

PERTH BASIN
ENERGY

CERVANTES 1

2022

COMPLIANCE ASSESSMENT
REPORT

MINISTERIAL STATEMENT 1178



Chris Newport

Director, Perth Basin Energy

Revision Control

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Distribution

Name	Position	Company
compliance@dwer.wa.gov.au	Compliance Officer	DWER
Ken Aitken	CEO	Metgasco
Chris Newport	Director Oil & Gas	Perth Basin Energy
Danny Burns	Executive - Exploration	Vintage

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Terms & Abbreviations

BKNR	Beekeepers Nature Reserve
C	Compliant
CAP	Compliance Assessment Plan
CAR	Compliance Assessment Report
CLD	Closed
DBCA	Department of Biodiversity, Conservation and Attractions
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
NA	Not Applicable
NC	Non-compliance / Non-conformance
NR	Not Required
PNC	Potential Non-compliance / Non-conformance
RCMA	RCMA Australia Pty Ltd

Related Documents

Document #	Document Name
RCMA-02-EM-PLN-011v3	Cervantes 1 Compliance Assessment Plan
RCMA-02-EM-PLN-004v3	Cervantes 1 Vegetation Management Plan
RCMA-02-EM-PLN-007v3	Cervantes 1 Fauna Management Plan
RCMA-02-EM-PLN-003v4	Cervantes 1 Weed and Dieback Hygiene Management Plan
RCMA-02-EM-PLN-008v3	Cervantes 1 Rehabilitation Plan

1. Introduction

This report addresses the status and compliance of the Cervantes 1 Conventional Oil Exploration Well Project with the conditions in Ministerial Statement 1178 (MS 1178). This report has been prepared for the purpose of meeting the requirements of condition 11 of MS 1178, which requires the submission of an annual Compliance Assessment Report (CAR). This document reports on compliance for the Cervantes 1 project for the period from 1st January to 31st December 2022.

1.1 Project Background

RCMA Australia Pty Ltd (RCMA), now Perth Basin Energy (PBE), drilled the Cervantes 1 exploration well 11 km south of Dongara/Port Denison within Production Licence L14. The site was located within the vegetated Beekeepers Nature Reserve (BKNR) in the northern Perth Basin.

The proposal was referred by RCMA to the EPA in July 2020. The EPA assessed the project on referral information and issued MS1178 on 14th December 2021. A Compliance Assessment Plan was submitted under condition 11-0 of MS1178 and under condition 11-5 a Compliance Assessment Report (CAR) will be submitted annually. The first CAR for the period 14th December to 31st December 2021 was submitted 29th March 2022.

2. Description of Activities

Documents were approved by DWER in the reporting period prior to implementation of the project:

- Cervantes 1 Compliance Assessment Plan [RCMA-02-EM-PLN-011v3]
- Cervantes 1 Vegetation Management Plan [RCMA-02-EM-PLN-004v3]
- Cervantes 1 Fauna Management Plan [RCMA-02-EM-PLN-007v3]
- Cervantes 1 Weed and Dieback Hygiene Management Plan [RCMA-02-EM-PLN-003v4]
- Cervantes 1 Rehabilitation Plan [RCMA-02-EM-PLN-008v3]

Site preparation commenced for one and half days on the 9th February 2022 however were paused and not recommenced until the 16th March.

Drilling activities commenced on the 26th of March and were ongoing until the well was decommissioned on 14th April 2022. All equipment and personnel were demobilised from site.

The wellsite has been under care and maintenance conducted by personnel from the nearby Jingemina Production Facility since demobilisation and this will continue (which includes weekly site visits) until rehabilitation is conducted in autumn 2023.

3. Audit Methodology

3.1 Audit Plan

This CAR has been prepared for Perth Basin Energy (the proponent) to fulfil the requirements of condition 11 of MS 1178, issued for the Cervantes 1 proposal. Condition 11-4 requires the proponent to submit an annual CAR (on the previous twelve month period) to Chief Executive Officer (CEO) of the Department of Water and Environmental Regulation (DWER).

Condition 11-6 requires the CAR to:

- (1) state whether each condition of this Statement has been complied with;
- (2) provide evidence to substantiate statements of compliance, or details of where there has been a non-compliance and describe corrective and preventative actions taken; and

(3) be provided in a form suitable for publication on the EPA website.

3.2 Audit Methodology

The site component of the audit was undertaken by Andrea Wills on:

- Site Preparation 10/02/2022 and 12/03/2022
- Drilling 02/04/2022 and 06/04/2022
- Care and Maintenance 31/10/2022 (JPF PIC) and 11/01/2023 (Andrea Wills)

Discussions were held with key personnel:

- Allan Lenane (Site Preparation Contractor)
- Mark Mitchell (Drilling HSE Advisor)
- Greg Nolan (JPF PIC)
- Chris Newport (PBE Director)

4. Details of Biological Monitoring

The monitoring undertaken since the last reporting period is included in Appendix G.

4.1 Baseline Soil and Groundwater Assessment

Gemec was engaged to undertake a baseline soil and groundwater assessment (SGA) at the Cervantes 1 exploration well location in the Shire of Irwin, Western Australia.

The baseline SGA was undertaken on 01 and 15 March 2022. The purpose of the works was to establish a baseline soil and groundwater data set for the Cervantes 1 location, sufficient to allow for future assessment of potential soil and groundwater impacts at the site.

The works involved the collection of eight soil samples from across the site targeting the various soil profiles and future areas of potential concern prior to establishment of the site and the collection of a representative groundwater sample from the groundwater monitoring bore (MW1).

- The soil and groundwater samples were analysed for a comprehensive range of substances to establish the background soil and groundwater chemical conditions.
- Most analysed substances in soil and groundwater samples were considered representative of ambient background concentrations that existed at the site prior to commencement of site activities, or imported gravel and fines material.
- No soil exceedances were reported.
- Exceedances of screening levels in groundwater included cobalt and copper exceeding the Marine Waters (MW) screening levels and chloride exceeding the Domestic Non-Potable Groundwater Use Guidelines (NPUG). Gemec has identified no risk associated with the exceedances due to the absence of exposure pathways.
- Residual hydrocarbons detected as >C10-C34 total recoverable hydrocarbons (TRH) in the groundwater sample collected from the MW1 monitor well are attributed to the drilling mud polymer used during the installation of the groundwater bore. The concentrations were below adopted site screening levels, are anticipated to degrade over time and not pose a risk to potential future groundwater users. There is no planned extraction or use of groundwater from beneath the site except for testing purposes.

Gemec strongly recommends that the conclusions stated here be reviewed in context to comments and information contained within the body of the report in Attachment 2.

4.2 Post Drilling Groundwater Monitoring Event

Results from the July groundwater monitoring event show that there are no observed unacceptable impacts to groundwater from gas exploration well installation activities. Most of the minor fluctuations in various hydrochemical parameters between sampling events are considered to represent naturally occurring seasonal fluctuations.

Evidence of residual monitoring bore drilling fluid polymer used in construction of the groundwater monitoring well is shown as TRH fractions >C10-C34. These are not considered to pose an unacceptable risk to any receptors in the vicinity and are anticipated to continue to degrade over time, as shown by the July GME results. Natural attenuation of the polymer is considered responsible for the trace of methane detected in MW1 in July and may also have resulted in a slight increase in the dissolved manganese concentration between the March and July sampling events.

Despite minor impacts from monitoring bore drilling fluid polymer, the overall groundwater hydrochemical signature does not suggest any unacceptable impacts to groundwater from site uses during the gas exploration well drilling process, such as temporary fuel storage, drilling mud retention pond and the flare pit. This is supported in particular by hydrochemical parameters such as pH, salinity as total dissolved solids (TDS), cations and anions, which were stable between sampling events.

5. Statement of Compliance

A signed Statement of Compliance is provided in Appendix A.

The results of the audit for MS 1178 are presented in Appendix B.

5.1 Compliance with conditions of MS 1178

The MS 1178 audit in Appendix B addressed 52 conditions and the findings are presented in Table 1. The potential non-compliances are listed in Table 2.

Table 1: Compliance Summary Table

Code	Definition	#
C	Compliant	23
CLD	Closed	7
NR	Not Required	19
PNC	Potential Non-Compliance	3

5.2 Conformance with Vegetation Management Plan

The Vegetation Management Plan audit in Appendix C addressed 50 conditions and was found:

- Conformant with 39 conditions
- Potentially non-conformant with 0 conditions
- 3 conditions were not required
- 8 conditions were not applicable at this stage.

5.3 Conformance with Fauna Management Plan

The Fauna Management Plan audit in Appendix D addressed 47 conditions and was found:

- Conformant with 37 conditions
- Potentially non-conformant with 0 conditions
- One condition was not required
- Nine conditions were not applicable at this stage.

5.4 Conformance with Hygiene Management Plan

The Hygiene Management Plan audit in Appendix E addressed 30 conditions and was found:

- Conformant with 20 conditions
- Potentially non-conformant with 0 conditions
- Ten conditions were not applicable at this stage.

The potential non-conformances are listed in Table 3.

5.5 Conformance with Rehabilitation Plan

The Rehabilitation Plan audit in Appendix F addressed 94 conditions and was found:

- Conformant with 18 conditions
- Potentially non-conformant with 0 conditions
- 76 conditions were not applicable at this stage.

The potential non-conformances are listed in Table 3.

6. Action Status

The action status for all actions resulting from a potential non-compliance / non-conformance in Table 2 is summarised in Table 3. There were no actions from previous compliance reports.

Table 2: Cervantes 1 Potential Non-compliances / Potential Non-conformances

Non-compliance #	Condition #	Non-compliance	Action #	Corrective Action
1.	1178:M01.3	The proposal disturbed 0.07 ha vegetation (total) outside the EPA shape file (but was within the permitted cleared area)	1.	Add vegetation cleared outside EPA shape file to the Rehabilitation Plan.
2.	1178:M01.4	The proposal disturbed 0.03 ha PEC outside the EPA shape file (but was within the permitted cleared area)		
3.	1178:M06.1	The proponent commenced site preparation activities prior to the confirmation of the rehabilitation performance bond being in place.	2.	Halt site preparation until the bond confirmed to be in place.

Table 3: Cervantes 1 Corrective Action Summary

Corrective Action #	Corrective Action	Corrective Action
2.	Add vegetation cleared outside EPA shape file to the Rehabilitation Plan.	Vegetation cleared outside the EPA shape file is already part of the rehabilitation plan.
1.	Halt site preparation until the bond confirmed to be in place.	Site preparation was halted until the rehabilitation performance bond was confirmed to be in place.

Appendix A Statement of Compliance

1. Proposal and Proponent Details

Proposal Title	<i>CERVANTES-01 CONVENTIONAL WELL DRILLING PROPOSAL</i>
Statement Number	<i>1178</i>
Proponent Name	<i>RCMA Australia Pty Ltd</i>
Proponent's Australian Company Number	612 244 827

2. Statement of Compliance Details

Reporting Period	<i>1/01/22 to 31/12/22</i>
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Implementation phase(s) during reporting period (please tick ✓ relevant phase(s))							
Pre-construction	<input checked="" type="checkbox"/>	Construction	<input checked="" type="checkbox"/>	Operation	<input checked="" type="checkbox"/>	Decommissioning	<input type="checkbox"/>

Audit Table for Statement addressed in this Statement of Compliance is provided at Attachment:	Appendix B
<p>An audit table for the Statement addressed in this Statement of Compliance must be provided as Attachment B to this Statement of Compliance. The audit table must be prepared and maintained in accordance with the Department of Water and Environmental Regulation (DWER) <i>Post Assessment Guideline for Preparing an Audit Table</i>, as amended from time to time. The 'Status Column' of the audit table must accurately describe the compliance status of each implementation condition and/or procedure for the reporting period of this Statement of Compliance. The terms that may be used by the proponent in the 'Status Column' of the audit table are limited to the Compliance Status Terms listed and defined in Table A1.</p>	

Were all implementation conditions and/or procedures of the Statement complied with within the reporting period? (please tick ✓ the appropriate box)			
No (please proceed to Section 3)	<input checked="" type="checkbox"/>	Yes (please proceed to Section 4)	<input type="checkbox"/>

3. Details of Non-compliance(s) and/or Potential Non-compliance(s)

The information required Section 3 must be provided for each non-compliance or potential non-compliance identified during the reporting period covered by this Statement of Compliance.

Non-compliance/potential non-compliance 3-1

Which implementation condition or procedure was non-compliant or potentially non-compliant?
As security for the due and punctual observance and performance by the proponent of the requirements of condition 5 to be observed, conformed and complied with, the proponent shall lodge with the CEO prior to commencement of site preparation activities, an irrevocable Performance Bond as nominated and approved by the CEO in his/her sole unfettered discretion to a cash value and in a form acceptable to the CEO ("the Security") which Security at the date hereof being \$324,500.
Was the implementation condition or procedure non-compliant or potentially non-compliant?
The proponent commence site preparation activities prior to the bond being confirmed in place.
On what date(s) did the non-compliance or potential non-compliance occur (if applicable)?
10/02/2022.

Was this non-compliance or potential non-compliance reported to the Chief Executive Officer, DWER?
It was reported in writing to DWER 12/02/2022. <input type="checkbox"/> No

What are the details of the non-compliance or potential non-compliance and where relevant, the extent of and impacts associated with the non-compliance or potential non-compliance?
Site preparation activities commenced before final administrative controls were in place. No known impacts.
What is the precise location where the non-compliance or potential non-compliance occurred (if applicable)? (please provide this information as a map or GIS co-ordinates)
Cervantes 1 project area (well site and access tracks).
What was the cause(s) of the non-compliance or potential non-compliance?
Miscommunication with DWER.
What remedial and/or corrective action(s), if any, were taken or are proposed to be taken in response to the non-compliance or potential non-compliance?
Site preparation ceased on the 11/02/2023 and was not commenced until after the bond was in place.
What measures, if any, were in place to prevent the non-compliance or potential non-compliance before it occurred? What, if any, amendments have been made to those measures to prevent re-occurrence?
Improved communication.

Please provide information/documentation collected and recorded in relation to this implementation condition or procedure:

- in the reporting period addressed in this Statement of Compliance; and
- as outlined in the approved Compliance Assessment Plan for the Statement addressed in this Statement of Compliance.
(the above information may be provided as an attachment to this Statement of Compliance)

For additional non-compliance or potential non-compliance, please duplicate pages of Section 3 as required.

4. Details of Non-compliance(s) and/or Potential Non-compliance(s)

The information required Section 3 must be provided for each non-compliance or potential non-compliance identified during the reporting period covered by this Statement of Compliance.

Non-compliance/potential non-compliance 3-1

Which implementation condition or procedure was non-compliant or potentially non-compliant?
<p>Limitation and Extent of Proposal (Physical element)</p> <ol style="list-style-type: none"> 1. When implementing the proposal, the proponent shall ensure the proposal does not exceed the following extent of direct disturbance of native vegetation (Up to 5.3 ha) 2. When implementing the proposal, the proponent shall ensure the proposal does not exceed the following extent of Direct disturbance of priority 1 'Coastal sands dominated by <i>Acacia rostellifera</i>, <i>Eucalyptus oraria</i> and <i>Eucalyptus obtusiflora</i>' Priority Ecological Community (PEC) (Up to 0.99 ha)
Was the implementation condition or procedure non-compliant or potentially non-compliant?
The proponent cleared small areas off the alignment of the access track outside the designated disturbance footprint.
On what date(s) did the non-compliance or potential non-compliance occur (if applicable)?
March 2022.

Was this non-compliance or potential non-compliance reported to the Chief Executive Officer, DWER?		
<table border="1"> <tr> <td>It was reported in writing to DWER 26/05/2022 when aerial imagery surveillance identified the issue..</td> <td><input type="checkbox"/> No</td> </tr> </table>	It was reported in writing to DWER 26/05/2022 when aerial imagery surveillance identified the issue..	<input type="checkbox"/> No
It was reported in writing to DWER 26/05/2022 when aerial imagery surveillance identified the issue..	<input type="checkbox"/> No	

What are the details of the non-compliance or potential non-compliance and where relevant, the extent of and impacts associated with the non-compliance or potential non-compliance?
The tracks are the planned width however they have been constructed to follow the existing clearing rather than a straight line to minimise clearing and avoid large trees.
What is the precise location where the non-compliance or potential non-compliance occurred (if applicable)? (please provide this information as a map or GIS co-ordinates)
Cervantes access track.
What was the cause(s) of the non-compliance or potential non-compliance?
The requirement to provide an exact development footprint for a 9m wide track.
What remedial and/or corrective action(s), if any, were taken or are proposed to be taken in response to the non-compliance or potential non-compliance?
The clearing was well below the permitted cleared area. The clearing was wholly within the development envelope. The clearing will be part of the rehabilitation.
What measures, if any, were in place to prevent the non-compliance or potential non-compliance before it occurred? What, if any, amendments have been made to those measures to prevent re-occurrence?

Drone survey of route of track clearing. Future activities would involve larger disturbance footprint.

Please provide information/documentation collected and recorded in relation to this implementation condition or procedure:

- in the reporting period addressed in this Statement of Compliance; and
- as outlined in the approved Compliance Assessment Plan for the Statement addressed in this Statement of Compliance.
(the above information may be provided as an attachment to this Statement of Compliance)

For additional non-compliance or potential non-compliance, please duplicate pages of Section 3 as required.

5. Proponent Declaration

I, Chris Newport (Director), declare that I am authorised on behalf of RCMA Australia Pty Ltd (being the person responsible for the proposal) to submit this form and that the information contained in this form is true and not misleading.



17 March 2023

Signature:.....

Date:.....

Please note that:

- it is an offence under section 112 of the Environmental Protection Act 1986 for a person to give or cause to be given information that to his knowledge is false or misleading in a material particular; and
- the Chief Executive Officer of the DWER has powers under section 47(2) of the Environmental Protection Act 1986 to require reports and information about implementation of the proposal to which the statement relates and compliance with the implementation conditions.

6. Submission of Statement of Compliance

One hard copy and one electronic copy (preferably PDF on CD or thumb drive) of the Statement of Compliance are required to be submitted to the Chief Executive Officer, DWER, marked to the attention of Manager, Compliance (Ministerial Statements).

Please note, the DWER has adopted a procedure of providing written acknowledgment of receipt of all Statements of Compliance submitted by the proponent, however, the DWER does not approve Statements of Compliance.

7. Contact Information

Queries regarding Statements of Compliance, or other issues of compliance relevant to a Statement may be directed to Compliance (Ministerial Statements), DWER:

Manager, Compliance (Ministerial Statements)
 Department of Water and Environmental Regulation
 Postal Address: Locked Bag 10, Joondalup DC, WA 6919
 Phone: (08) 6364 7000
 Email: compliance@dwer.wa.gov.au

8. Post Assessment Guidelines and Forms

Post assessment documents can be found at www.epa.wa.gov.au

Table A1: Compliance Status Terms

Compliance Status Terms	Abbrev	Definition	Notes
Compliant	C	Implementation of the proposal has been carried out in accordance with the requirements of the audit element.	This term applies to audit elements with: <ul style="list-style-type: none"> ongoing requirements that have been met during the reporting period; and requirements with a finite period of application that have been met during the reporting period, but whose status has not yet been classified as 'completed'.
Completed	CLD	A requirement with a finite period of application has been satisfactorily completed.	This term may only be used where: <ul style="list-style-type: none"> audit elements have a finite period of application (e.g. construction activities, development of a document); the action has been satisfactorily completed; and the DWER has provided written acceptance of 'completed' status for the audit element.
Not required at this stage	NR	The requirements of the audit element were not triggered during the reporting period.	This should be consistent with the 'Phase' column of the audit table.
Potentially Non-compliant	PNC	Possible or likely failure to meet the requirements of the audit element.	This term may apply where during the reporting period the proponent has identified a potential non-compliance and has not yet finalized its investigations to determine whether non-compliance has occurred.
Non-compliant	NC	Implementation of the proposal has not been carried out in accordance with the requirements of the audit element.	This term applies where the requirements of the audit element are not "complete" have not been met during the reporting period.

In Process	IP	Where an audit element requires a management or monitoring plan be submitted to the DWER or another government agency for approval, that submission has been made and no further information or changes have been requested by the DWER or the other government agency and assessment by the DWER or other government agency for approval is still pending.	<p>The term 'In Process' may not be used for any purpose other than that stated in the Definition Column.</p> <p>The term 'In Process' may not be used to describe the compliance status of an implementation condition and/or procedure that requires implementation throughout the life of the project (e.g. implementation of a management plan).</p>
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Appendix B Compliance with MS 1178

Audit Code	Subject	Requirement	How	Evidence	Phase	Timeframe	Status	Further Information
1178:M01.1	Limitation and Extent of Proposal (Physical element)	When implementing the proposal, the proponent shall ensure the proposal does not exceed the Development envelope (36.5 ha)	Survey will be undertaken prior to ground disturbing activities to ensure the proposal development envelope does not exceed 36.5 ha	E01_Clearing a2750_f13_02 E02_MS1178 development envelope .shp file	Construction	Annual	C	The proposal (5.4 ha) did not exceed the Development Envelope.
1178:M01.2	Limitation and Extent of Proposal (Physical element)	When implementing the proposal, the proponent shall ensure the proposal does not exceed the Disturbance footprint (Up to 7 ha)	Survey will be undertaken prior to ground disturbing activities to ensure the proposal disturbance footprint does not exceed 7 ha	Site Inspection 10/02/2022 and 12/03/2022 P01_Surveyed areas marked for clearing P02_Surveyed areas marked for clearing	Construction	Annual	C	The proposal (5.4 ha) did not exceed the Disturbance Footprint. Site inspection by auditor observed survey tape marking out areas to be cleared (P01, P02)
1178:M01.3	Limitation and Extent of Proposal (Physical element)	When implementing the proposal, the proponent shall ensure the proposal does not exceed the following extent of direct disturbance of native vegetation (Up to 5.3 ha)	Survey will be undertaken prior to ground disturbing activities to ensure the proposal direct disturbance of native vegetation does not exceed 5.3 ha	E01_Clearing a2750_f13_02 E02_MS1178 development envelope .shp file	Construction	Annual	PNC	The proposal disturbed 3.3 ha of native vegetation (within the 5.3 ha allowance). There was 0.07 ha of this clearing outside the GIS plot (EPA shape file) due to width and alignment issues on the tracks.
1178:M01.4	Limitation and Extent of Proposal (Physical element)	When implementing the proposal, the proponent shall ensure the proposal does not exceed the following extent of Direct disturbance of priority 1 'Coastal sands dominated by <i>Acacia rostellifera</i> , <i>Eucalyptus oraria</i> and <i>Eucalyptus obtusiflora</i> ' Priority Ecological Community (PEC) (Up to 0.99 ha)	Survey will be undertaken prior to ground disturbing activities to ensure the proposal does not impact more than 0.99 ha PEC	E01_Clearing a2750_f13_02 E02_MS1178 development envelope .shp file P03_PEC track clearing	Construction	Annual	PNC	The proposal disturbed 0.56 ha of PEC (within the 0.99 ha allowance). There was 0.03 ha of this clearing outside the GIS plot (EPA shape file) due to width and alignment issues on the tracks.
1178:M01.5	Limitation and Extent of Proposal (Operational elements)	When implementing the proposal, the proponent shall ensure the proposal uses conventional extraction methods	The Cervantes 1 well will be drilled by a conventional drilling rig with conventional drilling methods	R02_Cervantes 1 Conventional Oil Exploration Well EP (Rev 6) P04_Ensign Rig 970	Operation	Annual	CLD	Conventional drilling rig (Ensign Rig 970) utilising conventional drilling methods was utilised for drilling Cervantes.
1178:M01.6	Limitation and Extent of Proposal (Operational elements)	When implementing the proposal, the proponent shall ensure the proposal conducts rehabilitation consistent with an approved Rehabilitation Plan	RCMA will undertake rehabilitation in accordance with Cervantes 1 Rehabilitation Plan [RCMA-02-EM-PLN-008]	Audit shows that Cervantes 1 rehabilitation is conducted in accordance with Cervantes 1 Rehabilitation Plan [RCMA-02-EM-PLN-008]	Decommissioning	Annual	NR	The rehabilitation has not commenced and hence no rehabilitation activities conducted in the period: 01/01/2022 to 31/12/2022
1178:M01.7	Limitation and Extent of Proposal (Operational elements)	When implementing the proposal, the proponent shall ensure the proposal is decommissioned to ensure that the Removal of all drilling and exploration related infrastructure and equipment not required to remain under the Petroleum and Geothermal Energy Resources Act 1967	There should be no infrastructure or permanent markers (other than the well abandonment plaque), steel pegs or litter left on the rehabilitated area at any time following rehabilitation	Monthly workplace inspection record form [RCMA-02-SAF-FM-006] confirms there are no permanent markers or litter left on site Photos	Overall	Annual	NR	The proposal has not been decommissioned / rehabilitated. Remaining on site is the mud sump, well head, wood, survey tape.

Audit Code	Subject	Requirement	How	Evidence	Phase	Timeframe	Status	Further Information
1178:M01.8	Limitation and Extent of Proposal (Timing elements)	When implementing the proposal, the proponent shall ensure the proposal does not exceed the following extents: site preparation and drilling activities up to six (6) months from substantial commencement	RCMA has six months from substantial commencement to undertake site preparation and drilling	E03_Monthly Recordable Incident Report March Site Preparation E04_Monthly Recordable Incident Report March Drilling E05_Monthly Recordable Incident Report April Drilling	Overall	Annual	CLD	Site preparation activities substantially undertaken March (E03), drilling undertaken March and April (E04, E05).
1178:M01.9	Limitation and Extent of Proposal (Timing elements)	When implementing the proposal, the proponent shall ensure the proposal does not exceed the following extents: rehabilitation up to three (3) years from plugging of the well	RCMA shall rehabilitate the wellsite within three years from plugging the well	Records show rehabilitation is undertaken within three years of plugging the well	Decommissioning	Annual	NR	Rehabilitation not undertaken in the reporting period. Drilling activities were undertaken less than one year ago.
1178:M02.1	Time Limit Authorisation	The proponent shall not commence implementation of the proposal after five (5) years from the date of this Statement, and any commencement, prior to this date, must be substantial.	RCMA shall not commence the proposal after 14 December 2026	Records show Cervantes 1 civils are commenced before 14 December 2026	Pre-construction	Annual	CLD	The proposal was commenced in February 2022.
1178:M02.2	Time Limit Authorisation	Any commencement of implementation of the proposal, on or before five (5) years from the date of this Statement, must be demonstrated as substantial by providing the CEO with written evidence, on or before the expiration of five (5) years from the date of this Statement.	RCMA shall notify the CEO on substantial commencement of the proposal (before 14 December 2026)	C02_20220209 Substantial Commencement	Pre-construction	Annual	CLD	The proposal was commenced in February 2022 as notified to DWER 09/02/2022 (C02).
1178:M03.1.1	Flora and Vegetation Outcomes	The proponent shall ensure the following outcomes are achieved: no more than 0.99 ha direct disturbance to Coastal sands dominated by <i>Acacia rostellifera</i> , <i>Eucalyptus oraria</i> and <i>Eucalyptus obtusiflora</i> PEC;	Survey will be undertaken prior to ground disturbing activities to ensure the proposal does not impact more than 0.99 ha PEC	E01_Clearing a2750_f13_02 P03_PEC track clearing	Construction	Annual	C	Proposal impacted no more than 0.56 ha of PEC.
1178:M03.1.2	Flora and Vegetation Outcomes	The proponent shall ensure the following outcomes are achieved: avoid impacts from the implementation of the proposal to flora and vegetation from changes to fire regime, dieback (Phytophthora spp) and weeds.	RCMA will avoid impacts from the implementation of the proposal to flora and vegetation from changes to fire regime, dieback (Phytophthora spp) and weeds	R03_VMP Rev 3 R01_2022 CAR Appendix C Vegetation Management Plan Audit	Construction Decommissioning	Annual Annual	C	The Vegetation Management Plan has been implemented to ensure the outcomes are achieved. An audit (Appendix C) has been undertaken to determine if RCMA has avoided impacts from the implementation of the proposal to flora and vegetation from changes to fire regime, dieback and weeds (Appendix C). No non-conformances were identified.
1178:M04.1.1	Terrestrial Fauna Outcomes	The proponent shall ensure the following outcome is achieved: avoid impacts from the implementation of the proposal to terrestrial fauna from changes to fire regime, introduction of feral animals, spread of dieback and weeds,	RCMA will avoid impacts from the implementation of the proposal to terrestrial fauna from changes to fire regime, introduction of feral animals, spread of dieback and weeds, vehicle	R04_FMP Rev 3 Appendix D_Fauna Management Plan Audit	Overall	Annual	C	The Fauna Management Plan has been implemented to ensure the outcomes are achieved. An audit

Audit Code	Subject	Requirement	How	Evidence	Phase	Timeframe	Status	Further Information
		vehicle strikes, entrapment in excavation and artificial water bodies, light pollution, noise and dust.	strikes, entrapment in excavation and artificial water bodies, light pollution, noise and dust.					(Appendix D) has been undertaken to determine if RCMA has avoided impacts from the implementation of the proposal to terrestrial fauna from changes to fire regime, introduction of feral animals, spread of dieback and weeds, vehicle strikes, entrapment in excavation and artificial water bodies, light pollution, noise and dust (Appendix D). No non-conformances were identified.
1178:M05.1	Rehabilitation Plan	The proponent shall update and implement the Rehabilitation Management Plan (29 April 2021) for approval by the CEO, on advice from DBCA. The Rehabilitation Management Plan shall contain provisions for update and review.	RCMA will implement the Cervantes 1 Rehabilitation Plan [RCMA-02-EM-PLN-008v3 24/01/2022] under advice from DBCA (21/01/2022) and it will contain provisions for update and review	R06_Rehabilitation Plan Rev 3 C03_Rehab EMP - Letter to proponent - EMP Approved C01_Cervantes - Letter to proponent - DBCA Advice Appendix F_Rehabilitation Plan Audit	Pre-construction	Annual	C	The Rehabilitation Plan has been implemented (where applicable) as per the audit (Appendix F) undertaken to determine if PBE has implemented the approved version (C03) of Rehabilitation Plan (R06) as per DBCA advice (C01). One non-conformance was identified.
1178:M05.2	Rehabilitation Plan	The proponent must not commence ground disturbing works until the CEO has endorsed the latest version of the Rehabilitation Management Plan (29 April 2021) in writing.	RCMA must not commence site preparation until the Rehabilitation Plan has been approved	R06_Rehabilitation Plan Rev 3 C03_Rehab EMP - Letter to proponent - EMP Approved	Construction	Annual	CLD	Rehabilitation Plan (R06) was endorsed by Shaun Meredith, Executive Director of EPA Services 04/02/2022 (C03) prior to ground disturbing activities commencing 09/02/2022.
1178:M05.3	Rehabilitation Plan	The proponent shall implement the Rehabilitation Management Plan referred to in condition 5-1 until such time as the CEO agrees that the proponent's rehabilitation completion criteria have been fulfilled.	RCMA must not implement the Rehabilitation Plan until DBCA have approved the completion criteria	R06_Rehabilitation Plan Rev 3 C03_Rehab EMP - Letter to proponent - EMP Approved C01_Cervantes - Letter to proponent - DBCA Advice	Decommissioning	Annual	C	DBCA provided advice to DWER on the Completion Criteria in January 2022 as stated in DWER letter 21/01/2022 (C01). This Rehabilitation Plan was approved by DWER 04/02/2022 (C03).
1178:M06.1	Rehabilitation Performance Bond	As security for the due and punctual observance and performance by the proponent of the requirements of condition 5 to be observed, conformed and complied with, the proponent shall lodge with the CEO prior to commencement of site preparation activities, an irrevocable	RCMA must lodge a Rehabilitation Bond of \$324,500 prior to commencing site preparation activities	C07_MS1178 Performance Bond Approval - letter to RCMA	Pre-construction	Q1 2022 (assessed once)	PNC	Bond received by DWER 21/02/2022 (C07). RCMA had commenced site preparation prior to this without realising bond

Audit Code	Subject	Requirement	How	Evidence	Phase	Timeframe	Status	Further Information
		Performance Bond as nominated and approved by the CEO in his/her sole unfettered discretion to a cash value and in a form acceptable to the CEO ("the Security") which Security at the date hereof being \$324,500.						had not been confirmed by DWER. Works were halted after a day and a half until the bond was finalised.
1178:M06.2	Rehabilitation Performance Bond	If the proponent encounters hydrocarbons that have the potential to lead to a commercial field development, as security for the due and punctual observance and performance by the proponent of the requirements of condition 5 to be observed, conformed and complied with, the proponent shall lodge with the CEO on demand within three (3) months of the casing and suspension of the proposal, an irrevocable Performance Bond as nominated and approved by the CEO in his/her sole unfettered discretion to a cash value and in a form acceptable to the CEO ("the Security") which Security at the date hereof being \$275,000.	RCMA must lodge a Decommissioning Bond of \$275,000 within three months following a commercial hydrocarbon discovery	E05_Monthly Recordable Incident Report April Drilling	Operations	Q3 2022 (assessed once)	NR	Cervantes 1 did not encounter hydrocarbons. April recordable incident report documented P&A of the Cervantes 1 well.
1178:M06.3	Rehabilitation Performance Bond	Upon completion of appropriate decommissioning and rehabilitation works at the site as agreed by the CEO, the Performance Bond referred in condition 6-1 can be reduced to \$93,000 as a contingency Performance Bond. Additional works would be required if completion criteria have not been achieved in a period of three (3) years following completion of decommissioning and rehabilitation works as determined by the CEO, on advice of DBCA.	Following rehabilitation activities, on approval of the CEO, the Rehabilitation Bond is reduced to a Contingency Rehabilitation Bond of \$93,000	Letter from CEO notifying permission for bond reduction RCMA letter to CEO notifying them of Contingency Rehabilitation Bond	Decommissioning	Annual	NR	No rehabilitation has been undertaken
1178:M06.4	Rehabilitation Performance Bond	Security required by conditions 6-1, 6-2 and 6-3 may be reviewed at any time under Part VA 'Financial assurances' of the <i>Environmental Protection Act 1986</i> .	Rehabilitation Bond, Decommissioning bond and Contingency Rehabilitation Bond may be reviewed at any time.	-	Overall	Annual	-	Taken condition is taken as information to note.
1178:M07.1	Offsets	If completion criteria have not been fulfilled after decommissioning and rehabilitation, and a further three (3) years following additional works, resulting in significant residual impacts on Beekeepers Nature Reserve, then the proponent shall implement offsets to counter-balance any residual impacts on the nature reserve as determined by the CEO, on advice of DBCA.	More works (re rehabilitation) must be undertaken if rehabilitation is unsuccessful after 3 years Offsets must be implemented 3 years after re rehabilitation if works are unsuccessful	Re rehabilitation completion report Rehabilitation Monitoring Report Year 6	Decommissioning	Annual Annual	NR NR	Rehabilitation has not been undertaken. Therefore requirement for re-rehabilitation is not yet required.
1178:M08.1	Environmental Management Plan(s): Monitoring and Adaptive Management Program	Prior to ground disturbance and for approval, the proponent must prepare and submit to the CEO Environmental Management Plan(s) to substantiate that the outcomes of conditions M3, M4 and M5 will be met. The Plans must include: (1) threshold criteria that provide a limit beyond which the environmental outcomes are not achieved;	RCMA will prepare and submit and obtain approval from the CEO for Cervantes 1 Vegetation Management Plan [RCMA-02-EM-PLN-004], Cervantes 1 Fauna Management Plan [RCMA-02-EM-PLN-007], Cervantes 1 Weed and Dieback Hygiene Management Plan [RCMA-02-EM-PLN-003] and Cervantes 1	C04_Vegetation EMP - Letter to proponent - EMP Approved C05_Fauna EMP - Letter to proponent - EMP Approved C06_Hygiene EMP - Letter to proponent - EMP Approved C03_Rehab EMP - Letter to proponent - EMP Approved	Pre-construction	Q1 2022 (assessed once)	C	Cervantes 1 Vegetation Management Plan [RCMA-02-EM-PLN-004v3], Cervantes 1 Fauna Management Plan [RCMA-02-EM-PLN-007v3], Cervantes 1 Weed and Dieback Hygiene Management Plan [RCMA-

Audit Code	Subject	Requirement	How	Evidence	Phase	Timeframe	Status	Further Information
		<p>(2) trigger criteria that will provide an early warning that the environmental outcomes are not likely to be met;</p> <p>(3) monitoring parameters, sites, control/reference sites, methodology, timing and frequencies which will be used to measure threshold and trigger criteria. Include methodology for determining alternate monitoring sites as a contingency if proposed sites are not suitable in the future;</p> <p>(4) baseline data;</p> <p>(5) data collection and analysis methodologies;</p> <p>(6) adaptive management methodology; and</p> <p>(7) contingency measures which will be implemented if threshold or trigger criteria are met.</p>	Rehabilitation Plan [RCMA-02-EM-PLN-008]					02-EM-PLN-003v4] and Cervantes 1 Rehabilitation Plan [RCMA-02-EM-PLN-008v3] were approved by Shaun Meredith, Executive Director of EPA Services 04/02/2022 (C04, C05, C06, C03). Each of these plans contain threshold and trigger criteria, baseline data, data collection and analysis, adaptive management methodology and contingency measures.
1178:M08.2	Environmental Management Plan(s): Monitoring and Adaptive Management Program	The exceedance of a threshold criteria (regardless of whether threshold contingency measures have been or are being implemented), and / or failure to comply with the requirements of the Environmental Management Plan represents a non-compliance with these conditions.	The exceedance of a threshold criteria and / or failure to comply with the requirements of the Environmental Management Plans represents a non-compliance with these conditions	R01_2022 Compliance Assessment Report R07_Site Preparation Audit Report R08_Drilling Audit Report R09_C&M Audit Report	Overall	Annual	C	No exceedance of a threshold criteria and / or failure to comply with the requirements of the Environmental Management Plans occurred during the reporting period.
1178:M08.3	Environmental Management Plan(s): Monitoring and Adaptive Management Program	The proponent must not commence operations until the CEO, on advice from DBCA, has confirmed in writing that the Environmental Management Plan(s) satisfies the requirements of this condition.	RCMA must have CEO approval for Environmental Management Plans prior to site preparation	C01_Cervantes - Letter to proponent - DBCA Advice C04_Vegetation EMP - Letter to proponent - EMP Approved C05_Fauna EMP - Letter to proponent - EMP Approved C06_Hygiene EMP - Letter to proponent - EMP Approved C03_Rehab EMP - Letter to proponent - EMP Approved	Pre-construction	Q1 2022 (assessed once)	C	Audit confirms site preparation activities commenced after CEO approval letter for Management Plans (C04, C05, C06, C03) following advice from DBCA (C01).
1178:M09.1.1	Environmental Management Plan(s): General Provisions	After receiving notice in writing from the CEO that the management plan(s) for conditions 3, 4 and 5 of this Statement satisfy the requirements of condition 8 respectively, the proponent shall implement the proposal in accordance with the management plans	RCMA must implement the Cervantes 1 proposal in accordance with the Cervantes 1 Vegetation Management Plan [RCMA-02-EM-PLN-004], Cervantes 1 Fauna Management Plan [RCMA-02-EM-PLN-007], Cervantes 1 Weed and Dieback Hygiene Management Plan [RCMA-02-EM-PLN-003] and Cervantes 1 Rehabilitation Plan [RCMA-02-EM-PLN-008]	Site Inspection 12/03/2022, 02/04/2022, 06/04/2022, 31/10/2022. R07_Site Preparation Audit Report R08_Drilling Audit Report R09_C&M Audit Report Appendix C_VMP Audit Appendix D_FMP Audit Appendix E_HMP Audit Appendix F_Rehabilitation Plan Audit	Overall	Annual	C	Cervantes has been implemented in accordance with the Management Plans. There were two potential non conformances with the implementation of the Management Plans.

Audit Code	Subject	Requirement	How	Evidence	Phase	Timeframe	Status	Further Information
1178:M09.1.2	Environmental Management Plan(s): General Provisions	After receiving notice in writing from the CEO that the management plan(s) for conditions 3, 4 and 5 of this Statement satisfy the requirements of condition 8 respectively, the proponent shall continue to implement the approved plans and programs until the CEO has confirmed by notice in writing that it has been demonstrated that the condition requirements have been met and therefore the implementation of the actions is no longer required	RCMA must continue to implement the Cervantes 1 proposal in accordance with the Cervantes 1 Vegetation Management Plan [RCMA-02-EM-PLN-004], Cervantes 1 Fauna Management Plan [RCMA-02-EM-PLN-007], Cervantes 1 Weed and Dieback Hygiene Management Plan [RCMA-02-EM-PLN-003] and Cervantes 1 Rehabilitation Plan [RCMA-02-EM-PLN-008] until the CEO notifies RCMA	See M09.1.1	Overall	Annual	C	See M09.1.1
1178:M09.2	Environmental Management Plan(s): General Provisions	The proponent may review and revise the management plan(s).	RCMA may review and revise the management plan(s)	Management Advice 31/12/2022	Overall	Annual	C	PBE are currently consulting with DBCA in regard to a revision of the Rehabilitation Plan.
1178:M09.3	Environmental Management Plan(s): General Provisions	The proponent shall review and revise the management plan(s) as and when directed by the CEO.	RCMA shall review and revise the management plan(s) as and when directed by the CEO	Management Advice 31/12/2022	Overall	Annual	NR	The CEO has not directed PBE to review and revise the management plan(s).
1178:M09.4	Environmental Management Plan(s): General Provisions	The proponent shall implement the latest version of the management plan(s), which the CEO has confirmed by notice in writing, satisfies the requirements of conditions M3, M4, M5 and M8 respectively.	RCMA shall implement the CEO approved version of the management plan(s)	C04_Vegetation EMP - Letter to proponent - EMP Approved C05_Fauna EMP - Letter to proponent - EMP Approved C06_Hygiene EMP - Letter to proponent - EMP Approved C03_Rehab EMP - Letter to proponent - EMP Approved R07_Site Preparation Audit Report R08_Drilling Audit Report R09_C&M Audit Report	Overall	Annual	C	See M09.1.1
1178:M09.5	Environmental Management Plan(s): General Provisions	Despite condition M9.4, but subject to conditions M9.6 and M9.7, the proponent may implement minor revisions to a management plan(s) if the revisions will not result in any new or increased adverse impacts to the environment or result in a risk to the achievement of the management plan(s) limits, outcomes or objectives.	RCMA may implement minor revisions to a management plan(s) if the revisions will not result in any new or increased adverse impacts to the environment or result in a risk to the achievement of the management plan(s) limits, outcomes or objectives	Management Advice 31/12/2022	Overall	Annual	NR	No revisions were made to the Management Plans in 2022.

Audit Code	Subject	Requirement	How	Evidence	Phase	Timeframe	Status	Further Information
1178:M09.6	Environmental Management Plan(s): General Provisions	If the proponent is to implement minor revisions to a management plan(s) under condition 9-5, the proponent must provide the CEO with the following at least twenty (20) business days before it implements the revisions: (1) revised management plan(s) clearly showing the minor revisions; (2) explanation of reasons for the minor revisions; and (3) explanation of why the minor revisions will not result in a new or increased adverse impacts to the environment or result in a risk to the achievement of the management plan limits, outcomes or objectives.	RCMA must provide the CEO with the management plan(s) with minor revisions at least 20 days before implementation including: (1) revised management plan(s) clearly showing the minor revisions; (2) explanation of reasons for the minor revisions; and (3) explanation of why the minor revisions will not result in a new or increased adverse impacts to the environment or result in a risk to the achievement of the management plan limits, outcomes or objectives.	Management Advice 31/12/2022	Overall	Annual	NR	No revisions were made to the Management Plans in 2022.
1178:M09.7	Environmental Management Plan(s): General Provisions	The proponent must cease to implement any revisions which the CEO notifies the proponent in writing may not be implemented.	RCMA must implement the management plan(s) approved by the CEO and management plan(s) with minor changes unless notified by the CEO	Management Advice 31/12/2022	Overall	Annual	NR	No revisions were made to the Management Plans in 2022.
1178:M09.8	Environmental Management Plan(s): General Provisions	Management Plans must be provided in electronic form suitable for publication on the EPA website within ten (10) business days of endorsement, and also be provided on the proponent's website.	Management Plans must be sent to CEO in electronic format suitable for EPA website within ten (10) business days of endorsement, and also be posted on the RCMA website.	C08_Cervantes 1 Environmental management plans Management Plan(s) are posted at: www.rcma.com	Overall	Annual	C	The Management Plans were sent to the CEO on 18/07/2021 and the revised plans 24/01/2022 (C08). The plans were made available within 10 business days of approval on the proponent's website at: www.rcma.com
1178:M10.1	Contact Details	The proponent shall notify the CEO of any change of its name, physical address or postal address for the serving of notices or other correspondence within twenty-eight (28) days of such change. Where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.	RCMA shall notify the CEO of any change of name, physical address or postal address for the serving of notices or other correspondence within twenty-eight (28) days of such change	C12_20230118.PBE-DWER.Change of Business name & Address - Ministerial Statement 1178	Overall	Annual	C	PBE advised DWER of a change of proponent name and address on 17/01/2023.
1178:M11.1	Compliance and Exceedance Reporting	The proponent shall prepare and maintain a Compliance Assessment Plan which is submitted to the CEO at least six (6) months prior to the first Compliance Assessment Report required by condition M11.5, or prior to implementation of the proposal, whichever is sooner.	RCMA will submit a Compliance Assessment Plan prior to Site Preparation	R10_CAP Rev v3 C09_CAP Approval 15022022	Pre-construction	Complete 16/12/2021	CLD	The compliance assessment plan was submitted to the CEO compliance@dwer.wa.gov.au on 16/12/2021 (prior to site preparation)

Audit Code	Subject	Requirement	How	Evidence	Phase	Timeframe	Status	Further Information
								The compliance assessment plan was approved by the CEO.
1178:M11.2	Compliance and Exceedance Reporting	The Compliance Assessment Plan shall indicate: (1) the frequency of compliance reporting; (2) the approach and timing of compliance assessments; (3) the retention of compliance assessments; (4) the method of reporting of potential non-compliances and corrective actions taken; (5) the table of contents of Compliance Assessment Reports; and (6) public availability of Compliance Assessment Reports.	The Compliance Assessment Plan shall indicate: (1) the frequency of compliance reporting; (2) the approach and timing of compliance assessments; (3) the retention of compliance assessments; (4) the method of reporting of potential non-compliances and corrective actions taken; (5) the table of contents of Compliance Assessment Reports; and (6) public availability of Compliance Assessment Reports.	R10_CAP Rev v3 Audit confirms that the Compliance Assessment Plan contains the required content	Overall	Q1 2022 (assessed once)	CLD	Sections of the compliance assessment plan are as follows: (1) 2.1 (2) 2.2 (3) 2.3 (4) 2.4 (5) 2.5 (6) 2.6
1178:M11.3	Compliance and Exceedance Reporting	After receiving notice in writing from the CEO that the Compliance Assessment Plan satisfies the requirements of condition M11.2, the proponent shall assess compliance with conditions in accordance with the Compliance Assessment Plan required by condition M11.1.	RCMA shall assess compliance with conditions in accordance with the Compliance Assessment Plan	R01_2022 Compliance Assessment Report	Overall	Annual	C	This audit report for the period: 01/01/2022 to 31/12/2022
				Appendix C_VMP Audit Appendix D_FMP Audit Appendix E_HMP Audit Appendix F_Rehabilitation Plan Audit	Overall	Annual	C	This audit report for the period 1/01/2022 to 31/12/2022: <ul style="list-style-type: none"> Appendix C Appendix D Appendix E Appendix F
1178:M11.4	Compliance and Exceedance Reporting	The proponent must provide an annual Compliance Assessment Report to the CEO for the purpose of determining whether the implementation conditions are being complied with.	RCMA must provide an annual Compliance Assessment Report	R01_2022 Compliance Assessment Report W01_RCMA Website Snapshot	Overall	Annual	C	This 2021 CAR dated 28/03/2022 for the period: 14/12/2021 to 31/12/2021 was submitted 28/03/2022 (due date 31/03/2022). The report was published on the website at www.rcma.com
1178:M11.5	Compliance and Exceedance Reporting	The first annual Compliance Assessment Report must be submitted within twelve months of the issuing of this statement commencing on the first 31 March after the date of this Statement, and subsequent Compliance Assessment Reports must be submitted annually from that date, unless a different date is approved by the CEO.	RCMA must provide first annual Compliance Assessment Report by 31 March 2022	R11_2021 Compliance Assessment Report W01_RCMA Website Snapshot	-	31 Mar 2022 (assessed annually)	C	The first CAR (2021) for the period: 14/12/2021 to 31/12/2021 was submitted 28/03/2022.

Audit Code	Subject	Requirement	How	Evidence	Phase	Timeframe	Status	Further Information
1178:M11.6	Compliance and Exceedance Reporting	Each annual Compliance Assessment Report must be endorsed by the proponent's Chief Executive Officer and must: (1) state whether each condition of this Statement has been complied with; (2) provide evidence to substantiate statements of compliance, or details of where there has been a non-compliance and describe corrective and preventative actions taken; and (3) be provided in a form suitable for publication on the EPA website.	RCMA CEO must endorse the annual Compliance Assessment Report which must: (1) state whether each condition of this Statement has been complied with; (2) provide evidence to substantiate statements of compliance, or details of where there has been a non-compliance and describe corrective and preventative actions taken; and (3) be provided in a form suitable for publication on the EPA website.	R10_Compliance Assessment Plan Rev v3 R11_2021 Compliance Assessment Report	Overall	Annual	C	Annual 2021 CAR for the period: 14/12/2021 to 31/12/2021 was endorsed by Chris Newport (RCMA CEO) and completed in accordance with the Compliance Assessment Plan and endorsed. The CAR had a statement in the audit table of whether it condition was complied with and a description of the evidence of compliance. There were no non-compliances or corrective actions. It was provided as a pdf so that it could be loaded on the EPA website.
1178:M11.7.1	Compliance and Exceedance Reporting	If the proponent becomes aware a limit, outcome or threshold criteria contained in these conditions, or a management plan required in these conditions, has, or is likely to be exceeded, the proponent must report this to the CEO within seven (7) days	RCMA must report within 7 days to the CEO where they become aware of a non-compliance (a limit, outcome or threshold criteria contained in these conditions, or a management plan required in these conditions, has, or is likely to be exceeded)	R01_2022 CAR R16_Cervantes Clearing Summary C07_MS1178 Performance Bond Approval - letter to RCMA	Overall	Annual	C	PBE (the RCMA) notified DWER of the PNC associated with the bond (C07) and clearing outside the footprint (R16) at the time of the non-compliance.
1178:M11.7.2	Compliance and Exceedance Reporting	If the proponent becomes aware a limit, outcome or threshold criteria contained in these conditions, or a management plan required in these conditions, has, or is likely to be exceeded, the proponent must implement contingency measures	RCMA must implement contingency measures if they become aware of a non-compliance	Non-compliance report Notification to DWER: compliance@dwer.wa.go.au	Overall	Annual	NR	See M11.7.1
1178:M11.7.3	Compliance and Exceedance Reporting	If the proponent becomes aware a limit, outcome or threshold criteria contained in these conditions, or a management plan required in these conditions, has, or is likely to be exceeded, the proponent must investigate the cause of the exceedance	RCMA must investigate the cause of the exceedance if they become aware of a non-compliance	Non-compliance report CEO Report (21 day): compliance@dwer.wa.go.au	Overall	Annual	NR	See M11.7.1
1178:M11.7.4	Compliance and Exceedance Reporting	If the proponent becomes aware a limit, outcome or threshold criteria contained in these conditions, or a management plan required in	RCMA must investigate the environmental impacts of the	Non-compliance report	Overall	Annual	NR	See M11.7.1

Audit Code	Subject	Requirement	How	Evidence	Phase	Timeframe	Status	Further Information
		these conditions, has, or is likely to be exceeded, the proponent must investigate environmental impacts of the exceedance	exceedance if they become aware of a non-compliance	CEO Report (21 day): compliance@dwer.wa.go.au				
1178:M11.7.5	Compliance and Exceedance Reporting	If the proponent becomes aware a limit, outcome or threshold criteria contained in these conditions, or a management plan required in these conditions, has, or is likely to be exceeded, the proponent must propose rectification measures	RCMA must propose rectification measures if they become aware of a non-compliance	Non-compliance report CEO Report (21 day): compliance@dwer.wa.go.au	Overall	Annual	NR	See M11.7.1
1178:M11.7.6	Compliance and Exceedance Reporting	If the proponent becomes aware a limit, outcome or threshold criteria contained in these conditions, or a management plan required in these conditions, has, or is likely to be exceeded, the proponent must propose measures to ensure no further impact as a result of the exceedance	RCMA must propose measures to ensure no further impact as a result of the exceedance if they become aware of a non-compliance	Non-compliance report CEO Report (21 day): compliance@dwer.wa.go.au	Overall	Annual	NR	See M11.7.1
1178:M11.7.7	Compliance and Exceedance Reporting	If the proponent becomes aware a limit, outcome or threshold criteria contained in these conditions, or a management plan required in these conditions, has, or is likely to be exceeded, the proponent must provide a further report to the CEO within twenty-one (21) days of the original report, detailing the measures required under this condition	RCMA must provide a further report on the incident to the CEO within 21 days of the original report	CEO Report (21 day): compliance@dwer.wa.go.au	Overall	Annual	NR	See M11.7.1
1178:M12.1	Public Availability of Data	Subject to condition M12.2, within a reasonable time period approved by the CEO of the issue of this Statement and for the remainder of the life of the proposal, the proponent shall make publicly available, in a manner approved by the CEO, all validated environmental data (including sampling design, sampling methodologies, empirical data and derived information products (e.g. maps)), management plans and reports relevant to the assessment of this proposal and implementation of this Statement.	RCMA must upload the following to (www.rcma.com): all validated environmental data (including sampling design, sampling methodologies, empirical data and derived information products (e.g. maps)), management plans and reports relevant to the assessment of this proposal and implementation of this Statement	Audit confirms all required information is available at www.rcma.com	Overall	Annual	C	All data is available at: https://perthbasinenergy.com/compliance-documents
1178:M12.2	Public Availability of Data	If any data referred to in condition 12-1 contains particulars of: (1) a secret formula or process; or (2) confidential commercially sensitive information, the proponent may submit a request for approval from the CEO to not make these data publicly available. In making such a request the proponent shall provide the CEO with an explanation and reasons why the data should not be made publicly available.	RCMA may submit a request to the CEO not to make data publicly available with justification	Letter to the CEO requesting data remain confidential	Overall	Annual	NR	

Compliance Status: C = Compliant, CLD = Completed, NC = Non – compliant, NR = Not Required at this stage. Please note the terms NA = Not Audited and VR = Verification Required are only for OEPA use. IP = In Process may only be used by the proponent in circumstances outlined in Section 2.8 of the Post Assessment Guideline for Preparing an Audit Table

Appendix C Compliance with Vegetation Management Plan

Reference	Action	Timing	Status	Evidence	Further Information
VMP 1-1	Disturb no more than 5.3 ha of native vegetation	At all stages of the Cervantes 1 Project	C	E01_Clearing a2750_f13_02	The proposal disturbed 3.3 ha of native vegetation (within the 5.3 ha allowance).
VMP 1-2	Disturb no more than 0.99 ha of Priority Ecological Community 'Coastal sands dominated by <i>Acacia rostellifera</i> , <i>Eucalyptus oraria</i> and <i>Eucalyptus obtusiflora</i> ' (PEC)	At all stages of the Cervantes 1 Project	C	E01_Clearing a2750_f13_02	The proposal disturbed 0.56 ha of PEC (within the 0.99 ha allowance).
VMP 1-3	No fire originating from Cervantes 1 activities at any time	At all stages of the Cervantes 1 Project	C	Site Inspection 12/03/2022 Management Advice E03_Monthly Recordable Incident Report March Site Preparation	There were no fires originating from Cervantes 1 activities.
VMP1-4	No introduction of dieback disease to the Cervantes 1 Development Envelope at any time	At all stages of the Cervantes 1 Project	NA		Dieback assessment is to commence April 2022.
VMP 1-5	Foliage cover of weeds in rehabilitated areas is not greater than adjacent undisturbed remnant vegetation (Note 1) after 3 years. Note 1-Tracks are affected by the weed load on the opposite side of the track. The "edge effect" in comparison with adjacent track edge will be considered for the application of this outcome.	At all stages of the Cervantes 1 Project	NA		Weed assessment is to commence April 2022.
VMP 2-1	All personnel and contractors undertake the Cervantes 1 Induction [RCMA-07-TM-FM-004] and the records are included in the training log	At all stages of the Cervantes 1 Project	C	R07_Site Preparation Audit Report R08_Drilling Audit Report R09_C&M Audit Report	Induction records show all personnel on site during audit have completed inductions
VMP 2-2	The area of land disturbance for the Cervantes 1 Project will be kept to the practicable minimum (including the drilling of a directional well)	Land Clearing	C	E01_Clearing a2750_f13_02	Clearing was kept to 3.3 ha which was below the allowed 5.3 ha as a result of choosing a well pad accessible by existing access tracks (drilling a directional well).
VMP 2-3	Cleared areas no longer required for the project will be progressively rehabilitated	At all stages of the Cervantes 1 Project	C	R01_2022 CAR	Rehabilitation will commence at the best time for utilisation of topsoil and vegetation stockpiles (in Autumn 2023) prior to winter rains. This is the first opportunity since disturbance that RCMA has had to undertake rehabilitation.
VMP 2-4	A Site Preparation Plan is prepared and approved by the Project Manager to specify all details of site preparation requirements: <ul style="list-style-type: none"> • Areas to be cleared are clearly demarcated • Sensitivities identified in the flora and vegetation survey are avoided where possible • Site preparation activities occur during daylight hours only • Cleared vegetation is stockpiled in windrows less than 2 m high and separately stockpiled topsoil is lightly compacted in windrows to a height of no more than 2 m • All Crew have undertaken the site preparation induction [RCMA-07-TM-FM-004] • Vehicles and equipment to be used only within approved project footprint (specify areas) • Vehicles must be inspected and cleaned down (off site prior to mobilisation) 	Prior to Site Preparation	C	R14_Cervantes 1 Civil Works Program	Cervantes-1 Civil Works Program (CWP) [RCMA-05-DCW-PLN-012] was issued 06/02/2022.

Reference	Action	Timing	Status	Evidence	Further Information
	<ul style="list-style-type: none"> Construction refuelling vehicle to have refuelling drip tray, spill kit and contaminated soil bunding tarp (for segregation of material if a spill occurs prior to disposal) Construction refuelling vehicle is on site during daylight hours only Construction vehicles are left locked when unattended Construction light vehicles preferentially refuel offsite <p>Sheeting materials are from Pearson (ex-Grice) marl borrow pit only with all borrow pit topsoil excluded</p>				
VMP 2-5	No clearing will be undertaken until the Project Manager has approved and issued the Site Preparation Plan	Prior to Clearing Activity	C	R14_Cervantes 1 Civil Works Program	The CWP was issued 06/02/2022 and clearing commenced 09/02/2022.
VMP2-6	The Site Preparation Plan cannot be issued until Department of Mines, Industry Regulation and Safety (DMIRS) has accepted the Cervantes 1 Conventional Well Environment Plan [RCMA-02-EM-PLN-001]	Prior to Clearing Activity	C	C11_Approval DMIRS - Environment Plan 88636 R14_Cervantes 1 Civil Works Program	The Environment Plan was approved 04/02/2022 and the CWP was issued 06/02/2022.
VMP2-7	All site preparation personnel will receive instructions on the areas approved for clearing in the form of the Cervantes 1 Induction [RCMA-07-TM-FM-004] and toolbox meetings	Prior to Clearing Activity	C	Site inspection 12/03/2022	The induction contains a figure of the project foot print and personnel were instructed on areas approved for clearing during toolbox meetings.
VMP 2-8	All vegetation clearing is to occur in daylight hours only	During Clearing Activity		Site inspection 10/02/2022	Clearing activities commenced and were completed in daylight hours on 10/02/2022.
VMP 2-9	Clearing is undertaken to the extent necessary for the activity only	At all stages of the Cervantes 1 Project	C	E01_Clearing a2750_f13_02	Clearing was kept to 3.3 ha well below the allowed foot print of 5.5 ha.
VMP 2-10	Sensitivities identified in the flora and vegetation survey are avoided where possible	Clearing Activities	C	Site inspection 12/03/2022, 02/04/2022, 06/04/2022, 31/10/2022 P05_Zopherophloia P06_Thryptomene	Audit confirmed that the <i>Eucalyptus zopherophloia</i> (P05) and <i>Thryptomene</i> sp. Lancelin (M.E. Trudgen 14000) (P06) individuals identified during field survey were avoided.
VMP 2-11	Areas to be cleared are clearly demarcated	Clearing Activities	C	Site Inspection 12/03/2022 P01_Surveyed areas marked for clearing P02_Surveyed areas marked for clearing	HTD surveyed and physically marked out the footprint with survey tape prior to site preparation activities. The firebreak from Jingemia to the railway that was missed was pegged on a second visit.
VMP 2-12	Cleared vegetation is stockpiled in windrows less than 2 m high and separately stockpiled topsoil is lightly compacted in windrows to a height of no more than 2 m and covered in brush	Clearing Activities	C	Site Inspection 12/03/2022, 02/04/2022 P07_Topsoil Stockpiles	Audit confirmed topsoil is separately stockpiled topsoil is lightly compacted in windrows to a height of no more than 2 m and covered in brush. Remaining cleared vegetation is stockpiled in windrows less than 2 m high.
VMP 2-13	All Crew have undertaken the site preparation induction [RCMA-07-TM-FM-004]	Clearing Activities	C	See VMP 2-1	See VMP 2-1
VMP 2-14	Vehicles and equipment to be used only within approved project footprint (specify areas)	Clearing Activities	C	Site Inspection 12/03/2022, 02/04/2022, 06/04/2022, 31/10/2022	Vehicles and equipment use during audit was confined to the specified areas.
VMP 2-15	The person undertaking clearing is required to fill in a Clearing Vegetation Record Form [RCMA-02-EM-FM-002] (Appendix B) for clearing activities to provide a record of all clearing undertaken for the Project	Post Clearing Activities	C	R12_End of Site Preparation Report E01_Clearing a2750_f13_02	Site preparation contractor has included the Clearing Vegetation Record Form in the End of Site Preparation Report (R12).
VMP 2-16	The Earthmoving Supervisor is required to submit completed Clearing Vegetation Record Forms [RCMA-02-EM-FM-002] (Appendix B) for all clearing activities undertaken for the Project	Post Clearing Activities	C	R12_End of Site Preparation Report E01_Clearing a2750_f13_02	Site preparation contractor has included the Clearing Vegetation Record Form in the End of Site Preparation Report (R12).

Reference	Action	Timing	Status	Evidence	Further Information
VMP 2-17	If there were to be any additional vegetation clearing required, the VMP would require review and the identification of the requirement for any additional flora survey made well in advance of operations	Prior to Clearing Activities	NR	-	No additional clearing required.
VMP 2-18	Induction of personnel [RCMA-07-TM-FM-004] outlines the Project hygiene requirements	Prior to Clearing Activities	C	E10_Induction Slide Pack	Slide 13 of the induction covers project hygiene requirements.
VMP 2-19	Sheeting materials are from Pearson (ex-Grice) marl borrow pit only	Site Preparation	C	Inspection 12/03/2022 P08_Marl Pit	Audit confirmed that sheeting materials were taken from the Pearson marl borrow pit.
VMP 2-20	Borrow pit is managed to minimise the risk of weed transfer (topsoil exclusion during out loading)	Site Preparation	C	Inspection 12/03/2022 P08_Marl Pit P09_Marl Pit Top Soil Removal	Audit confirmed top 50cm of topsoil is being removed from borrow pit face prior to extraction of marl.
VMP 2-21	Vehicles must be inspected and cleaned down (off site prior to mobilisation). Offsite clean down must ensure vehicle is free of all soil and plant matter as per requirements of Cervantes 1 Hygiene Procedure [RCMA-02-EM-PRO-001] Section 6	Prior to Mobilisation to Site	C	E11_1GYR812 E12_1TUM486	Hygiene certificates for all earthmoving equipment on site was sighted during the audit.
VMP 2-22	A hygiene station is established at Jingemia Production Facility (JPF) during site preparation activities (including lined pad with drainage sump, brushes/brooms and weatherproof container for hygiene inspection log)	Site Preparation	C	Inspection 12/03/2022 P17_Hygiene Station P10_Site Preparation Hygiene Log	Audit confirmed the hygiene station had been established at JPF (including lined pad with drainage sump, brushes/brooms and weatherproof container for hygiene inspection log)
VMP 2-23	Vehicles and equipment are to arrive on site in a clean state and conduct inspection on site at JPF hygiene station in accordance with the Hygiene Procedure [RCMA-02-EM-PRO-001] including sign off on the hygiene inspection log	At all stages of the Cervantes 1 Project	C	Inspection 12/03/2022, 02/04/2022, 06/04/2022, 31/10/2022 P10_Hygiene Log P14_Drilling Hygiene Log	Vehicles were observed checking their vehicles on entry to the site (14P524, NR028) with the biosecurity register indicating where clean downs have been undertaken.
VMP 2-24	Personnel are required to complete the induction which outlines weed and dieback hygiene requirements	Prior to Mobilisation to Site	C	See VMP 2-18	See VMP 2-18
VMP 2-25	Firebreaks shall be maintained and constructed in compliance with statutory requirements to provide protection to adjacent undisturbed remnant vegetation from a potential fire from the Project ie vegetation cleared to 100 mm: <ul style="list-style-type: none"> 1m on either side of access tracks 10 m around the well site 	At all stages of the Cervantes 1 Project	C	Site Inspection 12/03/2022, 02/04/2022, 06/04/2022, 31/10/2022	Site inspection confirmed firebreaks in place as follows: <ul style="list-style-type: none"> >1m on either side of 5m wide running surface of access track 10m around well site
VMP 2-26	Smoking is permitted in designated areas only	At all stages of the Cervantes 1 Project	C	Management Advice	Most personnel do not smoke however the office was nominated as the designated smoking area.
VMP 2-27	All site vehicles have serviceable fire extinguishers	At all stages of the Cervantes 1 Project	C	Site Inspection 12/03/2022, 02/04/2022, 06/04/2022	All vehicles observed on site had fire extinguishers.
VMP 2-28	Serviceable fire extinguishers are in place in accordance with the (ERP) rig diagram	During Drilling	C	Site Inspection 02/04/2022, 06/04/2022	Serviceable fire extinguishers were in place in accordance with the ERP rig diagram.
VMP 2-29	A mobile water cart is on site at the times specified in the ERP	At all stages of the Cervantes 1 Project	C	Site Inspection 12/03/2022, 02/04/2022, 06/04/2022	A mobile water cart was on site during site preparation and drilling activities.
VMP 2-30	To prevent impact on native vegetation outside the project footprint, all personnel shall only drive on existing tracks, access roads, firebreaks, and service corridors. No travel outside designated access routes shall occur without the approval of the Project Manager	At all stages of the Cervantes 1 Project	C	Site Inspection 12/03/2022, 02/04/2022, 06/04/2022, 31/10/2022	All vehicles during audit drove on existing tracks, access roads, firebreaks, and service corridors.

Reference	Action	Timing	Status	Evidence	Further Information		
VMP 2-31	All personnel shall adhere to vehicle speed limits as sign posted and outlined in the induction to prevent dust from accumulating on vegetation	At all stages of the Cervantes 1 Project	C	Site Inspection 12/03/2022, 02/04/2022, 06/04/2022, 31/10/2022	All vehicles sighted during the audit were travelling at low speed (<40km/h).		
VMP 2-32	Should concerns of dust be raised, suppression measures will be investigated	At all stages of the Cervantes 1 Project	C	Site Inspection 12/03/2022 Management Advice 02/04/2022	Personnel were pre-empting dust issues and watering roads during site preparation and mobilisation activities.		
VMP 2-33	Where surface water drainage requires diversion away from operational areas, roads and other areas, the diversion shall be managed such that adjacent undisturbed remnant vegetation is protected from long-term inundation	At all stages of the Cervantes 1 Project	NR	Management Advice 06/04/2022	No diversion of surface water drainage required.		
VMP 2-34	Completion criteria monitoring is to continue annually until all completion criteria have been achieved.	Post Rehabilitation	NR				
VMP 3-1	Undertake routine inspections in accordance with Table 11.		At all stages of the Cervantes 1 Project	C	Site Inspections 12/03/2022 of site preparation R12_End of Site Preparation Report Site Inspections 02/04/2022, 06/04/2022 of drilling E06_2022 07 04 Cervantes Weekly Inspection E07_2022 07 11 Cervantes Weekly Inspection E08_2022 07 18 Cervantes Weekly Inspection E09_2022 07 25 Cervantes Weekly Inspection	Routine inspections were undertaken in accordance with Table 11 for the stages of Cervantes 1 operations undertaken in the reporting period.	
	Stage	Frequency					Inspection Descriptor
	Site Preparation	Daily					Ground Condition Checks as part of Daily Vehicle Checks
	End of Site Preparation	Once					Site Preparation Plan Check
	Drilling	Daily					Site Visual Inspection
	Well Testing	Daily					Site Visual Inspection
	Care & Maintenance	Weekly					Visual Site Inspection (Security) noted on Daily Logbook
	Decommissioning / Rehabilitation	Daily					Ground Condition Checks as part of Daily Vehicle Checks
	Post Decommissioning / Rehabilitation Activity	On Activity					Decommissioning / Rehabilitation Plan Check
Post Rehabilitation	Monthly	Visual Site Inspection [Workplace Inspection Checklist]					
VMP 3-2	Undertake environmental auditing in accordance with Table 12.		At all stages of the Cervantes 1 Project	C	R07_Site Preparation Audit Report R08_Drilling Audit Report R09_C&M Audit Report	Environmental auditing was undertaken during and following site preparation activities, during drilling activities and AIEA during care and maintenance activities. No well testing or remediation/rehabilitation activities were undertaken in the reporting period.	
	Timing						
	During or immediately post site preparation						
	During drilling activities						
During well testing activities							

Reference	Action	Timing	Status	Evidence	Further Information
	<p>During remediation / rehabilitation activities</p> <p>Annual internal environmental audit (AIEA) - To continue annually where no activities are being undertaken on site until completion criteria has been achieved</p>				
VMP 3-3	<p>Contingency measures are to be implemented where the threshold criteria "Disturbance of <5.3 ha of native vegetation" is met:</p> <ul style="list-style-type: none"> Reporting clearing outside of permitted area to DWER, DBCA and DMIRS Rehabilitation of non-permitted cleared area immediately 	At all stages of the Cervantes 1 Project	NA	See VMP 1-1	See VMP 1-1
VMP 3-4	<p>Contingency measures are to be implemented where the threshold criteria "Disturbance of ≤0.99 ha of Priority Ecological Community 'Coastal sands dominated by <i>Acacia rostellifera</i>, <i>Eucalyptus oraria</i> and <i>Eucalyptus obtusiflora</i>' (PEC)" is met:</p> <ul style="list-style-type: none"> Reporting clearing outside of permitted area to DWER, DBCA and DMIRS Rehabilitation of non-permitted cleared area immediately 	At all stages of the Cervantes 1 Project	NA	See VMP 1-2	See VMP 1-2
VMP 3-5	<p>Contingency measures are to be implemented where the threshold criteria "No fire entering native vegetation originating from Cervantes 1 Activity" is met:</p> <ul style="list-style-type: none"> Implement Emergency Response Plan Contact Emergency Services and DBCA All fires are reported as per Section 11.3 of the Cervantes 1 EP 	At all stages of the Cervantes 1 Project	NA	See VMP 1-3	See VMP 1-3
VMP 3-6	<p>Contingency measures are to be implemented where the threshold criteria "No introduction of dieback" is met:</p> <ul style="list-style-type: none"> Hygiene procedure review Dieback interpreter engaged Consultation with DBCA Reporting as per Section 11.3 of the Cervantes 1 EP 	At all stages of the Cervantes 1 Project	NA	See VMP 1-4	See VMP 1-4
VMP 3-7	<p>Contingency measures are to be implemented where the threshold criteria "The foliage cover of weeds in rehabilitation areas should not be greater than adjacent undisturbed remnant vegetation ^(Note 1)" is met:</p> <ul style="list-style-type: none"> Review of weed control program and implement revised program Review of hygiene procedures Consultation with DBCA Reporting as per Section 11.3 of the Cervantes 1 EP <p>Note 1-Tracks are affected by the weed load on the opposite side of the track. The "edge effect" in comparison with adjacent track edge will be considered for the application of this completion criteria on tracks</p>	At all stages of the Cervantes 1 Project	NA	See VMP 1-5	See VMP 1-5
VMP 3-8	<p>Environmental incidents shall be reported and investigated as soon as practicable following identification, enabling effective actions to be implemented without delay. Environmental incidents are defined as events that cause or could potentially cause harm to the environment.</p>	At all stages of the Cervantes 1 Project	C	E05_Monthly Recordable Incident Report April Drilling	Hydraulic hose oil spill incident occurred during rig down immediately cleaned up.

Reference	Action	Timing	Status	Evidence	Further Information
VMP 3-9	The person undertaking clearing is required to submit completed Clearing Vegetation Record Form/s [RCMA-02-EM-FM-002] (Appendix B) for clearing activities to provide a record of all clearing undertaken for the Project.	At all stages of the Cervantes 1 Project	C	R12_End of Site Preparation Report E01_Clearing a2750_f13_02	Site preparation contractor has included the Clearing Vegetation Record Form in the End of Site Preparation Report (R12).
VMP 3-10	An AER is submitted to DMIRS annually under Regulation 16 of the Petroleum and Geothermal Energy Resources (Environment) Regulations 2012. The AER requires details of: <ul style="list-style-type: none"> Activities that have been undertaken Clearing or rehabilitation that has been undertaken Compliance for each objective and standard in the EP (includes compliance with VMP) Audits undertaken Incidents that have occurred Monitoring results 	At all stages of the Cervantes 1 Project	C	C10_Cervantes 1 - AER DMIRS R13_C100-202210-003v1 DMIRS AER	AER submitted to DMIRS 29/11/2022 (revised due date as per correspondence with DMIRS).
VMP 3-11	A compliance assessment report will be submitted to EPA as per the requirements of the Compliance Assessment Plan [RCMA-02-EM-PLN-011] under the conditions of the Ministerial Statement. The report will contain evidence to substantiate statements of compliance against the requirements of this Vegetation Management Plan.	At all stages of the Cervantes 1 Project	C	R11_2021 Compliance Assessment Report	CAR submitted to DWER 28/03/2022.
VMP 3-12	This VMP is to be reviewed by RCMA: <ul style="list-style-type: none"> When the need for adaptive management not covered in this VMP is recognised Every second year from the commencement of operations until the achievement of rehabilitation completion criteria, to ensure it remains current As and when directed by the EPA 	At all stages of the Cervantes 1 Project	NA	Management Advice 31/12/2022	Management advised that there is no need for VMP review based on: <ul style="list-style-type: none"> Adaptive management not covered in this VMP 2 yearly review requirements (EMP is dated 24/01/2022) Direction from EPA has not been given

Appendix D Compliance with Fauna Management Plan

Reference	Action	Timing	Status	Evidence	Further Information
FMP 1-1	No fire originating from Cervantes 1 activities at any time	At all stages of the Cervantes 1 Project	C	Site Inspection 12/03/2022, 02/04/2022, 06/04/2022, 31/10/2022 Management Advice E03_Monthly Recordable Incident Report March Site Preparation E04_Monthly Recordable Incident Report March Drilling E05_Monthly Recordable Incident Report April Drilling	There were no fires originating from Cervantes 1 activities.
FMP 1-2	No introduction of dieback disease to the Cervantes 1 Development Envelope at any time	At all stages of the Cervantes 1 Project	NA		Dieback assessment is to commence April 2022.
FMP 1-3	Foliage cover of weeds in rehabilitated areas is not greater than adjacent undisturbed remnant vegetation (Note 1) after 3 years. Note 1-Tracks are affected by the weed load on the opposite side of the track. The "edge effect" in comparison with adjacent track edge will be considered for the application of this outcome.	At all stages of the Cervantes 1 Project	NA		Weed assessment is to commence April 2022.
FMP 1-4	No terrestrial fauna strike in the development envelope due to Cervantes 1 activities	At all stages of the Cervantes 1 Project	C	Site Inspection 12/03/2022, 02/04/2022, 06/04/2022, 31/10/2022.	No reports of fauna strike in the development envelope in the reporting period.
FMP 1-5	No entrapment of terrestrial fauna in the mud pit, well cellar or VSP pit at any time	At all stages of the Cervantes 1 Project	C	E03_Monthly Recordable Incident Report March Site Preparation	No reports of entrapment of terrestrial fauna in the mud pit, well cellar or VSP in the reporting period.
FMP 1-6	No terrestrial fauna found in waste receptacles	At all stages of the Cervantes 1 Project	C	E04_Monthly Recordable Incident Report March Drilling E05_Monthly Recordable Incident Report April Drilling	No reports of fauna found in waste receptacles in the reporting period.
FMP 2-1	All personnel and contractors undertake the Cervantes 1 Induction [RCMA-07-TM-FM-004] and the records are included in the training log. Specific items covered include RCMA travel procedures, Vehicle speed limits, Staying on access tracks, Requirement for personnel to be alert for wildlife while driving and Waste management requirements	At all stages of the Cervantes 1 Project	C	R07_Site Preparation Audit Report R08_Drilling Audit Report R09_C&M Audit Report	Induction records show all personnel on site during audit have completed inductions. Induction contains all required details; travel procedures, speed limits, staying on access tracks, waste management and being alert for wildlife.
FMP 2-2	The area of land disturbance for the Cervantes 1 Project will be kept to the practicable minimum	Land Clearing	C	E01_Clearing a2750_f13_02	Clearing was kept to 3.3 ha which was below the allowed 5.3 ha as a result of choosing a well pad accessible by existing access tracks (drilling a directional well).
FMP 2-3	Cleared areas no longer required for the project will be progressively rehabilitated	At all stages of the Cervantes 1 Project	C	R01_2022 CAR	Rehabilitation will commence at the best time for utilisation of topsoil and vegetation stockpiles (in Autumn 2023) prior to winter rains. This is the first opportunity since disturbance that RCMA has had to undertake rehabilitation.
FMP 2-4	A Site Preparation Plan is prepared and approved by the Project Manager to specify all details of site preparation requirements: <ul style="list-style-type: none"> • Areas to be cleared are clearly demarcated • Sensitivities identified in the flora and vegetation survey are avoided where possible • Site preparation activities occur during daylight hours only 	Prior to Site Preparation	C	R14_Cervantes 1 Civil Works Program	Cervantes-1 Civil Works Program (CWP) [RCMA-05-DCW-PLN-012] was issued 06/02/2022.

Reference	Action	Timing	Status	Evidence	Further Information
	<ul style="list-style-type: none"> A walk through with a loud sound to flush fauna is conducted prior to clearing of native vegetation All Crew have undertaken the site preparation induction [RCMA-07-TM-FM-004] Vehicles and equipment to be used only within approved project footprint (specify areas) <p>All waste is to be taken offsite for disposal</p>				
FMP 2-5	No clearing will be undertaken until the Project Manager has approved and issued the Site Preparation Plan	Prior to Clearing Activity	C	R14_Cervantes 1 Civil Works Program	The CWP was issued 06/02/2022 and clearing commenced 09/02/2022.
FMP 2-6	The Site Preparation Plan cannot be issued until Department of Mines, Industry Regulation and Safety (DMIRS) has accepted the Cervantes 1 Conventional Well Environment Plan [RCMA-02-EM-PLN-001]	Prior to Clearing Activity	C	C11_Approval DMIRS - Environment Plan 88636 R14_Cervantes 1 Civil Works Program	The Environment Plan was approved 04/02/2022 and the CWP was issued 06/02/2022.
FMP 2-7	All site preparation personnel will receive instructions on the areas approved for clearing in the form of the Cervantes 1 Induction [RCMA-07-TM-FM-004] and toolbox meetings	Prior to Clearing Activity	C	Site inspection 12/03/2022	The induction contains a figure of the project foot print and personnel were instructed on areas approved for clearing during toolbox meetings.
FMP 2-8	All vegetation clearing is to occur in daylight hours only	During Clearing Activity	C	Site inspection 10/02/2022	Clearing activities commenced and were completed in daylight hours on 10/02/2022.
FMP 2-9	Clearing is undertaken to the extent necessary for the activity only	At all stages of the Cervantes 1 Project	C	E01_Clearing a2750_f13_02	Clearing was kept to 3.3 ha well below the allowed foot print of 5.5 ha.
FMP 2-10	Sensitivities identified in the flora and vegetation survey are avoided where possible	Clearing Activities	C	Site inspection 12/03/2022 P05_Zopherophloia P06_Thryptomene	Audit confirmed that the <i>Eucalyptus zopherophloia</i> (P05) and <i>Thryptomene</i> sp. Lancelin (M.E. Trudgen 14000) (P06) individuals identified during field survey were avoided.
FMP 2-11	Areas to be cleared are clearly demarcated	Clearing Activities	C	Site Inspection 10/02/2022, 12/03/2022 P01_Surveyed areas marked for clearing P02_Surveyed areas marked for clearing	HTD surveyed and physically marked out the footprint with survey tape prior to site preparation activities. The firebreak from Jingemia to the railway that was missed was pegged on a second visit.
FMP 2-12	Site preparation activities occur during daylight hours only	Clearing Activities	C	Site inspection 10/02/2022 Management Advice 02/04/2022	Site preparation activities were undertaken in daylight hours.
FMP 2-13	A walk through with a loud sound to flush fauna is conducted prior to clearing of native vegetation	Clearing Activities	C	Site Inspection 10/02/2022 P13_Loud Sound Before Dozer	Personnel were observed during clearing making loud sounds in front of the dozer during site preparation.
FMP 2-14	All Crew have undertaken the site preparation induction [RCMA-07-TM-FM-004]	Clearing Activities	C	See FMP 2-1	See FMP 2-1
FMP 2-15	Vehicles and equipment to be used only within approved project footprint (specify areas)	Clearing Activities	C	Site Inspection 10/02/2022, 12/03/2022	Vehicles and equipment use during audit was confined to the specified areas.
FMP 2-16	The person undertaking clearing is required to fill in a Clearing Vegetation Record Form [RCMA-02-EM-FM-002] for clearing activities to provide a record of all clearing undertaken for the Project	Post Clearing Activities	C	R12_End of Site Preparation Report E01_Clearing a2750_f13_02	Site preparation contractor has included the Clearing Vegetation Record Form in the End of Site Preparation Report (R12).
FMP 2-17	The Earthmoving Supervisor is required to submit completed Clearing Vegetation Record Forms [RCMA-02-EM-FM-002] for all clearing activities undertaken for the Project	Post Clearing Activities	C	R12_End of Site Preparation Report E01_Clearing a2750_f13_02	Site preparation contractor has included the Clearing Vegetation Record Form in the End of Site Preparation Report (R12).

Reference	Action	Timing	Status	Evidence	Further Information
FMP 2-18	If there were to be any additional vegetation clearing required, the FMP would require review and the identification of the requirement for any additional fauna survey made well in advance of operations	Prior to Clearing Activities	NR	-	No additional clearing required.
FMP 2-19	To prevent impact on stygofauna, there will be no groundwater abstraction or dewatering at the Cervantes 1 drill site.	At all stages of the Cervantes 1 Project	C	Inspection 12/03/2022, 02/04/2022, 06/04/2022, 31/10/2022. P11_JPF Turkeys Nest P12_Drill Site Water Tanks	Water for the project was being taken from the Jingemia Production Facility not the Cervantes 1 drill site.
FMP 2-20	To prevent impact on native vegetation outside the project footprint, all personnel shall only drive on existing tracks, access roads, firebreaks, and service corridors. No travel outside designated access routes shall occur without the approval of the Project Manager.	At all stages of the Cervantes 1 Project	C	Site Inspection 12/03/2022, 02/04/2022, 06/04/2022, 31/10/2022.	All vehicles during audit drove on existing tracks, access roads, firebreaks, and service corridors.
FMP 2-21	All vehicles are to drive within the speed limits outlined in the Cervantes 1 Induction [RCMA-07-TM-FM-004] or as posted.	At all stages of the Cervantes 1 Project	C	Site Inspection 12/03/2022, 02/04/2022, 06/04/2022, 31/10/2022.	All vehicles sighted during the audit were travelling at low speed (<40km/h).
FMP 2-22	Personnel will report injured wildlife to the Project Supervisor to follow up with a fauna response agency listed in Section 10.1	At all stages of the Cervantes 1 Project	NA	E03_Monthly Recordable Incident Report March Site Preparation E04_Monthly Recordable Incident Report March Drilling E05_Monthly Recordable Incident Report April Drilling	No injured wildlife reported during Cervantes 1 activities.
FMP 2-23	All personnel shall adhere to vehicle speed limits as sign posted and outlined in the induction to prevent dust issues for fauna. Should concerns of dust be raised, suppression measures will be investigated.	At all stages of the Cervantes 1 Project	C	Site Inspection 12/03/2022, 02/04/2022, 06/04/2022, 31/10/2022, 11/01/2023	All vehicles sighted during the audit were travelling at low speed (<40km/h). Personnel were pre-empting dust issues and watering roads during site preparation and mobilisation activities.
FMP 2-24	Lighting during all phases of the proposal will be directed on operational areas only to minimise fauna attraction to light spill	At all stages of the Cervantes 1 Project	C	Site Inspection 02/04/2022, 06/04/2022.	Lighting towers on site were directed onto operational areas only.
FMP 2-25	All waste will be stored in appropriately covered receptacles to exclude fauna before being removed from site	At all stages of the Cervantes 1 Project	C	R08_Drilling Audit Report	Waste stored on site during drilling activities only and were removed on demobilisation. Putrescible waste and oily was skips are covered.
FMP 2-26	Good housekeeping practices are enforced on site throughout Project including site inspections at all stages of Project	At all stages of the Cervantes 1 Project	C	R07_Site Preparation Audit Report R08_Drilling Audit Report R09_C&M Audit Report	Audits identified well-kept site.
FMP 2-27	All drill pipe stored on the ground (i.e. not in use) will have the ends capped to prevent fauna ingress	At all stages of the Cervantes 1 Project	C	R08_Drilling Audit Report	Drill pipe was stored on racks on the western side of the well pad with end caps. Drill pipe temporarily on the ground was being inspected at the time of the audit and end caps were in the process of being replaced
FMP 2-28	Excavations such as the mud sump and Turkey's Nest will have fauna exclusion fencing and fauna escape mechanisms	At all stages of the Cervantes 1 Project	C	Site Inspection 12/03/2022, 02/04/2022, 06/04/2022, 31/10/2022.	Excavations had fauna exclusion fencing and fauna escape mechanisms (mud sump, VSP, JPF Turkey Nest).
FMP 2-29	Fenced excavations will be inspected: <ul style="list-style-type: none"> Daily – during drilling Weekly – during Care and Maintenance 	At all stages of the Cervantes 1 Project	C	E14_Daily Drilling Checklist E06_2022 07 04 Cervantes Weekly Inspection E07_2022 07 11 Cervantes Weekly Inspection E08_2022 07 18 Cervantes Weekly Inspection	Fenced Excavations were inspected daily during drilling activities and weekly during C&M.

Reference	Action	Timing	Status	Evidence	Further Information																								
				E09_2022 07 25 Cervantes Weekly Inspection																									
FMP 3-1	Undertake routine inspections in accordance with Table 11.																												
	<table border="1"> <thead> <tr> <th>Stage</th> <th>Frequency</th> <th>Inspection Descriptor</th> </tr> </thead> <tbody> <tr> <td>Site Preparation</td> <td>Daily</td> <td>Ground Condition Checks as part of Daily Vehicle Checks</td> </tr> <tr> <td>End of Site Preparation</td> <td>Once</td> <td>Site Preparation Plan Check</td> </tr> <tr> <td>Drilling</td> <td>Daily</td> <td>Site Visual Inspection</td> </tr> <tr> <td>Well Testing</td> <td>Daily</td> <td>Site Visual Inspection</td> </tr> <tr> <td>Care & Maintenance</td> <td>Weekly</td> <td>Visual Site Inspection (Security) noted on Daily Logbook</td> </tr> <tr> <td>Decommissioning / Rehabilitation</td> <td>Daily</td> <td>Ground Condition Checks as part of Daily Vehicle Checks</td> </tr> <tr> <td>Post Decommissioning / Rehabilitation Activity</td> <td>On Activity</td> <td>Decommissioning / Rehabilitation Plan Check</td> </tr> </tbody> </table>	Stage	Frequency	Inspection Descriptor	Site Preparation	Daily	Ground Condition Checks as part of Daily Vehicle Checks	End of Site Preparation	Once	Site Preparation Plan Check	Drilling	Daily	Site Visual Inspection	Well Testing	Daily	Site Visual Inspection	Care & Maintenance	Weekly	Visual Site Inspection (Security) noted on Daily Logbook	Decommissioning / Rehabilitation	Daily	Ground Condition Checks as part of Daily Vehicle Checks	Post Decommissioning / Rehabilitation Activity	On Activity	Decommissioning / Rehabilitation Plan Check	At all stages of the Cervantes 1 Project	C	Site Inspections 10/02/2022, 12/03/2022 of site preparation R12_End of Site Preparation Report Site Inspections 02/04/2022, 06/04/2022 of drilling E06_2022 07 04 Cervantes Weekly Inspection E07_2022 07 11 Cervantes Weekly Inspection E08_2022 07 18 Cervantes Weekly Inspection E09_2022 07 25 Cervantes Weekly Inspection	Routine inspections were undertaken in accordance with Table 11 for the stages of Cervantes 1 operations undertaken in the reporting period.
	Stage	Frequency	Inspection Descriptor																										
	Site Preparation	Daily	Ground Condition Checks as part of Daily Vehicle Checks																										
	End of Site Preparation	Once	Site Preparation Plan Check																										
	Drilling	Daily	Site Visual Inspection																										
	Well Testing	Daily	Site Visual Inspection																										
	Care & Maintenance	Weekly	Visual Site Inspection (Security) noted on Daily Logbook																										
Decommissioning / Rehabilitation	Daily	Ground Condition Checks as part of Daily Vehicle Checks																											
Post Decommissioning / Rehabilitation Activity	On Activity	Decommissioning / Rehabilitation Plan Check																											
FMP 3-2	Undertake environmental auditing in accordance with Table 12.																												
	<table border="1"> <thead> <tr> <th>Timing</th> </tr> </thead> <tbody> <tr> <td>During or immediately post site preparation</td> </tr> <tr> <td>During drilling activities</td> </tr> <tr> <td>During well testing activities</td> </tr> <tr> <td>During remediation / rehabilitation activities</td> </tr> <tr> <td>To continue annually where no activities are being undertaken on site until completion criteria has been achieved - AIEA</td> </tr> </tbody> </table>	Timing	During or immediately post site preparation	During drilling activities	During well testing activities	During remediation / rehabilitation activities	To continue annually where no activities are being undertaken on site until completion criteria has been achieved - AIEA	At all stages of the Cervantes 1 Project	C	R07_Site Preparation Audit Report R08_Drilling Audit Report R09_C&M Audit Report	Environmental auditing was undertaken during and following site preparation activities, during drilling activities and AIEA during care and maintenance activities. No well testing or remediation/rehabilitation activities were undertaken in the reporting period.																		
Timing																													
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To continue annually where no activities are being undertaken on site until completion criteria has been achieved - AIEA																													
FMP 3-3	Contingency measures are to be implemented where the threshold criteria "Disturbance of <5.3 ha of native vegetation" is met: <ul style="list-style-type: none"> Reporting clearing outside of permitted area to DWER, DBCA and DMIRS Rehabilitation of non-permitted cleared area immediately 	At all stages of the Cervantes 1 Project	NA	E01_Clearing a2750_f13_02	The threshold for disturbance of 5.3 ha has not been met.																								
FMP 3-4	Contingency measures are to be implemented where the threshold criteria "No fire entering native vegetation originating from Cervantes 1 Activity" is met: <ul style="list-style-type: none"> Implement Emergency Response Plan Contact Emergency Services and DBCA 	At all stages of the Cervantes 1 Project	NA	See FMP 1-1	See FMP 1-1																								

Reference	Action	Timing	Status	Evidence	Further Information
	<ul style="list-style-type: none"> All fires are reported as per Section 10.2 				
FMP 3-5	<p>Contingency measures are to be implemented where the threshold criteria “No introduction of dieback” is met:</p> <ul style="list-style-type: none"> Hygiene procedure review Dieback interpreter engaged Consultation with DBCA Reporting as per Section 10.2 	At all stages of the Cervantes 1 Project	NA	See FMP 1-2	See FMP 1-2
FMP 3-6	<p>Contingency measures are to be implemented where the threshold criteria “The foliage cover of weeds in rehabilitated areas is not greater than adjacent undisturbed remnant vegetation ^(Note 1)” is met:</p> <ul style="list-style-type: none"> Review of weed control program and implement revised program Review of hygiene procedures Consultation with DBCA Reporting as per Section 10.2 <p>Note 1-Tracks are affected by the weed load on the opposite side of the track. The “edge effect” in comparison with adjacent track edge will be considered for the application of this completion criteria on tracks</p>	At all stages of the Cervantes 1 Project	NA	See FMP 1-3	See FMP 1-3
FMP 3-7	<p>Contingency measures are to be implemented where the threshold criteria “No direct terrestrial native fauna deaths” is met:</p> <ul style="list-style-type: none"> Vehicle fauna strike Entrapment of terrestrial fauna in an excavation Entrapment of terrestrial fauna in an artificial water body Terrestrial fauna are attracted to light Dust suppression required more than twice per day Terrestrial fauna found in waste receptacle 	At all stages of the Cervantes 1 Project	NA	See FMP 1-4, FMP 1-5 and FMP 1-6	See FMP 1-4, FMP 1-5 and FMP 1-6
FMP 3-8	Environmental incidents shall be reported and investigated as soon as practicable following identification, enabling effective actions to be implemented without delay. Environmental incidents are defined as events that cause or could potentially cause harm to the environment.	At all stages of the Cervantes 1 Project	C	E05_Monthly Recordable Incident Report April Drilling	Hydraulic hose oil spill incident occurred during rig down immediately cleaned up.
FMP 3-9	The person undertaking clearing is required to submit completed Clearing Vegetation Record Form/s [RCMA-02-EM-FM-002] for clearing activities to provide a record of all clearing undertaken for the Project.	At all stages of the Cervantes 1 Project	C	R12_End of Site Preparation Report E01_Clearing a2750_f13_02	Site preparation contractor has included the Clearing Vegetation Record Form in the End of Site Preparation Report (R12).
FMP 3-10	<p>An AER is submitted to DMIRS annually under Regulation 16 of the Petroleum and Geothermal Energy Resources (Environment) Regulations 2012. The AER requires details of:</p> <ul style="list-style-type: none"> Activities that have been undertaken Clearing or rehabilitation that has been undertaken Compliance for each objective and standard in the EP (includes compliance with FMP) Audits undertaken Incidents that have occurred Monitoring results 	At all stages of the Cervantes 1 Project	C	C10_Cervantes 1 - AER DMIRS R13_C100-202210-003v1 DMIRS AER	AER submitted to DMIRS 29/11/2022 (revised due date as per correspondence with DMIRS).

Reference	Action	Timing	Status	Evidence	Further Information
FMP 3-11	A compliance assessment report will be submitted to EPA as per the requirements of the Compliance Assessment Plan [RCMA-02-EM-PLN-011] under the conditions of Ministerial Statement 1178. The report will contain evidence to substantiate statements of compliance against the requirements of this Fauna Management Plan.	At all stages of the Cervantes 1 Project	C	R11_2021 Compliance Assessment Report	CAR submitted to DWER 28/03/2022.
FMP 3-12	This FMP is to be reviewed by RCMA: <ul style="list-style-type: none"> When the need for adaptive management not covered in this FMP is recognised Every second year from the commencement of operations until the achievement of rehabilitation completion criteria, to ensure it remains current As and when directed by the EPA 	At all stages of the Cervantes 1 Project	NA	Management Advice 31/12/2022	Management advised that there is no need for VMP review based on: <ul style="list-style-type: none"> Adaptive management not covered in this VMP 2 yearly review requirements (EMP is dated 24/01/2022) Direction from EPA has not been given

Appendix E Compliance with Hygiene Management Plan

Reference	Action	Timing	Status	Evidence	Further Information
HMP 1-1	No introduction of dieback disease to the Cervantes 1 Development Envelope at any time	At all stages of the Cervantes 1 Project	NA		Dieback assessment is to commence April 2022.
HMP 1-2	Foliage cover of weeds in rehabilitated areas is not greater than adjacent undisturbed remnant vegetation (Note 1) after 3 years. Note 1-Tracks are affected by the weed load on the opposite side of the track. The “edge effect” in comparison with adjacent track edge will be considered for the application of this outcome.	At all stages of the Cervantes 1 Project	NA		Weed assessment is to commence April 2022.
HMP 2-1	All personnel and contractors undertake the Cervantes 1 Induction [RCMA-07-TM-FM-004] and the records are included in the training log	At all stages of the Cervantes 1 Project	C	R07_Site Preparation Audit Report R08_Drilling Audit Report R09_C&M Audit Report	Induction records show all personnel on site during audit have completed inductions
HMP 2-2	The area of land disturbance for the Cervantes 1 Project will be kept to the practicable minimum	Land Clearing	C	E01_Clearing a2750_f13_02	Clearing was kept to 3.3 ha which was below the allowed 5.3 ha as a result of choosing a well pad accessible by existing access tracks (drilling a directional well).
HMP 2-3	Cleared areas no longer required for the project will be progressively rehabilitated	At all stages of the Cervantes 1 Project	C	R01_2022 CAR	Rehabilitation will commence at the best time for utilisation of topsoil and vegetation stockpiles (in Autumn 2023) prior to winter rains. This is the first opportunity since disturbance that RCMA has had to undertake rehabilitation.
HMP 2-4	<p>A Site Preparation Plan will be prepared to specify all details of site preparation requirements, including:</p> <ul style="list-style-type: none"> • Earthmoving equipment inspection and clean down prior to mobilisation to site • Establishment of a hygiene station during site preparation activities (including lined pad with drainage sump, brushes/brooms and weatherproof container for inspection register) • Requirement for a Hygiene Procedure [RCMA-02-EM-PRO-001] (Appendix E) and Hygiene Inspection Log [RCMA-02-EM-FM-002] (Appendix F) available at the hygiene station • Sheeting materials are from the Pearson (ex-Grice) marl borrow pit only • Requirements for borrow pit management to exclude topsoil (minimise risk of weeds) • Areas to be cleared are clearly demarcated • Vehicles and equipment to be used only within approved project footprint (specify areas) • All Crew have undertaken the induction [RCMA-07-TM-FM-004] <p>Weed inspections will be undertaken 1-2 weeks following rainfall</p>	Prior to Site Preparation	C	R14_Cervantes 1 Civil Works Program	Cervantes-1 Civil Works Program (CWP) [RCMA-05-DCW-PLN-012] was issued 06/02/2022.
HMP 2-5	Induction of personnel [RCMA-07-TM-FM-004] outlines the Project hygiene requirements. And includes images of the weeds in Figure 4	At all stages of the Cervantes 1 Project	C	E10_Induction Slide Pack	Slide 13 of the induction covers project hygiene requirements.
HMP 2-6	Sheeting materials (marl to minimise dieback risk) are from Pearson (ex-Grice) marl borrow pit only	Site Preparation	C	Inspection 12/03/2022 P08_Marl Pit	Audit confirmed that sheeting materials were taken from the Pearson marl borrow pit.

Reference	Action	Timing	Status	Evidence	Further Information
HMP 2-7	Borrow pit is managed to minimise the risk of weed transfer (topsoil exclusion during out loading and stockpiled with sufficient controls to ensure that it does not contaminate materials being imported into the reserve (e.g. a sufficient distance away and not down-wind from material being loaded))	Site Preparation	C	Inspection 12/03/2022 P08_Marl Pit P09_Marl Pit Top Soil Removal	Audit confirmed top 50cm of topsoil is being removed from borrow pit face prior to extraction of marl.
HMP 2-8	All earthmoving equipment must be inspected and cleaned down off site prior to mobilisation. Offsite clean down must ensure vehicle is free of all soil and plant matter as per requirements of Cervantes 1 Hygiene Procedure [RCMA-02-EM-PRO-001] Section 6 (Appendix E)	Prior to Mobilisation to Site	C	E11_1GYR812 E12_1TUM486	Hygiene certificates for all earthmoving equipment on site was sighted during the audit.
HMP 2-9	A hygiene station is established at Jingemia Production Facility (JPF) (Figure 5) during site preparation activities (including lined pad with drainage sump, brushes/brooms and weatherproof container for hygiene inspection log) *Images of example hygiene station presented in Appendix G	Site Preparation	C	Inspection 12/03/2022 P10_Hygiene Log P17_Hygiene Station	Audit confirmed the hygiene station had been established at JPF (including lined pad with drainage sump, brushes/brooms and weatherproof container for hygiene inspection log)
HMP 2-10	Vehicles and equipment are to arrive on site in a clean state and all vehicles conduct inspection on site at JPF hygiene station in accordance with the Hygiene Procedure (Appendix E) including driver sign off on the hygiene inspection log (Appendix F) * *unless issued with a permit from the RCMA Operations Manager All soil moving machinery will be cleaned on leaving site to ensure plant pathogens are not exported from the site.	At all stages of the Cervantes 1 Project	C	Inspection 12/03/2022, 02/04/2022, 06/04/2022, 31/10/2022. P10_Site Preparation Hygiene Log P14_Drilling Hygiene Log	Vehicles were observed checking their vehicles on entry to the site (14P524, NR028) with the biosecurity register indicating where clean downs have been undertaken.
HMP 2-11	A permit may be granted for vehicles travelling on well maintained, hygienic, sealed roads to the Cervantes 1 site frequently to reduce the number of inspections required if the conditions on the permit are met	At all stages of the Cervantes 1 Project	C	Inspection 02/04/2022 P14_Drilling Hygiene Log R08_Drilling Audit Report	Vehicles were observed during auditor inspection entering the Cervantes 1 site not requiring inspection having recorded inspections previously (P14). Inspection of vehicle showed compliance with hygiene standard.
HMP 2-12	Only drive on existing tracks, access roads, firebreaks, and service corridors to prevent impact on native vegetation outside the project footprint	At all stages of the Cervantes 1 Project	C	Site Inspection 12/03/2022, 02/04/2022, 06/04/2022, 31/10/2022.	All vehicles during audit drove on existing tracks, access roads, firebreaks, and service corridors.
HMP 2-13	Personnel are required to complete the induction which outlines weed and dieback hygiene requirements including reiteration of the importance of staying within the project footprint	Prior to Mobilisation to Site	C	See HMP 2-5	See HMP 2-5
HMP 2-14	Following importation and spread of sheeting material at BKNR, a weed inspection will be carried out 1-2 weeks following rainfall	Immediately following rainfall	C	Site Inspection 06/04/2022	The first rainfall after the importation and spread of the marl was the 28/03/2022. The weed inspection was carried out 06/04/2022. No weeds were identified during this inspection.
HMP 2-15	Any identified weeds will be removed by hand pulling immediately on detection and DBCA notified as soon as possible	At all stages of the Cervantes 1 Project	C	R09_C&M Audit Report E13_2022 07 18 Cervantes Weekly Inspection	Workplace inspection (18/07/2022) reports observations of weeds however these were weeds present prior to project and not subject to the hygiene management plan. No other observations of weeds during the reporting period.
HMP 2-16	All removed weeds will be disposed of appropriately off-site	At all stages of the Cervantes 1 Project	NA	Refer to HMP 2-15	Refer to HMP 2-15
HMP 2-17	Following detection, ongoing monitoring for new germination will continue 1-2 weeks after rainfall events in consultation with DBCA	At all stages of the Cervantes 1 Project	C	R09_C&M Audit Report	Consultation with DBCA with reference to weeds at Cervantes on 02/12/2022 and 11/01/2023.
HMP 2-18	A rehabilitation plan is to be submitted to DMIRS and will outline measures during rehabilitation and over following periods to manage and control the spread of weed species and remediation actions to be implemented if required	Within two years of well P&A	NA	NA	Rehabilitation has not been undertaken yet.

Reference	Action	Timing	Status	Evidence	Further Information
HMP 2-19	Should any weed infestation remain present on cessation of the Cervantes 1 drilling activity, on-going control and monitoring will continue until the infestation is considered controlled in consultation with DBCA	Until Cervantes 1 completion criteria have been met	ND	-	Weed assessment has not been undertaken to determine if there is any weed infestations.
HMP 3-1	Inspections are conducted 1-2 weeks after rainfall events during care and maintenance and rehabilitation phases of the project.	During C&M and Rehabilitation Phases	NA	Refer to HMP 2-19	Refer to HMP 2-19
HMP 3-2	Weed and dieback monitoring is conducted on an annual basis commencing one year following the cessation of the Cervantes 1 drilling activity. The requirements of the monitoring are presented in Table 2.	At all stages of the Cervantes 1 Project	NA	Refer to HMP 1-1	Refer to HMP 1-1
HMP 3-4	Contingency measures are to be implemented where the threshold criteria "No introduction of dieback" is met: <ul style="list-style-type: none"> Hygiene procedure review Dieback interpreter engaged Consultation with DBCA Reporting as per Section 11.3 of the Cervantes 1 EP 	At all stages of the Cervantes 1 Project	NA	Refer to HMP 1-1	Refer to HMP 1-1
HMP 3-5	Contingency measures are to be implemented where the threshold criteria "The foliage cover of weeds in rehabilitation areas should not be greater than adjacent undisturbed remnant vegetation ^(Note 1) " is met: <ul style="list-style-type: none"> Review of weed control program and implement revised program Review of hygiene procedures Consultation with DBCA Reporting as per Section 11.3 of the Cervantes 1 EP <p>Note 1-Tracks are affected by the weed load on the opposite side of the track. The "edge effect" in comparison with adjacent track edge will be considered for the application of this completion criteria on tracks</p>	At all stages of the Cervantes 1 Project	NA	Refer to HMP 1-1	Refer to HMP 1-1
HMP 3-6	RCMA will continue to engage with stakeholders for the life of the Cervantes 1 Project.	At all stages of the Cervantes 1 Project	C	C10_Cervantes 1 - AER DMIRS	Ongoing stakeholder consultation is documented in the DMIRS Annual Environmental Report (C10).
HMP 3-7	Environmental incidents shall be reported and investigated as soon as practicable following identification, enabling effective actions to be implemented without delay. Environmental incidents are defined as events that cause or could potentially cause harm to the environment.	At all stages of the Cervantes 1 Project	C	E05_Monthly Recordable Incident Report April Drilling	Hydraulic hose oil spill incident occurred during rig down immediately cleaned up.
HMP 3-8	An AER is submitted to DMIRS annually under Regulation 16 of the Petroleum and Geothermal Energy Resources (Environment) Regulations 2012. The AER requires details of: <ul style="list-style-type: none"> Activities that have been undertaken Clearing or rehabilitation that has been undertaken Compliance for each objective and standard in the EP (includes compliance with HMP) Audits undertaken Incidents that have occurred 	At all stages of the Cervantes 1 Project	C	C10_Cervantes 1 - AER DMIRS R13_C100-202210-003v1 DMIRS AER	AER submitted to DMIRS 29/11/2022 (revised due date as per correspondence with DMIRS).

Reference	Action	Timing	Status	Evidence	Further Information
	<ul style="list-style-type: none"> Monitoring results 				
HMP 3-9	A compliance assessment report will be submitted to EPA as per the requirements of the Compliance Assessment Plan [RCMA-02-EM-PLN-011] under the conditions of the Ministerial Statement. The report will contain evidence to substantiate statements of compliance against the requirements of this Hygiene Management Plan.	At all stages of the Cervantes 1 Project	C	R11_2021 Compliance Assessment Report	CAR submitted to DWER 28/03/2022.
HMP 3-10	<p>This HMP is to be reviewed by RCMA:</p> <ul style="list-style-type: none"> When the need for adaptive management not covered in this FMP is recognised Every second year from the commencement of operations until the achievement of rehabilitation completion criteria, to ensure it remains current As and when directed by the EPA 	At all stages of the Cervantes 1 Project	NA	Management Advice 31/12/2022	<p>Management advised that there is no need for HMP review based on:</p> <ul style="list-style-type: none"> Adaptive management not covered in this HMP 2 yearly review requirements (EMP is dated 24/01/2022) Direction from EPA has not been given

Appendix F Compliance with Rehabilitation Plan

Reference	Action	Timing	Status	Evidence	Further Information
CRP 1	Outcome: No permanent markers, infrastructure or litter are left at rehabilitating sites	Immediately following rehabilitation	NA	NA	Rehabilitation has not been undertaken yet. Rehabilitation is planned for Autumn 2023.
CRP 2	Outcome: Natural contours are re-instated to pre-disturbance conditions upon rehabilitation as per pre-project survey	Immediately following rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 3	Outcome: No bare patches larger than 10 m2 after 3 years	3 years following rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 4	Outcome: Foliage cover of weeds in rehabilitated areas is not greater than adjacent undisturbed remnant vegetation after 3 years	3 years following rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 5	Outcome: Total native vegetation percentage cover of perennials should reach at least 50% of the control after 3 years for VTs	3 years following rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 6	Outcome: Native vegetation cover shows a pattern of increasing over time	Following rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 7	Outcome: The species richness of keystone species per monitoring plot is at least 50% of the control monitoring plot within 3 years	3 years following rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 8	Outcome: Keystone species richness in >90% of rehabilitating monitoring quadrats is not less than control monitoring quadrats within each vegetation type after three years	3 years following rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 9	Outcome: Species richness of the rehabilitation is greater than 50% of monitoring transects within each VT within 3 years	3 years following rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 10	Outcome: No introduction of dieback disease to the Cervantes 1 Development Envelope at any time	At all stages of the Cervantes 1 Project	ND	R05_HMP Rev 4	Dieback assessment is to commence April 2022.
CRP 11	Goal: An agreement is in place for the proposed future of Cervantes 1 infrastructure	Prior to rehabilitation	C	R06_Rehabilitation Plan Rev 3	Current Rehabilitation Plan approved 04/02/2022 in place.
CRP 12	Goal: Each area to be rehabilitated is included in the rehabilitation planning prior to the commencement of rehabilitation	Prior to rehabilitation	C	R06_Rehabilitation Plan Rev 3	Section 2.2 of the Rehabilitation Plan includes each area to be rehabilitated.
CRP 13	Goal: All areas are rehabilitated in accordance with the Rehabilitation Plan and documented in the "Supervision of Rehabilitation Report"	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 14	Goal: All areas achieve identified completion criteria or receive remedial actions that bring them into compliance	3 years following rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 15	Goal: The DBCA are satisfied with each area rehabilitated and progressively accept responsibility for ongoing management of rehabilitated areas following achievement of completion criteria	3 years following rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 16	Goal: The DMIRS accept RCMA have met all requirements of the Cervantes 1 Environment Plan under the Petroleum and Geothermal Energy Resources (Environment) Regulations 2012.	3 years following rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 17	Fire Breaks Decommission track by removing marl and retaining clearing of 6 m width for firebreak and rehabilitate remainder with native vegetation	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2

Reference	Action	Timing	Status	Evidence	Further Information
CRP 18	Access Tracks – existing The access track (4m wide) to be retained for future use. Rehabilitation works will be undertaken on the widened portion of the access track; Remove marl, cultivate/rip soil to relieve any induced compaction and rehabilitate to native vegetation of the adjacent vegetation type (VT).	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 19	Access Track – new Remove marl, cultivate/rip soil to relieve any induced compaction and rehabilitate the entire area to native vegetation of the adjacent VT. .	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 20	Well pad Remove marl, cultivate/rip soil to relieve any induced compaction and rehabilitate the entire area to native vegetation	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 21	Mud Sump Remove muds and liner from site and recontour	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 22	Flare pit Remove liner material for offsite disposal and recontour.	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 23	Groundwater Monitoring bore The groundwater monitoring bore will be decommissioned in accordance with Chapter 18 “Bore Decommissioning” of the Minimum Construction Requirements for Water Bores in Australia	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 24	Abandonment Plaque Leave in situ as per DMIRS requirement	Following P&A of the Cervantes 1 well	C	P15_Abandonment Plaque	Abandonment plaque is in place.
CRP 25	Baseline soil samples will be taken during construction prior to commencement of drilling operations from selected areas around the site, including but not limited to: <ul style="list-style-type: none"> • Base of the mud sump • Refuelling areas • Chemical and hydrocarbon storage areas • Flare pit The analytical suite will depend on the potential contaminating material in the area of sampling but in particular tests would include physical parameters, petroleum hydrocarbons and dissolved metals (eg. pH, salinity, total recoverable hydrocarbons, BTEX and heavy metals).	Prior to drilling the Cervantes 1 well	C	R13_C100-202210-003v1 DMIRS AER	Baseline soil samples were taken 01/03/2022 and 15/03/2022 (R13).
CRP 26	Once the exploration activities have ceased and during rehabilitation of the site, the specified areas will be resampled to characterise and validate the soil condition post exploration to ensure that activities have not impacted the native soils.	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 27	Contaminated soils will be removed from site prior to the completion of rehabilitation activities and further validation will be required until the site is clean.	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 28	A groundwater monitoring bore will be installed down gradient (west) of the mud sump on the perimeter of the drill site.	Prior to drilling the Cervantes 1 well	C	P16_Monitoring Bore	A groundwater monitoring bore is installed on the western perimeter of the drilling site in line with the drill sump.

Reference	Action	Timing	Status	Evidence	Further Information
CRP 29	Water sample analysis for the analytes listed in Table 5 will be initially conducted prior to the commencement of drilling operations.	Prior to drilling the Cervantes 1 well	C	R13_C100-202210-003v1 DMIRS AER	Water analysis was undertaken on 15/03/2022 (R13) by qualified environmental technician from GEMEC with the samples analysed at a NATA accredited laboratory.
CRP 30	The sampling will be conducted by a suitably qualified environmental technician with samples analysed by a NATA accredited laboratory and results provided to DMIRS and DBCA in AERs as per Sections 11.4.1 and 11.4.4 of the Cervantes 1 Conventional Oil Exploration Well Environment Plan [RCMA-02-EM-PLN-001].	Prior to drilling the Cervantes 1 well	C	Refer to CRP 29	Refer to CRP 29
CRP 31	The monitoring bore will be monitored within 3 months of the completion of drilling and 6-monthly thereafter until a final monitoring event following the later of decommissioning of the mud sump or P&A of the well.	Following drilling of the Cervantes 1 well	C	R13_C100-202210-003v1 DMIRS AER	Drilling was undertaken in April 2022 and the groundwater bore was monitored 3 months following in July 2022 (R13).
CRP 32	Anomalous results will be investigated and any requirement for remedial action addressed in the form of a remediation plan.	At all stages of the Cervantes 1 Project	NA	R13_C100-202210-003v1 DMIRS AER	No anomalous results reported (R13).
CRP 33	Earthmoving equipment inspection and clean down prior to mobilisation to site	Prior to rehabilitation activities	NA	Refer to CRP 2	Refer to CRP 2
CRP 34	Establishment of a hygiene station (including lined pad, brushes/brooms and weatherproof container for inspection register)	Site Preparation	C	P17_Hygiene Station Site inspection 10/02/2022, 12/03/2022.	The hygiene station was established prior to site preparation and has been maintained ready for rehabilitation works.
CRP 35	Hygiene Procedure [RCMA-02-EM-PRO-001] in place and Hygiene Inspection Log [RCMA-02-EM-FM-003] available at the hygiene station	At all stages of the Cervantes 1 Project	C	Site inspection 11/01/2023	Hygiene Procedure in place and Hygiene Inspection Log is available at the hygiene station. DBCA inspected and cleaned down vehicles prior to Cervantes 1 site visit 11/01/2023.
CRP 36	Areas to be cleared are clearly demarcated (where additional clearing for mulching is required)	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 37	Vehicles and equipment to be used only within approved project footprint (areas specified in this Rehabilitation Plan)	At all stages of the Cervantes 1 Project	C	Site Inspection 11/01/2023	Vehicles and equipment use during site visit was confined to the specified areas.
CRP 38	All Crew have undertaken the induction [RCMA-07-TM-FM-004]	At all stages of the Cervantes 1 Project	C	Site inspection 11/01/2023	DBCA personnel Steven Buitenhuis and Alanna Chant undertook Cervantes 1 induction prior to 11/01/2023 site visit.
CRP 39	To minimise the introduction of weeds into the rehabilitation vegetation, the access tracks and well-pad, and the topsoil and mulch stockpiles will be visually inspected for weeds and control implemented as required. Weed control will involve both 'hand pulling' and spot/target application of a general nonselective herbicide or in the case of grass weeds the application of a grass selective herbicide (Fusilade®).	At all stages of the Cervantes 1 Project	C	E06_2022 07 04 Cervantes Weekly Inspection E07_2022 07 11 Cervantes Weekly Inspection E08_2022 07 18 Cervantes Weekly Inspection E09_2022 07 25 Cervantes Weekly Inspection	Topsoil and mulch stockpiles were visually inspected for weeds. No weed control required.
CRP 40	All muds will be taken from site.	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 41	Validation sampling will be undertaken from the base of the sump, refuelling areas, chemical and hydrocarbon storage areas and the flare pit.	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 42	Any contaminated material will be removed from site in accordance with the Cervantes 1 Conventional Well Oil Spill Contingency Plan [RCMA-02-EM-PLN-002].	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2

Reference	Action	Timing	Status	Evidence	Further Information
CRP 43	The limestone marl from the well pad and “new” access tracks will be removed from BKNR utilising a front-end-loader and taken for re-use outside the conservation estate.	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 44	The well pad, flare pit, Turkey’s Nest and mud sump will be recontoured to achieve final landform.	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 45	The area to be rehabilitated will be ripped to a depth of approximately 50 cm to relieve induced compaction.	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 46	The existing topsoil stockpiles will be spread evenly over the area to be rehabilitated.	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 47	Topsoil will be spread back into areas with the same Vegetation Types to maximise the similarity with adjacent vegetation.	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 48	The final surface will be lightly scarified to 20cm depth on contour to provide a friable seedbed and mitigate surface erosion.	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 49	The stockpiled vegetation will be spread over the surface of the scarified topsoil. The vegetation will be spread back into areas with the same Vegetation Types to maximise the similarity with adjacent vegetation.	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 50	Monthly inspections of rehabilitating sites confirm no foreign materials	Following rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 51	Foreign materials are removed from the rehabilitating site if permanent markers, infrastructure or litter is left at the site at any time.	Following rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 52	Natural contours are re-instated to pre-disturbance conditions upon rehabilitation as per pre-project survey	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 53	Land survey confirms earthmoving equipment has achieved natural contours to pre-disturbance conditions	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 54	If contours do not appear to be pre-disturbance condition, earthworks will be undertaken again before proceeding with ripping and spreading of topsoil and vegetation	During rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 55	Annual rehabilitation monitoring confirms no bare patches larger than 10 m ² after 12 months	Annually	NA	NA	Rehabilitation monitoring transects will be set up in 2023 once rehabilitation has been undertaken, monitoring will then commence in 2024.
CRP 56	Re-rehabilitation options will be investigated where there are bare patches larger than 10 m ² after 12 months. Re-rehabilitation will be implemented where there are bare patches larger than 10 m ² after 3 years.	3 years following rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 57	Annual rehabilitation monitoring confirms weeds in rehabilitation areas are not greater than on adjacent undisturbed remnant vegetation ^(Note 1) Note 1-Tracks are affected by the weed load on the opposite side of the track. The “edge effect” in comparison with adjacent track edge will be considered for the application of this completion criteria on tracks	Annually	NA	Refer to CRP 55	Refer to CRP 55

Reference	Action	Timing	Status	Evidence	Further Information
CRP 58	Additional weed control to be implemented where weed control program is not managing weeds in rehabilitation areas to foliage cover less than 80% of adjacent undisturbed remnant vegetation (Note 1).	Where required	NA	Refer to CRP 2	Refer to CRP 2
CRP 59	Annual rehabilitation monitoring confirms total native vegetation percentage cover of perennials is at least 50% of the control	Annually	NA	Refer to CRP 55	Refer to CRP 55
CRP 60	Re-rehabilitation options will be investigated where Total native vegetation percentage cover of perennials is less than 40%. Re-rehabilitation will be implemented where Total native vegetation percentage cover of perennials has not reached at least 50% of the control after 3 years for VTs	Where required	NA	Refer to CRP 2	Refer to CRP 2
CRP 61	Annual rehabilitation monitoring confirms native vegetation cover is increasing over time	Annually	NA	Refer to CRP 55	Refer to CRP 55
CRP 62	Re-rehabilitation options will be investigated where Native vegetation cover is not increasing over time	Where required	NA	Refer to CRP 55	Refer to CRP 55
CRP 63	Annual rehabilitation monitoring confirms species richness of keystone species is at least 50% of the control monitoring plot	Annually	NA	Refer to CRP 55	Refer to CRP 55
CRP 64	Re-rehabilitation options will be investigated where Species richness of keystone species is less than 40% of the control monitoring plots. Re-rehabilitation will be implemented where the species richness of keystone species per monitoring plot is not at least 50% of the control monitoring plot within 3 years	Where required	NA	Refer to CRP 2	Refer to CRP 2
CRP 65	Annual rehabilitation monitoring confirms at least one of the keystone species is represented (as % cover) in >90% of monitoring quadrats within each VT	Annually	NA	Refer to CRP 55	Refer to CRP 55
CRP 66	Re-rehabilitation options will be investigated where there are no keystone species represented (as % cover) in >25% of monitoring quadrats within each VT. Re-rehabilitation will be implemented where Keystone species richness has not achieved in >90% of rehabilitating monitoring quadrats is not less than control monitoring quadrats within each vegetation type after three years	Where required	NA	Refer to CRP 2	Refer to CRP 2
CRP 67	Annual rehabilitation monitoring confirms species richness of the rehabilitation is greater than 50% of monitoring transects within each VT	Annually	NA	Refer to CRP 55	Refer to CRP 55
CRP 68	Re-rehabilitation options will be investigated where species richness of the rehabilitation is not greater than 50% of monitoring transects within each VT within 3 years.	Where required	NA	Refer to CRP 2	Refer to CRP 2
CRP 69	Monthly inspections of project area vegetation confirm no suspect deaths	At all stages of the Cervantes 1 Project	C	E06_2022 07 04 Cervantes Weekly Inspection E07_2022 07 11 Cervantes Weekly Inspection E08_2022 07 18 Cervantes Weekly Inspection E09_2022 07 25 Cervantes Weekly Inspection	Weekly inspections being undertaken of the Cervantes 1 project area. No suspect deaths identified.

Reference	Action	Timing	Status	Evidence	Further Information
CRP 70	Annual rehabilitation monitoring checks for visual signs of dieback	Annually	NA	Refer to CRP 55	Refer to CRP 55
CRP 71	Triennial dieback interpretation of vulnerable areas in project area	Triennial	C	R15_Dieback Assessment	The previous dieback assessment was undertaken in June 2021. The next dieback assessment is due June 2024. No susceptible areas were identified in the previous assessment.
CRP 72	Hygiene measures to protect susceptible areas will be implemented where suspect susceptible dieback flora deaths have occurred.	As required	NA	Refer to CRP 71	Refer to CRP 71
CRP 73	Training on relevant sections of this Rehabilitation Plan will be incorporated into the Cervantes 1 Induction [RCMA-07-TM-FM-004]. Upon completion, trained personnel will be signed off and recorded in the training log along with the date and the specific induction for which training was conducted. All personnel and contractors are required to undertake the induction.	Prior to rehabilitation	NA	NA	No rehabilitation activities occurred in 2022. The induction will be reviewed in 2023 prior to rehabilitation activities.
CRP 74	Undertake environmental auditing in accordance with Table 12.	At all stages of the Cervantes 1 Project	NA	NA	Rehabilitation has not commenced, not audits are required to be undertaken yet.
	Timing				
	During remediation / rehabilitation activities				
	To continue annually where no activities are being undertaken on site until completion criteria has been achieved - AIEA				
CRP 75	A program of rehabilitation monitoring will be conducted by a suitably qualified environmental professional initially 2 to 3 months following rehabilitation and then on an annual basis.	Annually	NA	Refer to CRP 55	Refer to CRP 55
CRP 76	The locations of monitoring sites are presented in Figure 11: <ul style="list-style-type: none"> 5 permanent transects 100m long comprising 25 2m x 2m quadrats across access tracks and fire breaks in each impacted vegetation type with three transects in the PEC 5 paired permanent transects 100m long comprising 25 2m x 2m quadrats as controls for the access tracks and fire breaks transects running immediately parallel 2 permanent transects 100m long comprising 25 2m x 2m quadrats running north south over the rehabilitating drill site 1 control transect 100m long comprising 25 2m x 2m quadrats immediately north of the drill site 	Annually	NA	Refer to CRP 76	Refer to CRP 76
CRP 77	Additional survey of rehabilitation areas outside of quantitative monitoring transects will occur and will focus on ensuring that the rehabilitation performance is consistent across the area (plant cover and species richness) and that any potential constraints such as weeds or bare areas receive appropriate remediation.	Annually	NA	Refer to CRP 76	Refer to CRP 76
CRP 78	A visual inspection of rehabilitation areas will be undertaken to identify any areas of erosion, weeds and bares areas. Identification of areas with inadequate establishment of vegetation enables early intervention with rectification work to return the rehabilitation to a trajectory for meeting the completion criteria.	Annually	NA	Refer to CRP 76	Refer to CRP 76
CRP 79	Assess vegetation within permanent monitoring transects <ul style="list-style-type: none"> Total cover of each native plant species, and 	Annually	NA	Refer to CRP 76	Refer to CRP 76

Reference	Action	Timing	Status	Evidence	Further Information
	<ul style="list-style-type: none"> Total cover of weed species. Cover of Keystone species 				
CRP 80	Photograph of each transect	Annually	NA	Refer to CRP 76	Refer to CRP 76
CRP 81	<p>Walk through rehabilitation and along tracks will be undertaken to provide an assessment over the entire rehabilitated area. Areas with inadequate establishment of vegetation will be recorded with GPS locations for follow up rectification work to return the rehabilitation to a trajectory for meeting the completion criteria. The rehabilitation will be visually assessed for:</p> <ul style="list-style-type: none"> bare areas weeds signs of dieback disease additional taxa not recorded within plots and transects. 	Annually	NA	Refer to CRP 76	Refer to CRP 76
CRP 82	Visual inspection over the site with GPS record of locations and physical measurement (regular monitoring) of any points of erosion	Annually	NA	Refer to CRP 76	Refer to CRP 76
CRP 83	Should the monitoring results indicate the rehabilitation is not progressing towards completion criteria, an assessment will be made to determine rectification requirements	Annually	NA	Refer to CRP 76	Refer to CRP 76
CRP 84	The rehabilitation monitoring program will cease after 3 years when the rehabilitation objectives and completion criteria have been achieved in consultation with DMIRS and DBCA.	3 years following rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 85	Should the rehabilitation not meet the criteria, a rectification plan will be developed and implemented, with monitoring continuing until the rehabilitation objectives and completion criteria have been achieved.	3 years following rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 86	The results of these management and monitoring activities will be detailed in the Annual Environmental Report (AER).	Annually	NA	Refer to CRP 2	Refer to CRP 2
CRP 87	The monitoring program will be reviewed in consultation with DBCA and DMIRS on an annual basis.	Annually	NA	Refer to CRP 2	Refer to CRP 2
CRP 88	The annual monitoring program will identify any maintenance or rectification work required (such as erosion control, weed control, reseeding etc). This information will be used to develop and implement the rectification work plan.	Annually	NA	Refer to CRP 76	Refer to CRP 76
CRP 89	<p>Where rehabilitation efforts have been unsuccessful after a period of three years, options will be investigated including but not limited to:</p> <ul style="list-style-type: none"> Seeding Planting Mulching Ripping Irrigating 	3 years after rehabilitation	NA	Refer to CRP 2	Refer to CRP 2
CRP 90	RCMA will continue to engage with stakeholders for the life of the Cervantes 1 Project.	At all stages of the Cervantes 1 Project	C	C10_Cervantes 1 - AER DMIRS	Ongoing stakeholder consultation is documented in the DMIRS Annual Environmental Report (C10).
CRP 91	Environmental incidents shall be reported and investigated as soon as practicable following identification, enabling effective actions to be implemented without delay. Environmental incidents are defined as events that cause or could potentially cause harm to the environment.	At all stages of the Cervantes 1 Project	NA	NA	Rehabilitation has not commenced. There have been no incidents.

Reference	Action	Timing	Status	Evidence	Further Information
CRP 92	On completion of any rehabilitation activities, an End of Rehabilitation Report [RCMA-02-EM-TRG-002] (Appendix D) will be submitted by the Rehabilitation Supervisor to the Project Manager. This report will be included in the AER submitted to DMIRS.	Following rehabilitation activities	NA	Refer to CRP 2	Refer to CRP 2
CRP 93	<p>An AER is submitted to DMIRS annually under Regulation 16 of the Petroleum and Geothermal Energy Resources (Environment) Regulations 2012. The AER requires details of:</p> <ul style="list-style-type: none"> • Activities that have been undertaken • Clearing or rehabilitation that has been undertaken • Compliance for each objective and standard in the EP (includes compliance with Rehabilitation Plan) • Audits undertaken • Incidents that have occurred • Monitoring results <p>The AER will also be provided to the DBCA and Environmental Protection Authority.</p>	At all stages of the Cervantes 1 Project	C	C10_Cervantes 1 - AER DMIRS R13_C100-202210-003v1 DMIRS AER	AER submitted to DMIRS 29/11/2022 (revised due date as per correspondence with DMIRS).
CRP 94	<p>The Rehabilitation Plan is to be reviewed and revised and approved by the EPA in consultation with the EPA, DBCA and DMIRS:</p> <ul style="list-style-type: none"> • When there is a change in the details of the Rehabilitation Plan, or • When the need for adaptive management not covered in this plan is recognised • When there is a change in rehabilitation circumstances, or • As and when directed by the EPA. 	At all stages of the Cervantes 1 Project	C	Site inspection 11/01/2023	Consultation has commenced with DBCA on potential amendments to the Rehabilitation Plan. On completion of consultation, a revision of the Rehabilitation will be submitted to DWER (EPA), DBCA and DMIRS.

Appendix G Groundwater Monitoring Results

BASELINE SOIL & GROUNDWATER ASSESSMENT REPORT

Metgasco Limited – Cervantes-01 Location



March 2022

Report Information

Project:

Baseline Soil & Groundwater Assessment
March 2022

Location:

Cervantes-01 Location
Lot 12174 Plan 39607, Mount Adams, Western Australia 6525

Prepared for:

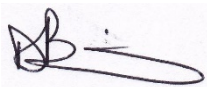
Metgasco Limited
West Perth Office
Level 2, 30 Richardson Street
West Perth, WA 6005

Prepared by:

Gemec Environmental Consultants
PO Box 89, Melville, Western Australia 6956
1/25 Foss St, Palmyra, Western Australia 6157
+61 (0) 8 9339 8449
info@gemec.com.au

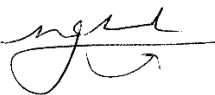
Compiled by:

Dan Baldwin BSc
Director, Contaminated Land Consultant



Reviewed and approved by:

Nicolo Jelovsek BSc
Director, Contaminated Land Consultant



Report Distribution Record

Date	Copies Issued	Recipient	Delivery Address	Name / Title
16.08.2022	1 PDF	Metgasco Limited	ken.aitken@metgasco.com.au	Ken Aitken / Project Manager

Revision List

Review Date	Revision	Description of Revision	Reviewer
16.08.2022	A	Internal Review	N. Jelovsek (Gemec)

Executive Summary

GemeC was engaged by Metgasco Limited (Metgasco) to undertake a baseline soil and groundwater assessment (SGA) at the Cervantes-01 exploration well location in the Shire of Mount Adams, Western Australia 6525 ('the site').

The baseline SGA was undertaken on 01 and 15 March 2022. The purpose of the works was to establish a baseline soil and groundwater data set for the Cervantes-01 location, sufficient to allow for future assessment of potential soil and groundwater impacts at the site.

The works involved the collection of eight soil samples from across the site targeting the various soil profiles and future areas of potential concern (AoPC) prior to establishment of the site and the collection of a representative groundwater sample from the groundwater monitoring bore (MW1).

- > The soil and groundwater samples were analysed for a comprehensive range of substances to establish the background soil and groundwater chemical conditions.
- > Most analysed substances in soil and groundwater samples were considered representative of ambient background concentrations that existed at the site prior to commencement of site activities, or imported gravel and fines material.
- > No soil exceedances were reported.
- > Exceedances of screening levels in groundwater included cobalt and copper exceeding the Marine Waters (MW) screening levels and chloride exceeding the Domestic Non-Potable Groundwater Use Guidelines (NPUG). GemeC has identified no risk associated with the exceedances due to the absence of exposure pathways.
- > Residual hydrocarbons detected as >C10-C34 total recoverable hydrocarbons (TRH) in the groundwater sample collected from the MW1 monitor well are attributed to the drilling mud polymer used during the installation of the groundwater bore. The concentrations were below adopted site screening levels, are anticipated to degrade over time and not pose a risk to potential future groundwater users. There is no planned extraction or use of groundwater from beneath the site except for testing purposes.

GemeC strongly recommends that the conclusions stated here be reviewed in context to comments and information contained within the body of the report.

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Figure 1	Regional Site Setting, 2022
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Appendix A – Analytical Results

Chain of Custody Forms and Laboratory Reports

- Soil Samples
- Groundwater Samples

Appendix B – Supporting Data

Land Title Details

DWER Groundwater Licence Information

DWER WIR Information

BOM GDE & IDE Information

Monitoring Well Construction Information

Field Equipment Calibration Certificate

Field Data Sheets

HSL Application Checklist

Appendix C – Site Photographs

Abbreviations and Acronyms

ABC	Ambient Background Concentration	LoR	limit of reporting
ACL	Added Contaminant Limits	m bgs	metres below ground surface
AHD	Australian Height Datum	m² / m³	square metres / cubic metres
ANZECC	Australian and New Zealand Environment and Conservation Council	meq	milliequivalents
AoPC	area(s) of potential concern	mg/kg	milligrams per kilogram
AS	Australian Standard	MGA	Map Grid of Australia
ASC NEPM	National Environmental Protection (Assessment of Site Contamination) Measure	ML	Management Limit
BoM	Australian Government Bureau of Meteorology	NATA	National Association of Testing Authorities
BTEXN	benzene, toluene, ethylbenzene, xylenes and naphthalene	NEPC	National Environment Protection Council
CEC	cation exchange capacity	NHMRC	National Health and Medical Research Council
CoC	chain of custody	NL	not limiting
CoPC	chemicals of potential concern	NORM	naturally occurring radioactive materials
CoT	certificate of title	NPUG	Non-Potable Use Guidelines (DoH)
CRC CARE	Co-operative Research Centre for Contamination Assessment and Remediation of the Environment	OCs	organochlorine pesticides
CSM	Conceptual Site Model	OH&S	occupational health and safety
DMIRS	Western Australian Department of Mines, Industry Regulation and Safety	OPs	organophosphorus pesticides
DMP	Western Australian Department of Mines and Petroleum (now DMIRS)	PAHs	polynuclear aromatic hydrocarbons
DoW	Western Australian Department of Water (now DWER)	PDWSA	Public Drinking Water Source Area
DPIRD	Department of Primary Industries and Regional Development	PFAS	perfluoroalkyl and polyfluoroalkyl substances
DQO	data quality objective	PID	photo-ionisation detector
DWER	Western Australian Department of Water and Environmental Regulation	ppm_v	parts per million by volume
EC	electrical conductivity	QA/QC	quality assurance / quality control
Eco-SSLs	Ecological Soil Screening Levels (US EPA, 2005)	RPD	relative percentage difference
EIL	Ecological Investigation Level	SAQP	Sampling Analysis and Quality Plan
EP	Environment Plan	SGA	Soil and Groundwater Assessment
ESL	Ecological Screening Level	SL	screening level
GDE	Groundwater Dependant Ecosystem	SRC_{eco}	Ecotoxicological Serious Risk Concentrations (RIVM, 2001)
ha	hectare(s)	TKN	total Kjeldahl nitrogen
HIL	Health Investigation Level	TOC	total organic carbon
HSL	Health Screening Level	TRH	total recoverable hydrocarbons
		µg/L	micrograms per litre
		UR&POS	urban residential and public open space
		US EPA	United States Environmental Protection Agency
		VOC	volatile organic compound
		WIR	Water Information Reporting (DWER)

1. Introduction

Gemec was engaged by Metgasco Limited (Metgasco) to undertake a baseline soil and groundwater assessment (SGA) at the Cervantes-01 gas exploration well location in the Shire of Mount Adams, Western Australia 6525 ('the site'). The baseline SGA was undertaken on 01 and 15 March 2022 and involved the collection of eight soil samples from across the site targeting the various soil profiles and future areas of potential concern (AoPC) prior to establishment of the site and the collection of a representative groundwater sample from the groundwater monitoring bore.

1.1 Purpose and Objectives

The purpose of the works was to establish a representative baseline soil and groundwater data set for the Cervantes-01 location, sufficient to allow for future assessment of potential soil and groundwater impacts at the site. The soil and groundwater data set will enable comparison of soil and groundwater conditions following the completion of drilling operations, and the removal of associated equipment, infrastructure, and potential contaminant sources from the site.

The objective of the works was to obtain sufficient soil and groundwater chemical and physical data from the site to achieve the purpose.

1.2 Scope of Work

The following activities were undertaken as part of the scope of work:

- developed a conceptual site model (CSM), data quality objectives (DQOs) and sampling and analysis quality plan (SAQP) for the works in collaboration with Metgasco;
- completed an occupational health and safety (OH&S) plan for the proposed works;
- collected eight primary soil samples over two site visits targeting native soils, imported gravel road base and areas where potentially contaminating activities are to be conducted;
- gauged, purged and collected one representative groundwater sample from the groundwater monitoring bore installed between the two site visits;
- undertook sufficient quality assurance (QA) processes and quality control (QC) procedures to achieve the DQOs;
- transported the samples on ice and under chain of custody (CoC) protocols to National Association of Testing Authorities (NATA) accredited laboratories for analysis of the chemicals of potential concern (CoPC); and
- prepared this report detailing the field activities, analytical results, conclusions and recommendations.

1.3 Stakeholder Consultation

All on-site soil and groundwater investigation works were conducted during normal business hours. The SAQP, OH&S plan and DQOs were developed in consultation with the client and works were conducted in cooperation with site operators. Wider community consultation was not considered necessary to conduct the soil and groundwater investigation works.

2. Site Identification

Site identification details for the Cervantes-01 location are provided in the following Table 2-1.

Table 2-1: Site identification details

Site name	Cervantes-01
Site address	Lot 12174, Plan 39607, Mount Adams, Western Australia, 6525
Land title details (CoT attached in Appendix B)	Lot 12174 on Deposited Plan 39607, Volume LR3110, Folio 928 Primary interest holder: National Parks and Nature Conservation Authority

Map / site plan	Provided in the Figures section
Local Government	Shire of Irwin
Zoning	'Conservation' – under Shire of Irwin Local Planning Scheme No. 5 (DPLH, 2018)
Cervantes-01 Well Head Co-ordinates MGA 2020, Zone 50	303298 m E, 6749757 m N

3. Background Information and Hydrogeology

The Cervantes-01 wellsite is located ~300 km north-northwest of Perth and ~13 km south-southeast of Dongara. The location is within the Beekeepers Nature Reserve, and ~1.5 km east of the nearest surface water receptor – the Indian Ocean. At the time of the SGA the site was being prepared for the installation of a gas exploration well.

3.1 Geology and Hydrogeology

The soil landscape of the area encompassing the Cervantes-01 wellsite is referred to as the Quindalup Central System – a coastal dune system, including foredunes, beach ridge plains, parabolic dunes, deflation basins and flats, with no fixed drainage. The soil is defined as calcareous deep and shallow sands and vegetation is referred to as coastal heathlands and scrub (DPIRD, Soil Landscape Mapping – Systems, 2022).

The Cervantes-01 wellsite lies within the sedimentary Perth Basin. This basin lies onshore and offshore and extends for about 700 km along the southern portion of the west coast of Western Australia. The basin is bounded to the east by the Darling Fault, which extends the full length of the basin. The onshore portion of the basin averages 65 km in width and extends from the southern coast to Geraldton in the north (DoW, 2017). The northern Perth Basin in the region contains sedimentary rocks of Early Permian to Late Jurassic age and reaches thicknesses greater than 5,000 m.

The proposed Cervantes-01 location overlies the Superficial Swan aquifer which has the following characteristics in the area (DoW, 2017 unless otherwise stated):

- > predominantly saturated;
- > comprised of lenses of Safety Bay Sand (calcareous sand) overlying Tamala Limestone (calcareous sand deposit);
- > estimated formation thickness of 20-30 m;
- > based on the surrounding topography, the depth to groundwater estimated to be <10 metres below ground surface (m bgs);
- > expected salinity of ~3,000-7,000 mg/L total dissolved solids (TDS) (saline);
- > hydraulic gradient is broadly west toward the Indian Ocean;
- > groundwater recharge is predominantly via rainfall, and upward groundwater flow from the underlying Yarragadee aquifer is expected in areas where the aquifers are hydraulically connected (Nidagal 1995; Irwin 2007);
- > groundwater discharges predominantly into the ocean at the coast over a seawater interface, which may be encountered up to 1.5 km inland (Moncrieff & Tuckson, 1989).

The Yarragadee Formation is the main formation that sub-crops in the area and underlies the Superficial aquifer in the vicinity of Cervantes-01, where it has an expected thickness of ~400 m and expected salinity of ~7,000-14,000 mg/L TDS (saline). The Yarragadee aquifer is the largest regional aquifer in the northern Perth Basin and consists of a multilayered sequence of sandstone beds with very fine to very coarse grained and granule sized quartz sand with variable amounts of matrix clay and interbedded siltstone, shale and claystone (DoW, 2017).

Groundwater recharge into the Yarragadee is mostly by direct rainfall (east of the Swan Coastal Plain), as well as downward leakage from overlying aquifers and river recharge. Groundwater also discharges from the Yarragadee via upward flow into overlying aquifers, such as in the vicinity of Cervantes-01, and some groundwater discharges offshore into the Indian Ocean (DoW, 2017).

Formations which underlie the Yarragadee aquifer, such as the Cattamarra Coal Measures and Eneabba Formation, which in other areas can contain fresh groundwater, occur at considerable depth within the area and are likely to contain brackish to saline groundwater (DoW, 2017). Although some connectivity exists between the aquifers, it is impeded by several confining layers (Rockwater, 2015).

3.2 Surrounding Sensitive Receptors

The nearest potential human receptors in the vicinity of the site are farm residents ~2.6 km north-northeast – up and across hydraulic gradient of the site. No human receptors exist down-hydraulic gradient of the site i.e., between the site and the nearby Indian Ocean.

Groundwater Abstraction – Bores, Licences and Reserves

The Allanoooka-Dongara Water Reserve represents the nearest Public Drinking Water Source protection area (PDWSA) and is located ~18 kilometres (km) to the north north-east of the site. The Allanoooka-Dongara Water Reserve is listed as a Priority one (P1) PDWSA (DoW, 2010).

A search of the Department of Water and Environmental Regulation (DWER) online registered groundwater abstraction bores in the vicinity of the site indicated that the nearest registered groundwater bore is located ~3.0 km north-east and up-hydraulic gradient (inferred) of the site (AWRC #70110399) and is understood to have historically been used for water supply to the abandoned Dooka gypsum mine. The remaining five bores listed in the vicinity of 70110399 are understood to be used for supply, monitoring and injection associated with the adjacent Jingemina oil production facility. DWER WIR information and a BOM groundwater bore use map are attached in Appendix B.

Information for the nearest active DWER licences to extract groundwater from the Superficial Swan and Yarragadee Aquifers is presented in Appendix B. The two licences are owned by the operator of the Jingemina Production Facility (RCMA Australia) and are understood to be used for the purposes discussed above.

Due to the up-gradient location, separation distance and use of the abovementioned groundwater bores, human receptors using these bores are not considered to be at risk of exposure to contaminants associated with future proposed drilling or production activities at the Cervantes-01 location.

Groundwater Dependent Ecosystems (GDEs) and Inflow Dependent Ecosystems (IDES)

The following information provided on GDEs was sourced from the Bureau of Meteorology (BoM, 2019) and the Department of Water (DoW, 2017). Potential GDEs in the vicinity of the site predominantly exists as native vegetation overlying a shallow water table – the Superficial aquifer. These areas are also considered as likely IDEs. Vegetation in the area is described as Acacia shrublands. Maps depicting terrestrial GDEs and IDEs in relation to the proposed site are provided in Appendix A.

The identified GDEs and IDEs in this area may be considered potential sensitive receptors for future surface activities associated with the proposed Cervantes-01 wellsite.

No aquatic or subterranean GDEs exist within a 5 km radius of the site.

Specified Ecosystems

Below are listed details of 'specified ecosystems' from corresponding DWER and Department of Biodiversity, Conservation and Attractions (DBCA) databases.

- Threatened and priority flora: Priority 4 threatened flora is listed as existing ~2.8 km north-northwest of the proposed site. No further documented threatened and priority fauna within 5 km of the site.

- No threatened and priority fauna exist within 5 km of the site.
- No threatened ecological communities exist within 5 km of the site.
- The proposed site is located within the Beekeepers Nature Reserve. No other DBCA Legislated Lands and Waters areas are located within 5 km of the site.
- No DWER environmentally sensitive areas, DBCA important wetlands, RAMSAR sites, RIWI Act surface water areas or irrigation districts are located within 5 km of the site. The proposed site is located within the Arrowsmith RIWI Act Groundwater Area.

Other Terrestrial Receptors

Other receptors in the vicinity of the proposed site include terrestrial the surrounding terrestrial flora and fauna including soil invertebrates and mammals and avian species inhabiting and accessing the abovementioned GDEs and IDEs. The nearest agricultural receptors including livestock and dryland crops are located ~2.5 km east of the site.

3.3 Groundwater Monitoring Bore Construction Details

The construction details for the monitoring bore MW1 are summarised below in Table 3-1.

Table 3-1: Bore construction details ¹

Bore ID	MW1
Coordinates (MGA Zone 50) ²	~303220 m E, ~6749745 m N
Installation date	04 March 2022
Drilled depth (m bgs)	14.0
Construction material	18 mm ø PVC
Screened interval (m bgs)	4.9-13.9
Gravel pack (m bgs)	2.0-13.9
Aquifer	Superficial aquifer
Bore development	Airlift

Notes

1 – Values measured by Dongara Drilling & Electrical unless stated.

2 – Coordinates estimated by Gemec.

Monitor well is installed with ~0.6 m of 'stick-up' – casing above ground surface.

4. Criteria and Screening Levels

Screening levels applied for the assessment of human and ecological risks associated with CoPC at the site are based on the DWER Contaminated Sites Guidelines (CSGs) – *Assessment and management of contaminated sites* (2021) and the National Environment Protection Council's (NEPC) *National Environment Protection (Assessment of Site Contamination) Measure* (2013) (ASC NEPM). Further references for CoPC screening levels are presented in the References section (s. 10).

The criteria and their respective screening levels that Gemec have deemed appropriate for the site are considered suitable for the protection of the environment, environmental values and human health, with due cognisance of any identified CoPC, potential contaminant pathways, identified receptors, the current, and as far as is known, future land use and the nearby surrounding environment.

Exceedance of the screening levels as presented within the adopted criteria does not necessarily infer that the substance presents a hazard or risk to human health, the environment or environmental values but that further investigation, assessment and / or risk mitigation measures are required. Future assessment of CoPC

concentrations in soil and groundwater will also be assessed against the ambient background soil and groundwater concentrations (ABCs) established during the SGA. The adopted screening levels applied for the protection of the respective receptors, and a brief justification of their selection are listed below.

Table 4-1: Screening levels – environment and environmental values

	Screening Level	Reference	Justification
Soil	Ecological Screening Levels (ESL) and Ecological Investigation Levels (EIL) for Areas of Ecological Significance (AES) ^{1,2}	DWER CSGs, 2021; ASC NEPM, 2013	Surrounding conservation land use
	Ecological Soil Screening Levels (Eco-SSLs)	US EPA, 2005; RIVM, 2001	Applied to analytes that do not have an established DWER referenced screening level (Ba, Cd, CrVI, Mn, Hg)
Groundwater	Marine Waters 95% protection level for slightly / moderately disturbed ecosystems (MW 95%) ¹ – applied to water quality at the point of discharge.	ANZECC & ARMCANZ, 2018	Application is conservative in the absence of other criteria – the nearest down-gradient water body is the Indian Ocean, ~1.5 km to the east of the site.

1: Applies to coarse (sand) soil types

2: ESLs and EILs apply to the upper two metres of the soil profile

Table 4-2: Screening levels – human health

	Screening Level	Reference	Justification
Soil	Health Screening Levels for Recreational / Open Space (HSL C) ¹ – Vapour Intrusion	DWER CSGs, 2021; ASC NEPM, 2013	Surrounding and future site land use for conservation purposes; no occupied slab-on-ground structures exist on-site or likely to exist in future; any potential future exposure to soil-based contaminants will be in the context of conservation land use.
	HSL C – Direct Contact		
	Management Limits (ML) for Residential, Parkland & Public Open Space		
	Health Investigation Levels for Recreational / Open Space (HIL C)		
Groundwater	Domestic Non-Potable Groundwater Use Guidelines (NPUG)	DoH, 2014	Application is conservative in the absence of other criteria – no down-gradient bores, no groundwater abstraction from site for well site construction.
	HSL C – Vapour Intrusion ¹	DWER CSGs, 2021; ASC NEPM, 2013	No occupied structures exist in the near vicinity of the site.

1: Applies to coarse (sand) soil types

4.1 Exclusions and Adjustments

Groundwater has not been screened against drinking water or fresh waters screening levels due to the saline nature of the groundwater in the surficial aquifer and the absence of applicable receptors in the vicinity of the site.

EILs for chromium, copper, nickel and zinc were derived for the site using background soil data obtained during the investigation. To determine the applicable EILs, background soil characteristics (pH, cation exchange capacity [CEC] and clay content) and ABCs for metals were entered into the ASC NEPM Toolbox EIL Calculation Spreadsheet. Soil characteristics used for the calculations included an average clay content of 9.5%, pH of 7.4 (CaCl₂ extraction) and CEC of 25.5 cmol_c/kg.

No other exclusions or adjustments were made.

5. Sampling and Analysis Quality Plan

The SAQP was established based on the CSM and the DQOs. Several components of the SAQP and DQOs were initially developed by Metgasco in their Environment Plan (EP) for the site, which also defines the potential contaminant sources, pathways and receptors that comprise the CSM. The proposed site use is for establishment of a gas exploration well.

Future results of soil and groundwater analyses will be assessed against ABCs obtained during this assessment, and the adopted site screening levels (s. 4) to identify source→pathway→receptor linkages (if present). The SAQP was developed to meet the purpose and objectives of the SGA (s. 1.1), as agreed upon with the client.

The SAQP was intended to capture variations in soil chemistry associated with different soil profiles encountered on-site and within imported materials, and it allowed for an assessment of spatial variation by targeting the various future AoPC locations outlined below. The resultant SAQP was therefore dynamic, as some locations were determined on-site via observations of the various soil types encountered. Sample locations are outlined in the Results Sections 7.1.1 and 7.2.1 and are presented in the attached Figures.

The SAQP is understood to be in conformance with obligations presented in the site's EP, and the groundwater SAQP is considered to also be in general conformance with the DWER/DMIRS *Guideline for Groundwater Monitoring in the Onshore Petroleum and Geothermal Industry* (2016).

Field work was undertaken by an Environmental Technician from Gemec's Perth office in accordance with the various standards and guidelines referenced in s. 4, s. 10 (References) and Gemec's Protocols.

5.1 Areas of Potential Concern

The future site uses considered to represent the main surface AoPC include the drilling mud retention pond, flare pit, and temporary diesel storage used during construction of the site. Proposed controls for the reporting of incidents involving contaminant losses is outlined in the EP, therefore a predominantly judgemental and targeted sampling programme is considered appropriate both for the baseline assessment, and the future decommissioning validation.

Potential future contaminant sources include:

- exploration well drilling fluids;
- well construction related materials such as cement and grease;
- formation derived cuttings and fluids;
- thermal alteration of existing soils and imported materials due to flaring;
- leaks from machinery operating at the site; and
- temporary fuel storage and distribution.

5.2 Chemicals of Potential Concern

The CoPC selected for assessment of the site are those associated with the future potential contaminant sources outlined in s. 5.2.1:

- petroleum hydrocarbon compounds including benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN);
- total recoverable hydrocarbon (TRH) fractions: C6-C10, >C10-C16, >C16-C34 and >C34-C40;
- the fuel oxygenate methyl tert-butyl ether (MTBE);
- metals and metalloids including aluminium, arsenic, barium, beryllium, boron, cadmium, chromium, hexavalent chromium, cobalt, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, titanium, uranium, vanadium and zinc; and
- nutrients including total nitrogen, total Kjeldahl nitrogen (TKN), ammonia, nitrate, nitrite and total phosphorous.

Additional soil analyses included moisture content, pH, electrical conductivity (EC), CEC, clay content, soil particle density, TOC and organic matter – to establish baseline soil characteristics for the site and for calculation of metals EILs as outlined in s. 4.1.

Additional groundwater analyses included major anions and cations, hardness, pH, EC and TDS – to provide an understanding of the general groundwater chemistry prior to commencement of operations and as an extra line of evidence to assess for potential impacts.

Naturally occurring radioactive materials (NORM), perfluoroalkyl and polyfluoroalkyl substances (PFAS), polynuclear aromatic hydrocarbons (PAHs), phenolic compounds (phenols), organochlorine pesticides (OCs) and organophosphorus pesticides (OPs) were not included in the soil and groundwater analytical suites. PFAS, PAHs, phenols, OCs and OPs are not considered CoPC associated with the proposed future site operations, based on recent investigations conducted at similar wellsites. BTEXN and TRH analyses were used as a screening tool to determine whether further analyses such as PAHs or phenols were necessary.

5.3 Soil Sample Collection Method

Soil samples were collected from various soil profiles using a stainless-steel hand trowel. A fresh pair of disposable nitrile gloves was worn for each sample collection and the hand trowel was decontaminated between sampling locations by washing with a laboratory grade phosphate free detergent solution (Quantumclean®) and rinsing with tap water. The soil samples were collected in laboratory supplied sample containers, placed on ice following collection and sent under CoC documentation to NATA accredited laboratories for testing. The sample containers were marked with an identifying number, depth and date.

5.4 Groundwater Sample Collection Method

Prior to sample collection, the monitor well was gauged using a Heron oil/water interface probe to determine the depth to groundwater (SWL) relative to top of casing (toc). Samples were collected from the screened interval of the monitor well using the low flow method, using a 12v single stage, variable speed, stainless steel low flow submersible pump and inert low-density polyethylene (LDPE) tubing connected to a flow through cell.

Groundwater field chemical parameters were obtained using a calibrated YSI Pro Plus field chemistry meter and flow cell. The field chemical properties and gauging data were recorded on the field data sheet attached in Appendix B. Once the field chemical properties had stabilised a representative sample was collected.

Fresh disposable nitrile gloves and HDPE sample tubing were used during the purging of the well and the collection of each sample. The pump, flow cell and interface probe were decontaminated between sample locations by washing with a Quantumclean® detergent solution and rinsing with tap water. Following collection, each sample was immediately placed on ice in a cool box and transferred under CoC protocols to the laboratory.

5.5 Quality Assurance and Quality Control

Refer to s. 6 for a summary of QC samples and a discussion of QC sample results. Field equipment calibration certificates are provided in the attached Appendix B.

5.6 Analytical Methods

Laboratory analytical methodology undertaken by both primary (ALS Environmental Perth and MPL Laboratories Perth) and secondary (ALS Environmental Melbourne and Envirolab Services NSW) laboratories are summarised within laboratory certificates of analysis (provided within Appendix A). The analytical procedures used by the laboratories undertake determinations in accordance with the following internationally recognised procedures – NEPM, US EPA, APHA and AS.

6. Quality Control

6.1 Field QC Sample Results and Discussion

QC samples were collected in the field in conformance with regulatory guidelines and the relevant Australian Standards. These included two blind field duplicate samples (Dup), two blind field triplicate samples (Split) and two equipment rinsate samples (Rinsate).

One rinsate sample was collected from the stainless-steel sampling trowel used to collect the soil samples on 01 March 2022 and one rinsate sample was collected from the low flow pump head following completion of sampling on 15 March 2022 to enable QC of decontamination procedures. The samples were analysed for a basic suite of eight metals, which were not detected above the laboratory limit of reporting (LoR) in the soil rinsate, suggesting that no cross contamination occurred during the sampling process and that decontamination procedures were adequately adhered to. Boron was detected above the laboratory LoR in the groundwater rinsate sample collected on 15 March 2022, however was interpreted as representative of laboratory supplied rinsate water, as iron and strontium – reported as higher concentrations in the primary / replicate samples, were not detected in the rinsate. As such, the detection of boron in the rinsate sample was interpreted as having no material effect on the outcomes of this investigation.

Three laboratory supplied sterile trip blank (Trip Blank) samples accompanied the soil and groundwater samples to the laboratory to assess for potential cross-contamination during storage and transport. The samples were analysed for the presence of BTEXN and TRH (C6-C10) (with the groundwater trip blank also analysed for the presence of MTBE), which were not detected in any of the samples, suggesting that no cross contamination occurred during transport, or that no external sources of these compounds have impacted sample concentrations.

Dup and Split soil and groundwater samples were obtained in the field to identify variations in analyte concentrations and / or the repeatability of laboratory analysis and proficiency. During the assessment 'Dup' and 'Split' were aggregated from the S4_0-0.3m soil sample and analysed for the metals suite, with groundwater 'Dup' and 'Split' samples aggregated from the MW1 groundwater sample and analysed for the metals suite (excluding hexavalent chromium).

Evaluation of the duplicate (Dup) and triplicate (Split) samples was undertaken by determining the relative percentage difference (RPD) of analyte concentrations in the QC samples compared to the primary sample. Gemec adopt an RPD acceptance criterion up to 50% for organics and inorganics in soil and groundwater. However, it is noted that RPDs may be higher due to low concentrations, heterogeneity of the samples and / or nature and age of the contaminant. Generally, an RPD failure is considered significant if the results are 10 times or greater than the LoR.

No RPD exceedances were reported during the soil assessment. The following RPD exceedances were reported during the groundwater assessment:

- 'Dup' sample: zinc (133%).
- 'Split' sample: molybdenum (67%), nickel (67%), zinc (133%).

6.2 Laboratory QC Results and Discussion

Soil 01.03.2022

EP2202496 (primary laboratory) outliers:

- pH and conductivity analysis was outside the holding times for all samples;
- Nitrite analysis was outside the holding times for the S6 sample;
- the frequency of quality control samples for Total Metals by ICP-MS – Suite X was below NEPM 2013 B3 and ALS QC Standard; and
- the matrix spike recovery for barium and manganese was not determined, the background level was greater or equal to 4x spike level.

ES2208158 (secondary laboratory) outliers:

- pH analysis was outside of the holding times; and
- the frequency of quality control samples for Total Metals by ICP-MS – Suite X was below NEPM 2013 B3 and ALS QC Standard.

Soil 15.03.2022

EP2203252 (primary laboratory) outliers:

- duplicate (Dup) RPD outliers exist for manganese – RPD exceeds LOR based limits;
- matrix spike recovery outliers exist for hexavalent chromium – recovery was less than lower data quality objectives; and
- the frequency of quality control samples for Total Metals by ICP-MS – Suite X was below NEPM 2013 B3 and ALS QC Standard.

Groundwater 15.03.2022

No laboratory outliers were reported by the primary nor secondary laboratories for the groundwater assessment.

6.3 Summary

The groundwater RPD exceedance is attributed to the low level of analytes detected in the samples, not due to the sampling technique. This is supported by low RPDs for the other metals analysed. The RPD exceedance concentrations did not exceed the adopted screening levels for the protection of the environment, environmental values or human health; however, the highest concentrations will be used for reporting purposes to maintain a conservative bias.

The laboratory outliers are not considered significant given the following:

- outliers corresponded with analytes that were either below LoRs, or site screening levels;
- concentrations were consistent with other samples, or expected chemical conditions for the area

By signing the laboratory reports the laboratories acknowledge that the results satisfy their NATA accreditation.

Based on the results of the QC programme, it is concluded that the SAQP adopted was acceptable and the results obtained are of reliable quality for interpretative purposes to meet the purpose and objectives.

7. Results and Discussion

The baseline SGA works involved the collection of eight primary soil samples over two sit visits and the gauging, purging and sampling of groundwater from one newly installed monitoring well. Results are discussed in context of the following attachments:

- > Soil analytical results: Tables 1-3.
- > Groundwater analytical results: Tables 4-7.
- > Groundwater field parameters: Table 8.
- > Laboratory analytical reports: Appendix A.
- > Soil and groundwater sample locations: Figure 2.

7.1 Soil Assessment

7.1.1 Sample Distribution and Soil Characteristics

Six primary soil samples were obtained from across the site at the following locations:

- S1_2.0m: base of the proposed flare pit.
- S2_3.5m: base of the proposed mud sump.

- S3_0-0.3m and S4_0-0.3m: proposed fuel and chemical storage area.
- S5_0-0.3m and S6_0-0.3m: natural topsoil.
- S7_0-0.3m and S8_0-0.3m: imported gravel and fines (collected on 15 March 2022 after fill material had been brought onto site).

Native soils were characterised as sand and limestone, grey at the surface with minor organic components, tending pale yellow with an increasing limestone content with depth.

7.1.2 Soil CoPC Analytical Results

Petroleum Hydrocarbons

No BTEXN or TRH analytes were detected above the laboratory LoR in any of the soil samples collected.

Metals, Metalloids and Non-Metals

Concentrations of the following metals were reported:

- aluminium (220-1,310 mg/kg), chromium (9-12 mg/kg), iron (280-1,350 mg/kg), lead (0.4-0.9 mg/kg), lithium (1.1-1.9 mg/kg), manganese (17-30 mg/kg), strontium (1330-2220 mg/kg), and uranium (0.3-1.0 mg/kg), were detected in all samples;
- barium (10-20 mg/kg) in S2-S8 only; and
- titanium (0.3-1.0 mg/kg) in S5-S8 only.

No concentrations exceeded the adopted screening criteria. The highest concentrations were associated with the imported gravel and fines material with the exception of strontium and uranium which were higher within the samples collected from native soils.

Arsenic, beryllium, boron, cadmium, hexavalent chromium, cobalt, copper, mercury, molybdenum, nickel, selenium, silver, vanadium and zinc were not detected above the laboratory LoR.

Nutrients

Samples S5_0-0.3m and S6_0-0.3m were analysed for nutrients. Total nitrogen (1,410-1,620 mg/kg) was present in both samples with the dominant component being present as TKN (1,410-1,620 mg/kg) with minor components of nitrate (0.4-0.8 mg/kg). Total phosphorous was present in both samples in concentrations ranging from 383 to 395 mg/kg. No screening levels exist for the aforementioned substances within the ASC NEPM guidelines.

7.2 Groundwater Assessment

7.2.1 Sample Distribution and Field Observations

One primary groundwater sample was obtained from the MW1 monitor well installed by Dongara Drilling & Electrical on 04 March 2022. MW1 is located to the west (inferred down-hydraulic gradient) of the proposed site infrastructure outside of the western site boundary.

Initial observations of groundwater within MW1 indicated that residual drilling fluid polymer was present within the casing, as such the well was extensively purged (54 L) prior to sample collection. Purged groundwater was initially observed to have a higher turbidity and viscosity prior to clearing, with no sediment observed at the completion of purging. Hydraulic conductivity was consistent, with a good recharge rate and no drawdown observed. No sheens were observed in the purged groundwater, however a sulphurous odour was noted which was inferred to be naturally occurring.

7.2.2 Standing Water Level

The SWL was recorded as being 4.004 metres below top of casing (m btoc), equivalent to ~3.4 m bgs (~0.6 m stick-up). Top of casing survey data in metres Australian Height Datum (m AHD) was not available to Gemec at the time of this report.

7.2.3 Field Hydrochemical Results & Laboratory EC / TDS Values

The DO, redox, EC, pH and temperature groundwater chemical data represented stabilised conditions prior to sample collection:

- DO was recorded as 0.4 mg/L, indicating aerobic conditions in shallow groundwater.
- Redox was recorded as being -198 mV, indicating that reducing conditions are present.
- EC was recorded in the field at 7652 $\mu\text{S}/\text{cm}$, corresponding to a TDS value of 5259 mg/L. Laboratory measured EC was reported at 8500 $\mu\text{S}/\text{cm}$ with a corresponding TDS value of 5300. TDS values indicate saline groundwater quality.
- The pH value was recorded as 6.9 in the field, with lab measured pH reported as 7.3 indicating the groundwater in the area is generally neutral.
- Temperature was 24.1°C.

7.2.4 Groundwater CoPC Analytical Results

Petroleum Hydrocarbons, MTBE, Ethane and Methane

Concentrations of BTEXN, C6-C10 TRH, >C34-C40 TRH, MTBE, ethane and methane were not reported above the laboratory LoR in the sample collected from MW1.

TRH fractions in the >C10-C34 range (3780 $\mu\text{g}/\text{L}$) were detected in the sample at concentrations below the adopted screening criteria. Based on supplementary laboratory information and field observations, TRH detected within MW1 represents residual drilling mud polymer used during installation of the monitoring bore, as supported by the semi-volatile TRH chromatogram provided by the laboratory (Appendix A). No other historical petroleum hydrocarbon sources exist at this location.

The residual drilling fluid is anticipated to biodegrade over time, which may result in several hydrochemical effects including an increase in some metals concentrations and the generation of methane, with a concomitant decrease in concentration of other species such as sulphate, nitrate and dissolved oxygen resulting in a lower redox potential. At Cervantes-01 this process may be affected by naturally occurring low redox conditions.

Dissolved Metals, Metalloids and Non-metals

The dissolved metals aluminium (20 $\mu\text{g}/\text{L}$), arsenic (2 $\mu\text{g}/\text{L}$), barium (130 $\mu\text{g}/\text{L}$), boron (390 $\mu\text{g}/\text{L}$), cobalt (4 $\mu\text{g}/\text{L}$), copper ($\mu\text{g}/\text{L}$), iron (850 $\mu\text{g}/\text{L}$), lithium (65 $\mu\text{g}/\text{L}$), manganese (380 $\mu\text{g}/\text{L}$), molybdenum (2 $\mu\text{g}/\text{L}$), nickel (4 $\mu\text{g}/\text{L}$), strontium (6,600 $\mu\text{g}/\text{L}$), uranium (2.8 $\mu\text{g}/\text{L}$) and zinc (6 $\mu\text{g}/\text{L}$) were detected in the sample collected from MW1. Concentrations of cobalt and copper exceeded the MW screening levels.

Beryllium, cadmium, chromium, hexavalent chromium, lead, mercury, selenium, titanium and vanadium were not detected above the laboratory LoR in the groundwater samples.

The degradation of hydrocarbons in groundwater, such as the adhesive / drilling fluid residues present within the MW1 casing, are known to temporarily affect groundwater hydrochemistry (such as reduced DO and redox) which can lead to desorption of some metal species from the aquifer matrix, increasing their dissolved concentration until aquifer conditions stabilise. Although this may have occurred at the MW1 location due to the drilling and development methods used.

Major Cations and Major Anions

Concentrations of the major cations and anions in the groundwater were dominated by sodium and chloride as expected. Chloride exceeded the adopted NPUG screening levels. Bicarbonate was detected at 470 mg/L, with carbonate not detected above the laboratory LoR in the groundwater. Bicarbonate dominated alkalinity is expected in the natural environment. Total hardness was 1100 mg/L, indicating groundwater is 'extremely hard'.

Nutrients

Total nitrogen was reported at 2.4 mg/L and was dominantly comprised of total Kjeldahl nitrogen (2.3 mg/L), reflecting an organic source with a trace concentration of nitrate (0.015 mg/L) present. Trace concentrations of total phosphate (0.06 mg/L) and phosphate (0.024 mg/L) were reported. Ammonia and nitrite were not detected above the laboratory LoR.

8. Conceptual Site Model

An initial CSM was developed to identify how the site may become contaminated (i.e., the source(s)), the locations of CoPC, the potential mechanisms for transport of the CoPC (i.e., pathways) and what potential receptors may be exposed to contamination (if present) in the present and into the future. The CSM is based on the ASC NEPM Schedule B2 *Guideline on Site Characterisation* and has been formulated based upon our current knowledge of site conditions (garnered from the results of this environmental investigation).

At the time of the investigation there were no potential sources of contamination identified at the site and therefore no complete pathways for identified sensitive receptors. The CSM will be revised for future assessments, following the proposed activities associated with gas exploration and production.

- Minor concentrations of residual drilling fluids as TRH are not considered to pose a risk to any receptors as they are anticipated to biodegrade over time and hydrochemical conditions are anticipated to continue to stabilise.
- There is no risk associated with the chloride exceedance of the NPUG screening levels as there is no planned extraction of groundwater from beneath the site except for testing purposes.
- The cobalt and copper exceedances of MW screening levels are not considered to pose a risk to the closest marine receptor (Indian Ocean) due to the distance to the receptor (~1.5 km) and the low level of analyte concentrations (3-4 µg/L) reported. The MW screening levels are applicable at the point of discharge i.e., the Indian Ocean

9. Conclusions and Recommendations

9.1 Summary of Conclusions

Gemec has achieved the purpose of the works (s. 1.1) by establishing a representative baseline soil and groundwater data set for the site, as summarised in s. 7. No significant data gaps were identified.

- > The soil and groundwater samples were analysed for a comprehensive range of substances to establish the background soil and groundwater chemical conditions (summarised in s. 5).
- > Most analysed substances in soil and groundwater samples were considered representative of ambient background concentrations that existed at the site prior to commencement of site activities, or imported gravel and fines material.
- > No soil exceedances were reported.
- > Exceedances of screening levels in groundwater included cobalt and copper exceeding the MW screening levels and chloride exceeding the NPUG screening levels. Gemec has identified no risk associated with the exceedances due to the absence of exposure pathways.
- > Residual hydrocarbons detected as >C10-C34 TRH in the groundwater sample collected from the MW1 monitor well are attributed to the drilling mud polymer used during the installation of the groundwater bore. The concentrations were below adopted site screening levels, are anticipated to degrade over time

and not pose a risk to potential future groundwater users. There is no planned extraction or use of groundwater from beneath the site except for testing purposes.

9.2 Summary of Recommendations

As proposed in the Cervantes-01 EP, during the care and maintenance / rehabilitation phase, soil sampling should be undertaken prior to reinstatement of the drilling mud retention pond to assess for potential impacts.

Gemec recommends that groundwater monitoring is continued in conformance with commitments made in the site's EP, including quarterly monitoring until rehabilitation of the drilling mud retention pond.

Gemec strongly recommends that the conclusions stated here be reviewed in context to comments and information contained within the body of the report.

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11. Limitations of Report

This report pertains to the Cervantes-01 location only, as identified herein.

The findings and conclusions given in this report are based on the site conditions and those applicable Government regulations that existed at the time the environmental investigation was conducted, and this report prepared. This report was prepared in accordance with accepted environmental practices used by environmental professionals undertaking projects of a similar nature.

Environmental investigation identifies subsurface conditions only at those locations where samples are taken and at the time they are taken. Decisions should not be made on the basis of this report if adequacy of the report has been affected by time as the report is based on conditions that existed at the time the site was investigated.

Gemec warrant that the environmental investigation and the assessments presented in this report identifies actual subsurface conditions at the location investigated and at the time the investigation was undertaken. No other warranty as to the accuracy and completeness, express or implied, is made as to any advice included in this report. While every effort has been made to ensure accuracy, no liability is accepted for errors of fact or opinion herein.

This report was prepared for use by the client, Metgasco Limited, and shall only be used by the client for the purpose or purposes that this report was bought into existence. All third parties rely on this report at their own risk. This report is not intended as a substitute for legal advice which can be given only by a qualified legal practitioner.

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Table 1: Soil Analytical Results - BTEXN & TRH

Sample ID	Depth (m)	Date	Time	PID	BTEXN						TRH					
					Benzene	Toluene	Ethylbenzene	m+p Xylenes	o- Xylenes	Naphthalene ¹	C6-C10	C6-C10 (less BTEX)	> C10-C16	> C10-C16 (less naphthalene)	> C16-C34	> C34-C40
Native Soil																
S1	2.0	01.03.22	13:15	0.0	<0.2	<0.5	<0.5	<0.5	<0.5	<1	<10	<10	<50	<50	<100	<100
S2	3.5	01.03.22	13:25	0.0	<0.2	<0.5	<0.5	<0.5	<0.5	<1	<10	<10	<50	<50	<100	<100
S3	0-0.3	01.03.22	13:45	0.0	<0.2	<0.5	<0.5	<0.5	<0.5	<1	<10	<10	<50	<50	<100	<100
S4	0-0.3	01.03.22	14:10	0.0	<0.2	<0.5	<0.5	<0.5	<0.5	<1	<10	<10	<50	<50	<100	<100
S5	0-0.3	01.03.22	14:20	0.0	<0.2	<0.5	<0.5	<0.5	<0.5	<1	<10	<10	<50	<50	<100	<100
S6	0-0.3	01.03.22	15:15	0.0	<0.2	<0.5	<0.5	<0.5	<0.5	<1	<10	<10	<50	<50	<100	<100
Imported Gravel and Fines																
S7	0-0.3	15.03.22	14:21	0.0	<0.2	<0.5	<0.5	<0.5	<0.5	<1	<10	<10	<50	<50	<100	<100
S8	0-0.3	15.03.22	14:32	0.0	<0.2	<0.5	<0.5	<0.5	<0.5	<1	<10	<10	<50	<50	<100	<100
QC Samples																
Trip Blank	-	01.03.22	12:30	-	<0.2	<0.5	<0.5	<0.5	<0.5	<1	<10	<10	-	-	-	-
		15.03.22	12:36		<0.2	<0.5	<0.5	<0.5	<0.5	<1	<10	<10	-	-	-	-
ESL - Areas of Ecological Significance ²					8	10	1.5	10	10 ³	NE	125	25	NE	300 ⁴	2800 ⁴	
HSL C (Vapour Intrusion) - Recreational / Open Space					NL	NL	NL	NL	NL	NE	NL	NE	NL	NE	NE	
HSL C (Direct Contact) - Recreational / Open Space					120	18000	5300	15000	1900	5100	NE	3800	NE	5300	7400	
ML - Residential, Parkland & Public Open Space					NE	NE	NE	NE	NE	700	NE	1000	NE	2500	10000	
Laboratory Limit of Reporting (mg/kg)					0.2	0.5	0.5	0.5	0.5	1	10	10	50	50	100	100
<p>Notes</p> <p>All concentrations reported in milligrams per kilogram (mg/kg) on a dry weight basis</p> <p>ESL, HSL and ML screening levels are for coarse / sandy soils</p> <p>'NE' denotes screening level not established or is under review</p> <p>'NL' denotes screening level not limiting</p> <p>'-' denotes not tested / parameter not obtained</p> <p>1. volatile extraction method</p> <p>2. ESLs apply to top 2 m of soil profile</p> <p>3. EIL for fresh naphthalene</p> <p>4. value for Urban Residential and Public Open Space applied for comparison only, in the absence of AES ESL</p>																

Table 2: Soil Analytical Results - Metals, Metalloids & Non-Metals

Sample ID	Depth (m)	Date	Time	Aluminium (Al)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Boron (B)	Cadmium (Cd)	Chromium (Cr)	Hexavalent Chromium (CrVI)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Lithium (Li)	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Strontium (Sr)	Titanium (Ti)	Uranium (U)	Vanadium (V)	Zinc (Zn)	
Native Soil																												
S1	2.0	01.03.22	13:15	220	<5	<10	<1	<50	<0.1	11	<0.5	<2	<5	280	0.4	1.5	17	<0.1	<2	<2	<1	<2	2150	<10	0.9	<5	<5	
S2	3.5	01.03.22	13:25	220	<5	10	<1	<50	<0.1	10	<0.5	<2	<5	280	0.4	1.6	17	<0.1	<2	<2	<1	<2	2210	<10	1.0	<5	<5	
S3	0-0.3	01.03.22	13:45	240	<5	10	<1	<50	<0.1	10	<0.5	<2	<5	290	0.4	1.5	18	<0.1	<2	<2	<1	<2	2130	<10	0.9	<5	<5	
S4	0-0.3	01.03.22	14:10	230	<5	10	<1	<50	<0.1	11	<0.5	<2	<5	290	0.4	1.5	17	<0.1	<2	<2	<1	<2	2220	<10	1.0	<5	<5	
S5	0-0.3	01.03.22	14:20	560	<5	10	<1	<50	<0.1	12	<0.5	<2	<5	500	0.7	1.1	27	<0.1	<2	<2	<1	<2	1970	10	0.7	<5	<5	
S6	0-0.3	01.03.22	15:15	530	<5	10	<1	<50	<0.1	12	<0.5	<2	<5	460	0.6	1.2	27	<0.1	<2	<2	<1	<2	2180	10	0.8	<5	<5	
Imported Gravel and Fines																												
S7	0-0.3	15.03.22	14:21	1180	<5	20	<1	<50	<0.1	10	<0.5	<2	<5	1260	0.8	1.8	29	<0.1	<2	<2	<1	<2	1510	20	0.4	<5	<5	
S8	0-0.3	15.03.22	14:32	1310	<5	20	<1	<50	<0.1	9	<0.5	<2	<5	1350	0.9	1.9	30	<0.1	<2	<2	<1	<2	1330	20	0.3	<5	<5	
QC Samples																												
Rinsate ¹	-	01.03.22	17:45	<10	<1	-	-	-	<0.1	<1	-	-	<1	<50	<1	-	-	-	-	-	-	-	-	-	-	-	-	<5
S4	0-0.3	01.03.22	14:10	230	<5	10	<1	<50	<0.1	11	<0.5	<2	<5	290	0.4	1.5	17	<0.1	<2	<2	<1	<2	2220	<10	1.0	<5	<5	
		Dup		240	<5	10	<1	<50	<0.1	11	<0.5	<2	<5	290	0.4	1.5	18	<0.1	<2	<2	<1	<2	2220	<10	1.0	<5	<5	
		RPD		4	NA	0	NA	NA	NA	0	NA	NA	NA	0	0	0	6	0	NA	NA	NA	NA	0	NA	0	NA	NA	
		Split		250	<5	10	<1	<50	0.2	12	0	<0.5	<2	330	0.5	1.5	17	<0.1	<2	<2	3	<2	2360	<10	1.0	<5	<5	
		RPD		8	NA	0	NA	NA	9	NA	NA	NA	13	22	0	0	NA	NA	NA	NA	NA	6	NA	0	NA	NA		
EIL - Areas of Ecological Significance ²				NE	40	790 ³	21 ⁴	NE	13 ³	140 ^{5,6}	130 ⁴	13 ⁴	75 ⁶	NE	470	NE	220 ⁴	36 ^{3,7}	190 ³	55 ⁶	0.52 ⁴	560 ⁴	NE	NE	NE	NE	190 ⁶	
HIL C - Recreational				NE	300	NE	90	20000	90	NE	300	300	17000	NE	600	19000	80 ⁷	NE	1200	700	NE	NE	NE	NE	NE	NE	NE	30000
Laboratory Limit of Reporting (mg/kg)				50	5	10	1	50	1	2	0.5	2	5	50	5	5	0.1	2	2	5	2	2	10	5	5	5	5	

Notes

All soil concentrations reported in milligrams per kilogram (mg/kg) on a dry weight basis

'NA' denotes not applicable - primary and QC sample concentration below laboratory LoR

'NE' denotes screening level not established or is under review

'RPD' denotes relative percentage difference

'-' denotes not tested / parameter not obtained

- concentrations reported in micrograms per litre (µg/L)
- EILs apply to top 2 m of soil profile
- Dutch SRCeco value based on ABC, 9.5% clay content, 3.6% TOM
- USEPA Eco SSL for plants or soil invertebrates
- screening level for trivalent chromium Cr(III)
- screening level derived using ABC, 9.5% clay content, pH 7.4, 25.5 meq/100g CEC (Gemec, 2022)
- value for inorganic mercury

Table 3: Soil Analytical Results - Nutrients & Soil Characteristics

Sample ID	Depth (m)	Date	Time	Nutrients						Soil Characteristics										
				Total Nitrogen (as N)	Total Kjeldahl Nitrogen (as N)	Ammonia (as N)	Nitrate (as N)	Nitrite (as N)	Total Phosphorus (as P)	Moisture Content (%)	pH	pH (CaCl ₂ extract)	Electrical Conductivity (µS/cm)	Cation Exchange Capacity (meq/100 g)	Clay (<2 µm) (%)	Soil Particle Density (Clay/Silt/Sand) (g/cm ³)	Total Organic Carbon (%)	Organic Matter (%)		
Native Soil																				
S1	2.0	01.03.22	13:15	-	-	-	-	-	-	0.3	9.5	-	327	-	-	-	-	-		
S2	3.5	01.03.22	13:25	-	-	-	-	-	-	5.6	9.2	-	1870	-	-	-	-	-		
S3	0-0.3	01.03.22	13:45	-	-	-	-	-	-	2.2	9.4	-	526	-	-	-	-	-		
S4	0-0.3	01.03.22	14:10	-	-	-	-	-	-	2.3	9.4	-	610	-	-	-	-	-		
S5	0-0.3	01.03.22	14:20	1620	1620	<20	0.4	0.2	395	1.0	8.7	7.3	113	25.3	8	2.49	2.2	3.8		
S6	0-0.3	01.03.22	15:15	1410	1410	<20	0.8	<0.1	383	1.0	8.8	7.5	110	25.7	11	2.49	1.9	3.3		
Imported Gravel and Fines																				
S7	0-0.3	15.03.22	14:21	-	-	-	-	-	-	3.0	9.5	-	97	-	-	-	-	-		
S8	0-0.3	15.03.22	14:32	-	-	-	-	-	-	3.4	9.6	-	109	-	-	-	-	-		
EIL - Areas of Ecological Significance ¹				NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	
HIL C - Recreational				NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Laboratory Limit of Reporting				20	20	20	0.1	0.1	2	0.1	1	1	5	0.1	1	0.01	0.5	0.5	0.5	

Notes

All concentrations reported on a dry weight basis
 'EIL' denotes Ecological Investigation Level
 'HIL' denotes Health Investigation Level
 'NE' denotes screening level not established or is under review
 '-' denotes not tested / parameter not obtained

1. EILs apply to top 2 m of soil profile

Table 4: Groundwater Analytical Results - BTEXN, TRH, MTBE, Methane & Ethane

Sample ID	Date	Time	BTEXN						TRH				MTBE	Methane	Ethane
			Benzene	Toluene	Ethylbenzene	m+p- Xylene	o- Xylene	Naphthalene	F1 - C6-C10 less BTEX	F2 - >C10-C16 less naphthalene	F3 - >C16-C34	F4 - >C34-C40			
Groundwater															
MW1	15.03.22	14:05	<1	<1	<1	<2	<1	<1	<10	3400	380	<100	<1	<5	<5
QC Samples															
Trip Blank	15.03.22	12:33	<1	<1	<1	<2	<1	<1	<10	-	-	-	<1	-	-
Non-Potable Groundwater Use (NPUG)			10	25 ¹	3 ¹	20 ¹		NE	NE	NE	NE	NE	20 ¹	NE	NE
Marine Waters 95% (MW)			500	NE	NE	NE	NE	50	NE	NE	NE	NE	NE	NE	NE
HSL C for vapour intrusion (sand)			NL	NL	NL	NL	NL	NL	NL	NL	NE	NE	NE	NE	NE
Laboratory Limit of Reporting			1	1	1	2	1	1	10	50	100	100	1	5	5

Notes
 All concentrations reported in micrograms per litre (µg/L)
 'NE' denotes screening level not established or is under review
 'NL' denotes screening level not limiting
 '!' denotes not tested / parameter not obtained

1. aesthetic value (taste / odour)
 2. para xylene screening level only
 3. drinking water value (health) as per ANZECC (2000)

Table 5: Groundwater Analytical Results - Dissolved Metals, Metalloids & Non-Metals

Sample ID	Date	Aluminium (Al)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Boron (B)	Cadmium (Cd)	Chromium (Cr)	Hexavalent Chromium (CrVI)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Lithium (Li)	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Strontium (Sr)	Titanium (Ti)	Uranium (U)	Vanadium (V)	Zinc (Zn)	
Groundwater																									
MW1	15.03.22	<10	2	130	<0.5	390	<0.1	<1	<1	4	3	850	<1	64	370	<0.05	1	4	<1	6600	<1	2.7	<1	1	
QC Samples																									
Rinsate	15.03.22	-	<1	<1	-	40	-	-	-	-	-	<10	-	<0.5	<5	-	-	-	-	<1	-	-	-	-	<1
MW1	15.03.22	<10	2	130	<0.5	390	<0.1	<1	<1	4	3	850	<1	64	370	<0.05	1	4	<1	6600	<1	2.7	<1	1	
	<i>Dup</i>	<10	2	130	<0.5	390	<0.1	<1	-	4	3	810	<1	65	380	<0.05	1	3	<1	6400	<1	2.6	<1	5	
	<i>RPD</i>	NA	0	0	NA	0	NA	NA	-	0	0	5	NA	2	3	NA	0	29	NA	3	NA	4	NA	133	
	<i>Split</i>	20	2	130	<0.5	360	<0.1	<1	-	4	3	720	<1	57	340	<0.05	2	2	<1	6500	<1	2.8	<1	6	
<i>RPD</i>	NA	0	0	NA	8	NA	NA	-	0	0	17	NA	12	8	NA	67	67	NA	2	NA	4	NA	143		
Non-Potable Groundwater Use		200 ¹	100	20000	600	40000	20	NE	500	NE	20000	300 ¹	100	NE	5000	10	500	200	100	NE	NE	170	NE	3000 ¹	
Marine Waters 95% (MW)		NE	NE	NE	NE	NE	0.7	27	4.4	1	1.3	NE	4.4	NE	NE	0.1	NE	7	NE	NE	NE	NE	100	15	
Laboratory Limit of Reporting		10	1	1	0.5	20	0.1	1	1	1	1	10	1	0.5	5	0.05	1	1	1	1	1	0.5	1	1	

Notes

All concentrations reported in micrograms per litre (µg/L)

850 shading indicates concentration exceeds the NPUG screening level

4 shading indicates concentration exceeds the MW screening level

'NA' denotes not applicable - primary and QC sample concentrations below laboratory LoR

'NE' denotes screening level not established or is under review

'RPD' denotes relative percentage difference

'-' denotes analysis not conducted / parameter not obtained

1. aesthetic value (taste / odour)

Table 6: Groundwater Analytical Results - Cations, Anions, Alkalinity & Hardness

Sample ID	Date	Time	Cations				Anions					Hardness as CaCO ₃	Total Alkalinity as CaCO ₃	Ionic Balance %
			Calcium (Ca ²⁺)	Magnesium (Mg ²⁺)	Sodium (Na ⁺)	Potassium (K ⁺)	Chloride (Cl ⁻)	Sulphate (SO ₄ ²⁻)	Carbonate (CO ₃ ²⁻)	Bicarbonate (HCO ₃ ⁻)	Hydroxide (OH ⁻) as CaCO ₃			
MW1	15.03.22	14:05	140	190	1200	45	2700	300	<5	470	<5	1100	470	-9
Non-Potable Groundwater Use (NPUG)			NE	NE	NE	NE	250 ¹	1000	NE	NE	NE	NE	NE	NE
Marine Waters 95% (MW)			NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Laboratory Limit of Reporting			0.5	0.5	0.5	0.5	1	1	5	5	5	5	3	5

Notes
 All concentrations reported in milligrams per litre (mg/L)
 2700 shading indicates concentration exceeds NPGU screening levels
 'NE' denotes screening level not established or is under review

1. aesthetic value
 2. value for moderately sensitive crops

Table 7: Groundwater Analytical Results - Nutrients

Sample ID	Date	Time	Total Nitrogen	Total Kjeldahl Nitrogen	Ammonia (as N)	Nitrate (as N)	Nitrite (as N)	Total Phosphorus	Phosphate (as P)
MW1	15.03.22	14:05	2.4	2.3	<0.005	0.015	<0.005	0.06	0.024
Non-Potable Groundwater Use (NPUG)			NE	NE	0.4 ¹	110	9	NE	NE
Marine Waters 95% (MW)			NE	NE	NE	NE	NE	NE	NE
Laboratory Limit of Reporting			0.1	0.1	0.005	0.005	0.005	0.05	0.005
<p><u>Notes</u> All concentrations reported in milligrams per litre (mg/L) 'NE' denotes screening level not established or is under review</p> <p style="text-align: right;">1. aesthetic value</p>									

Table 8: Groundwater Physical & Chemical Parameters

Sample ID	Date	Time	Depth of Well (m btoc)	SWL (m btoc)	Top of Screen (m btoc)	Purged Volume (L)	Temperature (°C)	Electrical conductivity - field (µS/cm)	Electrical conductivity - lab (µS/cm)	Total Dissolved Solids - field (mg/L)	Total Dissolved Solids - lab (mg/L)	Dissolved Oxygen (mg/L)	pH - field	pH - lab	Redox (mV)	
MW1	15.03.22	14:05	13.83	4.004	4.9	54	24.1	7652	8500	5259	5300	0.4	6.9	7.3	-198	
Laboratory Limit of Reporting							-	-	1	-	5	-	0.1	-	-	-
<p>Notes</p> <p>All field measured parameters obtained using a calibrated YSI Pro Plus multi probe meter</p> <p>Total Dissolved Solids is calculated by multiplying EC by 0.67 (ANZECC 2000)</p> <p>'-' denotes not applicable / analysis not conducted / parameter not obtained</p>							<p>Abbreviations & Acronyms</p> <p>btoc - below top of casing</p> <p>µS/cm - microSiemens per centimetre</p> <p>mg/L - milligrams per litre</p> <p>mV - millivolts</p> <p>SWL - standing water level</p>									

Figures



Figure 1 Regional Site Setting, 2022

Figure 2 Soil & Groundwater Sample Locations, March 2022




Gemec
ENVIRONMENTAL CONSULTANTS

PO Box 89
Melville W.A. 6956
T: + 61 8 9339 8449
E: info@gemec.com.au
W: www.gemec.com.au

-  Wellsite / lease boundary
-  Nature reserve



0 5
Scale (km), approx.

Regional groundwater
flow direction
(DoW, 2017)  W

Regional Site Setting, 2022

Cervantes-01 Well Site

Lot 12174 Plan 39607, Mount Adams, Western Australia

Drawn: GP

Date: 29.03.2022

Checked

NJ

Approved

NJ

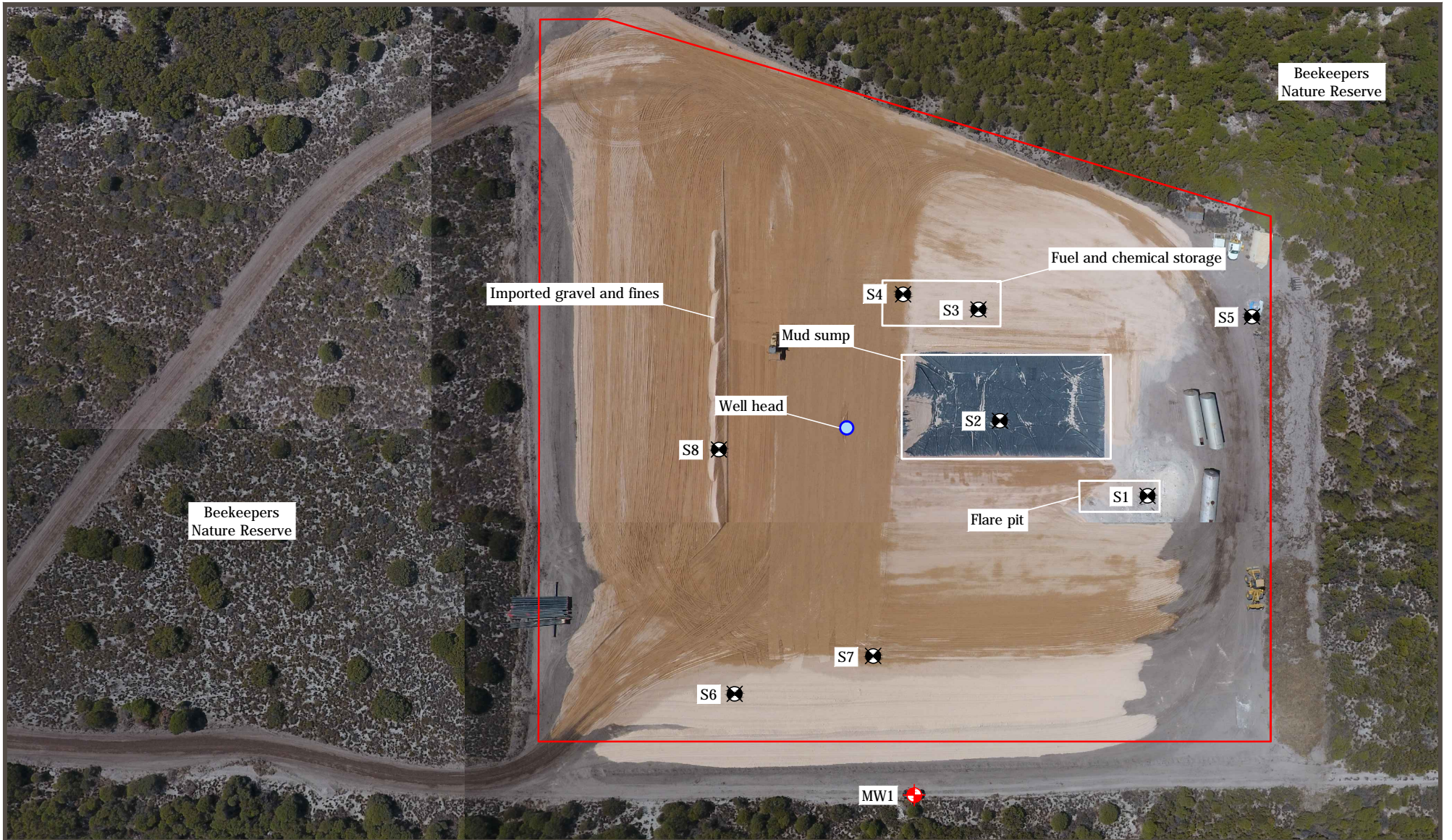
Dwg

No.

Figure






1

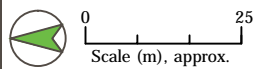
Source: National Map, Mar 2022




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E: info@gemec.com.au
W: www.gemec.com.au

-  Site Perimeter
-  Proposed site infrastructure / use (approx.)
-  Exploration well
-  Groundwater sampling location
-  Surface soil sampling location



Regional groundwater
flow direction
(DoW, 2017)



Soil & Groundwater Sample Locations, March 2022
Cervantes-01 Well Site
Lot 12174 Plan 39607, Mount Adams, Western Australia

Drawn: GP	Date: 29.03.2022	Checked NJ	Approved NJ	Dwg No.	Figure 2
Source: DJI drone, 15 March 2022					

Appendix A – Analytical Results

Chain of Custody Forms and Laboratory Reports

- Soil Samples
- Groundwater Samples

SOIL CHAIN OF CUSTODY & LABORATORY REPORTS



CHAIN OF CUSTODY

ALS Laboratory:
please tick →

@PERTH 26 Rigali Way Wangara WA 6065
Ph: 08 9466 1301 E: samples.perth@alsglobal.com
MELBOURNE 2/4 Westall Road Springvale VIC 3171
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

CLIENT: Gemec Environmental Consultants	TURNAROUND REQUIREMENTS : <input checked="" type="checkbox"/> Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle) Custody Seal Intact? <input type="checkbox"/> Yes Free ice / frozen ice bricks present upon receipt? <input type="checkbox"/> Yes Random Sample Temperature on Receipt: _____ Other comment: _____														
OFFICE: 1/25 Foss St, Palmyra, WA 6157	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) <input type="checkbox"/> Non Standard or urgent TAT (List due date):															
PROJECT: Cervantes-01 Soil	ALS QUOTE NO.: EP/978/21_V2	COC SEQUENCE NUMBER (Circle) COC: <table border="1"><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr></table> OF: <table border="1"><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr></table>	1	2	3	4	5	6	7	1	2	3	4	5	6	7
1	2	3	4	5	6	7										
1	2	3	4	5	6	7										
ORDER NUMBER: -	PROJECT MANAGER: Nicolo Jelovsek	CONTACT PH: 08 9339 8449														
SAMPLER: Goran Petrovic	SAMPLER MOBILE: 0468 821703	RELINQUISHED BY: Goran Petrovic														
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):	RECEIVED BY: SP														
Email Reports to: nicolo@gemec.com.au, goran@gemec.com.au	DATE/TIME: 02.03.2022 / 11:00	DATE/TIME: 1430														
Email Invoice to: marise@gemec.com.au		DATE/TIME: 2/3														
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Jars labelled MG																

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)					CONTAINER INFORMATION	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).													Addition						
	LAB ID	SAMPLE ID	DATE	TIME	MATRIX		TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	S-04: TRH / BTEXN	EP068A: Organochlorine Pesticides	P-19/2: Al, As, B, Ba, Be, Cd, Co, CrVI, Cu, Hg, Mn, Mo, Ni, Pb, Se, V, Zn + pH	EG005T: Cr, Fe, Sr, Ti	EG020T: Li, U	NT-8S: NH3, NO2, NO3, NOX, TKN, TN, TP	EN34: 1-5 leach	EA010: Electrical conductivity (1:5)	P-22: NEPM Screen for Soil Classification: Fe, CEC, pH(CaCl2), TOC, Clay Content	S-18: TRH (C6-C10) / BTEXN	W-01T: 7 Metals (total): As, Cd, Cr, Cu, Ni, Pb, Zn		EG020T: Al, Fe	Comments on likely dilutions, or samples analysis etc.				
	1	S1 2.0m	1/03/2022	13:15	S	1 x glass unpreserved	1	1		1	1	1		1	1											
	2	S2 3.5m	1/03/2022	13:25	S	1 x glass unpreserved	1	1		1	1	1		1	1											
	2	S3 0-0.3m	1/03/2022	13:45	S	1 x glass unpreserved	1	1		1	1	1		1	1											
	4	S4 0-0.3m	1/03/2022	14:10	S	1 x glass unpreserved	1	1		1	1	1		1	1											
	5	S5 0-0.3m	1/03/2022	14:20	S	3 x glass unpreserved, 2 x snap lock bag	5	1		1	1	1	1	1	1	1										
	6	S6 0-0.3m	1/03/2022	15:15	S	3 x glass unpreserved, 2 x snap lock bag	5	1		1	1	1	1	1	1	1										
	7	Dup 1	1/03/2022	-	S	1 x glass unpreserved	1			1	1	1														
	8	Trip Blank	1/03/2022	12:30	S	1 x glass unpreserved	1														1					
	9	Rinsate	1/03/2022	17:45	W	1 x P	1															1	1			
TOTAL							17	6	6	7	7	7	2	6	6	2	1	1	1							

Environmental Division
Perth
Work Order Reference
EP2202496

Telephone : -- 61-8-9406 1301

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VR = VOA Vial Sodium Bisulfate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; P = Plastic



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2202496

Client	: GEMEC	Laboratory	: Environmental Division Perth
Contact	: MR NICOLO JELOVSEK	Contact	: Nick Courts
Address	: UNIT 1/25 FOSS STREET PALMYRA WA, AUSTRALIA	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: nicolo@gemec.com.au	E-mail	: nick.courts@alsglobal.com
Telephone	: 9339 8449	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Cervantes-01 Soil	Page	: 1 of 3
Order number	: ----	Quote number	: EP2021GEMEC0009_V2 (EP/978/21_V2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: GORAN PETROVIC		

Dates

Date Samples Received	: 02-Mar-2022 14:30	Issue Date	: 03-Mar-2022
Client Requested Due Date	: 14-Mar-2022	Scheduled Reporting Date	: 14-Mar-2022

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 12.5 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 9 / 9

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- PSD conducted by ALS Newcastle, NATA accreditation no. 825, site no 1656.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA010 (solids), Electrical Conductivity (1:5)	SOIL - EA055-103 Moisture Content	SOIL - EG005T (solids) Total Metals by ICP-AES	SOIL - EG020T Total Metals by ICPMS	SOIL - NT-8S NH3, NO2, NO3, NOX, TKN, TN, TP	SOIL - P-19/2 WA Waste Classification (Metals Suite)	SOIL - S-04 TRH/BTEXN
EP2202496-001	01-Mar-2022 13:15	S1 2.0m	✓	✓	✓	✓		✓	✓
EP2202496-002	01-Mar-2022 13:25	S2 3.5m	✓	✓	✓	✓		✓	✓
EP2202496-003	01-Mar-2022 13:45	S3 0-0.3m	✓	✓	✓	✓		✓	✓
EP2202496-004	01-Mar-2022 14:10	S4 0-0.3m	✓	✓	✓	✓		✓	✓
EP2202496-005	01-Mar-2022 14:20	S5 0-0.3m	✓	✓	✓	✓	✓	✓	✓
EP2202496-006	01-Mar-2022 15:15	S6 0-0.3m	✓	✓	✓	✓	✓	✓	✓
EP2202496-007	01-Mar-2022 00:00	Dup 1		✓	✓	✓		✓	
EP2202496-008	01-Mar-2022 00:00	Trip Blank		✓					

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - P-22 (WA/SYD) NEPM Screen for Soil Classification WA	SOIL - S-18 TRH(C6-C9)/BTEXN
EP2202496-005	01-Mar-2022 14:20	S5 0-0.3m	✓	
EP2202496-006	01-Mar-2022 15:15	S6 0-0.3m	✓	
EP2202496-008	01-Mar-2022 00:00	Trip Blank		✓

CERTIFICATE OF ANALYSIS

Work Order : EP2202496 Client : GEMEC Contact : MR NICOLO JELOVSEK Address : UNIT 1/25 FOSS STREET PALMYRA WA, AUSTRALIA Telephone : 9339 8449 Project : Cervantes-01 Soil Order number : ---- C-O-C number : ---- Sampler : GORAN PETROVIC Site : ---- Quote number : EP/978/21_V2 No. of samples received : 9 No. of samples analysed : 9	Page : 1 of 10 Laboratory : Environmental Division Perth Contact : Nick Courts Address : 26 Rigali Way Wangara WA Australia 6065 Telephone : +61-8-9406 1301 Date Samples Received : 02-Mar-2022 14:30 Date Analysis Commenced : 04-Mar-2022 Issue Date : 14-Mar-2022 11:32
---	--



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Aleksandar Vujkovic	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PSD conducted by ALS Newcastle, NATA accreditation no. 825, site no 1656.
- This guideline comparison report only provides evaluation data where chemical parameters specifically listed within the DEC Waste Classification and Waste Definitions 1996 (as amended December 2019) guideline are analysed by ALS using I-IV package.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- For the 'Summary of Thresholds Reached or Exceeded' to accurately function, all samples must be analysed and included in the 'Analytical Results' section of the following report. Please verify that all required sample IDs are listed and analysed.
- This Automated Guideline Comparison report assesses potential chemical 'contaminants' versus guideline criteria. Other parameters may impact classification and 95% upper control limits may also be applied - refer to EPA Regulations.
- This guideline comparison report only provides evaluation of total concentration data against upper limit thresholds for Class I-IV.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S1 2.0m	S2 3.5m	S3 0-0.3m	S4 0-0.3m	S5 0-0.3m
Sampling date / time				01-Mar-2022 13:15	01-Mar-2022 13:25	01-Mar-2022 13:45	01-Mar-2022 14:10	01-Mar-2022 14:20	
Compound	CAS Number	LOR	Unit	EP2202496-001	EP2202496-002	EP2202496-003	EP2202496-004	EP2202496-005	
				Result	Result	Result	Result	Result	
EA001: pH in soil using 0.01M CaCl extract									
ø pH (CaCl2)	----	0.1	pH Unit	----	----	----	----	7.3	
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit	9.5	9.2	9.4	9.4	8.7	
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm	327	1870	526	610	113	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%	0.3	5.6	2.2	2.3	1.0	
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%	----	----	----	----	8	
EA152: Soil Particle Density									
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	----	----	----	----	2.49	
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	24.2	
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	0.9	
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	<0.1	
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	0.1	
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	25.3	
Exchangeable Sodium Percent	----	0.1	%	----	----	----	----	0.4	
EG005(ED093)T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	220	220	240	230	560	
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5	
Barium	7440-39-3	10	mg/kg	<10	10	10	10	10	
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1	
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50	
Chromium	7440-47-3	2	mg/kg	11	10	10	11	12	
Cobalt	7440-48-4	2	mg/kg	<2	<2	<2	<2	<2	
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	<5	
Iron	7439-89-6	0.005	%	----	----	----	----	0.050	
Iron	7439-89-6	50	mg/kg	280	280	290	290	----	
Manganese	7439-96-5	5	mg/kg	17	17	18	17	27	
Molybdenum	7439-98-7	2	mg/kg	<2	<2	<2	<2	<2	
Nickel	7440-02-0	2	mg/kg	<2	<2	<2	<2	<2	
Silver	7440-22-4	2	mg/kg	<2	<2	<2	<2	<2	
Strontium	7440-24-6	2	mg/kg	2150	2210	2130	2220	1970	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S1 2.0m	S2 3.5m	S3 0-0.3m	S4 0-0.3m	S5 0-0.3m
Sampling date / time				01-Mar-2022 13:15	01-Mar-2022 13:25	01-Mar-2022 13:45	01-Mar-2022 14:10	01-Mar-2022 14:20	
Compound	CAS Number	LOR	Unit	EP2202496-001	EP2202496-002	EP2202496-003	EP2202496-004	EP2202496-005	
				Result	Result	Result	Result	Result	
EG005(ED093)T: Total Metals by ICP-AES - Continued									
Vanadium	7440-62-2	5	mg/kg	<5	<5	<5	<5	<5	
Zinc	7440-66-6	5	mg/kg	<5	<5	<5	<5	<5	
Titanium	7440-32-6	10	mg/kg	<10	<10	<10	<10	10	
EG020T: Total Metals by ICP-MS									
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
Uranium	7440-61-1	0.1	mg/kg	0.9	1.0	0.9	1.0	0.7	
Lithium	7439-93-2	0.1	mg/kg	1.5	1.6	1.5	1.5	1.1	
Lead	7439-92-1	0.1	mg/kg	0.4	0.4	0.4	0.4	0.7	
Selenium	7782-49-2	1	mg/kg	<1	<1	<1	<1	<1	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
EG048: Hexavalent Chromium (Alkaline Digest)									
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
EK055: Ammonia as N									
Ammonia as N	7664-41-7	20	mg/kg	----	----	----	----	<20	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	----	----	----	----	0.2	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg	----	----	----	----	0.4	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	----	----	----	----	0.6	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	20	mg/kg	----	----	----	----	1620	
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg	----	----	----	----	1620	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg	----	----	----	----	395	
EP004: Organic Matter									
Organic Matter	----	0.5	%	----	----	----	----	3.8	
Total Organic Carbon	----	0.5	%	----	----	----	----	2.2	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10	
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S1 2.0m	S2 3.5m	S3 0-0.3m	S4 0-0.3m	S5 0-0.3m
Sampling date / time				01-Mar-2022 13:15	01-Mar-2022 13:25	01-Mar-2022 13:45	01-Mar-2022 14:10	01-Mar-2022 14:20	
Compound	CAS Number	LOR	Unit	EP2202496-001	EP2202496-002	EP2202496-003	EP2202496-004	EP2202496-005	
				Result	Result	Result	Result	Result	
EP080/071: Total Petroleum Hydrocarbons - Continued									
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10	
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50	
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50	
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	86.1	85.2	87.1	83.4	87.6	
Toluene-D8	2037-26-5	0.2	%	93.1	90.3	94.2	90.3	82.6	
4-Bromofluorobenzene	460-00-4	0.2	%	98.4	93.6	98.0	94.5	85.8	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S6 0-0.3m	Dup 1	Trip Blank	----	----
Sampling date / time			01-Mar-2022 15:15	01-Mar-2022 00:00	01-Mar-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2202496-006	EP2202496-007	EP2202496-008	-----	-----
				Result	Result	Result	----	----
EA001: pH in soil using 0.01M CaCl extract								
ø pH (CaCl2)	----	0.1	pH Unit	7.5	----	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	8.8	9.5	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	110	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	1.0	----	----	----	----
Moisture Content	----	1.0	%	----	<1.0	<1.0	----	----
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	11	----	----	----	----
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.49	----	----	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	24.3	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	1.2	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	0.2	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	25.7	----	----	----	----
Exchangeable Sodium Percent	----	0.1	%	0.6	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	530	240	----	----	----
Arsenic	7440-38-2	5	mg/kg	<5	<5	----	----	----
Barium	7440-39-3	10	mg/kg	10	10	----	----	----
Beryllium	7440-41-7	1	mg/kg	<1	<1	----	----	----
Boron	7440-42-8	50	mg/kg	<50	<50	----	----	----
Chromium	7440-47-3	2	mg/kg	12	11	----	----	----
Cobalt	7440-48-4	2	mg/kg	<2	<2	----	----	----
Copper	7440-50-8	5	mg/kg	<5	<5	----	----	----
Iron	7439-89-6	0.005	%	0.046	----	----	----	----
Iron	7439-89-6	50	mg/kg	----	290	----	----	----
Manganese	7439-96-5	5	mg/kg	27	18	----	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	<2	----	----	----
Nickel	7440-02-0	2	mg/kg	<2	<2	----	----	----
Silver	7440-22-4	2	mg/kg	<2	<2	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S6 0-0.3m	Dup 1	Trip Blank	----	----
Sampling date / time				01-Mar-2022 15:15	01-Mar-2022 00:00	01-Mar-2022 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2202496-006	EP2202496-007	EP2202496-008	-----	-----	
				Result	Result	Result	----	----	
EG005(ED093)T: Total Metals by ICP-AES - Continued									
Strontium	7440-24-6	2	mg/kg	2180	2220	----	----	----	
Vanadium	7440-62-2	5	mg/kg	<5	<5	----	----	----	
Zinc	7440-66-6	5	mg/kg	<5	<5	----	----	----	
Titanium	7440-32-6	10	mg/kg	10	<10	----	----	----	
EG020T: Total Metals by ICP-MS									
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	----	----	----	
Uranium	7440-61-1	0.1	mg/kg	0.8	1.0	----	----	----	
Lithium	7439-93-2	0.1	mg/kg	1.2	1.5	----	----	----	
Lead	7439-92-1	0.1	mg/kg	0.6	0.4	----	----	----	
Selenium	7782-49-2	1	mg/kg	<1	<1	----	----	----	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----	
EG048: Hexavalent Chromium (Alkaline Digest)									
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	----	----	----	
EK055: Ammonia as N									
Ammonia as N	7664-41-7	20	mg/kg	<20	----	----	----	----	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	----	----	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg	0.8	----	----	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	0.8	----	----	----	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	20	mg/kg	1410	----	----	----	----	
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg	1410	----	----	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg	383	----	----	----	----	
EP004: Organic Matter									
Organic Matter	----	0.5	%	3.3	----	----	----	----	
Total Organic Carbon	----	0.5	%	1.9	----	----	----	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	<10	----	<10	----	----	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S6 0-0.3m	Dup 1	Trip Blank	----	----
Sampling date / time				01-Mar-2022 15:15	01-Mar-2022 00:00	01-Mar-2022 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2202496-006	EP2202496-007	EP2202496-008	-----	-----	
				Result	Result	Result	----	----	
EP080/071: Total Petroleum Hydrocarbons - Continued									
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	----	
C15 - C28 Fraction	----	100	mg/kg	<100	----	----	----	----	
C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	<10	----	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	<10	----	----	
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	----	
>C16 - C34 Fraction	----	100	mg/kg	<100	----	----	----	----	
>C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	----	----	----	----	
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg	<0.2	----	<0.2	----	----	
Toluene	108-88-3	0.5	mg/kg	<0.5	----	<0.5	----	----	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	<0.5	----	----	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	<0.5	----	----	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	<0.5	----	----	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	----	<0.2	----	----	
^ Total Xylenes	----	0.5	mg/kg	<0.5	----	<0.5	----	----	
Naphthalene	91-20-3	1	mg/kg	<1	----	<1	----	----	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	94.5	----	92.5	----	----	
Toluene-D8	2037-26-5	0.2	%	88.6	----	90.6	----	----	
4-Bromofluorobenzene	460-00-4	0.2	%	93.9	----	93.4	----	----	



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				Rinsate	----	----	----	----
				Sampling date / time	01-Mar-2022 17:45	----	----	----
Compound	CAS Number	LOR	Unit	EP2202496-009	-----	-----	-----	-----
				Result	----	----	----	----
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	----	----	----	----



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	63	132
Toluene-D8	2037-26-5	66	125
4-Bromofluorobenzene	460-00-4	60	124

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry) 9854 (Biology).

(SOIL) EA150: Soil Classification based on Particle Size

(SOIL) EA152: Soil Particle Density

QUALITY CONTROL REPORT

Work Order	: EP2202496	Page	: 1 of 10
Client	: GEMEC	Laboratory	: Environmental Division Perth
Contact	: MR NICOLO JELOVSEK	Contact	: Nick Courts
Address	: UNIT 1/25 FOSS STREET PALMYRA WA, AUSTRALIA	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 9339 8449	Telephone	: +61-8-9406 1301
Project	: Cervantes-01 Soil	Date Samples Received	: 02-Mar-2022
Order number	: ----	Date Analysis Commenced	: 04-Mar-2022
C-O-C number	: ----	Issue Date	: 14-Mar-2022
Sampler	: GORAN PETROVIC		
Site	: ----		
Quote number	: EP/978/21_V2		
No. of samples received	: 9		
No. of samples analysed	: 9		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Aleksandar Vujkovic	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4214887)									
EP2202516-010	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	<10	<10	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	13	14	9.7	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Strontium	7440-24-6	2	mg/kg	2410	2250	6.9	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	11	11	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	7	12	52.1	No Limit
		EG005T: Aluminium	7429-90-5	50	mg/kg	730	820	11.0	0% - 50%
EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.0	No Limit		
EG005T: Iron	7439-89-6	50	mg/kg	680	750	10.0	0% - 50%		
EP2202446-001	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	270	260	3.9	0% - 20%
		EG005T: Chromium	7440-47-3	2	mg/kg	22	22	0.0	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	7	7	0.0	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	3	3	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	22	22	0.0	0% - 50%
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Strontium	7440-24-6	2	mg/kg	76	80	5.3	0% - 20%



Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4214887) - continued									
EP2202446-001	Anonymous	EG005T: Arsenic	7440-38-2	5	mg/kg	9	9	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	107	101	5.7	0% - 20%
		EG005T: Manganese	7439-96-5	5	mg/kg	207	217	4.7	0% - 20%
		EG005T: Vanadium	7440-62-2	5	mg/kg	43	43	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	172	165	3.8	0% - 20%
		EG005T: Aluminium	7429-90-5	50	mg/kg	8470	9000	6.0	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.0	No Limit
		EG005T: Iron	7439-89-6	50	mg/kg	28000	25700	8.7	0% - 20%
EA001: pH in soil using 0.01M CaCl extract (QC Lot: 4216350)									
EP2202496-005	S5 0-0.3m	EA001: pH (CaCl2)	----	0.1	pH Unit	7.3	7.4	1.5	0% - 20%
EA002: pH 1:5 (Soils) (QC Lot: 4216353)									
EP2202449-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	7.4	7.4	0.0	0% - 20%
EP2202496-007	Dup 1	EA002: pH Value	----	0.1	pH Unit	9.5	9.5	0.0	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 4216356)									
EP2202496-001	S1 2.0m	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	327	340	3.9	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4214893)									
EP2202496-001	S1 2.0m	EA055: Moisture Content	----	0.1	%	0.3	0.3	0.0	No Limit
ED007: Exchangeable Cations (QC Lot: 4219114)									
EP2202496-005	S5 0-0.3m	ED007: Exchangeable Sodium Percent	----	0.1	%	0.4	0.4	0.0	No Limit
		ED007: Exchangeable Calcium	----	0.1	meq/100g	24.2	23.9	1.3	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	0.9	0.9	0.0	No Limit
		ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.0	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	0.1	<0.1	0.0	No Limit
		ED007: Cation Exchange Capacity	----	0.1	meq/100g	25.3	25.0	1.3	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 4214889)									
EP2202446-001	Anonymous	EG020X-T: Uranium	7440-61-1	0.1	mg/kg	0.4	0.5	0.0	No Limit
		EG020X-T: Lithium	7439-93-2	0.1	mg/kg	2.4	2.5	0.0	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 4214891)									
EP2202496-001	S1 2.0m	EG020T: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020T: Lead	7439-92-1	0.1	mg/kg	0.4	0.4	0.0	No Limit
		EG020T: Selenium	7782-49-2	1	mg/kg	<1	<1	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4214890)									
EP2202446-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.4	0.6	35.4	No Limit
EP2202516-010	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 4219478)									
EP2202496-001	S1 2.0m	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP2202726-003	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EK055: Ammonia as N (QC Lot: 4217787)									

Page : 4 of 10
 Work Order : EP2202496
 Client : GEMEC
 Project : Cervantes-01 Soil



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)	
EK055: Ammonia as N (QC Lot: 4217787) - continued										
EP2202496-005	S5 0-0.3m	EK055: Ammonia as N	7664-41-7	20	mg/kg	<20	<20	0.0	No Limit	
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4216355)										
EP2202428-001	Anonymous	EK057G: Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	<0.1	0.0	No Limit	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4216354)										
EP2202428-001	Anonymous	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	4.0	3.4	16.0	0% - 20%	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4214377)										
EP2202428-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	70	70	0.0	No Limit	
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4214376)										
EP2202428-001	Anonymous	EK067G: Total Phosphorus as P	----	2	mg/kg	288	295	2.3	0% - 20%	
EP004: Organic Matter (QC Lot: 4216352)										
EP2202496-005	S5 0-0.3m	EP004: Organic Matter	----	0.5	%	3.8	3.8	0.0	No Limit	
		EP004: Total Organic Carbon	----	0.5	%	2.2	2.2	0.0	No Limit	
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4213805)										
EP2202496-001	S1 2.0m	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit	
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4213817)										
EP2202496-001	S1 2.0m	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit	
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit	
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4213805)										
EP2202496-001	S1 2.0m	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4213817)										
EP2202496-001	S1 2.0m	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit	
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit	
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit	
EP080: BTEXN (QC Lot: 4213805)										
EP2202496-001	S1 2.0m	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit	
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
			106-42-3							
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
	91-20-3	1	mg/kg	<1	<1	0.0	No Limit			
Sub-Matrix: WATER										
Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)	
EG020T: Total Metals by ICP-MS (QC Lot: 4208825)										
EP2202462-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit	
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.006	0.006	0.0	No Limit	
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.003	0.0	No Limit	



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 4208825) - continued									
EP2202462-001	Anonymous	EG020A-T: Copper	7440-50-8	0.001	mg/L	0.007	0.008	13.9	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.005	0.006	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.022	0.023	5.0	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	1.13	1.17	3.0	0% - 20%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	13.5	13.8	2.1	0% - 20%
EP2202532-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0002	78.3	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.031	0.034	7.6	0% - 20%
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.031	0.033	8.0	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.072	0.075	3.6	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.014	0.014	0.0	0% - 50%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.038	0.038	0.0	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	31.7	34.1	7.5	0% - 20%
EG020A-T: Iron	7439-89-6	0.05	mg/L	6.74	7.44	9.8	0% - 20%		



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
						LCS	Low	High	
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4214887)									
EG005T: Aluminium	7429-90-5	50	mg/kg	<50	6134 mg/kg	95.7	70.0	130	
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	98.8	81.5	118	
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	98.0	77.5	110	
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	106	70.0	130	
EG005T: Boron	7440-42-8	50	mg/kg	<50	----	----	----	----	
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	81.3	66.9	138	
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	93.8	70.0	130	
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	92.0	79.1	113	
EG005T: Iron	7439-89-6	50	mg/kg	<50	6655 mg/kg	95.8	70.0	130	
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	106	70.0	130	
EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	7.9 mg/kg	94.3	70.0	130	
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	92.7	81.5	126	
EG005T: Silver	7440-22-4	2	mg/kg	<2	2.1 mg/kg	85.7	70.0	130	
EG005T: Strontium	7440-24-6	2	mg/kg	<2	58.3 mg/kg	98.2	70.0	130	
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	93.9	70.0	130	
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	98.9	81.0	119	
EG005T: Titanium	7440-32-6	----	mg/kg	----	20 mg/kg	86.2	70.0	130	
EA001: pH in soil using 0.01M CaCl extract (QCLot: 4216350)									
EA001: pH (CaCl2)	----	----	pH Unit	----	4 pH Unit	101	98.8	101	
				----	7 pH Unit	99.7	99.2	101	
EA002: pH 1:5 (Soils) (QCLot: 4216353)									
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	70.0	130	
				----	7 pH Unit	100	70.0	130	
EA010: Conductivity (1:5) (QCLot: 4216356)									
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	147 µS/cm	99.4	93.6	106	
ED007: Exchangeable Cations (QCLot: 4219114)									
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	21.6 meq/100g	103	82.9	117	
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.76 meq/100g	102	78.4	119	
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	1 meq/100g	108	87.9	129	
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.9 meq/100g	108	92.9	132	
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	25.3 meq/100g	103	84.7	117	
ED007: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----	
EG020T: Total Metals by ICP-MS (QCLot: 4214889)									
EG020X-T: Uranium	7440-61-1	0.1	mg/kg	<0.1	7.3 mg/kg	92.4	70.0	130	



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
					LCS	Low	High	
EG020T: Total Metals by ICP-MS (QCLot: 4214889) - continued								
EG020X-T: Lithium	7439-93-2	0.1	mg/kg	<0.1	22.46 mg/kg	75.3	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 4214891)								
EG020T: Cadmium	7440-43-9	0.1	mg/kg	<0.1	4.64 mg/kg	97.9	88.0	120
EG020T: Lead	7439-92-1	0.1	mg/kg	<0.1	40 mg/kg	94.1	88.0	120
EG020T: Selenium	7782-49-2	1	mg/kg	<1	5.37 mg/kg	116	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4214890)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.154 mg/kg	108	81.0	115
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 4219478)								
EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	40 mg/kg	76.6	70.0	130
				<0.5	20 mg/kg	99.0	70.0	130
EK055: Ammonia as N (QCLot: 4217787)								
EK055: Ammonia as N	7664-41-7	20	mg/kg	<20	50 mg/kg	92.9	70.0	116
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4216355)								
EK057G: Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	2.5 mg/kg	98.1	94.7	106
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4216354)								
EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	2.5 mg/kg	102	89.8	109
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4214377)								
EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	<20	1000 mg/kg	94.8	78.0	112
				<20	100 mg/kg	108	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4214376)								
EK067G: Total Phosphorus as P	----	2	mg/kg	<2	440 mg/kg	93.1	78.0	108
				<2	44 mg/kg	99.9	70.0	130
EP004: Organic Matter (QCLot: 4216352)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	104	70.0	120
				<0.5	85 %	81.6	70.0	120
EP004: Total Organic Carbon	----	0.5	%	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4213805)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	32 mg/kg	90.4	66.0	122
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4213817)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	1468 mg/kg	87.6	70.0	111
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3111 mg/kg	99.5	71.9	109
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	436 mg/kg	93.2	63.8	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4213805)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	37 mg/kg	94.0	66.0	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4213817)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	2234 mg/kg	92.9	72.8	110
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	2553 mg/kg	101	67.8	114



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Result	Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)
						LCS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4213817) - continued								
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	71.1	50.3	123
EP080: BTEXN (QCLot: 4213805)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	87.4	72.0	122
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	85.6	75.0	119
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	87.1	73.0	121
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	4 mg/kg	88.2	74.0	122
	106-42-3							
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	85.1	75.0	121
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	70.3	64.0	126

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Result	Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)
						LCS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 4208825)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.4	89.7	117
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.3	89.6	118
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.4	89.2	116
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.7	87.8	114
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.7	85.8	115
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	88.4	111
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.4	87.4	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	100	88.1	120
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	109	87.1	120

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
					MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4214887)							
EP2202446-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	102	70.0	130
		EG005T: Barium	7440-39-3	50 mg/kg	# Not Determined	70.0	130
		EG005T: Beryllium	7440-41-7	50 mg/kg	108	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	94.4	70.0	130
		EG005T: Cobalt	7440-48-4	50 mg/kg	96.9	70.0	130
		EG005T: Copper	7440-50-8	50 mg/kg	102	70.0	130



Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4214887) - continued							
EP2202446-001	Anonymous	EG005T: Manganese	7439-96-5	50 mg/kg	# Not Determined	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	94.9	70.0	130
		EG005T: Vanadium	7440-62-2	50 mg/kg	91.4	70.0	130
		EG005T: Zinc	7440-66-6	50 mg/kg	84.7	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 4214891)							
EP2202496-001	S1 2.0m	EG020T: Cadmium	7440-43-9	12.5 mg/kg	97.8	70.0	130
		EG020T: Lead	7439-92-1	50 mg/kg	94.8	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4214890)							
EP2202446-001	Anonymous	EG035T: Mercury	7439-97-6	1 mg/kg	110	70.0	130
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 4219478)							
EP2202496-001	S1 2.0m	EG048G: Hexavalent Chromium	18540-29-9	40 mg/kg	75.3	70.0	130
EP2202496-001	S1 2.0m	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	90.9	70.0	130
EK055: Ammonia as N (QCLot: 4217787)							
EP2202496-006	S6 0-0.3m	EK055: Ammonia as N	7664-41-7	50 mg/kg	91.4	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4216355)							
EP2202428-002	Anonymous	EK057G: Nitrite as N (Sol.)	14797-65-0	2.5 mg/kg	99.7	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4216354)							
EP2202428-002	Anonymous	EK059G: Nitrite + Nitrate as N (Sol.)	----	2.5 mg/kg	104	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4214377)							
EP2202428-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	500 mg/kg	96.0	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4214376)							
EP2202428-002	Anonymous	EK067G: Total Phosphorus as P	----	100 mg/kg	85.5	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4213805)							
EP2202496-002	S2 3.5m	EP080: C6 - C9 Fraction	----	24 mg/kg	84.9	69.1	135
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4213817)							
EP2202496-002	S2 3.5m	EP071: C10 - C14 Fraction	----	1468 mg/kg	81.8	64.7	126
		EP071: C15 - C28 Fraction	----	3111 mg/kg	93.0	61.7	124
		EP071: C29 - C36 Fraction	----	436 mg/kg	88.4	64.6	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4213805)							
EP2202496-002	S2 3.5m	EP080: C6 - C10 Fraction	C6_C10	29 mg/kg	73.8	69.1	135
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4213817)							
EP2202496-002	S2 3.5m	EP071: >C10 - C16 Fraction	----	2234 mg/kg	86.9	64.7	126
		EP071: >C16 - C34 Fraction	----	2553 mg/kg	94.3	61.7	124
		EP071: >C34 - C40 Fraction	----	150 mg/kg	70.1	64.6	131

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 Work Order : EP2202496
 Client : GEMEC
 Project : Cervantes-01 Soil



Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 4213805)							
EP2202496-002	S2 3.5m	EP080: Benzene	71-43-2	2 mg/kg	105	76.4	118
		EP080: Toluene	108-88-3	2 mg/kg	97.6	67.4	112

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 4208825)							
EP2202462-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	100	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	100	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	96.4	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	98.4	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	109	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	96.8	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	100	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2202496	Page	: 1 of 11
Client	: GEMEC	Laboratory	: Environmental Division Perth
Contact	: MR NICOLO JELOVSEK	Telephone	: +61-8-9406 1301
Project	: Cervantes-01 Soil	Date Samples Received	: 02-Mar-2022
Site	: ----	Issue Date	: 14-Mar-2022
Sampler	: GORAN PETROVIC	No. of samples received	: 9
Order number	: ----	No. of samples analysed	: 9

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG005(ED093)T: Total Metals by ICP-AES	EP2202446--001	Anonymous	Barium	7440-39-3	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG005(ED093)T: Total Metals by ICP-AES	EP2202446--001	Anonymous	Manganese	7439-96-5	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA001: pH in soil using 0.01M CaCl extract							
Soil Glass Jar - Unpreserved							
S5 0-0.3m,	S6 0-0.3m	10-Mar-2022	08-Mar-2022	2	----	----	----
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved							
S1 2.0m, S3 0-0.3m, S5 0-0.3m, Dup 1	S2 3.5m, S4 0-0.3m, S6 0-0.3m,	09-Mar-2022	08-Mar-2022	1	----	----	----
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved							
S1 2.0m, S3 0-0.3m, S5 0-0.3m,	S2 3.5m, S4 0-0.3m, S6 0-0.3m	09-Mar-2022	08-Mar-2022	1	----	----	----
EK057G: Nitrite as N by Discrete Analyser							
Soil Glass Jar - Unpreserved							
S5 0-0.3m,	S6 0-0.3m	09-Mar-2022	08-Mar-2022	1	----	----	----

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Matrix Spikes (MS)					
Total Metals by ICP-MS - Suite X	0	7	0.00	5.00	NEPM 2013 B3 & ALS QC Standard



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: SOIL

Evaluation: ✘ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA001: pH in soil using 0.01M CaCl extract							
Soil Glass Jar - Unpreserved (EA001) S5 0-0.3m, S6 0-0.3m	01-Mar-2022	10-Mar-2022	08-Mar-2022	✘	10-Mar-2022	10-Mar-2022	✔
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002) S1 2.0m, S2 3.5m, S3 0-0.3m, S4 0-0.3m, S5 0-0.3m, S6 0-0.3m, Dup 1	01-Mar-2022	09-Mar-2022	08-Mar-2022	✘	09-Mar-2022	09-Mar-2022	✔
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010) S1 2.0m, S2 3.5m, S3 0-0.3m, S4 0-0.3m, S5 0-0.3m, S6 0-0.3m	01-Mar-2022	09-Mar-2022	08-Mar-2022	✘	09-Mar-2022	06-Apr-2022	✔
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) S1 2.0m, S2 3.5m, S3 0-0.3m, S4 0-0.3m, S5 0-0.3m, S6 0-0.3m, Dup 1, Trip Blank	01-Mar-2022	----	----	----	08-Mar-2022	15-Mar-2022	✔
EA150: Soil Classification based on Particle Size							
Snap Lock Bag - Friable Asbestos/PSD Bag (EA150H) S5 0-0.3m, S6 0-0.3m	01-Mar-2022	----	----	----	11-Mar-2022	28-Aug-2022	✔
EA152: Soil Particle Density							
Snap Lock Bag - Friable Asbestos/PSD Bag (EA152) S5 0-0.3m, S6 0-0.3m	01-Mar-2022	----	----	----	11-Mar-2022	28-Aug-2022	✔
ED007: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED007) S5 0-0.3m, S6 0-0.3m	01-Mar-2022	10-Mar-2022	29-Mar-2022	✔	10-Mar-2022	29-Mar-2022	✔



Matrix: SOIL

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T) S1 2.0m, S2 3.5m, S3 0-0.3m, S4 0-0.3m, S5 0-0.3m, S6 0-0.3m, Dup 1	01-Mar-2022	08-Mar-2022	28-Aug-2022	✔	09-Mar-2022	28-Aug-2022	✔	
EG020T: Total Metals by ICP-MS								
Soil Glass Jar - Unpreserved (EG020X-T) S1 2.0m, S2 3.5m, S3 0-0.3m, S4 0-0.3m, S5 0-0.3m, S6 0-0.3m, Dup 1	01-Mar-2022	08-Mar-2022	28-Aug-2022	✔	09-Mar-2022	28-Aug-2022	✔	
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T) S1 2.0m, S2 3.5m, S3 0-0.3m, S4 0-0.3m, S5 0-0.3m, S6 0-0.3m, Dup 1	01-Mar-2022	08-Mar-2022	29-Mar-2022	✔	09-Mar-2022	29-Mar-2022	✔	
EG048: Hexavalent Chromium (Alkaline Digest)								
Soil Glass Jar - Unpreserved (EG048G) S1 2.0m, S2 3.5m, S3 0-0.3m, S4 0-0.3m, S5 0-0.3m, S6 0-0.3m, Dup 1	01-Mar-2022	10-Mar-2022	29-Mar-2022	✔	10-Mar-2022	17-Mar-2022	✔	
EK055: Ammonia as N								
Soil Glass Jar - Unpreserved (EK055) S5 0-0.3m, S6 0-0.3m	01-Mar-2022	----	----	----	09-Mar-2022	29-Mar-2022	✔	
EK057G: Nitrite as N by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK057G) S5 0-0.3m, S6 0-0.3m	01-Mar-2022	09-Mar-2022	08-Mar-2022	✖	09-Mar-2022	11-Mar-2022	✔	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK059G) S5 0-0.3m, S6 0-0.3m	01-Mar-2022	09-Mar-2022	29-Mar-2022	✔	09-Mar-2022	11-Mar-2022	✔	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Soil Glass Jar - Unpreserved (EK061G) S5 0-0.3m, S6 0-0.3m	01-Mar-2022	08-Mar-2022	29-Mar-2022	✔	10-Mar-2022	05-Apr-2022	✔	
EK067G: Total Phosphorus as P by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK067G) S5 0-0.3m, S6 0-0.3m	01-Mar-2022	08-Mar-2022	29-Mar-2022	✔	10-Mar-2022	05-Apr-2022	✔	
EP004: Organic Matter								
Soil Glass Jar - Unpreserved (EP004) S5 0-0.3m, S6 0-0.3m	01-Mar-2022	11-Mar-2022	29-Mar-2022	✔	11-Mar-2022	29-Mar-2022	✔	



Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP071) S1 2.0m, S2 3.5m, S3 0-0.3m, S4 0-0.3m, S5 0-0.3m, S6 0-0.3m	01-Mar-2022	08-Mar-2022	15-Mar-2022	✓	08-Mar-2022	17-Apr-2022	✓
Soil Glass Jar - Unpreserved (EP080) S1 2.0m, S2 3.5m, S3 0-0.3m, S4 0-0.3m, S5 0-0.3m, S6 0-0.3m, Trip Blank	01-Mar-2022	08-Mar-2022	15-Mar-2022	✓	09-Mar-2022	15-Mar-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP071) S1 2.0m, S2 3.5m, S3 0-0.3m, S4 0-0.3m, S5 0-0.3m, S6 0-0.3m	01-Mar-2022	08-Mar-2022	15-Mar-2022	✓	08-Mar-2022	17-Apr-2022	✓
Soil Glass Jar - Unpreserved (EP080) S1 2.0m, S2 3.5m, S3 0-0.3m, S4 0-0.3m, S5 0-0.3m, S6 0-0.3m, Trip Blank	01-Mar-2022	08-Mar-2022	15-Mar-2022	✓	09-Mar-2022	15-Mar-2022	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) S1 2.0m, S2 3.5m, S3 0-0.3m, S4 0-0.3m, S5 0-0.3m, S6 0-0.3m, Trip Blank	01-Mar-2022	08-Mar-2022	15-Mar-2022	✓	09-Mar-2022	15-Mar-2022	✓

Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) Rinsate	01-Mar-2022	04-Mar-2022	28-Aug-2022	✓	04-Mar-2022	28-Aug-2022	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Buchi Ammonia	EK055	1	2	50.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Electrical Conductivity (1:5)	EA010	1	6	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	2	50.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	2	50.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH in soil using a 0.01M CaCl2 extract	EA001	1	2	50.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS	EG020T	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite X	EG020X-T	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus By Discrete Analyser	EK067G	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	6	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Buchi Ammonia	EK055	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Electrical Conductivity (1:5)	EA010	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	2	100.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH in soil using a 0.01M CaCl2 extract	EA001	2	2	100.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	2	8	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS	EG020T	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite X	EG020X-T	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus By Discrete Analyser	EK067G	2	8	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **SOIL** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
TRH - Semivolatile Fraction	EP071	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Buchi Ammonia	EK055	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Electrical Conductivity (1:5)	EA010	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS	EG020T	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite X	EG020X-T	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Buchi Ammonia	EK055	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS	EG020T	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite X	EG020X-T	0	7	0.00	5.00	*	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Control Samples (LCS) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH in soil using a 0.01M CaCl ₂ extract	* EA001	SOIL	In house: Referenced to Rayment and Lyons 4B3 (mod.) or 4B4 (mod.) 10 g of soil is mixed with 50 mL of 0.01M CaCl ₂ and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM Schedule B(3).
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Particle Size Analysis by Hydrometer	EA150H	SOIL	Particle Size Analysis by Hydrometer according to AS1289.3.6.3
Soil Particle Density	EA152	SOIL	Soil Particle Density by AS 1289.3.5.1: Methods of testing soils for engineering purposes - Soil classification tests - Determination of the soil particle density of a soil - Standard method
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Metals by ICP-MS	EG020T	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020. Metals in solids are determined following an appropriate acid digestion. The ICPMS technique ionizes selected elements. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass / charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM Schedule B(3)
Total Metals by ICP-MS - Suite X	EG020X-T	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl ₂) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM Schedule B(3)



Analytical Methods	Method	Matrix	Method Descriptions
Buchi Ammonia	EK055	SOIL	In house: Referenced to APHA 4500-NH3 B&G, H Samples are steam distilled (Buchi) prior to analysis and quantified using titration, FIA or Discrete Analyser.
Nitrite as N - Soluble by Discrete Analyser	EK057G	SOIL	In house: Referenced to APHA 4500-NO3- B. Nitrite in a water extract is determined by direct colourimetry by Discrete Analyser.
Nitrate as N - Soluble by Discrete Analyser	EK058G	SOIL	In house: Referenced to APHA 4500-NO3- F. Nitrate in the 1:5 soil:water extract is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results.
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	SOIL	In house: Thermo Scientific Method D08727 and NEMI (National Environmental Method Index) Method ID: 9171. This method covers the determination of total oxidised nitrogen (NOx-N) and nitrate (NO3-N) by calculation, Combined oxidised Nitrogen (NO2+NO3) in a water extract is determined by direct colourimetry by Discrete Analyser.
TKN as N By Discrete Analyser	EK061G	SOIL	In house: Referenced to APHA 4500-Norg-D Soil samples are digested using Kjeldahl digestion followed by determination by Discrete Analyser.
Total Nitrogen as N (TKN + NOx) By Discrete Analyser	EK062G	SOIL	In house: Referenced to APHA 4500 Norg/NO3- Total Nitrogen is determined as the sum of TKN and Oxidised Nitrogen, each determined seperately as N.
Total Phosporus By Discrete Analyser	EK067G	SOIL	In house: Referenced to APHA 4500 P-B&F This procedure involves sulfuric acid digestion and quantification using Discrete Analyser.
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatle Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Preparation Methods	Method	Matrix	Method Descriptions
pH in soil using a 0.01M CaCl2 extract	EA001-PR	SOIL	In house: Referenced to Rayment and Lyons 4B1, 10 g of soil is mixed with 50 mL of 0.01M CaCl2 and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
Alkaline digestion for Hexavalent Chromium	EG048PR	SOIL	In house: Referenced to USEPA SW846, Method 3060A.
TKN/TP Digestion	EK061/EK067	SOIL	In house: Referenced to APHA 4500 Norg- D; APHA 4500 P - H. Macro Kjeldahl digestion.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)



CHAIN OF CUSTODY

207 Dora Rd, Gosport, WA 6055
Ph: 81 940 1300 E: samples.wa@als.com.au

1960 Spring Rd, Springvale, VIC 3171
Ph: 81 940 1300 E: samples.vic@als.com.au

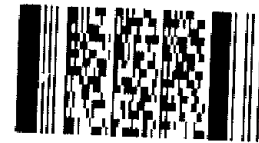
ALS Laboratory:
please tick →

CLIENT: Gemec Environmental Consultants		TURNAROUND REQUIREMENTS : <input checked="" type="checkbox"/> Standard TAT (List due date):		FOR LABORATORY USE ONLY (Circle)	
OFFICE: 1/25 Foss St, Palmyra, WA 6157		(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) <input type="checkbox"/> Non Standard or urgent TAT (List due date):		Custody Seal Intact? Yes No N/A	
PROJECT: Cervantes-01 Soil		ALS QUOTE NO.: EPI/878/21_V2		Free ice / frozen ice bricks present upon receipt? Yes No N/A	
ORDER NUMBER: -				Random Sample Temperature on Receipt: °C	
PROJECT MANAGER: Nicolo Jelovsek		CONTACT PH: 08 9339 8449		Other comment:	
SAMPLER: Goran Petrovic		SAMPLER MOBILE: 0468 821 703		RECEIVED BY: <i>SP</i>	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):		RELINQUISHED BY: <i>JMW</i>	
Email Reports to: nicolo@gemec.com.au, goran@gemec.com.au		DATE/TIME:		DATE/TIME: <i>1430</i>	
Email Invoice to: marise@gemec.com.au		DATE/TIME: 02.03.2022 / 11:00		DATE/TIME: <i>3/3/22 1600</i>	

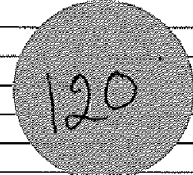
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please send split sample to ALS Melbourne; jars labelled MG. *Rec: 08/3/22 1400 126*

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)					CONTAINER INFORMATION		ANALYSIS REQUIRED (including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information			
	LAB ID	SAMPLE ID	DATE	TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	SO4: TRH / BTEXN	EPOSA: Organochlorine Pesticides	P-10/2: Al, As, B, Ba, Be, Cd, Co, CrVI, Cu, Hg, Mn, Mo, Ni, Pb, Se, V, Zn + pH	EG005: Cr, Fe, Sr, Ti	EG020: Li, U	NTSS: NH3, NO2, NO3, NOX, TKN, TN, TP	EN34: 1-5 leach	EA019: Electrical conductivity (1:5)	P-22: NERM Screen for Soil Classification: Fe, CEC, pH(CAC12), TOC, Clay Content	S-18: TRH (C6-C10) / BTEXN		ML017: 7 Metals (Total): As, Cd, Cr, Cu, Ni, Pb, Zn	EG020: Al, Fe	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	Split 1		1/03/2022	-	S	1 x glass unpreserved	1			1	1	1								External ALS lab required, Melb.	
TOTAL							1			1	1	1									

Environmental Division
Sydney
Work Order Reference
ES2208158



Telephone: 81-2-8784 8555



Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES2208158

Client	: GEMEC	Laboratory	: Environmental Division Sydney
Contact	: MR NICOLO JELOVSEK	Contact	: Nick Courts
Address	: UNIT 1/25 FOSS STREET PALMYRA WA, AUSTRALIA	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: nicolo@gemec.com.au	E-mail	: nick.courts@alsglobal.com
Telephone	: 9339 8449	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: Cervantes-01 Soil	Page	: 1 of 2
Order number	: ----	Quote number	: EP2021GEMEC0009_V2 (EP/978/21_V2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Goran Petrovic		

Dates

Date Samples Received	: 02-Mar-2022 14:30	Issue Date	: 09-Mar-2022
Client Requested Due Date	: 15-Mar-2022	Scheduled Reporting Date	: 15-Mar-2022

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 4	Temperature	: 12.6°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

CERTIFICATE OF ANALYSIS

Work Order	: ES2208158	Page	: 1 of 3
Client	: GEMEC	Laboratory	: Environmental Division Sydney
Contact	: MR NICOLO JELOVSEK	Contact	: Nick Courts
Address	: UNIT 1/25 FOSS STREET PALMYRA WA, AUSTRALIA	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 9339 8449	Telephone	: +61-2-8784 8555
Project	: Cervantes-01 Soil	Date Samples Received	: 02-Mar-2022 14:30
Order number	: ----	Date Analysis Commenced	: 10-Mar-2022
C-O-C number	: ----	Issue Date	: 15-Mar-2022 12:16
Sampler	: Goran Petrovic		
Site	: ----		
Quote number	: EP/978/21_V2		
No. of samples received	: 1		
No. of samples analysed	: 1		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Sample ID		Split 1	----	----	----	----
Sampling date / time		01-Mar-2022 14:15		----	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2208158-001	-----	-----	-----	-----
				Result	----	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	9.0	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	12.8	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	250	----	----	----	----
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Barium	7440-39-3	10	mg/kg	10	----	----	----	----
Beryllium	7440-41-7	1	mg/kg	<1	----	----	----	----
Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
Chromium	7440-47-3	2	mg/kg	12	----	----	----	----
Cobalt	7440-48-4	2	mg/kg	<2	----	----	----	----
Copper	7440-50-8	5	mg/kg	<5	----	----	----	----
Iron	7439-89-6	50	mg/kg	330	----	----	----	----
Manganese	7439-96-5	5	mg/kg	17	----	----	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	----	----	----	----
Nickel	7440-02-0	2	mg/kg	<2	----	----	----	----
Silver	7440-22-4	2	mg/kg	<2	----	----	----	----
Strontium	7440-24-6	2	mg/kg	2360	----	----	----	----
Vanadium	7440-62-2	5	mg/kg	<5	----	----	----	----
Zinc	7440-66-6	5	mg/kg	<5	----	----	----	----
Titanium	7440-32-6	10	mg/kg	<10	----	----	----	----
EG020T: Total Metals by ICP-MS								
Cadmium	7440-43-9	0.1	mg/kg	0.2	----	----	----	----
Uranium	7440-61-1	0.1	mg/kg	1.0	----	----	----	----
Lithium	7439-93-2	0.1	mg/kg	1.5	----	----	----	----
Lead	7439-92-1	0.1	mg/kg	0.5	----	----	----	----
Selenium	7782-49-2	1	mg/kg	3	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: ES2208158	Page	: 1 of 5
Client	: GEMEC	Laboratory	: Environmental Division Sydney
Contact	: MR NICOLO JELOVSEK	Contact	: Nick Courts
Address	: UNIT 1/25 FOSS STREET PALMYRA WA, AUSTRALIA	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 9339 8449	Telephone	: +61-2-8784 8555
Project	: Cervantes-01 Soil	Date Samples Received	: 02-Mar-2022
Order number	: ----	Date Analysis Commenced	: 10-Mar-2022
C-O-C number	: ----	Issue Date	: 15-Mar-2022
Sampler	: Goran Petrovic		
Site	: ----		
Quote number	: EP/978/21_V2		
No. of samples received	: 1		
No. of samples analysed	: 1		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4220950)									
ES2208158-001	Split 1	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	10	10	0.0	No Limit
		EG005T: Titanium	7440-32-6	10	mg/kg	<10	<10	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	12	12	0.0	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Strontium	7440-24-6	2	mg/kg	2360	2440	3.4	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	17	17	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Aluminium	7429-90-5	50	mg/kg	250	260	0.0	No Limit
EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.0	No Limit		
EG005T: Iron	7439-89-6	50	mg/kg	330	330	0.0	No Limit		
EA002: pH 1:5 (Soils) (QC Lot: 4220957)									
ES2208393-004	Anonymous	EA002: pH Value	----	0.1	pH Unit	6.2	6.2	0.0	0% - 20%
EW2201121-002	Anonymous	EA002: pH Value	----	0.1	pH Unit	3.3	3.3	0.0	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4220964)									
ES2208119-002	Anonymous	EA055: Moisture Content	----	0.1	%	86.3	87.1	0.9	0% - 20%
EW2201106-004	Anonymous	EA055: Moisture Content	----	0.1	%	18.1	18.2	0.7	0% - 20%

Page : 3 of 5
 Work Order : ES2208158
 Client : GEMEC
 Project : Cervantes-01 Soil



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 4220951)									
ES2208158-001	Split 1	EG020X-T: Uranium	7440-61-1	0.1	mg/kg	1.0	1.0	0.0	0% - 50%
		EG020X-T: Lithium	7439-93-2	0.1	mg/kg	1.5	1.5	0.0	0% - 50%
EG020T: Total Metals by ICP-MS (QC Lot: 4220952)									
ES2208158-001	Split 1	EG020T: Cadmium	7440-43-9	0.1	mg/kg	0.2	0.1	0.0	No Limit
		EG020T: Lead	7439-92-1	0.1	mg/kg	0.5	0.4	0.0	No Limit
		EG020T: Selenium	7782-49-2	1	mg/kg	3	2	64.5	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4220953)									
ES2208158-001	Split 1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 4218412)									
ES2207612-013	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	1.2	1.1	0.0	No Limit
ES2207612-016	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	0.8	0.8	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4220950)								
EG005T: Aluminium	7429-90-5	50	mg/kg	<50	15070 mg/kg	115	82.0	119
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	98.4	88.0	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	90.5 mg/kg	103	65.0	136
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	0.5 mg/kg	113	70.0	130
EG005T: Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	107	68.0	132
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	10.4 mg/kg	95.5	83.0	117
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	106	89.0	111
EG005T: Iron	7439-89-6	50	mg/kg	<50	31660 mg/kg	111	89.0	112
EG005T: Manganese	7439-96-5	5	mg/kg	<5	534 mg/kg	107	83.0	117
EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	2.3 mg/kg	81.3	77.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	101	80.0	120
EG005T: Silver	7440-22-4	2	mg/kg	<2	2.3 mg/kg	118	42.0	158
EG005T: Strontium	7440-24-6	2	mg/kg	<2	58.3 mg/kg	102	89.0	111
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	58.6 mg/kg	114	75.0	125
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	92.8	66.0	133
EG005T: Titanium	7440-32-6	10	mg/kg	<10	889 mg/kg	118	89.0	119
EG020T: Total Metals by ICP-MS (QCLot: 4220951)								
EG020X-T: Uranium	7440-61-1	0.1	mg/kg	<0.1	----	----	----	----
EG020X-T: Lithium	7439-93-2	0.1	mg/kg	<0.1	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 4220952)								
EG020T: Cadmium	7440-43-9	0.1	mg/kg	<0.1	0.8 mg/kg	104	46.0	155
EG020T: Lead	7439-92-1	0.1	mg/kg	<0.1	57.4 mg/kg	100	87.0	139
EG020T: Selenium	7782-49-2	1	mg/kg	<1	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4220953)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.087 mg/kg	96.6	70.0	125
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 4218412)								
EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	20 mg/kg	105	68.0	114

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Matrix Spike (MS) Report



Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4220950)							
ES2208158-001	Split 1	EG005T: Arsenic	7440-38-2	50 mg/kg	107	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	94.8	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	109	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	88.7	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	85.5	66.0	133
EG020T: Total Metals by ICP-MS (QCLot: 4220952)							
ES2208158-001	Split 1	EG020T: Cadmium	7440-43-9	50 mg/kg	95.8	70.0	130
		EG020T: Lead	7439-92-1	250 mg/kg	85.2	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4220953)							
ES2208158-001	Split 1	EG035T: Mercury	7439-97-6	5 mg/kg	89.5	70.0	130
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 4218412)							
ES2207612-016	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	86.3	70.0	130
ES2207612-016	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	73.1	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2208158	Page	: 1 of 5
Client	: GEMEC	Laboratory	: Environmental Division Sydney
Contact	: MR NICOLO JELOVSEK	Telephone	: +61-2-8784 8555
Project	: Cervantes-01 Soil	Date Samples Received	: 02-Mar-2022
Site	: ----	Issue Date	: 15-Mar-2022
Sampler	: Goran Petrovic	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA002: pH 1:5 (Soils)						
Soil Glass Jar - Unpreserved Split 1	14-Mar-2022	08-Mar-2022	6	----	----	----

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Control Samples (LCS)					
Total Metals by ICP-MS - Suite X	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Total Metals by ICP-MS - Suite X	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002) Split 1	01-Mar-2022	14-Mar-2022	08-Mar-2022	*	14-Mar-2022	14-Mar-2022	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) Split 1	01-Mar-2022	----	----	----	10-Mar-2022	15-Mar-2022	✓
EG005(ED093): Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) Split 1	01-Mar-2022	12-Mar-2022	28-Aug-2022	✓	14-Mar-2022	28-Aug-2022	✓
EG020T: Total Metals by ICP-MS							
Soil Glass Jar - Unpreserved (EG020T) Split 1	01-Mar-2022	12-Mar-2022	28-Aug-2022	✓	12-Mar-2022	28-Aug-2022	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) Split 1	01-Mar-2022	12-Mar-2022	29-Mar-2022	✓	14-Mar-2022	29-Mar-2022	✓

Page : 3 of 5
 Work Order : ES2208158
 Client : GEMEC
 Project : Cervantes-01 Soil



Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method <i>Container / Client Sample ID(s)</i>	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG048: Hexavalent Chromium (Alkaline Digest)							
Soil Glass Jar - Unpreserved (EG048G)							
Split 1	01-Mar-2022	10-Mar-2022	29-Mar-2022	✓	10-Mar-2022	17-Mar-2022	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	14	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	14	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	11	18.18	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	7	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	3	33.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS	EG020T	1	1	100.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite X	EG020X-T	1	1	100.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	14	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	7	14.29	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	3	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS	EG020T	1	1	100.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite X	EG020X-T	0	1	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	7	14.29	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	3	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS	EG020T	1	1	100.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite X	EG020X-T	1	1	100.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	14	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	7	14.29	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	3	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS	EG020T	1	1	100.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite X	EG020X-T	0	1	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Metals by ICP-MS	EG020T	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020. Metals in solids are determined following an appropriate acid digestion. The ICPMS technique ionizes selected elements. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass / charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM Schedule B(3)
Total Metals by ICP-MS - Suite X	EG020X-T	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl ₂) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Alkaline digestion for Hexavalent Chromium	EG048PR	SOIL	In house: Referenced to USEPA SW846, Method 3060A.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).



CHAIN OF CUSTODY

ALS Laboratory:
please tick →

PERTH 28 Rigali Way Wangara WA 6055
Ph: 08 9406 1301 E: samples.perth@alsglobal.com
MELBOURNE 2 4 Westall Road Springvale VIC 3171
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

CLIENT: Gemec Environmental Consultants		TURNAROUND REQUIREMENTS : <input checked="" type="checkbox"/> Standard TAT (List due date):		FOR LABORATORY USE ONLY (Circle)	
OFFICE: 1/25 Foss St, Palmyra, WA 6157		(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) <input type="checkbox"/> Non Standard or urgent TAT (List due date):		Custody Seal Intact? Yes	
PROJECT: Cervantes-01 Soil		ALS QUOTE NO.: EP1978/21_V2		Free ice / frozen ice bricks present upon receipt? Yes	
ORDER NUMBER: -		COC SEQUENCE NUMBER (Circle)		Random Sample Temperature on Receipt:	
PROJECT MANAGER: Nicolo Jelovsek		CONTACT PH: 08 9339 8449		Other comment:	
SAMPLER: Goran Petrovic		SAMPLER MOBILE: 0468 821703		RECEIVED BY:	
COC emailed to ALS? (YES / NO)		RELINQUISHED BY: Goran Petrovic		RECEIVED	
Email Reports to: nicolo@gemec.com.au, goran@gemec.com.au		DATE/TIME: 17.03.2022 / 08:00		DATE/TIME:	
Email Invoice to: marise@gemec.com.au				DATE/TIME:	

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: **Jars labelled MG**

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)					CONTAINER INFORMATION	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).													Addition					
	LAB ID	SAMPLE ID	DATE	TIME	MATRIX		TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	S-04: TRH / BTEXN	EP068A: Organochlorine Pesticides	P-19/2: Al, As, B, Ba, Be, Cd, Co, CrVI, Cu, Hg, Mn, Mo, Ni, Pb, Se, V, Zn + pH	EG005T: Cr, Fe, Sr, Ti	EG020T: Li, U	NT-8S: NH3, NO2, NO3, NOX, TKN, TN, TP	EN34: 1:5 leach	EA010: Electrical conductivity (1:5)	P-22: NEPM Screen for Soil Classification: Fe, CEC, pH(CaCl2), TOC, Clay Content	S-18: TRH (C6-C10) / BTEXN	W-01T: 7 Metals (total): As, Cd, Cr, Cu, Ni, Pb, Zn		EG020T: Al, Fe	Comments on likely dilutions, or sample analysis etc.			
	1	S7	15.03.2022	14:21	S	1 x glass unpreserved	1	1		1	1	1		1	1										
	2	S8	15.03.2022	14:32	S	1 x glass unpreserved	1	1		1	1	1		1	1										
	3	Trip Blank	15.03.2022	12:36	S	1 x glass unpreserved	1											1							
TOTAL							3	2	6	7	7	7	2	6	6	2	1	1	1						

Environmental Division
Perth
Work Order Reference
EP2203252



Telephone : - 61-8-9406 1301

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VR = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial; SG = Sulfuric Preserved Amber Glass; B = HCl Preserved Plastic; UB = HCl Preserved Plastic



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2203252

Client	: GEMEC	Laboratory	: Environmental Division Perth
Contact	: MR NICOLO JELOVSEK	Contact	: Nick Courts
Address	: UNIT 1/25 FOSS STREET PALMYRA WA, AUSTRALIA	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: nicolo@gemec.com.au	E-mail	: nick.courts@alsglobal.com
Telephone	: 9339 8449	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Cervantes-01 Soil	Page	: 1 of 2
Order number	: ----	Quote number	: EP2021GEMEC0009_V2 (EP/978/21_V2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Goran Petrovic		

Dates

Date Samples Received	: 17-Mar-2022 12:00	Issue Date	: 18-Mar-2022
Client Requested Due Date	: 24-Mar-2022	Scheduled Reporting Date	: 24-Mar-2022

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 9.5 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

CERTIFICATE OF ANALYSIS

Work Order	: EP2203252	Page	: 1 of 5
Client	: GEMEC	Laboratory	: Environmental Division Perth
Contact	: MR NICOLO JELOVSEK	Contact	: Nick Courts
Address	: UNIT 1/25 FOSS STREET PALMYRA WA, AUSTRALIA	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 9339 8449	Telephone	: +61-8-9406 1301
Project	: Cervantes-01 Soil	Date Samples Received	: 17-Mar-2022 12:00
Order number	: ----	Date Analysis Commenced	: 21-Mar-2022
C-O-C number	: ----	Issue Date	: 24-Mar-2022 16:30
Sampler	: Goran Petrovic		
Site	: ----		
Quote number	: EP/978/21_V2		
No. of samples received	: 3		
No. of samples analysed	: 3		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EG048G (Hexavalent Chromium by Alkaline Digestion): Poor spike recovery due to possible sample matrix interference.
- EG005T: Poor duplicate precision was obtained for Manganese on sample EP2203255-006 due to possible sample heterogeneity. Results have been confirmed by re-extraction and re-analysis.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S7	S8	Trip Blank	----	----
Sampling date / time				15-Mar-2022 14:21	15-Mar-2022 14:32	15-Mar-2022 12:36	----	----	
Compound	CAS Number	LOR	Unit	EP2203252-001	EP2203252-002	EP2203252-003	-----	-----	
				Result	Result	Result	----	----	
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit	9.5	9.6	----	----	----	
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm	97	109	----	----	----	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	3.0	3.4	<1.0	----	----	
EG005(ED093)T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	1180	1310	----	----	----	
Arsenic	7440-38-2	5	mg/kg	<5	<5	----	----	----	
Barium	7440-39-3	10	mg/kg	20	20	----	----	----	
Beryllium	7440-41-7	1	mg/kg	<1	<1	----	----	----	
Boron	7440-42-8	50	mg/kg	<50	<50	----	----	----	
Chromium	7440-47-3	2	mg/kg	10	9	----	----	----	
Cobalt	7440-48-4	2	mg/kg	<2	<2	----	----	----	
Copper	7440-50-8	5	mg/kg	<5	<5	----	----	----	
Iron	7439-89-6	50	mg/kg	1260	1350	----	----	----	
Manganese	7439-96-5	5	mg/kg	29	30	----	----	----	
Molybdenum	7439-98-7	2	mg/kg	<2	<2	----	----	----	
Nickel	7440-02-0	2	mg/kg	<2	<2	----	----	----	
Silver	7440-22-4	2	mg/kg	<2	<2	----	----	----	
Strontium	7440-24-6	2	mg/kg	1510	1330	----	----	----	
Vanadium	7440-62-2	5	mg/kg	<5	<5	----	----	----	
Zinc	7440-66-6	5	mg/kg	<5	<5	----	----	----	
Titanium	7440-32-6	10	mg/kg	20	20	----	----	----	
EG020T: Total Metals by ICP-MS									
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	----	----	----	
Uranium	7440-61-1	0.1	mg/kg	0.4	0.3	----	----	----	
Lithium	7439-93-2	0.1	mg/kg	1.8	1.9	----	----	----	
Lead	7439-92-1	0.1	mg/kg	0.8	0.9	----	----	----	
Selenium	7782-49-2	1	mg/kg	<1	<1	----	----	----	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----	
EG048: Hexavalent Chromium (Alkaline Digest)									
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	----	----	----	
EP080/071: Total Petroleum Hydrocarbons									



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S7	S8	Trip Blank	----	----
Sampling date / time				15-Mar-2022 14:21	15-Mar-2022 14:32	15-Mar-2022 12:36	----	----	
Compound	CAS Number	LOR	Unit	EP2203252-001	EP2203252-002	EP2203252-003	-----	-----	
				Result	Result	Result	----	----	
EP080/071: Total Petroleum Hydrocarbons - Continued									
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	----	----	
C10 - C14 Fraction	----	50	mg/kg	<50	<50	----	----	----	
C15 - C28 Fraction	----	100	mg/kg	<100	<100	----	----	----	
C29 - C36 Fraction	----	100	mg/kg	<100	<100	----	----	----	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	----	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	----	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	----	----	
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	----	----	----	
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	----	----	----	
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	----	----	----	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	----	----	----	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	----	----	----	
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	----	----	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	98.5	100	102	----	----	
Toluene-D8	2037-26-5	0.2	%	90.1	92.2	93.4	----	----	
4-Bromofluorobenzene	460-00-4	0.2	%	95.6	97.2	98.0	----	----	



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	63	132
Toluene-D8	2037-26-5	66	125
4-Bromofluorobenzene	460-00-4	60	124

QUALITY CONTROL REPORT

Work Order	: EP2203252	Page	: 1 of 7
Client	: GEMEC	Laboratory	: Environmental Division Perth
Contact	: MR NICOLO JELOVSEK	Contact	: Nick Courts
Address	: UNIT 1/25 FOSS STREET PALMYRA WA, AUSTRALIA	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 9339 8449	Telephone	: +61-8-9406 1301
Project	: Cervantes-01 Soil	Date Samples Received	: 17-Mar-2022
Order number	: ----	Date Analysis Commenced	: 21-Mar-2022
C-O-C number	: ----	Issue Date	: 24-Mar-2022
Sampler	: Goran Petrovic		
Site	: ----		
Quote number	: EP/978/21_V2		
No. of samples received	: 3		
No. of samples analysed	: 3		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4239965)									
EP2203255-006	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	1	<1	0.0	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	170	150	11.8	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	16	12	26.5	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	20	17	17.9	0% - 50%
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	4	3	0.0	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Strontium	7440-24-6	2	mg/kg	18	20	14.2	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	241	# 172	33.2	0% - 20%
		EG005T: Vanadium	7440-62-2	5	mg/kg	54	46	15.8	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Aluminium	7429-90-5	50	mg/kg	9570	9720	1.5	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.0	No Limit
EG005T: Iron	7439-89-6	50	mg/kg	28400	23300	19.7	0% - 20%		
EP2203252-001	S7	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	20	20	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	10	10	0.0	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Strontium	7440-24-6	2	mg/kg	1510	1550	2.1	0% - 20%



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4239965) - continued									
EP2203252-001	S7	EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	29	29	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Aluminium	7429-90-5	50	mg/kg	1180	1200	2.1	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.0	No Limit
		EG005T: Iron	7439-89-6	50	mg/kg	1260	1280	1.7	0% - 20%
EA002: pH 1:5 (Soils) (QC Lot: 4239769)									
EP2203227-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	6.2	6.2	0.0	0% - 20%
EP2203253-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	9.8	9.9	0.0	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 4239770)									
EP2203252-001	S7	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	97	96	0.0	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4239759)									
EP2203252-001	S7	EA055: Moisture Content	----	0.1	%	3.0	3.1	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 4239967)									
EP2203252-001	S7	EG020T: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020T: Lead	7439-92-1	0.1	mg/kg	0.8	0.8	0.0	No Limit
		EG020T: Selenium	7782-49-2	1	mg/kg	<1	<1	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 4239968)									
EP2203252-001	S7	EG020X-T: Uranium	7440-61-1	0.1	mg/kg	0.4	0.4	0.0	No Limit
		EG020X-T: Lithium	7439-93-2	0.1	mg/kg	1.8	1.8	0.0	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4239966)									
EP2203255-006	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP2203252-001	S7	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 4242020)									
EP2203227-001	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<2.5	<2.5	0.0	No Limit
EP2203253-002	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4239118)									
EP2203252-001	S7	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4239119)									
EP2203252-001	S7	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4239118)									
EP2203252-001	S7	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4239119)									
EP2203252-001	S7	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit

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 Work Order : EP2203252
 Client : GEMEC
 Project : Cervantes-01 Soil



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4239119) - continued									
EP2203252-001	S7	EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080: BTEXN (QC Lot: 4239118)									
EP2203252-001	S7	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
						LCS	Low	High	
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4239965)									
EG005T: Aluminium	7429-90-5	50	mg/kg	<50	6134 mg/kg	82.2	70.0	130	
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	91.9	81.5	118	
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	88.2	77.5	110	
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	97.7	70.0	130	
EG005T: Boron	7440-42-8	50	mg/kg	<50	----	----	----	----	
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	75.8	66.9	138	
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	96.9	70.0	130	
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	88.8	79.1	113	
EG005T: Iron	7439-89-6	50	mg/kg	<50	6655 mg/kg	76.0	70.0	130	
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	84.3	70.0	130	
EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	7.9 mg/kg	92.4	70.0	130	
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	90.2	81.5	126	
EG005T: Silver	7440-22-4	2	mg/kg	<2	2.1 mg/kg	81.0	70.0	130	
EG005T: Strontium	7440-24-6	2	mg/kg	<2	58.3 mg/kg	97.8	70.0	130	
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	94.8	70.0	130	
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	94.4	81.0	119	
EG005T: Titanium	7440-32-6	----	mg/kg	----	20 mg/kg	91.8	70.0	130	
EA002: pH 1:5 (Soils) (QCLot: 4239769)									
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	101	70.0	130	
				----	7 pH Unit	99.7	70.0	130	
EA010: Conductivity (1:5) (QCLot: 4239770)									
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	93.6	106	
EG020T: Total Metals by ICP-MS (QCLot: 4239967)									
EG020T: Cadmium	7440-43-9	0.1	mg/kg	<0.1	4.64 mg/kg	97.8	88.0	120	
EG020T: Lead	7439-92-1	0.1	mg/kg	<0.1	40 mg/kg	92.0	88.0	120	
EG020T: Selenium	7782-49-2	1	mg/kg	<1	5.37 mg/kg	111	70.0	130	
EG020T: Total Metals by ICP-MS (QCLot: 4239968)									
EG020X-T: Uranium	7440-61-1	0.1	mg/kg	<0.1	7.3 mg/kg	91.9	70.0	130	
EG020X-T: Lithium	7439-93-2	0.1	mg/kg	<0.1	22.46 mg/kg	76.4	70.0	130	
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4239966)									
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.154 mg/kg	98.9	81.0	115	
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 4242020)									
EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	40 mg/kg	81.0	70.0	130	
				<0.5	20 mg/kg	99.2	70.0	130	



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Result	Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4239118)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	32 mg/kg	83.8	66.0 122	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4239119)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	1468 mg/kg	87.4	70.0 111	
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3111 mg/kg	89.3	71.9 109	
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	436 mg/kg	77.3	63.8 118	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4239118)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	37 mg/kg	84.2	66.0 122	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4239119)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	2234 mg/kg	90.3	72.8 110	
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	2553 mg/kg	86.2	67.8 114	
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	90.8	50.3 123	
EP080: BTEXN (QCLot: 4239118)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	91.9	72.0 122	
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	85.4	75.0 119	
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	89.6	73.0 121	
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	91.3	74.0 122	
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	92.1	75.0 121	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	81.6	64.0 126	

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%) MS	Acceptable Limits (%) Low High	
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4239965)							
EP2203252-001	S7	EG005T: Arsenic	7440-38-2	50 mg/kg	111	70.0 130	
		EG005T: Barium	7440-39-3	50 mg/kg	106	70.0 130	
		EG005T: Beryllium	7440-41-7	50 mg/kg	99.0	70.0 130	
		EG005T: Chromium	7440-47-3	50 mg/kg	98.7	70.0 130	
		EG005T: Cobalt	7440-48-4	50 mg/kg	94.8	70.0 130	
		EG005T: Copper	7440-50-8	50 mg/kg	109	70.0 130	
		EG005T: Manganese	7439-96-5	50 mg/kg	88.8	70.0 130	
		EG005T: Nickel	7440-02-0	50 mg/kg	94.3	70.0 130	
		EG005T: Vanadium	7440-62-2	50 mg/kg	102	70.0 130	
		EG005T: Zinc	7440-66-6	50 mg/kg	84.2	70.0 130	



Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 4239967)							
EP2203252-001	S7	EG020T: Cadmium	7440-43-9	12.5 mg/kg	94.1	70.0	130
		EG020T: Lead	7439-92-1	50 mg/kg	88.6	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4239966)							
EP2203252-001	S7	EG035T: Mercury	7439-97-6	1 mg/kg	83.8	70.0	130
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 4242020)							
EP2203227-001	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	40 mg/kg	# 52.2	70.0	130
EP2203227-001	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	# 65.2	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4239118)							
EP2203252-002	S8	EP080: C6 - C9 Fraction	----	24 mg/kg	70.7	69.1	135
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4239119)							
EP2203252-002	S8	EP071: C10 - C14 Fraction	----	1468 mg/kg	86.5	64.7	126
		EP071: C15 - C28 Fraction	----	3111 mg/kg	88.4	61.7	124
		EP071: C29 - C36 Fraction	----	436 mg/kg	76.5	64.6	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4239118)							
EP2203252-002	S8	EP080: C6 - C10 Fraction	C6_C10	29 mg/kg	83.6	69.1	135
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4239119)							
EP2203252-002	S8	EP071: >C10 - C16 Fraction	----	2234 mg/kg	89.4	64.7	126
		EP071: >C16 - C34 Fraction	----	2553 mg/kg	85.4	61.7	124
		EP071: >C34 - C40 Fraction	----	150 mg/kg	89.0	64.6	131
EP080: BTEXN (QCLot: 4239118)							
EP2203252-002	S8	EP080: Benzene	71-43-2	2 mg/kg	88.6	76.4	118
		EP080: Toluene	108-88-3	2 mg/kg	83.5	67.4	112

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2203252	Page	: 1 of 7
Client	: GEMEC	Laboratory	: Environmental Division Perth
Contact	: MR NICOLO JELOVSEK	Telephone	: +61-8-9406 1301
Project	: Cervantes-01 Soil	Date Samples Received	: 17-Mar-2022
Site	: ----	Issue Date	: 24-Mar-2022
Sampler	: Goran Petrovic	No. of samples received	: 3
Order number	: ----	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Laboratory Control outliers occur.
- Duplicate outliers exist - please see following pages for full details.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EG005(ED093)T: Total Metals by ICP-AES	EP2203255--006	Anonymous	Manganese	7439-96-5	33.2 %	0% - 20%	RPD exceeds LOR based limits
Matrix Spike (MS) Recoveries							
EG048: Hexavalent Chromium (Alkaline Digest)	EP2203227--001	Anonymous	Hexavalent Chromium	18540-29-9	52.2 %	70.0-130%	Recovery less than lower data quality objective
EG048: Hexavalent Chromium (Alkaline Digest)	EP2203227--001	Anonymous	Hexavalent Chromium	18540-29-9	65.2 %	70.0-130%	Recovery less than lower data quality objective

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Matrix Spikes (MS)					
Total Metals by ICP-MS - Suite X	0	5	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for **VOC in soils** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA002: pH 1:5 (Soils)								
Soil Glass Jar - Unpreserved (EA002) S7,	S8	15-Mar-2022	22-Mar-2022	22-Mar-2022	✓	22-Mar-2022	22-Mar-2022	✓
EA010: Conductivity (1:5)								
Soil Glass Jar - Unpreserved (EA010) S7,	S8	15-Mar-2022	22-Mar-2022	22-Mar-2022	✓	22-Mar-2022	19-Apr-2022	✓
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055) S7, Trip Blank	S8,	15-Mar-2022	----	----	----	21-Mar-2022	29-Mar-2022	✓
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T) S7,	S8	15-Mar-2022	21-Mar-2022	11-Sep-2022	✓	21-Mar-2022	11-Sep-2022	✓



Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS							
Soil Glass Jar - Unpreserved (EG020X-T) S7, S8	15-Mar-2022	21-Mar-2022	11-Sep-2022	✓	21-Mar-2022	11-Sep-2022	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) S7, S8	15-Mar-2022	21-Mar-2022	12-Apr-2022	✓	21-Mar-2022	12-Apr-2022	✓
EG048: Hexavalent Chromium (Alkaline Digest)							
Soil Glass Jar - Unpreserved (EG048G) S7, S8	15-Mar-2022	22-Mar-2022	12-Apr-2022	✓	23-Mar-2022	29-Mar-2022	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) S7, Trip Blank	15-Mar-2022	21-Mar-2022	29-Mar-2022	✓	22-Mar-2022	29-Mar-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) S7, Trip Blank	15-Mar-2022	21-Mar-2022	29-Mar-2022	✓	22-Mar-2022	29-Mar-2022	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) S7, Trip Blank	15-Mar-2022	21-Mar-2022	29-Mar-2022	✓	22-Mar-2022	29-Mar-2022	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	3	33.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS	EG020T	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite X	EG020X-T	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	7	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS	EG020T	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite X	EG020X-T	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	7	14.29	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS	EG020T	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite X	EG020X-T	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	7	14.29	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS	EG020T	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite X	EG020X-T	0	5	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard

Page : 5 of 7
 Work Order : EP2203252
 Client : GEMEC
 Project : Cervantes-01 Soil



Matrix: **SOIL** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
<i>Analytical Methods</i>							
Matrix Spikes (MS) - Continued							
TRH Volatiles/BTEX	EP080	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Metals by ICP-MS	EG020T	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020. Metals in solids are determined following an appropriate acid digestion. The ICPMS technique ionizes selected elements. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass / charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM Schedule B(3)
Total Metals by ICP-MS - Suite X	EG020X-T	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl ₂) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.
Preparation Methods	Method	Matrix	Method Descriptions
Alkaline digestion for Hexavalent Chromium	EG048PR	SOIL	In house: Referenced to USEPA SW846, Method 3060A.



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na ₂ SO ₄ and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

GROUNDWATER CHAIN OF CUSTODY & LABORATORY REPORTS

CHAIN OF CUSTODY - Client

Client: Gemec
Project Mgr: Nicolo Jelovsek
Sampler: Goran Petrovic
Address: 1/25 Foss St Palmyra 6157
Email: nicolo@gemec.com.au, goran@gemec.com.au
Phone: 08 9339 8449 / 0439 093 980



Client Project Name and Number: Metgasco - Cervantes 01
Location: Lot 12174 plan 39607 Mt Adams, WA
MPL Quote No: 20P329
Date results required:
Or choose: standard / 1 day / 2 day / 3 day
Note: Inform lab in advance if urgent turnaround is required - surcharge applies

MPL Laboratories
Address: 16-18 Hayden Crt Myaree 6154
Phone: 08 9317 2505
Fax: 08 9317 4163
E-mail: lab@mpl.com.au



Sample information

Analyses Required

Comments

MPL Sample ID	Client Sample ID	Depth (m)	Date sampled	Time	Type of sample	Gemec Suite 1 (MBTEXN, TRH, dissolved metals)	Gemec Suite 2 (MBTEXN, TRH, dissolved metals, CrVI-LL)	Ionic Balance	Extended Nutrient Suite	pH	EC	TDS (grav.)	MBTEXN & TRH	VTRH (C6-C9) + BTEX	8 metals: As B Ba Fe Li Mn Sr Zn (total) - excl. CrVI	Methane & Ethane	Dissolved metals (as per Gemec Suite 1)	
1	MW1	-	15.03.2022	14:05	Water		X	X	X	X	X	X				X		
2	Dup	-	15.03.2022	-	Water												X	
3	Trip Blank	-	15.03.2022	12:33	Water									X				
4	Rinsate	-	15.03.2022	14:45	Water										X			

Email CoC with report also please
Sample containers labelled MG
Gemec Suite 2 dissolved metals: Al As B Ba Be Cd Cr CrVI (LL) Co Cu Fe Hg Li Mn Mo Ni Pb Se Sr Ti U V Zn
Gemec Suite 1 dissolved metals: Al As B Ba Be Cd Cr Co Cu Fe Hg Li Mn Mo Ni Pb Se Sr Ti U V Zn

Extended Nutrient Suite: Total N, NH3, NO3, NO2, TKN (calc.), Total P, PO4

Laboratories
Job No. - 278628
Date Rec - 17/3
Time Rec - 10:00
Rec By - GT
TAT Req - SAME 1/2/3/STD
Temp - cool/ambient
Cooling - ice/ice pack/None
Security Seal - Yes/No

Relinquished by (company): Gemec
Print Name: Nicolo Jelovsek
Date & Time: 17.03.2022 / 08:00
Signature: *[Signature]*

Received by (company): MPL
Print Name: G.
Date & Time: 17/3/22
Signature: *[Signature]*

Laboratory Use Only:
Samples Received: Cool / ambient
Temperature Received at: 15 (if applicable)
Transported by: Hand delivered / courier



SAMPLE RECEIPT ADVICE

Client Details

Client	Gemec
Attention	Nicolo Jelovsek

Sample Login Details

Your reference	Metgasco - Cervantes 01
MPL Reference	278628
Date Sample Received	17/03/2022
Date Instructions Received	17/03/2022
Date Results Expected to be Reported	23/03/2022

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	4 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	15
Cooling Method	Ice Pack
Sampling Date Provided	Yes

Comments

Nil

Please direct any queries to:

Heram Halim

Phone: 08 9317 2505

Fax: 08 9317 4163

Email: hhalim@mpl.com.au

Meredith Conroy

Phone: 08 9317 2505

Fax: 08 9317 4163

Email: mconroy@mpl.com.au

Analysis Underway, details on the following page:



Sample ID	pH	Electrical Conductivity (EC)	Total Dissolved Solids (grav)	Dissolved CrVI - Low Level	Ionic Balance	Nutrients in Water	vTRH(C6-C10)/MBTEXN in water	svTRH(C10-C40) in water	Dissolved Metals in Water	Total Metals in water	Methane in water
MW1	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Dup									✓		
Trip Blank							✓				
Rinsate										✓	

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

Requests for longer term sample storage must be received in writing.



CERTIFICATE OF ANALYSIS 278628

Client Details

Client	Gemec
Attention	Nicolo Jelovsek
Address	PO Box 89, MELVILLE, WA, 6956

Sample Details

Your Reference	<u>Metgasco - Cervantes 01</u>
Number of Samples	4 Water
Date samples received	17/03/2022
Date completed instructions received	17/03/2022
Location	Lot 12174 Plan 39607 Mt Adams WA

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	23/03/2022
Date of Issue	23/03/2022

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By

Huong Tran, Chemist
Lien Tang, Assistant Operations Manager
Michael Mowle, Metals/Inorganics Supervisor
Travis Carey, Organics - Team Leader

Authorised By

Michael Kubiak, Laboratory Manager

Miscellaneous Inorganics			
Our Reference			278628-1
Your Reference	UNITS	PQL	MW1
Date Sampled			15/03/2022
Type of sample			Water
Time Sampled			02:05 PM
Date prepared	-		17/03/2022
Date analysed	-		17/03/2022
pH	pH Units		7.3
Electrical Conductivity (EC)	µS/cm	1	8,500
Total Dissolved Solids (grav)	mg/L	5	5,300
Dissolved CrVI - Low Level	mg/L	0.001	<0.001

Ionic Balance			
Our Reference			278628-1
Your Reference	UNITS	PQL	MW1
Date Sampled			15/03/2022
Type of sample			Water
Time Sampled			02:05 PM
Date prepared	-		22/03/2022
Date analysed	-		22/03/2022
Calcium - Dissolved	mg/L	0.5	140
Potassium - Dissolved	mg/L	0.5	45
Magnesium - Dissolved	mg/L	0.5	190
Sodium - Dissolved	mg/L	0.5	1,200
Bicarbonate HCO ₃ as CaCO ₃	mg/L	5	470
Carbonate CO ₃ ²⁻ as CaCO ₃	mg/L	5	<5
Hydroxide OH ⁻ as CaCO ₃	mg/L	5	<5
Total Alkalinity as CaCO ₃	mg/L	5	470
Chloride	mg/L	1	2,700
Sulphate	mg/L	1	300
Ionic Balance	%		-9.0
Hardness as CaCO ₃	mg/L	3	1,100

Nutrients in Water			
Our Reference			278628-1
Your Reference	UNITS	PQL	MW1
Date Sampled			15/03/2022
Type of sample			Water
Time Sampled			02:05 PM
Date prepared	-		17/03/2022
Date analysed	-		17/03/2022
Total Nitrogen	mg/L	0.1	2.4
Total Kjeldahl Nitrogen	mg/L	0.1	2.3
Nitrate as N	mg/L	0.005	0.015
Nitrite as N	mg/L	0.005	<0.005
NOx as N	mg/L	0.005	0.016
Ammonia as N	mg/L	0.005	<0.005
Total Phosphorus	mg/L	0.05	0.06
Phosphate as P	mg/L	0.005	0.024

vTRH(C6-C10)/MBTEXN in water				
Our Reference			278628-1	278628-3
Your Reference	UNITS	PQL	MW1	Trip Blank
Date Sampled			15/03/2022	15/03/2022
Type of sample			Water	Water
Time Sampled			02:05 PM	12:33 PM
Date analysed	-		17/03/2022	17/03/2022
TRH C ₆ - C ₉	µg/L	10	<10	<10
TRH C ₆ - C ₁₀	µg/L	10	<10	<10
TRH C ₆ -C ₁₀ less BTEX (F1)	µg/L	10	<10	<10
MTBE	µg/L	1	<1	<1
Benzene	µg/L	1	<1	<1
Toluene	µg/L	1	<1	<1
Ethylbenzene	µg/L	1	<1	<1
m+p-xylene	µg/L	2	<2	<2
o-xylene	µg/L	1	<1	<1
Naphthalene	µg/L	1	<1	<1
Surrogate Dibromofluoromethane	%		105	99
Surrogate toluene-d8	%		96	101
Surrogate 4-BFB	%		104	100

svTRH(C10-C40) in water			
Our Reference			278628-1
Your Reference	UNITS	PQL	MW1
Date Sampled			15/03/2022
Type of sample			Water
Time Sampled			02:05 PM
Date extracted	-		18/03/2022
Date analysed	-		20/03/2022
TRH C ₁₀ - C ₁₄	µg/L	50	2,300
TRH C ₁₅ - C ₂₈	µg/L	100	1,400
TRH C ₂₉ - C ₃₆	µg/L	100	<100
TRH >C ₁₀ - C ₁₆	µg/L	50	3,400
TRH >C ₁₀ -C ₁₆ less N (F2)	µg/L	50	3,400
TRH >C ₁₆ - C ₃₄	µg/L	100	380
TRH >C ₃₄ - C ₄₀	µg/L	100	<100
Surrogate o-Terphenyl	%		75

Dissolved Metals in Water				
Our Reference			278628-1	278628-2
Your Reference	UNITS	PQL	MW1	Dup
Date Sampled			15/03/2022	15/03/2022
Type of sample			Water	Water
Time Sampled			02:05 PM	
Date prepared	-		22/03/2022	22/03/2022
Date analysed	-		22/03/2022	22/03/2022
Aluminium-Dissolved	mg/L	0.01	<0.01	<0.01
Arsenic-Dissolved	mg/L	0.001	0.002	0.002
Boron-Dissolved	mg/L	0.02	0.39	0.39
Barium-Dissolved	mg/L	0.001	0.13	0.13
Beryllium-Dissolved	mg/L	0.0005	<0.0005	<0.0005
Cadmium-Dissolved	mg/L	0.0001	<0.0001	<0.0001
Chromium-Dissolved	mg/L	0.001	<0.001	<0.001
Cobalt-Dissolved	mg/L	0.001	0.004	0.004
Copper-Dissolved	mg/L	0.001	0.003	0.003
Iron-Dissolved	mg/L	0.01	0.85	0.81
Mercury-Dissolved	mg/L	0.00005	<0.00005	<0.00005
Lithium-Dissolved	mg/L	0.0005	0.064	0.065
Manganese-Dissolved	mg/L	0.005	0.37	0.38
Molybdenum-Dissolved	mg/L	0.001	0.001	0.001
Nickel-Dissolved	mg/L	0.001	0.004	0.003
Lead-Dissolved	mg/L	0.001	<0.001	<0.001
Selenium-Dissolved	mg/L	0.001	<0.001	<0.001
Strontium-Dissolved	mg/L	0.001	6.6	6.4
Titanium-Dissolved	mg/L	0.001	<0.001	<0.001
Uranium-Dissolved	mg/L	0.0005	0.0027	0.0026
Vanadium-Dissolved	mg/L	0.001	<0.001	<0.001
Zinc-Dissolved	mg/L	0.001	0.001	0.005

Total Metals in water			
Our Reference			278628-4
Your Reference	UNITS	PQL	Rinsate
Date Sampled			15/03/2022
Type of sample			Water
Time Sampled			02:45 PM
Date digested	-		22/03/2022
Date analysed	-		22/03/2022
Arsenic-Total	mg/L	0.001	<0.001
Boron-Total	mg/L	0.02	0.04
Barium-Total	mg/L	0.001	<0.001
Iron-Total	mg/L	0.01	<0.01
Lithium-Total	mg/L	0.0005	<0.0005
Manganese-Total	mg/L	0.005	<0.005
Strontium-Total	mg/L	0.001	<0.001
Zinc-Total	mg/L	0.001	<0.001

Methane in water			
Our Reference			278628-1
Your Reference	UNITS	PQL	MW1
Date Sampled			15/03/2022
Type of sample			Water
Time Sampled			02:05 PM
Date prepared	-		22/03/2022
Date analysed	-		22/03/2022
Methane	µg/L	5	<5
Ethane	µg/L	5	<5

Client Reference: Metgasco - Cervantes 01

QUALITY CONTROL: Nutrients in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			17/03/2022	[NT]	[NT]	[NT]	[NT]	17/03/2022	[NT]
Date analysed	-			17/03/2022	[NT]	[NT]	[NT]	[NT]	17/03/2022	[NT]
Total Nitrogen	mg/L	0.1	INORG-110	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Total Kjeldahl Nitrogen	mg/L	0.1	INORG-062	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Nitrate as N	mg/L	0.005	INORG-055	<0.005	[NT]	[NT]	[NT]	[NT]	107	[NT]
Nitrite as N	mg/L	0.005	INORG-055	<0.005	[NT]	[NT]	[NT]	[NT]	102	[NT]
NOx as N	mg/L	0.005	INORG-055	<0.005	[NT]	[NT]	[NT]	[NT]	107	[NT]
Ammonia as N	mg/L	0.005	INORG-057	<0.005	[NT]	[NT]	[NT]	[NT]	84	[NT]
Total Phosphorus	mg/L	0.05	METALS-020	<0.05	[NT]	[NT]	[NT]	[NT]	100	[NT]
Phosphate as P	mg/L	0.005	INORG-060	<0.005	[NT]	[NT]	[NT]	[NT]	111	[NT]

Client Reference: Metgasco - Cervantes 01

QUALITY CONTROL: vTRH(C6-C10)/MBTEXN in water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date analysed	-			17/03/2022	[NT]	[NT]	[NT]	[NT]	17/03/2022	[NT]
TRH C ₆ - C ₉	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	88	[NT]
TRH C ₆ - C ₁₀	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	88	[NT]
MTBE	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	85	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	88	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	90	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	103	[NT]	[NT]	[NT]	[NT]	99	[NT]
Surrogate toluene-d8	%		Org-023	97	[NT]	[NT]	[NT]	[NT]	103	[NT]
Surrogate 4-BFB	%		Org-023	101	[NT]	[NT]	[NT]	[NT]	99	[NT]

Client Reference: Metgasco - Cervantes 01

QUALITY CONTROL: svTRH(C10-C40) in water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			18/03/2022	[NT]	[NT]	[NT]	[NT]	18/03/2022	[NT]
Date analysed	-			19/03/2022	[NT]	[NT]	[NT]	[NT]	19/03/2022	[NT]
TRH C ₁₀ - C ₁₄	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	101	[NT]
TRH C ₁₅ - C ₂₈	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	102	[NT]
TRH C ₂₉ - C ₃₆	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	96	[NT]
TRH >C ₁₀ - C ₁₆	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	101	[NT]
TRH >C ₁₆ - C ₃₄	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	102	[NT]
TRH >C ₃₄ - C ₄₀	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	88	[NT]
Surrogate o-Terphenyl	%		Org-020	99	[NT]	[NT]	[NT]	[NT]	101	[NT]

Client Reference: Metgasco - Cervantes 01

QUALITY CONTROL: Dissolved Metals in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	278628-2
Date prepared	-			22/03/2022	1	22/03/2022	22/03/2022		22/03/2022	22/03/2022
Date analysed	-			22/03/2022	1	22/03/2022	22/03/2022		22/03/2022	22/03/2022
Aluminium-Dissolved	mg/L	0.01	METALS-022	<0.01	1	<0.01	<0.01	0	110	111
Arsenic-Dissolved	mg/L	0.001	METALS-022	<0.001	1	0.002	0.002	0	104	111
Boron-Dissolved	mg/L	0.02	METALS-022	<0.02	1	0.39	0.39	0	105	92
Barium-Dissolved	mg/L	0.001	METALS-022	<0.001	1	0.13	0.12	8	98	97
Beryllium-Dissolved	mg/L	0.0005	METALS-022	<0.0005	1	<0.0005	<0.0005	0	104	119
Cadmium-Dissolved	mg/L	0.0001	METALS-022	<0.0001	1	<0.0001	<0.0001	0	99	105
Chromium-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	103	105
Cobalt-Dissolved	mg/L	0.001	METALS-022	<0.001	1	0.004	0.004	0	111	106
Copper-Dissolved	mg/L	0.001	METALS-022	<0.001	1	0.003	0.003	0	106	97
Iron-Dissolved	mg/L	0.01	METALS-022	<0.01	1	0.85	0.81	5	114	122
Mercury-Dissolved	mg/L	0.00005	METALS-021	<0.00005	1	<0.00005	<0.00005	0	104	102
Lithium-Dissolved	mg/L	0.0005	METALS-022	<0.0005	1	0.064	0.063	2	108	104
Manganese-Dissolved	mg/L	0.005	METALS-022	<0.005	1	0.37	0.35	6	105	117
Molybdenum-Dissolved	mg/L	0.001	METALS-022	<0.001	1	0.001	0.001	0	101	115
Nickel-Dissolved	mg/L	0.001	METALS-022	<0.001	1	0.004	0.004	0	107	97
Lead-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	103	93
Selenium-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	106	112
Strontium-Dissolved	mg/L	0.001	METALS-022	<0.001	1	6.6	6.3	5	102	108
Titanium-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	109	115
Uranium-Dissolved	mg/L	0.0005	METALS-022	<0.0005	1	0.0027	0.0027	0	105	100
Vanadium-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	105	115
Zinc-Dissolved	mg/L	0.001	METALS-022	<0.001	1	0.001	0.002	67	104	108

Client Reference: Metgasco - Cervantes 01

QUALITY CONTROL: Total Metals in water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date digested	-			22/03/2022	4	22/03/2022	22/03/2022		22/03/2022	[NT]
Date analysed	-			22/03/2022	4	22/03/2022	22/03/2022		22/03/2022	[NT]
Arsenic-Total	mg/L	0.001	METALS-022	<0.001	4	<0.001	<0.001	0	106	[NT]
Boron-Total	mg/L	0.02	METALS-022	<0.02	4	0.04	0.03	29	105	[NT]
Barium-Total	mg/L	0.001	METALS-022	<0.001	4	<0.001	<0.001	0	102	[NT]
Iron-Total	mg/L	0.01	METALS-022	<0.01	4	<0.01	<0.01	0	112	[NT]
Lithium-Total	mg/L	0.0005	METALS-022	<0.0005	4	<0.0005	<0.0005	0	110	[NT]
Manganese-Total	mg/L	0.005	METALS-022	<0.005	4	<0.005	<0.005	0	108	[NT]
Strontium-Total	mg/L	0.001	METALS-022	<0.001	4	<0.001	<0.001	0	97	[NT]
Zinc-Total	mg/L	0.001	METALS-022	<0.001	4	<0.001	0.002	67	107	[NT]

Client Reference: Metgasco - Cervantes 01

QUALITY CONTROL: Methane in water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			22/03/2022	1	22/03/2022	22/03/2022		22/03/2022	[NT]
Date analysed	-			22/03/2022	1	22/03/2022	22/03/2022		22/03/2022	[NT]
Methane	µg/L	5	Ext-054	<5	1	<5	<5	0	94	[NT]
Ethane	µg/L	5	Ext-054	<5	1	<5	<5	0	100	[NT]

Result Definitions	
NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

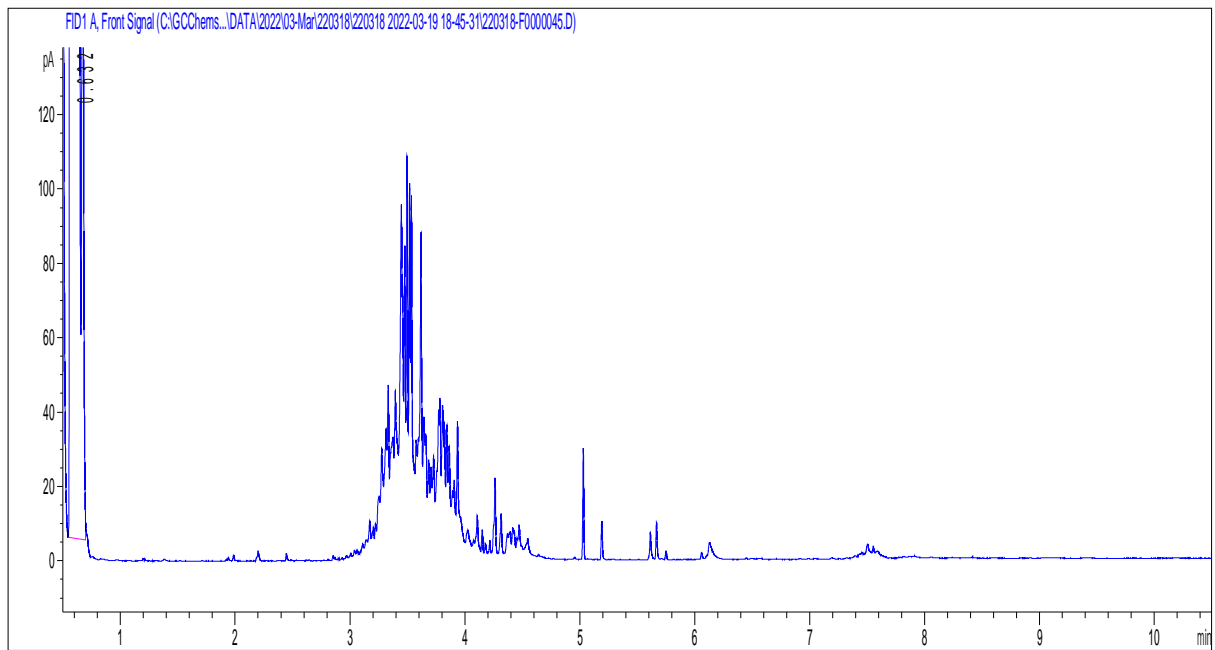
Measurement Uncertainty estimates are available for most tests upon request.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Methane and Ethane analysis conducted by Envirolab Services Pty Ltd, NSW, report reference 291351.

278628-1 (MW1)



CHAIN OF CUSTODY - Client

Client: Gemec
Project Mgr: Nicolo Jelovsek
Sampler: Nicolo Jelovsek
Address: 1/25 Foss St Palmyra 6157
Email: nicolo@gemec.com.au, goran@gemec.com.au
Phone: 08 9339 8449 / 0439 093 980



Client Project Name and Number: Metgasco - Cervantes 01

Location: Lot 12174 plan 39607 Mt Adams, WA

MPL Quote No: 20P329

Date results required:
Or choose: standard / 1 day / 2 day / 3 day

Note: Inform lab in advance if urgent turnaround is required - surcharge applies

MPL Laboratories
Address: 16-18 Hayden Crt Myaree 6154
Phone: 08 9317 2505
Fax: 08 9317 4163
E-mail: lab@mpl.com.au



Sample information

Analyses Required

Comments

MPL Sample ID	Client Sample ID	Depth (m)	Date sampled	Time	Type of sample	Gemec Suite 1 (MBTEXN, TRH, dissolved metals)	Gemec Suite 2 (MBTEXN, TRH, dissolved metals, CrVI-LL)	Ionic Balance	Extended Nutrient Suite	pH	EC	TDS (grav.)	MBTEXN & TRH	VTRH (C6-C9) + BTEx	8 metals: As, B, Ba, Fe, Li, Mn, Sr, Zn (total) - excl.	Methane & Ethane	Dissolved metals (as per Gemec Suite 1)
	Split	13.8	15.03.2022	-	Water	X											

Email CoC with report also please
Sample containers labelled Metgasco
Please send Split sample to Envirolab Sydney
Gemec Suite 1 dissolved metals: Al As B Ba Be Cd Cr Co Cu Fe Hg Li Mn Mo Ni Pb Se Sr Ti U V Zn
Extended Nutrient Suite: Total N, NH3, NO3, NO2, TKN (calc.), Total P, PO4

Envirolab Services
112 Ashby St
Cherrywood NSW 2537
PH: (02) 9941 0900
Job ID: 291352
Date Received: 18-3-22
Time Received: 1500
Received By: TJHAW
Temp: Cool/Ambient
Cooling: Ice/Coolers
Security: Intact/Broken/None

Relinquished by (company): Gemec
Print Name: Nicolo Jelovsek
Date & Time: 17.03.2022 / 08:00
Signature: *[Signature]*

Received by (company): MPL
Print Name: ECS 540
Date & Time: 17/3/22 @ 1000
Signature: *[Signature]*

Laboratory Use Only:
Samples Received: Cool / ambient
Temperature Received at: 15 (if applicable)
Transported by: Hand delivered / courier

SAMPLE RECEIPT ADVICE

Client Details

Client	Gemec
Attention	Nicolo Jelovsek

Sample Login Details

Your reference	Metgasco - Cervantes 01, Lot 12174 Plan 39607
Envirolab Reference	291352
Date Sample Received	28/03/2022
Date Instructions Received	28/03/2022
Date Results Expected to be Reported	25/03/2022

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	1 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	15
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie

Phone: 02 9910 6200
Fax: 02 9910 6201
Email: ahie@envirolab.com.au

Jacinta Hurst

Phone: 02 9910 6200
Fax: 02 9910 6201
Email: jhurst@envirolab.com.au

Analysis Underway, details on the following page:



Envirolab Services Pty Ltd

ABN 37 112 535 645

12 Ashley St Chatswood NSW 2067

ph 02 9910 6200 fax 02 9910 6201

customerservice@envirolab.com.au

www.envirolab.com.au

Sample ID	All metals in water-dissolved
Split	✓

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

Requests for longer term sample storage must be received in writing.

Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

TAT for Micro is dependent on incubation. This varies from 3 to 6 days.



Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 291352

Client Details

Client	Gemec
Attention	Nicolo Jelovsek
Address	1/25 Foss St, Palmyra, WA, 6157

Sample Details

Your Reference	<u>Metgasco - Cervantes 01, Lot 12174 Plan 39607</u>
Number of Samples	1 Water
Date samples received	18/03/2022
Date completed instructions received	18/03/2022

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	25/03/2022
Date of Issue	25/03/2022
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Giovanni Agosti, Group Technical Manager

Authorised By

Nancy Zhang, Laboratory Manager

All metals in water-dissolved		
Our Reference		291352-1
Your Reference	UNITS	Split
Date Sampled		15/03/2022
Type of sample		Water
Date prepared	-	23/03/2022
Date analysed	-	23/03/2022
Aluminium-Dissolved	µg/L	20
Arsenic-Dissolved	µg/L	2
Boron-Dissolved	µg/L	360
Barium-Dissolved	µg/L	130
Beryllium-Dissolved	µg/L	<0.5
Cadmium-Dissolved	µg/L	<0.1
Chromium-Dissolved	µg/L	<1
Cobalt-Dissolved	µg/L	4
Copper-Dissolved	µg/L	3
Iron-Dissolved	µg/L	720
Mercury-Dissolved	µg/L	<0.05
Lithium-Dissolved	µg/L	57
Manganese-Dissolved	µg/L	340
Molybdenum-Dissolved	µg/L	2
Nickel-Dissolved	µg/L	2
Lead-Dissolved	µg/L	<1
Selenium-Dissolved	µg/L	<1
Strontium-Dissolved	µg/L	6,500
Titanium-Dissolved	µg/L	<1
Uranium-Dissolved	µg/L	2.8
Vanadium-Dissolved	µg/L	<1
Zinc-Dissolved	µg/L	6

Method ID	Methodology Summary
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.

Client Reference: Metgasco - Cervantes 01, Lot 12174 Plan 39607

QUALITY CONTROL: All metals in water-dissolved				Duplicate			Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	[NT]
Date prepared	-			23/03/2022	1	23/03/2022	23/03/2022		23/03/2022	[NT]
Date analysed	-			23/03/2022	1	23/03/2022	23/03/2022		23/03/2022	[NT]
Aluminium-Dissolved	µg/L	10	Metals-022	<10	1	20	[NT]		96	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	2	[NT]		98	[NT]
Boron-Dissolved	µg/L	20	Metals-022	<20	1	360	[NT]		111	[NT]
Barium-Dissolved	µg/L	1	Metals-022	<1	1	130	[NT]		94	[NT]
Beryllium-Dissolved	µg/L	0.5	Metals-022	<0.5	1	<0.5	[NT]		109	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	[NT]		99	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		96	[NT]
Cobalt-Dissolved	µg/L	1	Metals-022	<1	1	4	[NT]		95	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	3	[NT]		96	[NT]
Iron-Dissolved	µg/L	10	Metals-022	<10	1	720	[NT]		94	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	106	[NT]
Lithium-Dissolved	µg/L	1	Metals-022	<1	1	57	[NT]		91	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	<5	1	340	[NT]		96	[NT]
Molybdenum-Dissolved	µg/L	1	Metals-022	<1	1	2	[NT]		94	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	2	[NT]		96	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		98	[NT]
Selenium-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		98	[NT]
Strontium-Dissolved	µg/L	1	Metals-022	<1	1	6500	[NT]		97	[NT]
Titanium-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		98	[NT]
Uranium-Dissolved	µg/L	0.5	Metals-022	<0.5	1	2.8	[NT]		98	[NT]
Vanadium-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		97	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	6	[NT]		97	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Appendix B – Supporting Data

Land Title Details

DWER Groundwater Licence Information

DWER WIR Information

Monitoring Well Construction Information

Field Equipment Calibration Certificate

Field Data Sheets

HSL Application Checklist

LAND TITLE DETAILS

WESTERN



AUSTRALIA

REGISTER NUMBER 12174/DP39607	
DUPLICATE EDITION N/A	DATE DUPLICATE ISSUED N/A

RECORD OF QUALIFIED CERTIFICATE
OF
CROWN LAND TITLE

VOLUME FOLIO
LR3110 928

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997
NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE OF WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts
REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 12174 ON DEPOSITED PLAN 39607

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE VESTED UNDER STATUTE

PRIMARY INTEREST HOLDER: NATIONAL PARKS AND NATURE CONSERVATION AUTHORITY
(XE F816234) REGISTERED 27/2/1995

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. N468019 RESERVE 24496 FOR THE PURPOSE OF PROTECTION OF FLORA REGISTERED 26/10/2016.
J333114 AMENDMENT OF RESERVE. RESERVE AMENDED TO EXCLUDE PORTION COMPRISED IN
LOT 12793 ON DEPOSITED PLAN 218516. REGISTERED 23/6/2005.
- N468019 AMENDMENT OF RESERVE. RESERVE AMENDED. REGISTERED 26/10/2016.
2. F816234 VESTED. PURSUANT TO SECTION 7 (2) OF THE CONSERVATION AND LAND MANAGEMENT
ACT 1984. REGISTERED 27/2/1995.
3. J277694 TAKING ORDER. THE DESIGNATED PURPOSE OF AN INTEREST TAKEN FOR AN EASEMENT
IS EASEMENT FOR THE PURPOSES OF CONSTRUCTING AND OPERATING PETROLEUM AND
PRODUCED WATER PIPELINES AND INCIDENTAL INFRASTRUCTURE. REGISTERED 9/5/2005.
4. J277695 EASEMENT TO ROC OIL (WA) PTY. LTD. REGISTERED 9/5/2005.
5. J333112 PORTION COMPRISED IN LOT 12793 ON DP218516 TO VOL 3133 FOL 12. REGISTERED
23/6/2005.
6. N468021 PORTION TAKEN AS COMPRISED IN LOT 700 ON DP408197. REGISTERED 26/10/2016.
7. N468022 PORTION AS COMPRISED IN LOT 700 ON DP408197 AMALGAMATED INTO LOT 102 ON PLAN
23209 TO VOL 2165 FOL 411. REGISTERED 26/10/2016.
8. O422679 MEMORIAL. LAND ADMINISTRATION ACT 1997. SECTION 17. REGISTERED 10/6/2020.

Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
Lot as described in the land description may be a lot or location.
(2) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.

END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE
QUALIFIED

REGISTER NUMBER: 12174/DP39607

VOLUME/FOLIO: LR3110-928

PAGE 2

(3) The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP39607
PREVIOUS TITLE:	LR3098-892
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF IRWIN
RESPONSIBLE AGENCY:	DEPARTMENT OF BIODIVERSITY, CONSERVATION AND ATTRACTIONS (SCLM)

NOTE 1: A000001A CORRESPONDENCE FILE 05153-1948-10RO.

NOTE 2: SUBJECT TO SURVEY - NOT FOR ALIENATION PURPOSES

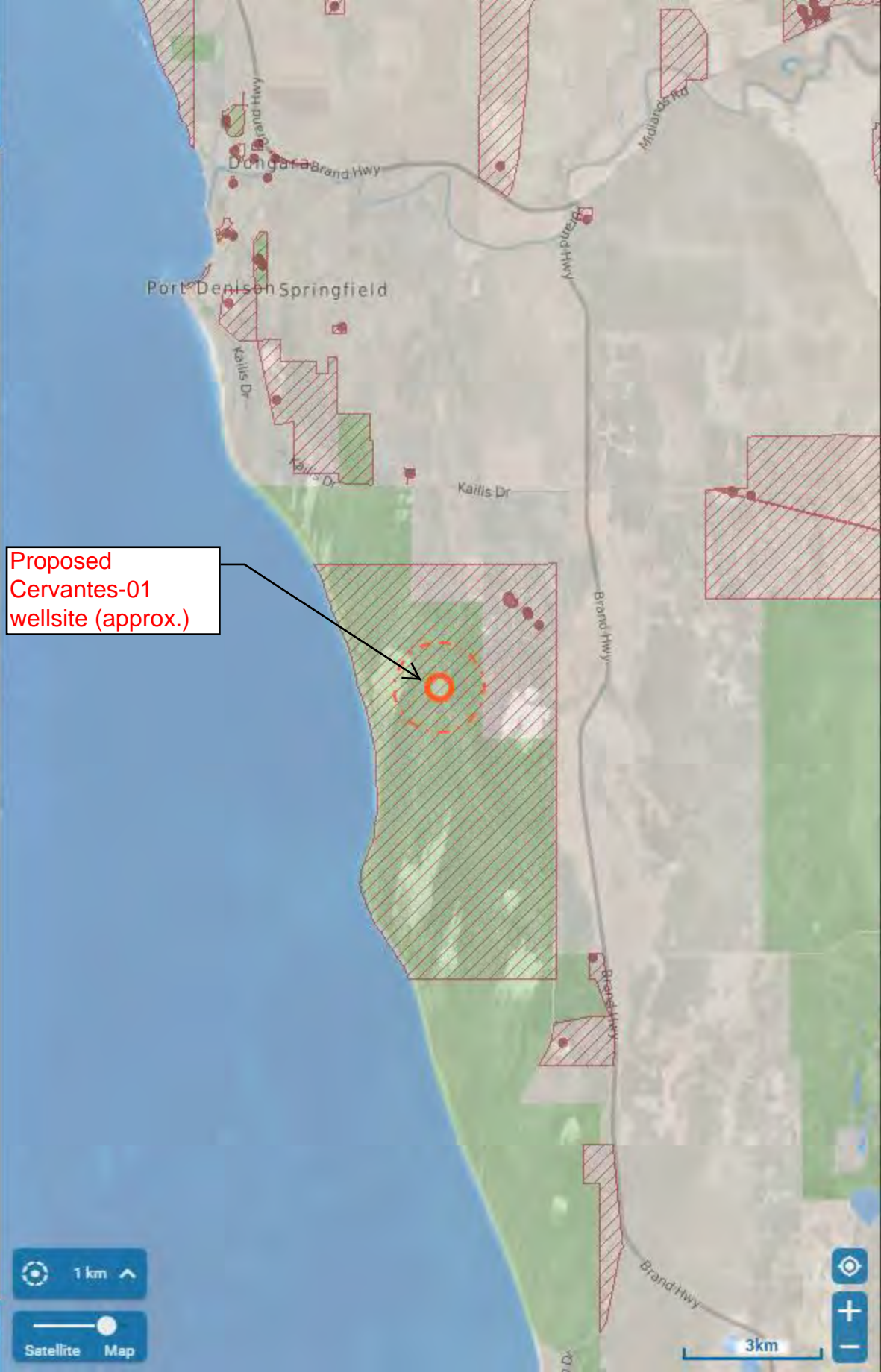
DWER WATER LICENCE INFORMATION

← Licence details

Selected 1 of 2 > ⚡ 📍 📏

WRI_NUMBER:	202619
INSTRUMENT_TYPE:	Groundwater Licence
ISSUE_DATE:	28/3/2019
EXPIRY_DATE:	20/6/2025
LICENCE_ALLOCATION:	12800 KL
ALL_PARTIES:	RCMA Australia Pty Ltd
POSTAL_ADD:	3/49 Ord St West Perth WA 6005 Australia
GW_AREA:	Arrowsmith
SUB_AREA:	Dongara
AQUIFER:	Perth - Superficial Swan
DIVISION:	
BASIN:	
RESOURC:	
LICENCE_ADDRESS:	L 14
SECURITY_INT:	No
CONVICT_EXIST:	No
AGREE_EXIST:	No
NOTATIONS_EXIST:	No
DIRECTIONS_EXIST:	No

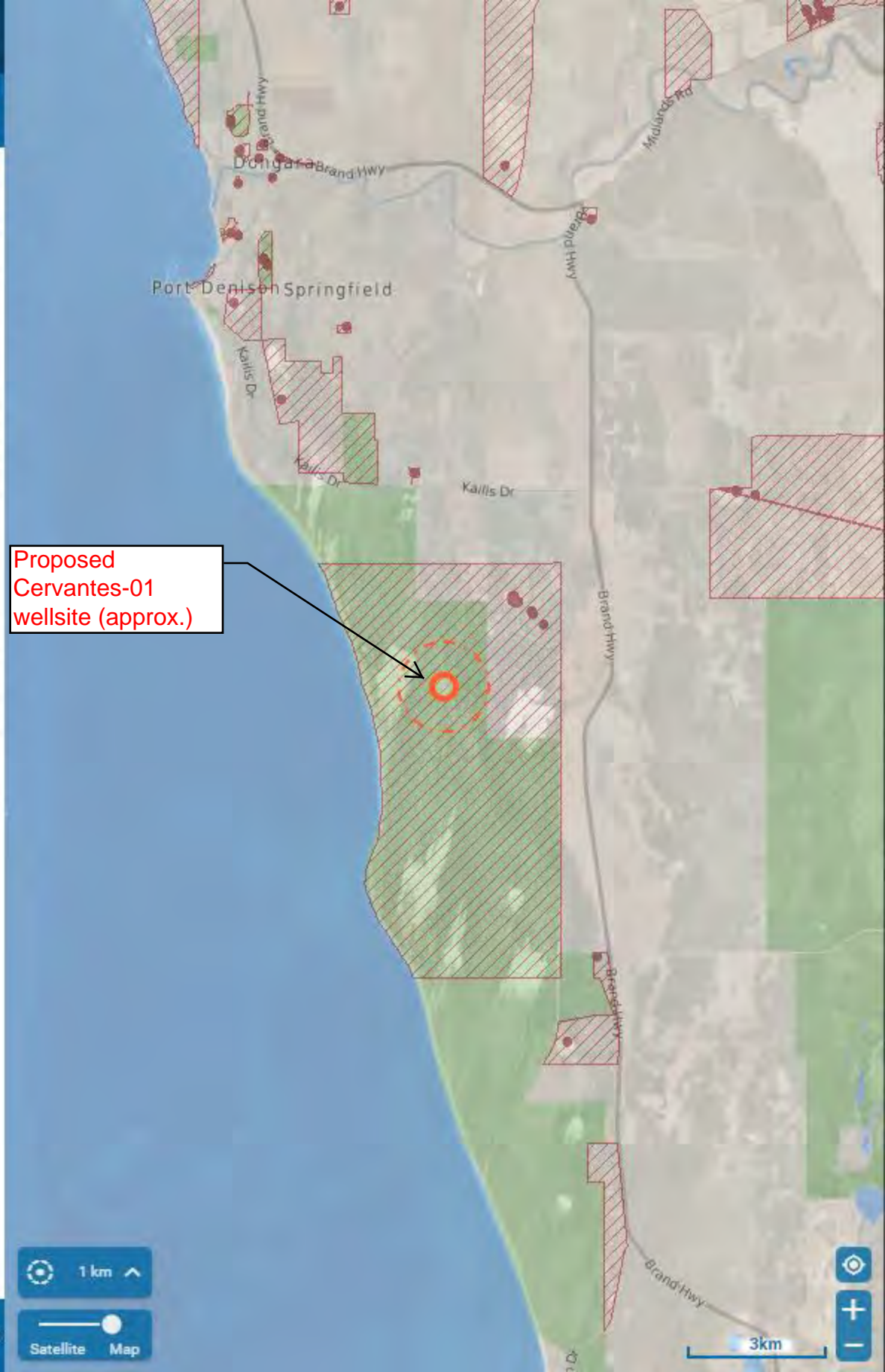
Proposed
Cervantes-01
wellsite (approx.)



← Licence details

✓ Selected < 2 of 2 ⚡ 📍 📍

WRI_NUMBER:	202801
INSTRUMENT_TYPE:	Groundwater Licence
ISSUE_DATE:	28/5/2019
EXPIRY_DATE:	27/5/2029
LICENCE_ALLOCATION:	450000 KL
ALL_PARTIES:	RCMA Australia Pty Ltd
POSTAL_ADD:	3/49 Ord St West Perth WA 6005 Australia
GW_AREA:	Arrowsmith
SUB_AREA:	Dongara
AQUIFER:	Perth - Yarragadee North
DIVISION:	
BASIN:	
RESOURC:	
LICENCE_ADDRESS:	L 14
SECURITY_INT:	No
CONVICT_EXIST:	No
AGREE_EXIST:	No
NOTATIONS_EXIST:	No
DIRECTIONS_EXIST:	No



Proposed Cervantes-01 wellsite (approx.)

1 km ^
Satellite Map

3km
📍 + -



Water Information Reporting

Site Filter (133132 available/6 selected)



Site Category
All

Filtering Criteria
Show Advanced

Keyword:

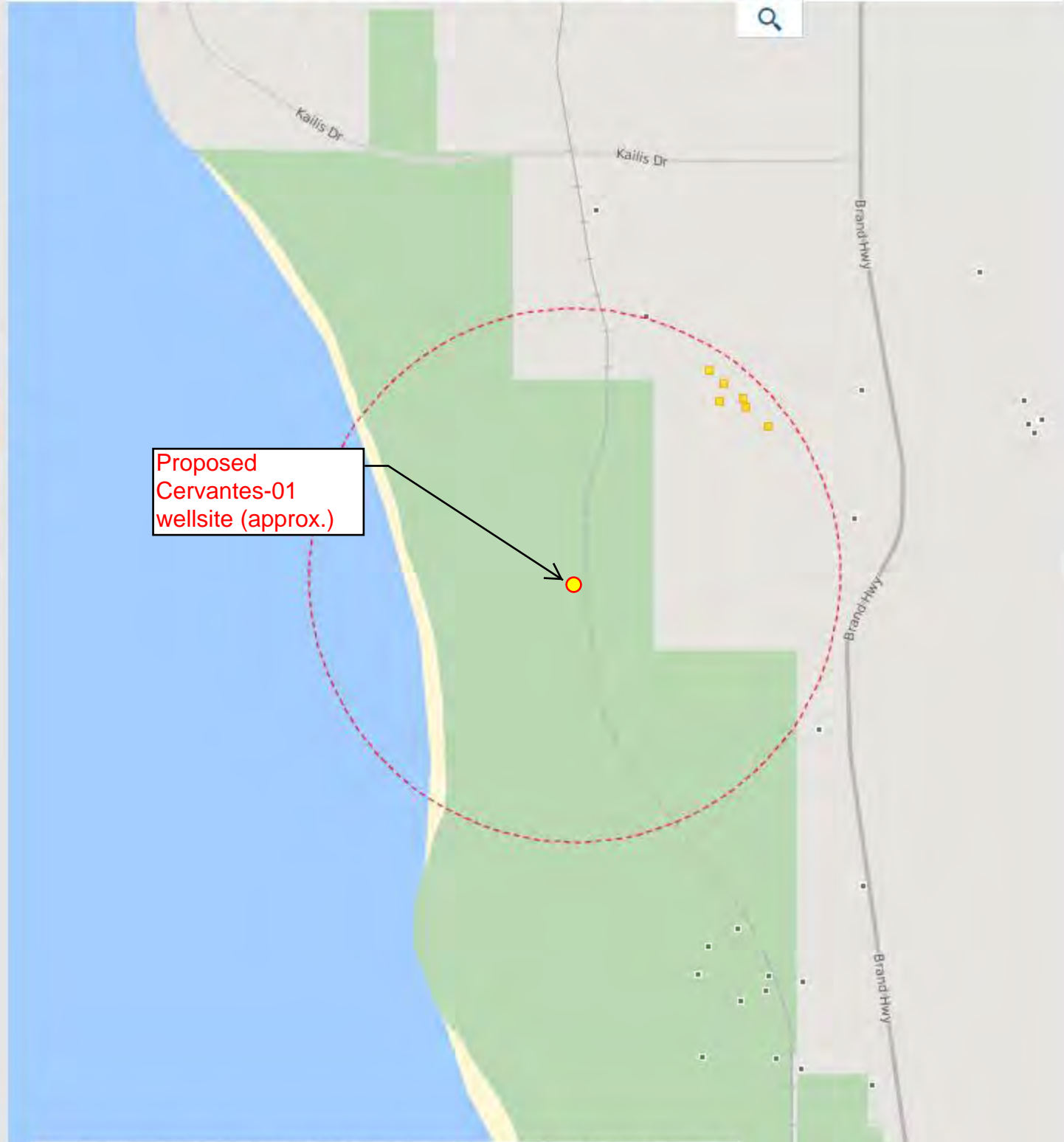
Data Category
All

Apply Clear

Site Cart (0 sites selected)



Quick Help



Proposed Cervantes-01 wellsite (approx.)

Longitude: 114.960, Latitude: -29.400 / Easting: 302066, Northing: 6745953, Zone: 50

BOM GDE & IDE INFORMATION



Proposed Cervantes-01 wellsite (approx.)

Terrestrial GDE (no data)



No ecosystems analysed

Terrestrial GDE



Known GDE (regional study)



High potential GDE (regional study)



Moderate potential GDE (regional study)



Low potential GDE (regional study)



Unclassified potential GDE (regional study)



High potential GDE (national assessment)



Moderate potential GDE (national assessment)



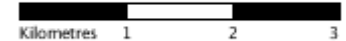
Low potential GDE (national assessment)



Unclassified potential GDE (national assessment)



1:70,786



Data Source: Bureau of Meteorology, Geoscience Australia and State/Territory lead water agencies. Refer to metadata for further information: [Click here](#)

Australian Albers GDA94





Proposed Cervantes-01 wellsite (approx.)

Terrestrial GDE (no data)



No ecosystems analysed

Terrestrial Inflow Dependent Ecosystem (IDE), reliant on water in addition to rainfall



Highly likely to be an ID

Likely to be an IDE

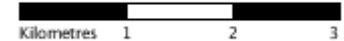
Terrestrial Inflow Dependent Ecosystem (IDE), reliant on water in addition to rainfall



Highly likely to be an ID



1:70,786



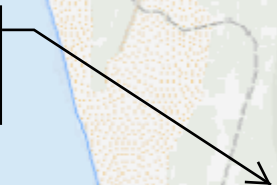
Data Source: Bureau of Meteorology, Geoscience Australia and State/Territory lead water agencies. Refer to metadata for further information: [Click here](#)

Australian Albers GDA94





Proposed Cervantes-01 wellsite (approx.)



- Water supply bores
 - Water supply
- Stock and domestic bores
 - Stock and domestic
- Monitoring bores
 - Monitoring
- Commercial and industrial bores
 - Commercial and industri
- Unknown bores
 - Unknown
- Irrigation bores
 - Irrigation



Data Source: Bureau of Meteorology, Geoscience Australia and State/Territory lead water agencies. Refer to metadata for further information: [Click here](#)

Australian Albers GDA94



WELL COMPLETION REPORT

FIELD EQUIPMENT CALIBRATION CERTIFICATES

CALIBRATION CERTIFICATE

Instrument: YSI Pro Plus - multiparameter water quality meter

Serial No: 17E103511

Equipment Report

Component	Checked
YSI PRO+ Display	<input checked="" type="checkbox"/>
YSI Quatro Sonde	<input checked="" type="checkbox"/>
Probe Guard	<input checked="" type="checkbox"/>
Manual	<input checked="" type="checkbox"/>

Calibration Details

Sensor	Calibration Undertaken	Accuracy	Pass
pH	pH4.00	±0.2	<input checked="" type="checkbox"/>
	pH7.00	±0.2	<input checked="" type="checkbox"/>
Conductivity	718µS/cm at 25°C	±0.5%	<input checked="" type="checkbox"/>
	Checked Zero in air		<input checked="" type="checkbox"/>
TDS	Auto calibrated using above EC value x 0.67	±1%	<input checked="" type="checkbox"/>
Dissolved Oxygen	100% Saturation	±2%	<input checked="" type="checkbox"/>
	Pressure Compensation	1022 hPa	<input checked="" type="checkbox"/>
Redox	231mV	±20mV	<input checked="" type="checkbox"/>
Temperature	Factory Calibrated	±0.2°C	<input checked="" type="checkbox"/>

This instrument has been calibrated in accordance with the manufacturers calibration procedure as recommended in the instrument service manual.

Date: 05.02.2022

Name: Nicolo Jelovsek

Signature: 



Calibration Certificate

AirMet Scientific P/L
Unit 8 Rowallan Street
Osborne Park
WA 6017, Australia
Tel: 08 9202 6600
Fax: 08 9202 6633

This document certifies that the instrument detailed has been calibrated to the parameters

Certificate Print Date: 23-Feb-2022 Call ID / Order No: 254239
Calibration Date: 23-Feb-2022 Job No / Pack No: S2542390001
Next Calibration Due: 23-Feb-2023

Customer: Gemec-ID 602526 **Serial No:** T-105368
Description: PhoCheck Tiger Li-ion Battery Data Logging, B

Calibration Summary

Frequency: Yearly **Temp:** 22°C **As Found:** In Tolerance **Result:** Pass
Humidity: 45% **Certificate:** S2542390001

<u>Desc</u>	<u>As Found</u>		<u>As Left (Cal Status)</u>	
	<u>Actual</u>	<u>Result</u>	<u>Actual</u>	<u>Result</u>
Isobutylene 0ppm	0.0	Pass	0.0	Pass
Isobutylene 100ppm	100.6	Pass	100.6	Pass

<u>Equip ID</u>	<u>Standard Used</u> <u>Description</u>	<u>Valid Until</u>	<u>Cert</u>
WA237	100ppm Isobutylene	01/02/2025	
WA284	Zero Air 20.9 %vol (THC <1ppm)	01/03/2026	

Completed By: Eoin Doyle

Signed: 

FIELD DATA SHEETS

Groundwater Sample Log & Field Chemical Data

m

Site / location: CELUENTES 9 Sampler: G.P. Date: 15.3.22 Casing Diameter: 50mm

Well ID	Time	SWL (mBTOC)	Depth of well (mBTOC)	Purged volume (L)	Temp (°C) ±3%	DO (mg/L) ±10%/0.2	EC (µS/cm) ±3%	TDS (mg/L) ±3%	pH ±0.1	ORP ±10mv	Odour	Sheen	Colour	Turbidity	Sediment load	Notes
	12:20	4084	13830	0	24.2	11.00	7906	5293	6.88	-70	SLIGHT	NO	THICK	MED.	MED.	STRONG SULPHUR ODOR, VERY VISCOS AT START UP. PURGED FOR 1:30 MIN TO GET CLEAR.
				10	24.2	2.00	7900	5252	6.87	-71						
				20	24.2	1.31	7891	5462	6.88	-71						
	13:40			36L	24.0	0.72	7882	6282	6.87	-72						
				40	24.0	0.61	7793	5993	6.89	-112						
				48	24.0	0.61	7661	5270	6.88	-180						
				50	24.1	0.37	7655	5261	6.87	-189						
	14:05			52	24.1	0.36	7650	5260	6.88	-197						
				54	24.1	0.37	7652	5259	6.89	-198	LIGHT SWIRL	NO	CLEAR	VERY LOW	NO	

m

Dup / Split collected from well #:

Sampling method (circle): Low Flow / disposable bailer / Hydra Sleeve / bore pump

HSL APPLICATION CHECKLIST

HSL APPLICATION CHECKLIST

INTRODUCTION

This checklist is designed to allow assessors to conceptualise potential issues with contaminated land, and how to apply the HSLs. The checklist is designed to trigger responses from the assessor in determining whether the HSLs are applicable or whether consideration should be given to a more site-specific determination of risk. It highlights the key limitations and considerations that are common to contamination assessments and risk assessment.

The checklist summarises the key items from this Application Document.
It is recommended that the Application Document be read in conjunction with the use of this Checklist.

Summary of Steps

- Step 1 Identification of key limitations to the application of health screening levels
- Step 2 Identification of key receptors and scenarios
- Step 3 Identification of relevant soil type
- Step 4 Identification of impacted media and depths
- Step 5 Identification of source concentrations to be compared with health screening levels
- Step 6 Selecting appropriate HSL and consideration of combining vapour intrusion and direct contact exposure
- Step 7 Applying adjustments to the HSLs based on vapour biodegradation, soil organic carbon content, air exchange rate, and soil moisture content
Consideration given to soil saturation and water solubility limits
- Step 8 Adjustments for cancer risk assessment - modification of acceptable cancer risk level, assessment of cumulative cancer risk

Step 1 – Limitations to HSLs	Comments
<p>Assessing contamination in soil and groundwater should only be carried out by a qualified professional.</p> <p>Are guidelines relevant for site? Check the following limitations:</p>	
<p>Have chemicals other than petroleum hydrocarbons been identified at the site? → Y May consider site-specific risk assessment (refer to Section 5.2 of the Application Document)</p> <p>Is the groundwater to be used for irrigation purposes? → N May consider site-specific risk assessment (refer to Section 2.4.5 of the Application Document)</p> <p>Is the site conservation land? → Y May be required to also assess ecological values (refer to Section 2.4.6 of the Application Document)</p> <p>Is the depth to groundwater impact less than 2m bgs ? → N May consider site-specific risk assessment for direct contact May consider soil vapour sampling for vapour intrusion (refer to Section 2.4.2 of the Application Document)</p> <p>Has significant odour been observed at the site? → Y May be required to also assess odour for sensitive land uses (refer to Section 5.4 of the Application Document)</p> <p>Is the identified chemical a result of a solvent spill rather than petroleum spill/leak? → N HSLs may be used where saturation point is not considered (refer to Section 5.3 of the Application Document)</p> <p>Is the identified contamination an atypical petroleum mixture? → N May consider site-specific risk assessment to consider cumulative effects between chemicals (refer to Section 3.6 of the Application Document)</p> <p>Is the soil source thickness significantly different than 2 m? → Y For small source thicknesses, HSLs may be overly conservative if source fully depletes. For larger thicknesses HSLs may not adequately characterise risk, however lateral extent of contamination should also be considered. A site-specific HRA may be considered. (refer to Section 2.4.7 of the Application Document)</p> <p>Does the building have a crawl space rather than slab-on-ground construction? → NA HSLs may be used as likely to be conservative. However, for situations where habitants may be exposed in crawl space area such as spaces under dwellings which incorporate garages/workshop then consideration may be given to ambient air sampling. (refer to Section 2.3.4 of the Application Document)</p> <p>Does the building have or is likely to have a habitable basement? → NA May consider site-specific risk assessment (refer to Section 2.3.3 of the Application Document)</p>	<p>Baseline soil & groundwater assessment Biodegradable drilling polymer</p> <p>Adjacent nature reserve</p> <p>Naturally occurring sulphurous odours</p> <p>Drilling polymer used throughout monitoring well installation</p> <p>No structures on-site</p>
<p><i>Note that the HSLs may be used for assessing health risk. In addition to this assessment, legislation requirements still need to be fulfilled which may include other considerations and assessments. Such considerations may include:</i></p> <ul style="list-style-type: none"> - Assessment of environmental values and ecological impacts - Consideration of sustainability issues - Risks for extraction and use of groundwater - Soil source ongoing source to groundwater contamination - Local planning requirements, such as sensitive uses under commercial zones, or future land use zones - Social impacts and consultation with stakeholders 	

Step 2 – Identify receptors and scenarios to be considered

Check the receptors and scenarios to be assessed. Note that receptors and scenarios may require consideration of future land use planning and local regulations pertaining to site redevelopment.

- | | |
|--|--|
| <p>HSL-A <input type="checkbox"/> Residential use (refer to Sections 2.1.1 and 2.3.1 of the Application Document)</p> <p>HSL-A <input type="checkbox"/> Low-Density Residential – assumes access to soils with no management controls on site. Assessment may consider surface soils with direct contact, intrusive maintenance worker protection, and consider using surface soil HSL for all soils down to 3 m depth to protect uncontrolled excavation of contamination.</p> <p>HSL-B <input type="checkbox"/> High-Density Residential – assumes limited access to surface soils with management controls on site. Assessment may consider surface soils/dust with limited direct contact. Intrusive maintenance workers may be protected under suitable site management plan.</p> <p>HSL-A <input type="checkbox"/> Medium-Density Residential with grassed open space – assumes access to soils with management controls on site. Assessment may consider surface soils with direct contact and subsurface soils through vapour intrusion. Intrusive maintenance workers may be protected under suitable site management plan.</p> <p>HSL-B <input type="checkbox"/> Medium-Density Residential with permanent paving open space – assumes limited access to soils with management controls on site. Assessment may consider surface soils/dust with limited direct contact. Intrusive maintenance workers may be protected under suitable site management plan.</p> <p>HSL-A (for VI) <input type="checkbox"/> Low- or Medium-Density Residential with single basement garage – for vapour intrusion, low-density residential (HSL-A) may apply due to low air exchange rate for basement garage. HSL depth is displaced by depth of basement. For soil direct contact HSLs, select from above medium density scenarios based on access to soils. Intrusive maintenance workers may be protected under suitable site management plan (refer to Section 2.3.3 of the Application Document).</p> <p>HSL-A or HSL-B (for DC)</p> <p>HSL-D (for VI) <input type="checkbox"/> Medium- or High-Density Residential with communal basement car park – assumes no access to soils with management controls on site. HSL depth is displaced by depth of basement. Intrusive maintenance workers may be protected under suitable site management plan. Note that areas outside of the basement footprint may be required to be assessed as a building without basement and with limited direct contact with soil. Also, limited exposure time for basement users and therefore HSL for Commercial Worker may be used for vapour intrusion (refer to Section 2.3.3 of the Application Document).</p> <p>HSL-B (for DC outside footprint)</p> <p>HSL-C <input type="checkbox"/> Recreational / Public Open Space (refer to Section 2.1.2 of the Application Document)</p> <p><input type="checkbox"/> Parks, ovals, pedestrian areas</p> <p><input checked="" type="checkbox"/> National parks, conservation areas – may be required to also assess ecological values (refer to Section 2.4.6 of the Application Document)</p> <p>HSL-D <input type="checkbox"/> Commercial / Industrial Workers (refer to Section 2.1.3 of the Application Document) – considers only healthy adults under normal working conditions. Does not consider sensitive commercial uses such as schools, day care centres and medical practices.</p> <p><input type="checkbox"/> Commercial sensitive users – may consider using residential HSLs or a site-specific HRA (refer to Section 2.4.1 of the Application Document)</p> <p><input type="checkbox"/> Agricultural land – may consider a site specific HRA (refer to Section 2.4.5 of the Application Document)</p> <p><input type="checkbox"/> Shallow intrusive workers down to 1 m deep. May require assessment of direct contact for soils surface to <2 m (refer to Sections 2.1.4 and 2.4.3 of the Application document)</p> <p><input type="checkbox"/> Deep intrusive workers down to >1 m deep, such as sewer. Should be managed with appropriate procedures and work practices for confined spaces (refer to Section 2.4.4 of the Application Document)</p> | <p>—————→ <input type="checkbox"/> N May not need to consider health risks to intrusive workers</p> |
|--|--|

Is a site management plan (that includes specific occupational hazard management for works on the site) to be implemented on the site (controlled site)?

N May not need to consider health risks to intrusive workers

Step 3 – Identify soil type relevant to site (soils above impacts in soil and/or groundwater)	Comments
<p>Note the following before selecting soil type for use in assessment:</p> <ol style="list-style-type: none"> 1. The prime parameter that influences the value of the HSL is the air filled porosity and volatility of the specific chemical. The higher the air filled porosity the greater the potential for volatile chemicals to migrate vertically through the soil profile. 2. The selection of a generic soil type requires knowledge of the soil profile across the site. 3. The selection of generic soil types should take into account the predominant characteristics of the soil profile and depth of contamination. The generic soil types assume a uniform profile, which at many, if not all, sites will not be the case. Where the overlying profile is predominantly fine materials (clays) (i.e. > 50% for soil column), these may be considered as the generic soil type. If the profile has a significant proportion of loose/coarse materials (including backfill) (i.e. > 50%), these materials may be considered as the generic soil type. 4. Air filled porosity is affected by moisture content. The wetter the soil, the lower the air filled porosity. Generic soil types have assumed a typical moisture content for the profile typical of average soil conditions occurring at depth. Moisture content will vary greatly by location and season. Moisture content will also vary between sub-categories of soil, e.g. between sand and clayey sand. HSLs may be adjusted based on moisture content. This is done in Step 7. 5. The selection of appropriate soil type is discussed in Section 3.2 of the Application Document. <p>Is there one dominant soil type on the site (> 50% of soil column)? Or can a geological setting be conservatively identified (i.e. allowing greater vapour transport)?</p> <p style="text-align: right; margin-right: 20px;">→</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"><input checked="" type="checkbox"/></div> <div style="margin-right: 10px;">Y - Proceed</div> <div style="margin-right: 10px;"><input type="checkbox"/></div> <div>N - Consideration may be given to assuming the more conservative soil type, or may be given to a site-specific HRA (refer to Section 4.6 of the Application Document)</div> </div> <p>Has excavated area(s) been backfilled with more porous materials ?</p> <p style="text-align: right; margin-right: 20px;">→</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"><input type="checkbox"/></div> <div style="margin-right: 10px;">Y - Consideration should be given to adopting a more porous soil type (refer to Section 3.2 of the Application Document)</div> <div style="margin-right: 10px;"><input checked="" type="checkbox"/></div> <div>N - Proceed</div> </div> <p>Does the site lithology contain rock formations or soil with large cracks that can form preferential pathways?</p> <p style="text-align: right; margin-right: 20px;">→</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"><input type="checkbox"/></div> <div style="margin-right: 10px;">Y - The derived HSLs do not include lithologies with rock formations. Consideration may be given to using soil-vapour sampling or carrying out a site-specific HRA (refer to Section 4.6 of the Application Document)</div> <div style="margin-right: 10px;"><input checked="" type="checkbox"/></div> <div>N - Proceed</div> </div>	
<p>Identify HSL soil type relevant to site and assessment (above impacts)</p> <p>The soil profile properties have been based on a predominant soil texture grouping developed by the US Department of Agriculture. The 12 texture classes have been grouped into 3 groups: sand, silt and clay. The groupings of the classes are based on mean particle size and saturation porosities. Refer to Section 3.2 for further discussion on the soil properties.</p> <p>HSL soil type selected:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Sand – Properties selected to be representative of a coarse textured undisturbed soil profile. Consists of texture classes sand, sandy clay. <input type="checkbox"/> Silt – Properties selected to be representative of a coarse textured undisturbed soil profile. Consists of texture classes silt, silty clay. <input type="checkbox"/> Clay – Properties selected to be representative of a fine textured undisturbed soil profile. Consists of texture classes clay. <input type="checkbox"/> Other – Including soil with large cracks (preferential pathways) and fractured rock (basalt, sandstone, siltstone, limestone) - refer to Section 4.6 of the Application Document. Soil vapour measurement is preferred to soil or groundwater. Due to fractures and preferential vapour pathways in rock, consideration should be given to overlying weathered soil, or to using HSLs for surface soil in sand. <p>For soil assessment (texture classification) undertaken in accord with AS 1726 the classifications of sand, silt and clay may be applied as coarse, fine with liquid limit less than 50%, and fine with liquid limit greater than 50% respectively.</p> <p>Where there is uncertainty, laboratory analysis should be carried out. This may include parameters for detailed particle analysis and exact soil texture sub-class, and saturation porosity.</p>	

Step 4 – Impact media (cont.)	Comments
<p>Soil vapour</p> <p>Has soil vapour sampling been used to characterise vapour intrusion at the site? _____ →</p> <div style="display: flex; align-items: center; margin-left: 150px;"> <div style="border: 1px solid black; width: 15px; height: 15px; background-color: #e0f7fa; margin-right: 5px;"></div> Y - Proceed <div style="border: 1px solid black; width: 15px; height: 15px; background-color: #e0f7fa; margin-right: 5px; display: flex; align-items: center; justify-content: center;">X</div> N - Proceed to Step 5 </div> <p>Depth to soil impacts. Note if considering basements, depths need to be displaced e.g. a 3 m deep basement means surface to <1 m represents 3 m to <4 m. (Refer to Section 2.3.3 of the Application Document.)</p> <div style="display: flex; align-items: flex-start; margin-left: 20px;"> <div style="margin-right: 20px;"> <div style="border: 1px solid black; width: 15px; height: 15px; background-color: #fff9c4; margin-bottom: 2px;"></div> surface to <1 m <div style="border: 1px solid black; width: 15px; height: 15px; background-color: #fff9c4; margin-bottom: 2px;"></div> 1 m to <2 m <div style="border: 1px solid black; width: 15px; height: 15px; background-color: #fff9c4; margin-bottom: 2px;"></div> 2 m to <4 m <div style="border: 1px solid black; width: 15px; height: 15px; background-color: #fff9c4; margin-bottom: 2px;"></div> 4 m to <8 m <div style="border: 1px solid black; width: 15px; height: 15px; background-color: #fff9c4;"></div> 8 m and deeper </div> <div> <div style="border: 1px solid black; width: 15px; height: 15px; background-color: #fff9c4; margin-bottom: 2px; display: flex; align-items: center; justify-content: center;"> ■ Displacement due to basement </div> Distance of displacement (m) _____ </div> </div> <p>In using soil vapour sampling, please note the following:</p> <ol style="list-style-type: none"> 1) It is recommended that soil vapour samples be taken as laterally close to a vapour source as possible (within or above). 2) Any sample taken within 1 m of the open air is subject to high levels of uncertainty due to atmospherical and meteorological effects. This includes the base and wall of excavation pits. 3) For sites subject to redevelopment with residential or commercial buildings, the soil vapour profiles are subject to change due to presence of concrete slabs. Caution is required on the use of soil vapour samples that are not within a soil source and in locations where buildings currently do not exist (refer to Section 1.6 of the Application Document). 	

Step 5 – Selection of relevant source concentrations	Comments
<p>Soil concentrations</p> <p>1. Is the investigation site likely to be subdivided into smaller lots? <input type="checkbox"/> Y - Statistical analysis using entire data set may not be applicable. Consideration may be given to using the maximums or using a sub-set for statistical analysis (refer to Section 3.4.1 of the Application Document) <input checked="" type="checkbox"/> N - Statistical analysis using entire data set may be applicable</p> <p>2. Is the site public open space / recreational land where users are unlikely to be in the same location for extended period? <input checked="" type="checkbox"/> Y - Statistical analysis using entire data set may not be applicable. Consideration may be given to using the maximums or using a sub-set for statistical analysis (refer to Section 3.4.1 of the Application Document) <input type="checkbox"/> N - Statistical analysis using entire data set may be applicable</p> <p><u>If statistical analysis is appropriate consideration should be given to the following methodology (refer to Section 3.4.1 of the Application Document):</u></p> <ol style="list-style-type: none"> 1. Samples should be sub-divided into appropriate depth ranges as defined by HSLs (i.e. surface to <1 m, 1 m to <2 m, 2 m to <4 m, 4 m+). Note if considering basement, the appropriate displacement distance should be accounted for. 2. For each depth range, the statistical mean (e.g. 95% UCL arithmetic mean) soil concentration should be calculated for each chemical. One approach is described in the NSW EPA <i>Contaminated sites: Sampling design guidelines</i> (1995). The coefficient of variance test described in the document may be used to determine if the distribution is normal or lognormal. Consideration of other statistical methods may be adopted if justified (e.g. distribution does not fit a normal or lognormal distribution). 3. For samples with no detection, it is recommended to use half the detection limit during statistical analysis. 4. If the standard deviation is very large (due to outliers or low number of samples) the statistical mean may be higher than the maximum concentrations. In this case it is recommended to use the maximum. 5. It is recommended to keep note of maximum concentrations as well as statistical mean concentrations. Maximum concentrations may be required to address potential acute exposure issues. 	
<p>Groundwater concentrations</p> <p>Has floating product been identified in any well? <input checked="" type="checkbox"/> Y - Refer to point (a)</p> <p>(a) If PSH is identified, dissolved phase is likely to contain chemicals at solubility limits. Proceed with HSL comparison, noting that if there is at least one chemical for which HSLs in groundwater is limiting (i.e. not all chemical HSLs are NL) then presence of PSH may be a potential vapour risk to site users (refer to Section 3.4.2 of the Application Document). Also note that the presence of PSH may trigger other legislative requirements for remediation/monitoring.</p> <p>Is the area of interest represented by a single groundwater location or multiple? <input checked="" type="checkbox"/> Single - small area of interest such as residential dwelling may be represented by the maximum groundwater concentration if the dwelling location is unknown, otherwise if the building footprint is known, the groundwater well nearest to the point of interest may be used. <input type="checkbox"/> Multiple - where exposure may occur over larger areas such as recreational parkland, consideration may be given to averaging the concentrations across the area of interest.</p> <p>In deciding which set of monitoring data is most useful for analysis consideration may also be given to: - Historical results to determine trends in groundwater concentrations (i.e. the likelihood that concentrations may increase) - Upgradient wells and background concentrations - Groundwater flow direction (Refer to Section 3.4.2 of the Application Document.)</p>	

Step 5 – Selection of relevant source concentrations (cont)	Comments
<p>Soil vapour concentrations</p> <p>Is the area of interest represented by a single or multiple vapour location? →</p> <ul style="list-style-type: none"> NA Single - small area of interest such as residential dwelling may be represented by the maximum soil vapour concentration if the dwelling location is unknown, otherwise if the building footprint is known, the groundwater well nearest to the point of interest may be used. NA Multiple - where exposure may occur over larger areas such as recreational parkland, consideration may be given to averaging the concentrations across the area of interest. <p>Are soil vapour samples measured in shallow soil less than 1 m from the surface where there is no existing slab or concrete paving? →</p> <p>NA Y - Measurements are subject to influence from weather and atmospheric conditions and may not be considered reliable.</p> <p>Are soil vapour samples measured in areas where there is no existing slab or concrete paving, and the site is planned to be redeveloped where a building will exist (residential/commercial/industrial use)? →</p> <p>NA Y - Soil vapour samples not measured within a soil or groundwater source, may not be representative of the soil vapour in the future when a building is located on site. The placement of an impermeable barrier such as a concrete slab can cause build-up of soil vapour within the soil and sub-slab, above levels measured where there is no slab present. Note soil vapour measurements from within soil and groundwater sources are not subject to vapour build-up as the soil vapour is likely to be at its maximum concentration when located within the source.</p> <p>Soil vapour measurements may be taken at multiple depths, including within the source zone, above the source zone, and directly under a building foundation. Each of the measurement depths should be considered individually.</p> <p>Refer to Sections 3.4.3 and 1.6 of the Application Document.</p>	<p>Not Applicable</p>

Step 7 – HSLs and adjustments (vapour intrusion)	Comments
<p>HSL adjustments (vapour intrusion only) For each adjustment, careful consideration and justification is required.</p> <p>1. Vapour biodegradation (refer to Section 4.2 of Application Document) Prior to applying attenuation factor for vapour degradation it is recommended to read the source documentation (Davis et al. 2009). The minimum requirements for allowing attenuation factors for vapour degradation are as follows:</p> <p>1. Is there evidence of oxygen penetration? —————> NA Y - Requires measurement of oxygen in soil gas with at least 5% at 1 m depth (refer to Section 4.2.1 of Application Document) NA N - Attenuation factor may not be applicable</p> <p>2. Is the source depth 2 m or deeper? —————> NA Y - Continue to Question 3 (refer to Section 4.2.2 of Application Document) NA N - Attenuation factor may not be applicable</p> <p>3. Does the slab have one side less than 15m length? —> NA Y - Degradation factor may apply. Less than 4 m depth, a factor of 10 may apply. 4 m and deeper, a factor of 100 may apply. (refer to Section 4.2.3 of Application Document) NA N - Attenuation factor may not be applicable</p> <p>2. Soil organic carbon content (refer to Section 4.3 of Application Document) May be used to adjust soil HSLs only. Soil HSLs were based on fraction organic carbon content of 0.003. HSL may be adjusted if background levels of organic carbon content at the same depth as source is different from baseline. Background sample must not be contaminated with hydrocarbons. If surface soil, background sample in open space may not be appropriate to use if comparing for soil under slab. Adjustment is linear, i.e. doubling the organic carbon will double the HSL. Applies only to soil HSL for vapour intrusion.</p> <p>3. Air exchange rate (refer to Section 4.4 of Application Document) HSLs are based on air exchange rate (AER) of 0.6 h⁻¹ for residential and 0.83 h⁻¹ for commercial. Careful justification may be required prior to changing AER. Consideration should be given to weather conditions, practice of leaving doors/windows open, or closed in climate controlled building. New buildings tend to be more air tight to comply with energy saving regulations. For soil and groundwater, adjustment is linear with respect to AER. For soil vapour, adjustment is variable depending on soil type and depth. Refer to the charts in Appendix D to determine the adjustment factor.</p> <p>4. Moisture content (refer to Section 4.5 of Application Document) HSLs may be adjusted if moisture content in soil is significantly different from baseline HSLs. The baseline moisture contents used were (dry wt) for sand 8%, silt 22% and clay 20%. Moisture content should be representative of long-term moisture content and not short-term result from recent rain event. Also note that for a development with future building where no building currently exists, moisture contents on site may not be representative for the future state of the site. HSL scaling factors for different land use/chemicals/soils are presented in Appendix C of the Application Document and may be applied as described in Section 4.5.</p>	<p style="text-align: center;">Not Applicable</p>

Step 7 – HSLs and adjustments (vapour intrusion) (cont.)	Comments
<p>Saturation/solubility limits (soil and groundwater HSLs only)</p> <p>Apply the adjustments to the HSLs for vapour intrusion by multiplying by the determined factors.</p> <p>After applying the adjustments to the HSLs, is the revised HSL greater than the solubility / saturation limit? → <input checked="" type="checkbox"/> Y - Indicates that the predicted source concentration to produce an unacceptable vapour risk is higher than the saturation point. The revised HSL is not limiting to vapour (NL). Note this does not apply to soils with direct contact. <input type="checkbox"/> N - Revised HSL may be compared with measured source concentrations.</p>	
<p>Multi-Pathway Exposure</p> <p>1. Is inclusion of direct contact with soils required? → <input type="checkbox"/> Y - Repeat Step 6 with Adjusted Vapour Intrusion HSLs and Direct Contact HSLs <input checked="" type="checkbox"/> N - Proceed to Question 2</p> <p>2. Is cross-scenario exposure required to be assessed? → <input type="checkbox"/> Y - Repeat Step 6 with Adjusted Vapour Intrusion HSLs and Direct Contact HSLs <input checked="" type="checkbox"/> N - Proceed to 'Screening assessment'</p>	
<p>Screening assessment</p> <p>Is the adjusted HSL less than source concentration? → <input type="checkbox"/> Y - Indicates potential health risk <input checked="" type="checkbox"/> N - Considered within acceptable health risks. If cancer endpoint (benzene) may also need to assess cancer risk level and cumulative cancer risk in Step 8</p> <p>Is the maximum soil, groundwater or soil-vapour concentration greater than the HSL by more than one or two orders of magnitude? → <input type="checkbox"/> Y - Indicates potential acute risk around hotspot <input checked="" type="checkbox"/> N - Considered within acceptable health risks</p> <p>If the screening assessment indicates the potential for unacceptable health risk, consideration may be given to further investigations such as further contamination delineation, site-specific health risk assessment or site management. Before deciding the appropriate form of action considerations should include:</p> <ul style="list-style-type: none"> - The magnitude of HSL exceedence - The nature of the source - The time frame required for managing health risks - Other statutory requirements 	

Step 8 – Cancer risk assessment	Comments
<p>Acceptable cancer risk (Refer to Section 5.1 of Application Document) HSLs for benzene have been based on 1×10^{-5} cancer risk. In some jurisdictions it may be required to assess carcinogenic risks based on 1×10^{-6} cancer risk.</p> <ol style="list-style-type: none"> 1) The HSLs are linearly related to acceptable risk. HSLs based on a cancer risk of 1×10^{-6} may be calculated by dividing the HSLs in Appendix B by a factor of 10. 2) If the HSL is NL (vapour only HSL), it is possible that it may become limiting if the HSL is within a factor of 10 of the soil saturation concentration (or solubility limit for groundwater). 3) If soil or groundwater source concentration is less than an order of magnitude of the saturation concentration / solubility limit (in Appendix B), then even dividing the non-limiting HSL by 10 would result in an acceptable risk. Hence there is no need to proceed further. 4) If soil or groundwater source concentration is within an order of magnitude of the saturation concentration / solubility limit it is recommended to calculate the revised HSL from the non-limiting HSL. This process is outlined as follows: <p>Calculating revised HSL for 10^{-6} cancer risk from non-limiting HSL.</p> <ol style="list-style-type: none"> 1) The non-limiting HSLs are presented in Friebel & Nadebaum 2011 (Part 1). 2) The derived HSLs are presented in Appendix F. 3) Find the pages that correspond to the source type (soil, groundwater, soil vapour) for the given scenario (residential / commercial / recreational / intrusive maintenance). Note indicator chemicals and TPH have been separated. 4) For the corresponding soil category, depth and chemical, the Vapour Intrusion HSL and saturation/solubility concentration is presented in the columns on the right. 5) If this HSL is divided by 10 and the result is greater than Csat (for soil) or saturation limit (for groundwater), then the revised HSL is still NL. Otherwise the result is the revised Vapour HSL. 	
<p>Cumulative cancer risk (Refer to Section 3.6.1 of Application Document) HSLs for benzene have been based on 1×10^{-5} cancer risk. In most jurisdictions it is required to assess total carcinogenic risks based on 1×10^{-5} cancer risk. If HSLs are not NL for benzene and another carcinogenic chemical is identified, such as PAHs, follow the procedure outlined in Section 3.6.1. The-cumulative fraction may also be applied to more than two chemicals.</p> <p>Note that multiple sources should be considered. For example, a resident may be exposed through direct contact with PAHs in surface soil, but also benzene vapours from soil and groundwater. For vapour risk (benzene), the risk contribution should consider the greatest risk for the receptor from all vapour sources. Because multiple sources do not have an additive effect, the source with the greatest risk needs to be identified (refer to Section 3.5 for discussion on multiple vapour sources). This means that for all sources/depths the source concentration should be divided by their respective HSLs to calculate the benzene contribution to cumulative risk. The highest fraction determines which source poses the greatest risk to receptors. The same may be carried out for carcinogenic PAHs. The sum of the highest benzene fraction and the highest PAH fraction results in the highest possible cumulative fraction.</p>	

Appendix C – Site Photographs



Aerial view to the west of the site and MW1 location, 15 March 2022.



Aerial photo showing soil sampling locations, 15 March 2022.



Proposed flare pit and S1 location, 01 March 2022.



Soil sample S1, 01 March 2022.



Mud sump void and S2 location, 01 March 2022.



Soil sample S2, 01 March 2022.



Proposed fuel and chemical storage area and S3 location, 01 March 2022.



Soil sample S3, 01 March 2022.



Proposed fuel and chemical storage area and S4 location, 01 March 2022.



Soil sample S4, 01 March 2022.



S5 location, 01 March 2022.



Soil sample S5, 01 March 2022.



S6 location, 01 March 2022.



Soil sample S6, 01 March 2022.



Imported material and S7 location, 15 March 2022.



Soil sample S7, 15 March 2022.



Imported material and S8 location, 15 March 2022.



Soil sample S8, 15 March 2022.



Groundwater monitoring well MW1 location, 15 March 2022.

