.* e) Any impact the action has on the heritage values of the Dampier Archipelago (including Burrup Peninsula) National Heritage Place must be reported to the Department in writing within 72 hours. Impacts may include (but will not necessarily be limited to) any impacts caused by construction activity; vandalism perpetrated by personnel involved in plant construction or operation; spillage of potentially corrosive materials into the National Heritage Place; impacts from blasting activity.	Compliant	a) Chain mesh fencing installed b) Signs have been installed. c) records of personnel on site are tracked. e) YPN is not aware of any impacts to the National Heritage Place resulting from TAN Plant activities or personnel involved in the construction or operation of the TAN Plant.
9	To protect the 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 (NOx); • Sulphur Oxides (SOx); 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	Potentially Non-Compliant	a) YPN has carried out an air quality monitoring program. Monitoring was carried out at the indicated off-site locations. These sites are those previously selected and operated for the original DEC/CSIRO monitoring program. However, construction commenced in February 2013 and monitoring commenced in late Q3/early Q4 2013 (Potential Non-Compliance). The monitoring continued during the reporting period and has been undertaken for a period of more than 24 months. NO_2 was monitored to determine NOx risks. SO_2 was monitored to determine SOx risks. NH_3 was monitored to determine NH_4+ (ammonium ion) risks. Airborne dust was monitored at the Water Tanks site as TSP using a MiniVol sampler, to provide 24-hour average concentrations. A baseline TSP data set has been prepared for the off-site locations from PM_{10} monitoring conducted at the TAN Plant boundary, with 5-minute PM_{10} concentrations observed for selected wind direction not affected by the construction activities utilised to calculate 24-hour averages. The TSP concentrations were derived from co-located HVAS (high volume air samplers) TSP and PM_{10} data, with the proportion of PM_{10} in TSP calculated from those measurements. The TSP data set will be augmented by the TSP measurements made at Water Tanks site, PM_{10} data from all three (3) sites over the 24 months and more recent TSP measurements at all three (3) sites. The term "…including dust…" has been interpreted to mean dust deposition. As such, dust deposition sampling and analysis was carried out in the monitoring program.

Condition Number	Condition	Is the Project compliant with this condition?	Evidence / Comments
	Department in writing within 12 months of the completion of construction or following twenty four (24) months of baseline monitoring (which ever 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 NOx, SOx 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.		b) Details of the organisations involved in the air quality monitoring (sampling and analyses) are as follows: NH_3, NO_2 and SO_2 passive samplers from CSIRO were deployed by YPN laboratory staff under instruction and as per training provided by CSIRO. YPN laboratory and environmental staff collectively have over 5 years' experience in the deployment of environmental samplers, including dust monitors. The laboratory is also highly experienced at gravimetric analysis of dust samples. CSIRO NH_3, NO_2 and SO_2 passive samplers were analysed by CSIRO using in-house developed methods. CSIRO scientists have >5 years' experience with air quality monitoring and analysis of passive samples. NH_3, NO_2 and SO_2 Radiello passive samplers have now replaced the CSIRO samplers. The Radiello samplers are deployed by YPN laboratory staff as per methodology provided by Radiello (Fondazione Salvatore Maugeri IRCCS). Radiello samples are analysed by Leeder Analytical, who are NATA accredited. TSP and dust deposition sampling was carried out by YPN laboratory staff under instruction from Lear Siegler Australasia (providers of sampling equipment). Recent dust monitoring services have been provided by Compliance Monitoring. Lear Siegler and Compliance Monitoring are NATA accredited for dust monitoring. TSP and dust deposition samples were previously analysed by YPN laboratory using gravimetric methods. Those analyses are now carried out by Compliance Monitoring. Automatic rain water sampling is carried out at off-site locations, with samples recovered by Yara laboratory staff. Chemical analyses were carried out by CSIRO using in-house developed methods. Recent analyses are carried out by ALS (NATA accredited laboratory). The review of the ambient air quality monitoring program and preparation of the baseline monitoring report is being undertaken by Dr Peter Forster, Strategen Environmental Consultants Pty Ltd's air quality specialist (Attachment 9A). Peter has over 25 years' experience in air quality assessments, including monitoring of gaseous, semi-volatile and particulate pollutants. c) NH_3, NO_2 and SO_2 samples have been collected for >24 months and at least once in each quarter for each year. Dust deposition samples have been collected for >24 months and at least once in each quarter for each year. TSP samples have been collected for >24 months and at least once in each quarter for each year, from the Water Tanks site only. A baseline TSP data set has been developed from TAN plant boundary monitoring of PM_{10} for application to all three sites. Those data were collected for >24 months and at least once in each quarter for each year. d) Construction was completed in February 2016. Monitoring commenced in September 2013. Monitoring is still in progress, a Baseline Monitoring report is to be submitted when monitoring is completed, which will include a map of monitoring locations. e) Not relevant at this time. f) Not relevant at this time.

Condition Number	Condition	Is the Project compliant with this condition?	Evidence / Comments
10 *Note: modified as per variations 18/12/2013 and 10/02/2014*	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 participate in monitoring the rock art by: a) Contributing a pro-rata amount annually (in line with that currently utilised by the WA DER, but not exceeding $15,000/year) for a period of not less than two (2) years from the beginning of construction to DER for the DER-managed colour contrast and spectral mineralogy Monitoring Program (DER-managed Monitoring Program), which is an independent scientific program of monitoring, to detect any changes in patination, including any discolouration, of the surface of the rock art or the surrounding rock surface; b) If the DER-managed Monitoring Program continues after the completion of the two year period referenced in condition 10(a) above, the person taking the action must continue to provide the agreed annual contribution referenced in condition 10(a), for an additional period of five (5) years maximum or until the DER-managed Monitoring Program is concluded (whichever is reached first). c) In addition to the above condition 10(a) and 10(b) requirements, the person taking the action must provide for additional monitoring of rock art sites in a manner that is consistent with the DER-managed Monitoring Program. The monitoring of additional rock art sites must meet the following requirements. i. Engage a heritage monitor or other suitably qualified person (Heritage) to survey rock art sites within a two (2) kilometre radius of the project site, to provide advice on any changes to the appearance, or cultural value, of rock art sites within the examined area ii. The monitoring must be undertaken in a manner that is consistent with and complementary to the monitoring of rock art sites undertaken through the DER-managed Monitoring Program. If agreed by DER the monitoring of additional rock art sites may be integrated with the DER-managed Monitoring Program, with the person taking the action providing full contribution to the DER for the additional site monitoring. iii. Prior to undertaking condition 10(c) monitoring, provide the Department with written endorsement from a heritage monitor or other suitably qualified person (Heritage) on the suitability of the rock art monitoring proposed under condition 10(c). iv. Undertake the condition 10(c) rock art monitoring at least once annually, where the first rock art monitoring event must be undertaken within 16 months of the commencement of construction. v. The monitoring must continue for at least five (5) years of the plant's operations and until the person taking that action has demonstrated in writing, to the satisfaction of the Minister, that operation is not having unacceptable impacts on the rock art sites. vi. At least once annually, engage with the Murujuga Aboriginal Corporation in the planning and reporting associated with the annual survey of rock art sites required under condition 10(c). d) Within two (2) months of the results of the DER-managed Monitoring Program and monitoring undertaken under condition 10(c) being completed, the person taking the action must provide the results, including a report on the condition 10(c) monitoring to the Department and to the Murujuga Aboriginal Corporation. The person taking the action must also publish the monitoring report on their website at the same time as submitting it to the Department.	Potentially Non-Compliant	a) During the reporting period YPN continued to financially contribute (> $15,000/year) through the Burrup Rock Art Technical Working Group (BRATWG) to the Department of Environment Regulation's (DER) rock art monitoring program with the first payment being made in 2011. b) BRATWG completed its five (5) year term of engagement on 30 June 2016. YPN supports the ongoing operation of BRATWG. It is YPN's preference that the ongoing program of monitoring Aboriginal rock art and air quality at the original three (3) locations and additional three (3) locations (refer to c) below) surrounding the TAN Plant be undertaken within the BRATWG framework and is coordinated with other Burrup industry monitoring efforts. c) On 31 January 2014 (not sighted), YPN and BRATWG agreed to expand the rock art monitoring program within two (2) kilometres of the project site in order to comply with the variation condition received from Federal Government (Department of the Environment). In July 2014, the three (3) new sites became part of the BRATWG monitoring program. The Heritage Monitoring of the six (6) sites within 2 km of YPN's TAN Plant site in the Burrup Peninsula has been undertaken annually since 2013. The engravings and background rocks are measured in situ. Measurement of the annual colour and mineralogical changes utilised two spectrophotometer techniques, the Analytical Spectral Device (ASD) and the BYK colour spectrophotometer. On 2 December 2013 YPN submitted to the Department a letter from the CSIRO dated 27 November 2013 endorsing the suitability of the proposed rock art monitoring (Attachment 10A). YPN have been informed that the 2015 and 2016 monitoring was completed in August of each year and that CSIRO liaised with Murujuga Aboriginal Corporation prior to undertaking the monitoring. d) YPN have been informed that following the monitoring in August of both 2015 and 2016 a draft report was issued to DER and BRATWG. However, this monitoring report has not been published on the DER website nor has YPN been provided a copy. Consequently, YPN have not been able to submit the report to the DEE, the Murujuga Aboriginal Corporation nor publish the report on YPN's website as required by this condition (Potential Non-Compliance). YPN commit to providing the report to both the DEE and the Murujuga Aboriginal Corporation and publishing the report on YPN's website once the report has been received from DER.

Condition Number	Condition	Is the Project compliant with this condition?	Evidence / Comments
11 *Note: modified as per variation 18/12/2013*	If the results of the DER-managed Monitoring Program (colour contrast and spectral mineralogy monitoring) or additional monitoring required under condition 10(c) show there is evidence of changes in patination, including but not limited to discolouration of the surface of the rock art motif or the surrounding rock surface, including patina, the person taking the action must: a) Upon being notified that evidence of changes in patination of monitored rock art surfaces have been identified, notify the Department within 72 hours in writing of this reported change in the surface of the rock art; b) From the date that changes in patination of the rock art surface/s is reported (the event), continue to provide funds annually in the amount specified in condition 10(b) to the DER-managed Monitoring Program for a period of a further five (5) years (maximum) from the event date; c) Within two (2) months of the date that changes in patination of the rock art surface is reported, provide a management plan to the Minister for approval regarding the reported changes. This Management plan must include. i. a summary of the results of the DER-managed Monitoring Program and the air quality monitoring program required under condition 9 to that date, ii. a detailed description of the changes detected in the surface of the rock art motif {the event); iii. if identifiable, an analysis of the cause or causes of the detected change in the rock art surface. This analysis must be provided by a suitably qualified person from the DER-managed Monitoring Program; iv. details of consultation with a suitably qualified person to determine appropriate mitigation to further protect those rock art sites surrounding the project site from degradation; and v. a detailed plan for the continuation, for a further period of five (5) years from the date of the reported event, of the DER-managed Monitoring Program and the air quality monitoring program required under condition 9. If the Minister approves the management plan(s) required under condition 11(c), then the approved plan{s) must be implemented.	Not Applicable	YPN has not been notified of any evidence of changes in patination of monitored rock art surfaces.
12	If the person taking the action wishes to carry out any activity otherwise than in accordance with the management plan(s) and or monitoring program(s) as specified in the conditions, the person taking the action must submit to the Department for the Minister's written approval a revised version of that management plan(s) and or monitoring program(s). The varied activity shall not commence until the Minister has approved the varied management plan(s) and or monitoring program(s) in writing. The Minister will not approve a varied management plan(s) and or monitoring program(s) unless the revised management plan(s) and or monitoring program(s) would result in an equivalent or improved environmental outcome over time. If the Minister approves the revised management plan(s), and or monitoring program(s) that management plan(s) and or monitoring program(s) must be implemented in place of the management plan(s) and or monitoring program(s) originally approved.	Compliant	On 8 December 2016 a letter was submitted to Heather Cross at DEE requesting that the air quality monitoring conducted on site be consistent with the operational phase of the project as the construction phase air quality monitoring does not address the risks to air quality that the commissioning phase presents (Attachment 12A). No response received from DEE during the reporting period.

Condition Number	Condition	Is the Project compliant with this condition?	Evidence / Comments
13	If the Federal Minister believes that it is necessary or convenient for the better protection of National Heritage Place, listed threatened species and communities and listed migratory species to do so, the Minister may request that the person taking the action make specified revisions to the management plan(s), monitoring program(s) specified in the conditions and submit the revised management plan(s), monitoring program(s) for the Minister's written approval. The person taking the action must comply with any such request. The revised approved management plan(s), monitoring program(s), must be implemented. Unless the Minister has approved the revised management plan(s), monitoring program(s), then the person taking the action must continue to implement the management plan(s), monitoring program(s) originally approved, as specified in the conditions.	Not applicable	The Minister has made no request during the reporting period.
14	Unless otherwise agreed to in writing by the Minister, the person taking the action must publish all management plan(s) and monitoring program(s) referred to in these conditions of approval on their website. Each management plan(s) and monitoring program(s) must be published on the website within 1 month of being approved.	Compliant	YPN publishes all management plan(s) and monitoring program(s) on the website, http://yara.com.au/about-yara/about-yara-local/yara-pilbara/nitrates/ .
15	If, at any time after 2 years from the date of this approval, the person taking the action has not substantially commenced the action, then the person taking the action must not substantially commence the action without the written agreement of the Minister.	Compliant	The TAN Plant substantially commenced in 2012, within 2 years of the date of approval.

3.3 Details of Potential Non-Compliance(s)

3.3.1 Potential Non-Compliance – Condition 9(a)

Which EPBC approval condition number was non-compliant?
Condition 9(a) – commence air quality monitoring from the commencement of construction
Who detected the non-compliance?
YPN
On what date(s) was the non-compliance detected?
2 March 2017
Was the Department notified of the non-compliance and if so, when and how?
Yes, during a meeting with Department officers on 2 March 2017.
How the non-compliance was/will be corrected?
The non-compliance is unable to be corrected. However, the consequence of the monitoring not commencing from the beginning of construction is not considered significant as the majority of the monitoring has continued for longer than the required 24 months.
Who (the actual person completing the correction) was/is responsible for correcting the non-compliance?
Not applicable.
Date corrective measures were/will be commenced and/or completed or the timeframe for correction?
Not applicable.
What measures have been/will be taken to avoid recurrence?
Not applicable.

3.3.2 Potential Non-Compliance – Condition 10(d)

Which EPBC approval condition number was non-compliant?
Condition 10(d) – provide the results, including a report, on the condition 10(c) monitoring to the Department and to the Murujuga Aboriginal Corporation and publish the monitoring report on their website at the same time as submitting it to the Department.
Who detected the non-compliance?
YPN
On what date(s) was the non-compliance detected?
17 May 2016
Was the Department notified of the non-compliance and if so, when and how?
Yes. Letter from YPN, Brian Howarth, Subject: EPBC 2008/4546 Heritage Monitoring Report, dated 21 September 2016
How the non-compliance was/will be corrected?
YPN has made contact with representatives from DER (including the Minister for the Environment) to ascertain the status of BRATWG and the 2016 Burrup Rock Art Monitoring Report (based on the 2015 monitoring), however, at the date of this ACR, there has been no advice forthcoming.
Who (the actual person completing the correction) was/is responsible for correcting the non-compliance?
YPN's Health, Environment, Safety and Quality Manager, Brian Howarth
Date corrective measures were/will be commenced and/or completed or the timeframe for correction?
Formal written communication with the DER regarding the tenure of BRATWG commenced in September 2016.
What measures have been/will be taken to avoid recurrence?
Liaison with the Department of Environment & Energy to commence proceedings to vary the conditions under the EPBC Act.

4 Management Plans

During the reporting period the following management plans were implemented:

- Construction Environmental Management Plan (CEMP) including management measures for:
  - Air Quality and Dust;
  - Water Quality;
  - Erosion Control and Storm Water;
  - Waste; and
  - Traffic.
- Aboriginal Heritage Management Plan;
- Hazardous Materials Management Plan; and
- Emergency Response Management Plan:

An Operational Environmental Management Plan (650-200-PLN-YPN-0001) (OEMP) and revised Emergency Management Plan (250-500-PLN-000-0003) was submitted to DEE for review on 6 December 2016 (Attachment 7C).

On 8 December 2016 correspondence was submitted to DEE seeking consent to implement operations phase on-site air quality monitoring, reflecting the environmental risks relevant to the current commissioning phase of the project.

5 New Environmental Risks

The construction phase of the TAN Plant is complete. During the 2016-2017 reporting period the TAN Plant moved into commissioning phase. During the 2017-2018 reporting period it is expected that the TAN Plant will begin operations phase and the environmental risks will reflect this. An Operations Environmental Management Plan has been developed for the TAN Plant and once approved by the Department will be implemented to control the environmental risks associated with the facility.

No new environmental risks that were not contemplated in the Project referral and assessment process have been identified.

6 Attachments

The following documents are attached to this 2017 CAR as evidence of compliance:

- Attachment 6A: Email from DPAW, dated 25 June 2015, providing support for bird deterrent systems assessment and selected technology.
- Attachment 6B: Bird Deterrent Systems Assessment Report.
- Attachment 6C: Photograph of bird deterrent lines across site water pond.
- Attachment 7A: Letter from SEWPAC, dated 22 November 2012, approving CEMP, HMMP and ERMP.
- Attachment 7B: Letter from SEWPAC, dated 24 October 2012, approving AHMP.
- Attachment 7C: Letter to DEE, dated 6 December 2017, submitting Operational Environmental Management Plan and revised Emergency Management Plan.
- Attachment 9A: CV of Dr Peter Forster, Strategen Environmental Consultants Pty Ltd's air quality specialist.
- Attachment 10A: Letter from CSIRO to YPN dated 27 November 2013 endorsing the suitability of the proposed rock art monitoring.
- Attachment 12A: Letter to DEE, dated 8 December 2017, seeking consent to implement operations phase on-site air quality monitoring.

The following list of evidence has not been sighted during the preparation of this 2016 ACR, but has been referenced in previous ACR's for the TAN plant:

- Letter to SEWPaC, dated 17 February 2013, advising date of commencement of action EPBC2008/4546.
- Evidence of YPN and BRATWG agreeing to expand the rock art monitoring program within two (2) kilometres of the project site in order to comply with the variation condition received from Federal Government (Department of the Environment) dated 31 January 2014.

Attachment 6A: Email from DPAW, dated 25 June 2015, providing support for bird deterrent systems assessment and selected technology

Peter French

Subject: FW: Request to get approval of bird deterrents as per condition 7.1 of MS 870 of YARA PILBARA NITRATE Project
Attachments: 20150618085325416.pdf

From: Corbellini, Michelle [mailto:Michelle.Corbellini@DPaW.wa.gov.au]
Sent: Thursday, June 25, 2015 1:48 PM
To: Rajan Sinha
Cc: Wessels, Nigel
Subject: RE: Request to get approval of bird deterrents as per condition 7.1 of MS 870 of YARA PILBARA NITRATE Project

Hi Rajan

Yara fertiliser Pilbara's proposed methodology appears to align directly with the Department of Parks and Wildlife's (Parks and Wildlife) Pilbara Region advice dated 23 April 2015. Parks and Wildlife has no further comments on the proposed bird deterrent methods.

Kind regards

Michelle Corbellini
Environmental Project Coordinator
Pilbara Region

Department of Parks and Wildlife
Locked Bag 104, Bentley Delivery Centre, WA, 6983
Ph: (08) 9334 0260
Michelle.Corbellini@DPaW.wa.gov.au

Department of Parks and Wildlife

From: Rajan Sinha [mailto:rajan.sinha@yara.com]
Sent: Thursday, 18 June 2015 9:47 AM
To: Corbellini, Michelle
Cc: Wessels, Nigel
Subject: RE: Request to get approval of bird deterrents as per condition 7.1 of MS 870 of YARA PILBARA NITRATE Project

Hi Michelle,

Please find the attached document with regards to the information requested under your mail below as per your advice and it is related with overhead wires. Enclosed please see updated Bird Deterrent System Assessment report.

Please feel free to contact me for any further information. Your approval on the above is highly appreciated.

Regards,

Rajan Sinha
Technical Services and Business Development Manager
Operations
Upstream
Production
Mobile: +61 410 840 369
Office: +61891834139
Email: rajan.sinha@yara.com

Yara Pilbara Fertilisers Pty Ltd
Lot 564. Village Road Burrup
WA 6714 Karratha, Australia
www.yara.com

From: Corbellini, Michelle [mailto:Michelle.Corbellini@DPaW.wa.gov.au]
Sent: Thursday, April 23, 2015 2:24 PM
To: Rajan Sinha
Cc: Wessels, Nigel
Subject: RE: Request to get approval of bird deterrents as per condition 7.1 of MS 870 of YARA PILBARA NITRATE Project

Hi Rajan

Thank you for providing the Department of Parks and Wildlife (Parks and Wildlife) Pilbara Region with further information regarding Yara Fertilisers proposed bird deterrents at the Technical Ammonium Nitrate Production Facility, on the Burrup Peninsula, approved under Ministerial Statement 870. Ministerial Statement 870 includes the following requirement in relation to deterring birds from entering the contaminated water pond, clean water pond and sewage wastewater treatment station evaporation pond.

> *7-1 The proponent shall employ such structures and apparatus as are necessary and agreed by the DEC to deter birds from entering the contaminated water pond, clean water pond, and sewage wastewater treatment station evaporation pond.*

Parks and Wildlife considers that the proposed deterrent techniques appear to be appropriate, provided that Yara Fertilisers commit to a monitoring program being developed and undertaken, to measure the effectiveness of the deterrent devices on the presence and abundance of bird species over time. If monitoring systems detect no effect of the devices, or a reduction in effectiveness is noted over time then other methods should be considered and implemented.

The preparation and implementation of a monitoring program is highly recommended as the effectiveness of ultrasonic and audio devices is variable, and highly dependent on how they are deployed, and dependent on target species present within the area. The range of sounds able to be detected between species varies markedly and the successfulness of an audio or ultrasonic devices in deterring birds can vary based on the activity that the bird is undertaking. There are concerns about relying solely on audio repellents for birds because they have not been demonstrated to be an effective long term solution. Some species become habituated to the devices over time. An effective deterrent system requires a variety of methods to be successful, whether in combination or in rotation, as well as frequently changing the type, timing and location of the equipment. Other deterrent methods which may be used in combination include, modifying the surface banks to make them less desirable to shorebirds (e.g. covering the banks with rocks to prevent nesting and foraging in the mud), or the installation of non-electrified string lines parallel across

the ponds to prevent birds from landing or entering the water. Trials at BHP's Olympic dam have been successful in using string lines spaced at 5m intervals to deter birds (reducing presence by 99.2%). These additional methods should be considered if monitoring detects that the devices are not effective, or are decreasing in effectiveness over time.

If you have any further queries please do not hesitate to contact me.

Kind regards

Michelle Corbellini
Environmental Project Coordinator

Department of Parks and Wildlife - Pilbara Region
17 Dick Perry Ave, Kensington
Locked Bag 104, Bentley Delivery Centre, WA, 6983
Ph: (08) 9334 0260
Michelle.Corbellini@DPaW.wa.gov.au

From: Rajan Sinha [mailto:rajan.sinha@yara.com]
Sent: Monday, 30 March 2015 8:23 PM
To: Corbellini, Michelle
Cc: Wessels, Nigel
Subject: RE: Request to get approval of bird deterrents as per condition 7.1 of MS 870 of YARA PILBARA NITRATE Project

Hi Michelle,

Please find the attached document with regards to the information requested under your mail below ref.: "Request to get approval of bird deterrents as per condition 7.1 of MS 870 of YARA PILBARA NITRATE Project", dated on 19/December/2014. We were trying to source out the information from the vendor, and we received the detailed information just recently.

Please feel free to contact me for any further information. Your approval on the above is highly appreciated.

Regards,

Rajan Sinha
Technical Services and Business Development Manager
Operations
Upstream
Production
Mobile: +61 410 840 369
Office: +61891834139
Email: rajan.sinha@yara.com

Yara Pilbara Fertilisers Pty Ltd
Lot 564. Village Road Burrup
WA 6714 Karratha, Australia
www.yara.com

From: Corbellini, Michelle [mailto:Michelle.Corbellini@DPaW.wa.gov.au]
Sent: Friday, December 19, 2014 8:20 AM
To: Rajan Sinha
Cc: Wessels, Nigel
Subject: RE: Request to get approval of bird deterrents as per condition 7.1 of MS 870 of YARA PILBARA NITRATE Project

Hi Rajan

Thanks for your email and phone call to discuss yesterday.

I've had one of Parks and Wildlife's fauna experts review the deterrent methods proposed by Yara Pilbara Nitrate. They have requested that a bit more information is provided on how this method is implemented and what other options have been considered by Yara Pilbara Nitrate. If you could please provide the following information this would assist with a timely review of your request:

- State the model of the devices (i.e. brand, model number/series)
- Indicate the number of devices to be installed in total, and the number per pond, indicate the location of the installation on the map
- Indicate how the devices will be applied - frequency of use
- Provide information on other deterrent methods/devices which Yara has considered. How were other options assessed to be appropriate or inappropriate in this circumstance? Examples of other methods include noise cannons, physical barriers etc. Were other methods considered to be applied in combination (i.e. more than one method)?
- State the common bird species at this site, which may use these ponds. This is required as it appears that certain species are more sensitive than others to these particular deterrent devices. The use of the device should be justified based on the bird species found in this area.

Please note that our fauna expert and I will be taking leave over the Christmas / New Year period, and therefore based on the supply of the above information we should be able to provide you with a response during January.

If you do have any questions please do not hesitate to give me a call on the number below.

Kind regards,

Michelle Corbellini
Environmental Project Coordinator

Department of Parks and Wildlife - Pilbara Region
17 Dick Perry Ave, Kensington
Locked Bag 104, Bentley Delivery Centre, WA, 6983
Ph: (08) 9334 0260
Michelle.Corbellini@DPaW.wa.gov.au

Department of Parks and Wildlife

From: Rajan Sinha [mailto:rajan.sinha@yara.com]
Sent: Wednesday, 17 December 2014 11:29 AM
To: Corbellini, Michelle
Cc: Esszig, Fiona; David Hegerty; Jason Roberts; Guillaume Holweck
Subject: Request to get approval of bird deterrents as per condition 7.1 of MS 870 of YARA PILBARA NITRATE Project

Hi Michelle,

Please note that YARA PILBARA NITRATE (YPNPL) is currently constructing a Technical Ammonium Nitrate Plant in Burrup Peninsula. You may get more information about this project in the website www.ypnpl.com.au . Please find the attached letter to get the approval of bird deterrents as per advice from Department of Environment Regulation.

Please feel free to contact me for any further information.

Regards,

Rajan Sinha
Deputy General Manager (TAN Project)
Yara Pilbara
Mobile: +61 410840369
Office: +61 (8) 91834139
rajan.sinha@yara.com

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Attachment 6B: Bird Deterrent Systems Assessment Report

Bird Deterrent Systems Assessment Report

COMMERCIAL IN CONFIDENCE

Yara Pilbara Nitrates Pty Ltd

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Index

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ABN Number
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1. INTRODUCTION AND PURPOSE

Yara Pilbara Nitrates Pty Ltd (YPNPL) is developing a Technical Ammonium Nitrate Production Facility (TANPF) with a production capacity of (circa) 350,000 TPA or 915 MTPD of Technical Ammonium Nitrate (TAN).
The TANPF development site is located approximately 13 km northwest of Karratha and 1300 km north of Perth, on the Burrup Peninsula, Western Australia, within the Shire of Roeburne. The site for the TANPF is a 49 Ha area located adjacent to the existing Yara Pilbara Fertilisers Pty Ltd (YPFPL) Ammonia plant.
The purpose of this document is to describe the process followed to identify, assess and install the bird control measure at TANPF in order to comply with Condition 870:M7.1 of the Environmental Ministerial Statement (MS) 870:

- *"The proponent shall employ such structures and apparatus as are necessary and agreed by the DEC to deter birds from entering the contaminated water pond, clean water pond, and sewage wastewater treatment station evaporation pond".*

- *"Seek advice from DEC is required".*

2. FAUNA BIRDS IDENTIFICATION AT TANPF

2.1 General

The Burrup Peninsula has a rich bird fauna, attributed to its complex topography and consequent diversity of habitats, i.e. Rock Piles, Grasslands, Intertidal, Supratidal, and Mangroves including inter-tidal and marine areas.
One hundred and sixty-eight (186) species are known from either the Burrup or from areas close by (DEC, 2006). Although the peninsula possesses no large permanent fresh-water wetlands, the salt ponds of the Dampier Solar Salt operation and the sheltered waters of the mangroves, creeks and small embankments all provide good localities for episodic visits by many waterbirds (DEC, 2006).
From the 186 species, some of them are considered as Conservation Significant fauna species listed under both the EPBC Act and the WC Act.

2.2 Conservation Significant Bird species

Migratory bird habitats within the Site are considered to occur in association with the saline supra-tidal flat that occurs through the centre of the Site. As this area is likely to be inundated after extreme tides, storm surges or after extended heavy rainfall, it is likely that this area would provide occasional foraging habitat in the period following these events. These species represents protected matters under the EPBC Act. Refer to Table 2-1. In addition to these species a number of migratory species listed under the JAMBA, CAMBA and ROKAMBA conventions have previously been recorded within the Burrup Peninsula or are known for the area (DEC 2006). These species also represents protected matters under the EPBC Act. Refer to Table 2-2.
Conservation Significant fauna species listed under both the WC Act which have a high or medium likelihood of occurrence within the Site are included in Table 2-3.

Table 2-1 EPBC Listed Migratory species - Conservation Significant Bird species which have the potential to occur within the Site

Species Name	Common Name	Habitat Requirements	Habitat Potential of the Site?
Black-winged Stilt	Himantopus himantopus	Migratory bird species are known to rely on coastal wetland habitats along western Australia	Supratidal flat is likely to provide an occasional foraging resource for migratory bird species
Common Greenshank	Tringa nebularia		

Red-capped Plover	Charadrius ruficapillus	as part of their habitat requirements. The Supratidal flat located within the site is considered to provide a potential foraging resource	
Rainbow Bee-eater	Merops ornatus		
Little eagle	Hieraaetus morphnoides		
Common Sandpiper	Actitis Hypoleucos		

Table 2-2 EPBC Listed Migratory species - Conservation Significant Bird 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

Matters of National Environmental Significance – Migratory Species				Potential to Occur on Site
Species	JAMBA	CAMBA	ROKAMBA	
Glareola maldivarum Oriental Pratincole	✓	✓		Site represents potential habitat.
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
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.

Matters of National Environmental Significance – Migratory Species				Potential to Occur on Site
Species	JAMBA	CAMBA	ROKAMBA	
Tringa nebularia Common greenshank	✓	✓		Recorded on site
Tringa stagnatilis Marsh sandpiper	✓	✓		Supratidal flat is likely to provide an occasional foraging resource

Table 2-3 WC Act Listed Species - Conservation Significant Bird species which have the potential to occur within the Site

Species Name	Common Name	Conservation WC Act	Habitat Requirements	Habitat Potential of the Site?
Falco peregrinus	Peregrine Falcon	S4	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.
Ardeotis australis	Australian Bustard	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 BNPL site.
Burhinus grallarius	Bush Stonecurlew	P4	Open woodland, coastal scrub and mangrove fringes (Pizzey & Knight 1997).	Species not previously recorded within the site or adjacent BNPL site.
Numenius Madagascariensis	Eastern Curlew	P4	Tidal mudflats, saltmarses and grasslands near water (Pizzey & Knight 1997).	Site represents potential habitat.
Phaps histrionica	Flock Bronzewing	P4	Flooded claypans, watercourses and treeless grassy plains, nest on the ground by low bush or tussock.	Site represents potential habitat.

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.

2.3 Bird Survey on TANPF Site

ERM conducted a fauna survey (PER, Annex J) of Site D within the King Bay Hearson Cove Industrial Precinct on the Burrup Peninsula. The bird fauna observed is shown in Table 2-4.
The TANPF and temporary laydown areas had result in the removal of approximately 49 Ha of occasional foraging habitat associated with the supra-tidal flat. Areas of habitat would continue to exist to the south and west of the TANPF.
As such, the TANPF development is supposed to have implied the habitat loss of the migratory species now considered not having the potential to utilize the Site. Refer to the Public Environmental Review (PER).

Table 2-4 Bird Species Observed on Site

Species Name	Common Name
Birds	
Phaps chalcoptera	Common Bronze-wing Pigeon
Geopelia cuneata	Diamond Dove
Grallina cyanoleuca	Magpie Lark
Coracina novaehollandiae	Black-faced Cuckoo Shrike
Lichenostomus virescens	Singing Honeyeater
Larus novaehollandiae	Silver Gull
Himantopus himantopus	Black-winged Stilt*
Tringa nebularia	Common Greenshank*
Charadrius ruficapillus	Red-capped Plover*
Egretta garzetta	Little Egret
Sterna caspia	Caspian Tern
Megalurus timoriensis	Tawny Grassbird
Hirundo neoxena	Welcome Swallow
Artamus cinereus	Blackfaced Woodswalow
Hieraaetus morphnoides	Little Eagle*
Merops ornatus	Rainbow Bee-eater*
Egretta novaehollandiae	Whitefaced Heron
Nycticorax caledonicus	Nankeen Night Heron
Malurus lamberti	Variegated Fairy-wren
Actitis Hypoleucos	Common Sandpiper*

(*): EPBC Listed Migratory species - Conservation Significant Bird species

3. BIRD CONTROL METHODS IDENTIFICATION AND ASSESSMENT

3.1 Identification of Bird Deterrent Methods

The following available methods to deter birds have been identified:

- Physical Bird Control: Wire system, Bird Control Spikes, Bird Spiders, Hydroblast, Netting/Mesh.
- Electrical/Electronic Bid Controls: Audible Bird Control, Non Audible Bird Control Visual Bird Control, electrifier wire.
- Chemical Bird Controls (gels, avicides, fogging agents, etc.).

3.2 Assessment of Bird Deterrent Methods

Generally, all of the methods above listed have limited effectiveness requiring to carry out a decision making process to select a suitable bird deterrent system. Issues of installation and associated costs limit the choices even further. The factors considered when selecting a bird deterrent system for the ponds include the following:

- Bird species (including size, behaviour and habits);
- Bird Control effectiveness.
- Environmentally safe;
- Installation and Maintenance;
- Number and size of ponds,

A netting system has been discarded as an accurate installation to be effective is very difficult, time consuming and expensive due to size of the contaminated ponds. Because of the big of the ponds (e.g. 3,000 m2), bridges are needed to be able to tension and support the mesh hence this is a huge impact that does not justify the purposes. Netting systems requires a difficult netting clean and maintenance.
Chemical control, electrifier wirer and spikes are discarded due to the occupational health and safety regulations restrictions and potential harm to people, fauna and environment.
Sound bird control devices have been discarded due to the noise pollution originated: distress signals are generally very loud, thus disturbing the human inhabitants as well. There is also a possibility of habituation towards the noise. The effects are temporary in that birds may return after the distress signal is turned off.
The 'silent' ultrasonic repellents were considered at first instance taking into account the following applications and advantages: effective against most species of birds identified under Table 2-4, eco-friendly ('green'), environmentally safe, non-toxic and non-harmful, easy to install, low clean-up and repair costs and acoustic environment for customers and employees. Nevertheless suppliers have recognised that ultrasonic device as their range and affect is limited outdoors, and are ineffective on many bird types or species become habituated to the devices over time.
Following recommendations from Department of Parks and Wildlife - Pilbara Region, YPNPL has investigated further other methods already implemented as modifying the surface banks to make them less desirable to shorebirds (e.g. covering the banks with rocks to prevent nesting and foraging in the mud), or the installation of non-electrified string lines parallel across the ponds to prevent birds from landing or entering the water. Trials at BHP's Olympic dam have been successful in using string lines hand effectiveness have been investigated by YPNPL. The BHP Billiton Olympic Dam project identified the suspension of parallel overhead wires above the evaporation ponds as a potential option to restrict wildlife interaction with the TRS. To test the effectiveness of this approach a trial was undertaken at a local waterbody. A series of wires/lines 1m above the water surface were installed on it for a period of three weeks, during that time the spacing between the lines was tested at different intervals (5m, 7m and 10m). The trial concluded that lines spaced at 5m intervals are capable of reducing the presence of waterfowl by 99.2%.
In addition, Department of Parks and Wildlife - Pilbara Region recommends that YPNPL should commit to a monitoring program being developed and undertaken, to measure the effectiveness of the deterrent devices on the presence and abundance of bird species over time. If monitoring systems detect no effect of the method (deviations to targets in reducing the number of listed migratory birds lost), or a reduction in effectiveness is noted over time then other methods should be considered and implemented whether in combination or in rotation.

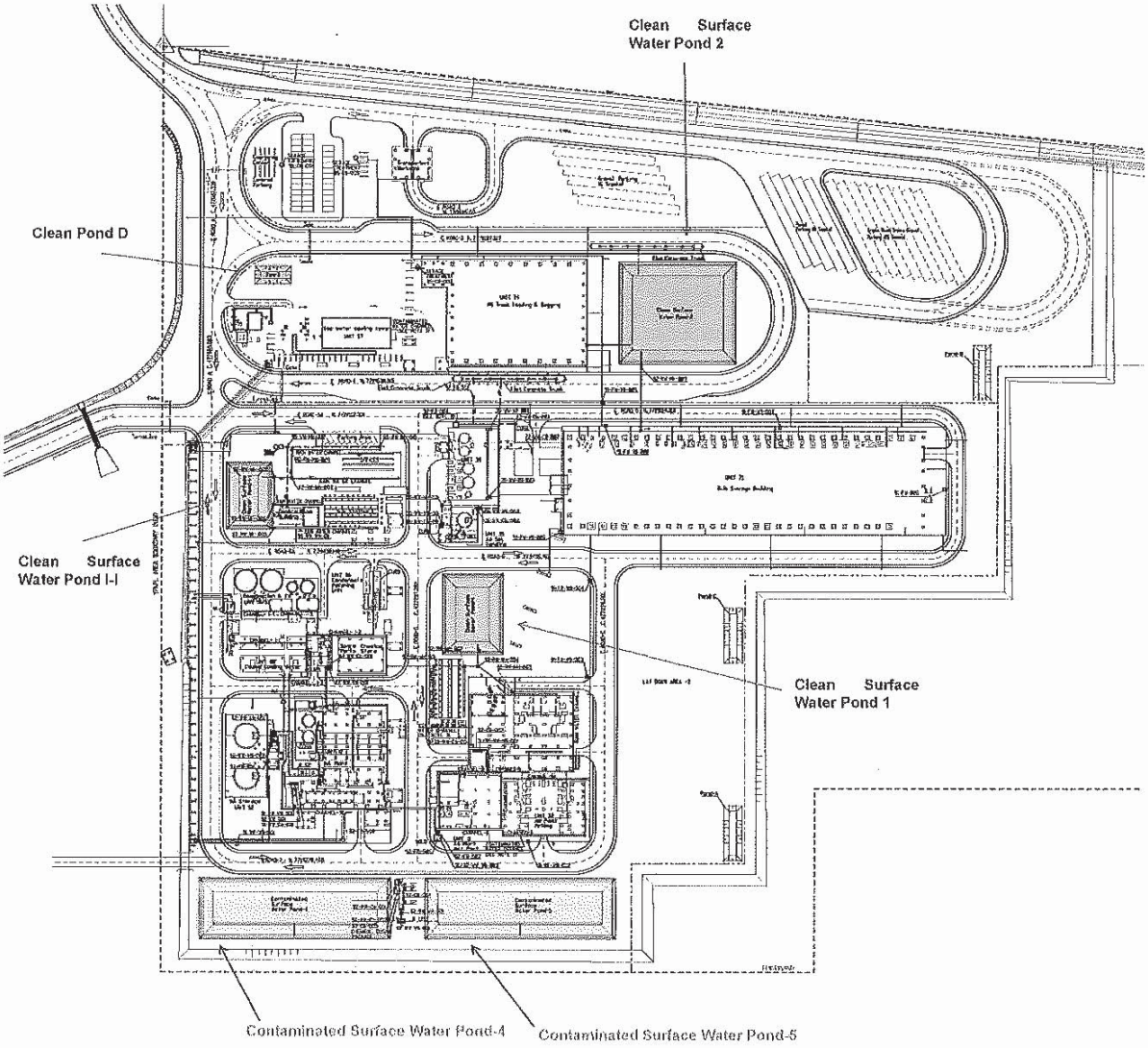
4. NUMBER OF BIRD DETERRENT DEVICES AT TANPF'S

Based on the assessment undertaken under section 3.2 and recommendations made from Department of Parks and Wildlife - Pilbara Region, the methods considered to deter birds method from entering the contaminated water pond, clean water pond and sewerage wastewater treatment station evaporation pond are described in Table 4-1.

Table 4-1 Bird Deterrent Method (s) implemented on Site

	Civil Drawing	Pond Dimension East-West	Pond Dimension North-South	Pond Surface	Bird Deterrent Method Measures
Clean Pond D	2-300-329-DWG-TRE-2964	20 m	10 m	200 m2	- Parallel overhead wire lines spaced at 5 m and 1 m above water surface - Weekly monitoring program
Clean Surface Water Pond I-I	2-300-329-DWG-TRE-2964	20,8 m	32,8 m	662.4 m2	-Parallel overhead wire lines spaced at 5 m and 1 m above water surface - Weekly monitoring program
Clean Water Surface Pond-1	2-300-329-DWG-TRE-2964	32,9 m	42,35 m	1,393.31 m2	- Parallel overhead wire lines spaced at 5 m and 1 m above water surface - Weekly monitoring program
Clean Water Surface Pond-2	2-300-329-DWG-TRE-2964	60,8 m	51,3 m	3,119.04 m2	- Parallel overhead wire lines spaced at 5 m and 1 m above water surface - Weekly monitoring program
Contaminated Surface Water Pond-4	2-300-329-DWG-TRE-2962	99,8 m	29 m	2,894.2 m2	- Parallel overhead wire lines spaced at 5 m and 1 m above water surface - Weekly monitoring program

Figure 4-1 Bird Deterrent Method (s) Location on Site



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5. WIRE LINE SYSTEM TECHNICAL DETAILS

StealthNet — HVAC • Gridwire

HVAC Netting System

HVAC units provide birds with shelter (underneath the units), and a high perch to check out food and other opportunities (on top of the units).

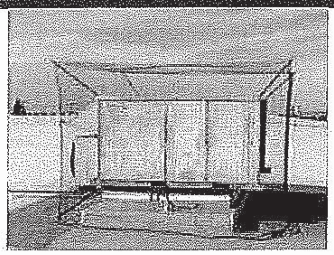
Rooftop units can be difficult to protect. Installers generally screen off the bottoms, and put Daddi Long Legs on the top. The units need to be accessed for maintenance, and building owners generally don't like holes drilled in their roofs.

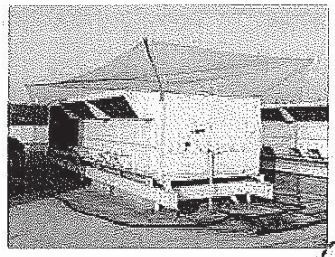
Our HVAC protection system offers many unique features:

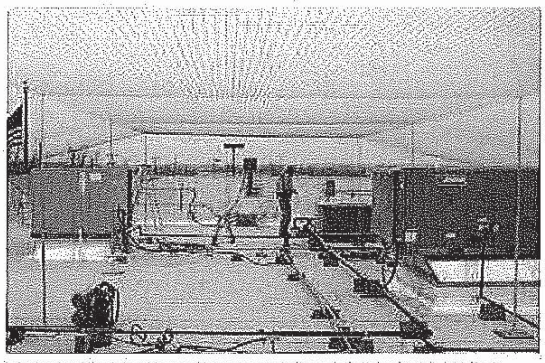
- System protects top and space below the unit
- Corner Stand-off brackets raise net well above unit
- Brackets keep net away from the sides of the unit as well
- Brackets can usually mount to unit without screws
- Weighted hose secures to roof, no fasteners or holes necessary
- Hose can be lifted up for repair access
- Installed using most standard Bird Barrier items (StealthNet, cable, net-rings, tools etc.)
- Zippers can be installed for smaller access, or as pipes and other obstructions demand

Stand-off Bracket, 24"	HV-S024	168770
Stand-off Bracket, 48"	HV-S048	
Weighted Hose, 25 ft.	NR-WH25	115440

Bird Barrier provides an online HVAC calculator that will generate a list of the materials you need and the cost for each. www.birdbarrier.com







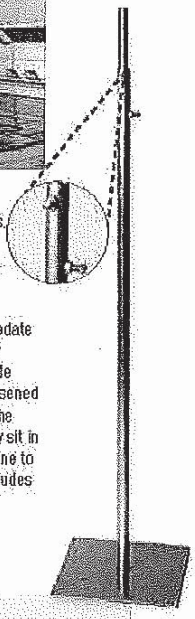
The telescopic support poles allow netting to be installed securely over the heads of workers and equipment.

Telescoping Support Poles

These poles can be used to build raised netting systems. The poles can be used to keep the center cable higher (like a tent), or to raise a whole net system above a flat roof, or a roof covered with HVAC equipment.

The top of the pole has four holes designed to accommodate both perimeter net cable and turnbuckles. This flexibility allows the pole to accommodate a wide range of possible installations. The bolts half-way-up the poles can be loosened to adjust the poles to the perfect height. By tensioning the cables equally in each direction, the flat base will simply sit in place. Protective neoprene pads insure no damage is done to the roof. Extend poles from 4.5 ft. to 8 ft. Each pole includes one protective pad.

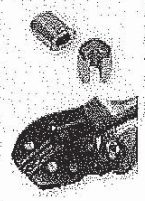
Pole Cable Support, 4'6"-8'	HV-P04	731743
Protective Pad	HV-PAD12	732729

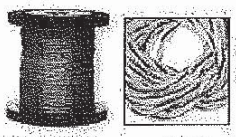


Gridwire®

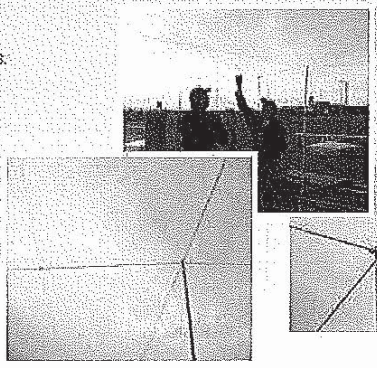
Gridwire or polyethylene Fibrescent GridTwine (more visible to birds) can be suspended in various horizontal and vertical patterns to deter large aquatic birds. Grid spacings are site and species specific. You can protect lakes, parking lots, warehouse roofs, etc. from gulls, geese and other large aquatic birds.

5/64" Copper Ferrules for Gridwire (100)	NG-N160	646103
5/64" Open Copper Ferrules (100)	GW-C100	
Ratchet Crimping Tool	TN-B100	638178
.77 mm SS Gridwire 500 ft.	GW-WX77	651434
.96mm SS Gridwire 500 ft.	GW-WX96	652272
Fibrescent GridTwine w/SS, 1,000 ft.	GW-T100	
Pole Cable Support (see above)	HV-P04	731743





Orange Gridwire with two strands of SS wire for added longevity.



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Yours sincerely,

Yara Pilbara Nitrates Pty. Ltd.

Rajan Sinha
Technical Services & Business Development Manager

Yara Pilbara Nitrates Pty Ltd

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Attachment 6C: Photograph of bird deterrent lines across site water pond.

Attachment 7A: Letter from SEWPAC, dated 22 November 2012, approving CEMP, HMMP and ERMP

Our reference: 2012/08279

Contact Officer: Sam Wagstaff
Telephone: (02) 6274 2741 Facsimile: (02) 6274 1878
Email: post.approvals@environment.gov.au

Mr Wolfgang Jovanovic
Director – Corporate and Company Secretary
Yara Pilbara Nitrates Pty Ltd
Level 5, 182 St Georges Terrace
PERTH WA 6000

CC: Rajan Sinha, Deputy General Manager (TAN Project) Yara Pilbara Nitrates

Dear Mr Jovanovic

Burrup Nitrates Technical Ammonium Nitrate Facility (EPBC 2008/4546)

I refer to your request for approval of the Construction Environmental Management Plan (CEMP), Hazardous Materials Management Plan (HMMP) and Emergency Response Management Plan (ERMP), first received on 22 September 2012. As you are aware, these plans are required to be submitted for approval under condition 7(a) and 7(c) of the approval decision dated 14 September 2011.

The revised CEMP (Rev 2) has been reviewed by officers of the department and has been found to meet the requirements of condition 7(a). On this basis, and as delegate of the Minister for Sustainability, Environment, Water, Population and Communities I have decided to approve the Plan. The approved plan must be implemented.

Whilst the CEMP (Rev 2) has been approved, I note that there are some typographical and formatting errors in the document. These errors must be resolved before the CEMP is published online as per condition 14 of the approval decision. Please correspond with Sam Wagstaff to ensure this requirement is satisfactorily fulfilled.

The HMMP (Rev 1) and ERMP (Rev 1) have also been reviewed by officers of the department and have been found to meet the requirements of condition 7(c) in relation to construction activities. On this basis, and as delegate of the Minister, I have decided to approve these Plans. The approved plans must be implemented.

Please note that before commencement of operations (as defined in the approval instrument for EPBC 2008/4546), you will be required to revise the HMMP and ERMP in order to address management of operational activities. These plans must be re-approved prior to commencement of operations.

Following the installation of the chain mesh fencing as per condition 8(a) of the project approval, construction activities may commence in accordance with the approved plans.

If you have any further questions or enquiries, please contact Sam Wagstaff on (02) 6274 2741.

Yours sincerely

S. Gaddes

Shane Gaddes
A/g Assistant Secretary
Compliance & Enforcement Branch
Environment Assessment and Compliance Division
22 November 2012

Note: Under s 491 of the *Environment Protection and Biodiversity Conservation Act 1999* it is an offence to knowingly provide false and/or misleading information to a departmental officer.

Attachment 7B: Letter from SEWPAC, dated 24 October 2012, approving AHMP

Australian Government
Department of Sustainability, Environment, Water, Population and Communities

Our reference: 2012/08279

Contact Officer: Sam Wagstaff
Telephone: (02) 6274 2741 Facsimile: (02) 6274 1878
Email: post.approvals@environment.gov.au

Mr Wolfgang Jovanovic
Director – Corporate and Company Secretary
Burrup Nitrates Pty Ltd
Level 5
182 St Georges Terrace
PERTH WA 6000

cc: Ms Barbara Rees – Kellie Hill Consulting

Dear Mr Jovanovic

Burrup Nitrates ammonium nitrate facility (EPBC 2008/4546)

I refer to your request for approval of the Aboriginal Heritage Management Plan (AHMP) revision 0.5. As you are aware, the AHMP is required to be submitted for approval under condition 7(c) of the approval decision dated 14 September 2011.

The AHMP has been reviewed by officers of the department and has been found to meet the requirements of condition 7(c). On this basis, and as delegate of the Minister for Sustainability, Environment, Water, Population and Communities I have decided to approve the Plan. The approved plan must be implemented.

You should note that under your conditions of approval the AHMP is one of a number of plans that are to be submitted to the Minister for approval. Construction (other than the fence specified in condition 8(a) and operation cannot begin until all of the relevant management plans mentioned in Condition 7 of the approval have been approved by the Minister.

If you have any further questions or enquiries, please contact Sam Wagstaff on (02) 6274 2741.

Yours sincerely

S. Gaddes

Shane Gaddes
A/g Assistant Secretary
Compliance & Enforcement Branch
Environment Assessment and Compliance Division
24 October 2012

Attachment 7C: Letter to DEE, dated 6 December 2017, submitting Operational Environmental Management Plan and revised Emergency Management Plan

6th December 2016

Our Reference: Transmittal 0076

Your Reference: EPBC 20084546

Department of the Environment and Energy

Environmental Standards Division

GPO Box 787

CANBERRA ACT 2601

Attention: Heather Cross

Post Approvals Project Officer

Dear Heather

Subject: EPBC 2008/4546 Operational Documentation

Following from the site inspection in September 2016, Yara Pilbara Nitrates Pty Ltd (YPN) has taken action to finalise the Technical Ammonium Nitrate (TAN) plant operational documentation required by EPBC 2008/4546 approval decision Condition 7. This documentation is required to be approved by the Department prior to operations commencing. Commissioning of the TAN Plant is continuing and operations is expected to commence in early 2017.

The following documents were provided to the Department for review and approval on Friday, 2 December:

- The TAN Plant Operational Environmental Management Plan (OEMP) (650-200-PLN-YPN-0001). This is a modified version of the draft OEMP submitted in late 2015 and previously reviewed by the Department. Comments made by the Department and the responses provided by Yara have attempted to be maintained within this updated version. The OEMP has been prepared to specifically meet the requirements of condition 7b), and partially 7c). Section 11.6 of the OEMP has been prepared to meet the Hazardous Materials Management Plan requirement of Condition 7c).

- The Yara Pilbara Emergency Management Plan (EMP) (250-500-PLN-000-0003). The EMP has been prepared and is maintained to meet both the on-site and off-site emergency planning and response requirements for both Yara Pilbara Fertiliser's ammonia plant and YPN's TAN Plant. The current version of this EMP is provided to the Department to fulfil the Emergency Response Management Plan requirement of Condition 7c).

Yara Pilbara Nitrates Pty Ltd

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The TAN Plant Aboriginal Heritage Management Plan (Construction and Operation) (250-200-PLN-YPN-0001), as required by condition 7c), was approved by the Department of Sustainability, Environment, Water, Population and Communities on 24 October 2012 and remains in effect during the operation of the TAN plant.

Should you have queries please do not hesitate to contact myself or Susan Giles (susan.giles@yara.com).

Yours Sincerely,

Brian HOWARTH

HESQ Manager

Yara Pilbara Nitrates

Attachment 9A: CV of Dr Peter Forster, Strategen Environmental Consultants Pty Ltd's air quality specialist

strategen
ENVIRONMENTAL

CURRICULUM VITAE

Dr Peter Forster BSc (Hons); PhD; MRACI; CChem

Affiliate & Principal Consultant

Dr Peter Forster joined Strategen as an Affiliate in 2012 after nine years as a Director of a number of smaller environmental consultancies. He was the Principal Research Scientist at Southern Pacific Petroleum in 2001-2003, and continued that role as a consultant under subcontract to SPP and subsequently Queensland Energy Resources for the development of shale derived hydrocarbon processing technologies. He held positions as a Senior Research Scientist and Research Chemist with Alcoa of Australia's Technology Development Group from 1990 to 2001, working on process optimisation, organics impacts on hydrometallurgical processes and air quality issues from process emissions. He has over 25 years' experience in the minerals processing, petrochemical, manufacturing, waste management and mining sectors as a research scientist, air quality specialist, industrial process control specialist, process optimisation and risk assessment expert. Peter is a member of the Royal Australian Chemical Institute, the Clean Air Society of Australia and New Zealand and the International Humics Substances Society.

Peter has a vast knowledge of the fundamental science behind the generation, chemistry, dispersion and impacts of pollutants and odours on the environment. This includes studies of air emissions from petrochemical industries including hydrocarbons, BTEX, organosulfides, amines, PAHs and dioxins as well as leachates from industrial waste materials involving analysis of a wide range of parameters such as dioxins, PAHs, heavy metals, metal salts, nutrients and organics. Those studies have included a strong focus on quality assurance and quality control, to provide understanding of uncertainties for risk assessments. He has managed and operated pilot plant trials of new technologies for air pollution control and has developed new methodologies for odour and air emissions sampling and analysis from complex industrial sources.

Other areas of expertise in the petrochemical sector includes oil corrosion chemistry, oil stability chemistry, crude oil and shale oil chemical products extraction testing and pilot studies, syngas generation and reforming, and natural gas reforming for chemicals manufacturing. Peter has expertise in preparation of materials mass balances for process optimisation and minimisation of air emissions from mineral processing and petrochemical industries. He has worked on natural gas storage and piping projects involving determination of air emissions impacts and associated risk assessments.

Key areas of expertise include:

- Environmental and process risk assessments.
- Shale oil chemistry.
- Industrial Process Chemistry.
- Petroleum chemistry.
- Syngas and natural gas reforming chemistry and air emissions studies.
- Combustion and gasification chemistry and engineering.
- Industrial process materials and pollutants materials and mass balances for development of emissions inventories.
- Waste to Energy process risk assessment and air quality impacts.
- Industrial waste materials leachate studies, analytical development and quality assurance.
- Project technical/contractual management.
- Air quality assessments, emissions chemistry, measurement and controls.
- Odour emissions chemistry, measurement, assessment and controls.
- Research project management.
- Environmental Analytical Chemistry.
- Environmental Impact Assessments.
- Strategic and technical leadership in environmental science and engineering.
- Pilot plant design, operation and optimisation.
- Regulatory approvals, regulator communications and negotiations.

In addition to the technical expertise, Peter has provided expert testimony and advocacy for client legal matters, primarily involving air quality impacts and approvals. He has worked closely with regulatory agencies, representing client's interests in negotiations for works approvals, licenses and operating permits.

As an affiliate at Strategen, Peter provides specialist consulting services in pollution control, emissions chemistry, leachate chemistry and impacts, air quality measurement and assessment, petrochemical and other industrial process control and optimisation; odour measurement, assessment and mitigation; general chemical sciences and project management.

Attachment 10A: Letter from CSIRO to YPN dated 27 November 2013 endorsing the suitability of the proposed rock art monitoring

Dr. Erick Ramanaidou
www.csiro.au

ARRC, 26 Dick Perry Avenue WA 6151
PO Box 1130, BENTLEY WA 6102, Australia
T (08) 6436 8810 • **ABN** 41 687 119 230

27 November 2013

Rajan Singha
Deputy General Manager (TAN Project)
Yara Pilbara Nitrates Pty Ltd
Lot 564, Village Road, Burrup Peninsula WA 6714
Locked Bag 5009, Karratha WA 67

Dear Rajan

In November 2013, Yara Pilbara Nitrates Pty Ltd approached CSIRO to assess its ability to become the heritage monitor for the Technical Ammonium Nitrate Production Facility on the Burrup Peninsula and to provide a written endorsement of the proposed monitoring strategy.

Yara Pilbara Nitrates Pty Ltd is constructing a Technical Ammonium Nitrate Production Facility on the Burrup Peninsula adjacent to the existing Yara Pilbara Fertilisers Pty Ltd ammonia plant. Environmental approval under the EPBC Act is subject to a number of conditions including a requirement for monitoring of rock art within two kilometres of the plant site.

Background on CSIRO Monitoring of the Petroglyphs in the Burrup Peninsula (Western Australia) 2004-2013

The Burrup Peninsula is around 30 km long and 6 km wide and is located 1300 km from Perth (Western Australia). The peninsula is of unique cultural and archaeological significance as it contains Australia's largest and most important collection of indigenous petroglyphs. Alongside the petroglyphs, the Burrup Peninsula has several large industrial complexes including iron ore, liquefied natural gas production, salt production and fertilisers with one of Australia's largest ports. Since some of the petroglyphs adjoin industrial areas there has been very public concern expressed that the petroglyphs could be damaged by airborne emissions from the industry. In 2002, The Western Australian government established the independent Burrup Rock Art Monitoring Management Committee (BRAMMC) to review the available

expertise and oversee the studies that were conducted to establish whether industrial emissions are likely to affect the petroglyphs.

In response to tender issued in 2003, by the former WA Department of Industry and Resources and more recently under contract with the Department of Environmental Regulation, CSIRO was selected to measure selected petroglyphs on the Burrup Peninsula over a period of 10 years. The requirements stipulated by the project were the non-invasive and culturally sensitive measurements of re-identifiable sample points on petroglyphs annually for the measurement period. It was desirable that the equipment employed should show any small changes including those that are not yet visible to the naked eye.

The sites for monitoring (Table 1 and Figure 1) were determined by the Rock Art Management Committee, and the final decision for a representative petroglyph at each site (each site contains one or more petroglyphs) was determined in consultation with the Committee's Technical Advisor and nominated representatives of the local indigenous communities including members of Murujuga Aboriginal Corporation. Respecting the cultural laws of the traditional owners for the entitlement of access, the selected petroglyphs were firstly evaluated for their suitability for scientific study, including aspect (e.g. elevation and direction of exposure). The studies were based on the monitoring of seven sites with two control sites located on the northern Burrup area and the other five located further south on the lower Burrup Peninsula, closer to the industrial areas.

On each monitored petroglyph panel, sampling areas were chosen on the basis that they had relatively uniform colour over a minimum area of 20 mm, so that comparative measurements could be made between the various measuring instruments. Originally, three pairs of sampling 'spots' on each of the seven selected petroglyphs were identified (i.e. six sampling points per petroglyph):

- An area classified as 'engraving' – defined by the graffito lines or pecking marks that constitute the image.
- An area classified as 'background' – a section of the adjacent rock surface unmarked by the petroglyph.

In 2013, an additional pair of sampling "spots" was measured bringing the total pairs of spots for each site to 4 (4 engravings and 4 backgrounds).

Table 1 Details of the sites for colour and spectral mineralogy measurements (site 3 is not included in this study)

Site	Site name	Coordinates (GDA 94, Zone 50)	
1	Dolphin Island	484,975	7,738,503
2	Gidley Island	482,166	7,740,857
4	Woodside	477,398	7,721,980
5	Burrup Rd	475,959	7,719,771
6	Water Tanks	477,698	7,720,137
7	Deep Gorge	477,956	7,717,987
8	King Bay South	474,082	7,717,229

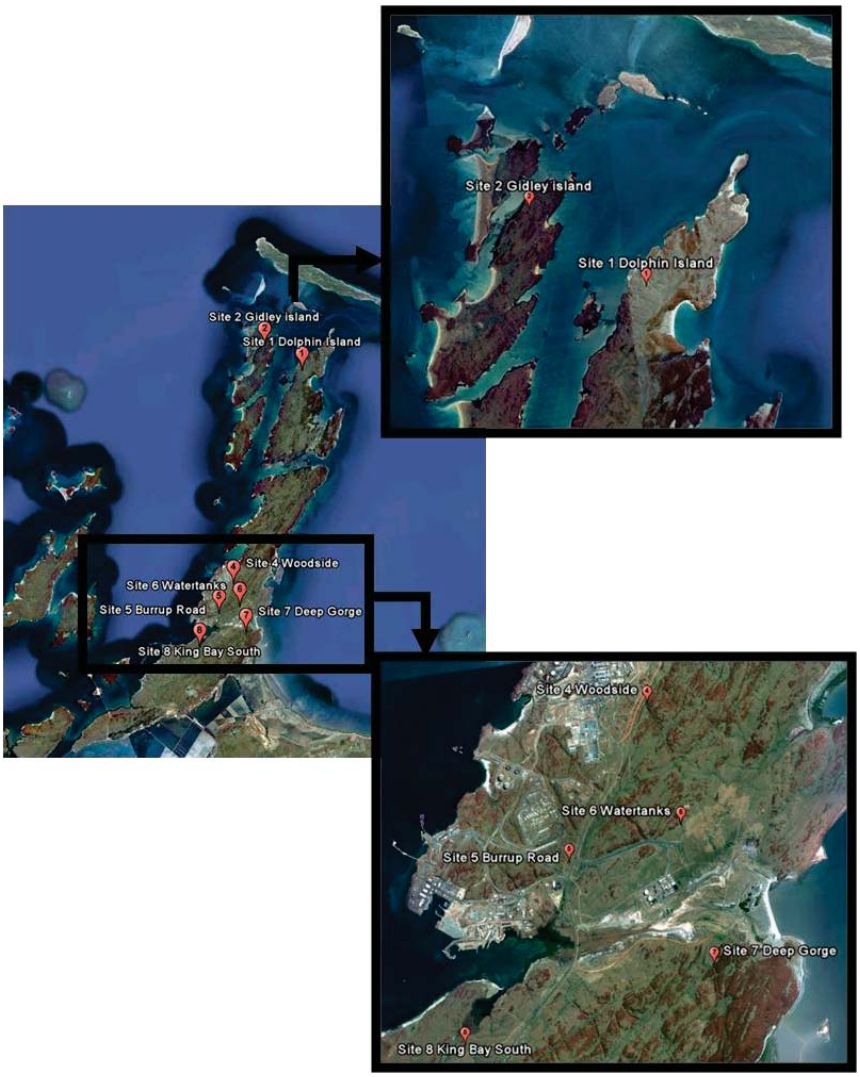

Figure 1: Google Earth® maps of the Burrup Peninsula with the petroglyph locations.

For the last 10 years (2004 to 2013), the petroglyphs at the seven specially selected sites in the Burrup Peninsula have been measured using colour and reflectance spectroscopy measurements (Figure 2). Three spots on each engraving and three spots on each background rock (4 from 2013) were measured in situ using a portable spectrophotometer for colour measurement and a reflectance spectrometer for visible and near infrared spectral analysis. Photogrammetry was also used to generate three-dimensional images of the petroglyphs to monitor sub-millimetre depth change to both the engravings and the background. The 2004 spectral study is the baseline dataset that has been used to monitor potential variation during the last 10 years. The Burrup Rock Art Monitoring Program is ongoing and will continue to be performed annually.

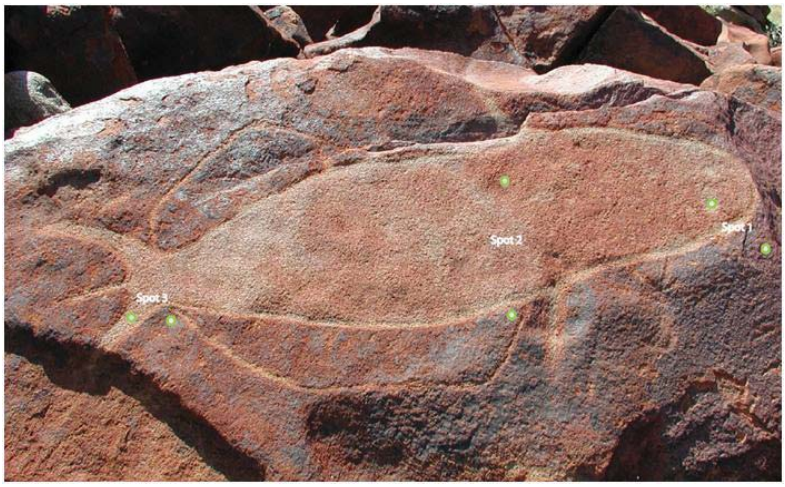

Figure 2: Site 1- Dolphin Island

Scientific Methodology

Portable, hand-held spectrophotometry was identified as a suitable technique. It has been recognised as a repeatable way of recording colour in units of standard CIE chromaticity coordinates in many contexts, including archaeological situations (Mirti, 2004). CIE chromaticity coordinates are an internationally recognised numerical system of permanently and objectively describing the colour of a surface or material as a point in three-dimensional L*a*b* colour space, identifying a tristimulus value (L*a*b*) for each sample point.

In situ monitoring of degradative change through colour measurement has been reported by Mirmehdi et al. (2001), who undertook a pilot study designed for monitoring and modelling the deterioration of paint

residues in a cave environment through digital image comparisons with a reference image. The template-matching technique was considered unsuitable and impractical for the Burrup study for two reasons:

- Template matching, as described by Mirmehdi et al. (2001), would require the collection of digital images with repeatable and controlled spectral illumination, angle of incidence and collection. Burrup petroglyphs are located in remote, exposed locations, and it would not be possible to control the colour, temperature and angle of the ambient lighting easily without blocking all the ambient daylight, or collecting images in the night with the ambient moon and starlight removed.

- The effect of metamerism in relation to the reference template and rock surface has not been accounted for. It is well known that surfaces appearing similar in colour under one set of illumination conditions can appear dramatically different with another spectral illuminant or angle of incidence. The reference template is a glossy (laminated) smooth surface, while the rocks in this study are significantly rougher.

The difference between two colours measured instrumentally is ΔE. It derives from the German word – Empfindung – which means a difference in sensation. A ΔE value of zero represents an exact match. It is the standard CIE colour difference method, and measures the distance between the two colours, calculated in 3D L*a*b* colour space. In this way, colour difference can be evaluated through measuring the tristimulus values of points over time, and calculating ΔE to evaluate the colour difference with time. This enabled the colour contrast between an engraving and a rock surface to be monitored to evaluate whether it is decreasing. The difference between two colours, ΔE, can be evaluated using the 1976 CIE colour difference formula (Hunter, 1987). In CIE L*a*b* space, the difference is: $\Delta E^*ab = [(\Delta L^*)2 + (\Delta a^*)2 + (\Delta b^*)2]0.5$

This was used to evaluate the colour change of single points between consecutive years. The instrument used for colour measurement is a portable spectrophotometer (Konica Minolta CM-700/600d) with inbuilt spectral illuminants: CIE illuminant A, D65 and F2 (Figure 3 and Table 2). A CIE standard illuminant represents an aimed spectral power distribution of a theoretical real light source. For example, CIE illuminant A is a mathematical representation of tungsten halogen (incandescent), and CIE illuminant D65 is a mathematical representation of a phase of daylight, recommended by the CIE if daylight is of interest. F illuminants are similar to fluorescent light sources.

It is essential to use an artificial light source for reproducibility and determination of colour change, as the fluctuations in the natural daylight spectrum due to time of day, season and weather means naturally

illuminated measurements would be inconsistent and unreliable. The geometry of the measuring head on the spectrophotometer is designed to exclude light on flat surfaces. However, as rock surfaces are not always flat, a collar of black fabric was used when necessary for the complete exclusion of natural light.

Figure 3 Konica Minolta CM-700/600d photospectrometer

Table 2: Portable spectrophotometer specifications

Repeatability	Inter-Instrument Agreement	Color System	Color Differences	Indices	Spectral Interval
0.01 ΔE, 1σ	0.02 ΔE, 1σ	CIELab/Ch; Lab(h); XYZ; Yxy; RxRyRz	ΔE; ΔE(h); ΔEFMC2; ΔE94; ΔECMC; Component differences	YIE313; YID1925; WIE313; CIE; Berger; Color strength; Opacity; Metamerism	20 nm
Observer	**Language**	**Power Supply**	**Operating Temperature**	**Illuminants**	**Spectral Range**
2°; 10°	English; German; French; Italian; Spanish; Japanese	4 AA alkaline; NiCd or MH	50 to -110 °F (10 to -42 °C)	A; C; D50; D55; D65; F2; F6; F7; F8; F10; F11	400 - 700 nm
Geometry	**Aperture**	**Humidity**			
45/0	4 mm	< 85% relative humidity, non-condensing / 35 °C (95 °F)			

CSIRO has been involved in the development of reflectance spectroscopy research (Ramanaidou et al., 2008 and references within) techniques for characterising iron ore, gold, bauxites, mineral sands, talc, lateritic nickel and asbestos. Using field reflectance spectrometry, the mineralogy of the samples can be characterised on the basis of key spectral features.

Reflectance spectroscopy is now available as a field tool for geologists through the development of portable instruments like the Analytical Spectral Device (ASD) FieldSpecPro field spectrometer (Figure 4). These systems measure diagnostic mineral spectral features that are particularly suitable for quantitative analysis of many geological materials. Some of the advantages of the technique include little sample preparation (if any), and rapid measurement (around 1 s) though the measurement is restricted to the sample's surface (< 50 μm). Reflectance spectroscopy, the analysis of reflected light, between 400 and 2500 nm is now a proven technique for mineral analysis in both the laboratory and in the field. Reflectance spectroscopy has been used intensely to characterise weathering minerals such as iron oxides and clay minerals. The most common iron oxides minerals (hematite, maghemite and goethite) have broad absorptions between 400 and 1000 nm (visible and near infrared or VNIR), whereas OH-bearing minerals such as phyllosilicates, inosilicates as well as carbonates and sulphates show narrow absorption features between 1000 to 2500 nm (short wave infrared or SWIR). The combination of these wavelength ranges provides a step forward towards quick and accurate mineral characterisation.

The Analytical Spectral Device (ASD) FieldSpec Pro covers the spectral range 400-2500 nm with a spectral resolution of 3 nm at 700 nm using 3 detectors: a 512 element Si photodiode array for the 400-1000 nm range and two separate, TE cooled, graded index InGaAs photodiodes for the 1000-2500 nm range. The input is through a1.4 m fiber optic. The average scanning time to acquire a spectrum is 1 second. There are two ways of operating the ASD, it consists of either using (1) an external source of light (sun or artificial) or (2) an internal source of light. The absolute measurements are obtained using a white reference plate that reflects 100% of the light in the 400 to 2500 nm wavelength range. For this study, the second option for lighting was used as it eliminates any external light interference.

Appropriate statistical analysis - including means, standard deviations, regression analysis and tests of statistical significance such as analysis of variance – in respect of the designated rock art petroglyphs are also part of the monitoring process, to establish whether there is a significant change in the colour of the rock art since monitoring commenced and also whether any colour change is more significant at sites in closer proximity to industry than others.

Close-range photogrammetry where the digital camera is close to the subject and is on a tripod is also used to generate three-dimensional images of the petroglyphs by acquiring 2 pictures of the same object at different angles (Figure 5). This will provide greater accuracy of measurement and sampling than conventional mapping methods in the generation and comparison (from year to year) of images of the engravings and to monitor sub-millimetre depth change to both the engravings and the background.

Figure 4: ASD FieldSpecPro operating on petroglyphs in the Burrup Peninsula (2005)

Figure 5 Photogrammetry of the petroglyphs by acquiring 2 pictures of the same object at different angles

Adequacy of the proposed Yara Pilbara Nitrates Pty Ltd Monitoring

The CSIRO program conducted for the Western Australian Government embodies the largest study ever undertaken in Australia on the environmental impacts of airborne pollutants on rock art. The unique study has produced a number of outcomes/outputs, both scientific and for the Australian community:
Developing novel methods for assessing colour change and spectral mineralogy in the field, designed specifically for extreme conditions and remote locations. These methods are reproducible and provide both current data and also a baseline for long-term future measurements. These techniques are appropriate for monitoring of any effects of air emissions from the Yara Pilbara Nitrates Pty Ltd plant.
3D photography has produced three dimensional models of each petroglyph panel as a basis for comparison in future years. This comparison is possible at sub millimetre scale.

The map (Figure 6) shows the proposed monitoring sites within 2km of the Yara Pilbara Nitrates Pty Ltd plant site. There are three existing monitoring sites that are part of the current BRATWG program as well as three new sites. The three new sites are considered desirable as the main wind directions are from the south west, west and, to a lesser extent, the east (Figure 6).

Annual monitoring is seen to be appropriate as the monitoring would pick up changes that are not visible to the naked eye. Also monitoring at less frequent intervals may lead to changes not being observed for some time. However the program should be reviewed after 5 years to assess whether the frequency of monitoring is appropriate.

The proposed reporting approach with a brief report of observations immediately following the field work and a detailed scientific report once all data has been collated and reviewed is seen to be appropriate. It is suggested that the scientific report of the monitoring within 2 km of the plant site could have attached the annual full scientific report provided to BRATWG to provide context.

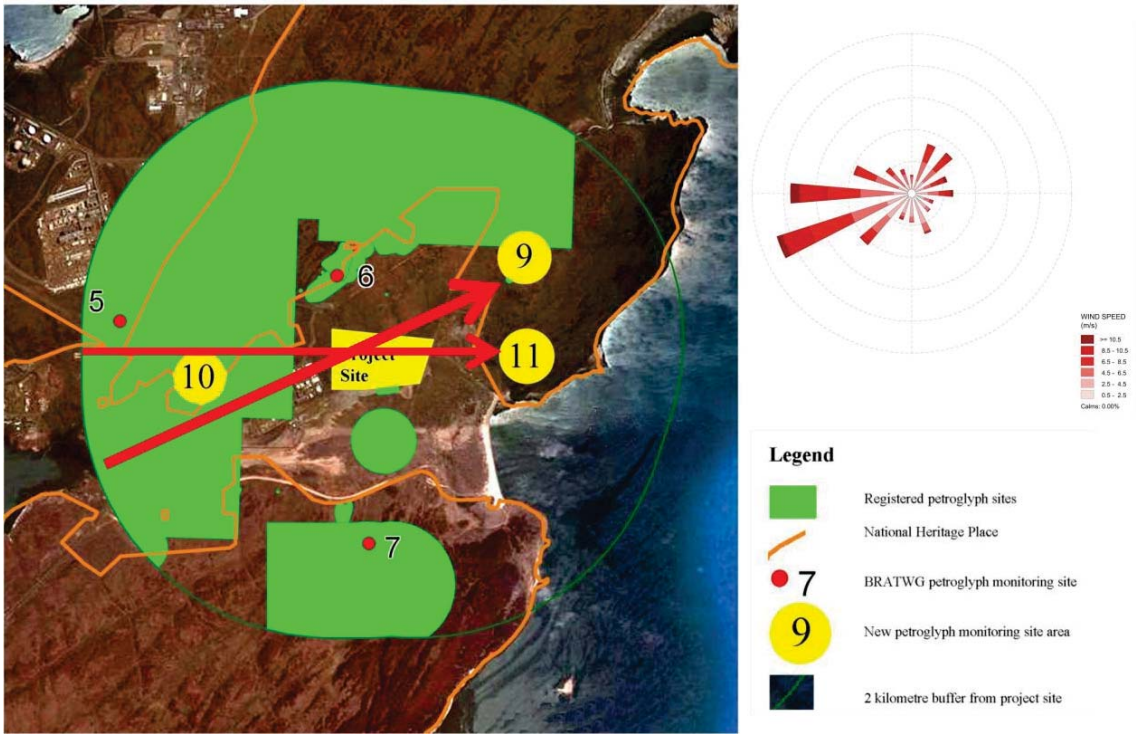

Figure 6 Left: Proposed new sites (Yellow numbers) and dominant wind directions and speed (2 red arrows coming from the West and South West). Right: Rose wind showing the Wind direction and speed.

Yours sincerely

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Attachment 12A: Letter to DEE, dated 8 December 2017, seeking consent to implement operations phase on-site air quality monitoring

8th December 2016

Our Reference: 200-200-LET-DOE-0003

Your Reference: EPBC2008/4546

Department of the Environment and Energy

Environmental Standards Division

GPO Box 787

CANBERRA ACT 2601

Attention: Heather Cross

Post Approvals Project Officer

Email: heather.cross@environment.gov.au

Dear Heather,

Subject: Proposed Change to Air Quality Management measures during commissioning (EPBC2008/4546)

This letter follows from the 2016 Annual Compliance Report (ACR) that Yara Pilbara Nitrates Pty Ltd (YPN) submitted for the Technical Ammonium Nitrate (TAN) Plant on 6 October 2016. In undertaking the review of compliance for the 2016 reporting period YPN identified that the construction phase air quality monitoring had not been effectively implemented during the current reporting period (18 February 2015 to 17 February 2016) and that the air emissions risk profile of the Plant had significantly changed. Specifically, the air emissions risk profile for the past 6-12 months had been more representative of the operations phase air emissions rather than construction phase air emissions.

YPN seeks the Department's consent to apply the air emissions monitoring measures described within the TAN Plant Operational Environmental Management Plan (OEMP), rather than the construction phase monitoring described within the TAN Plant Construction Environmental Management Plan (CEMP). This change is to reflect and recognise the change in air emissions risk profile associated with a move from construction (and bulk earthworks) activities to commissioning (plant start up and operation) activities.

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This change will bring the air quality monitoring in line with the monitoring described in the Commissioning Environmental Management Plan that has been approved by the Western Australian Department of Environment Regulation as a requirement of the Works Approval W4701/2010/1.

YPN acknowledges that this request is an interim measure, as once the plant moves from commissioning into operations phase, the OEMP will be the Department approved plan relevant for that phase.

If you have any queries please do not hesitate to contact Susan Giles, Environmental Superintendent on 9183 4167 or susan.giles@yara.com.

Yours Sincerely,

Jason BARTLETT

Acting HESQ Manager

Yara Pilbara Nitrates