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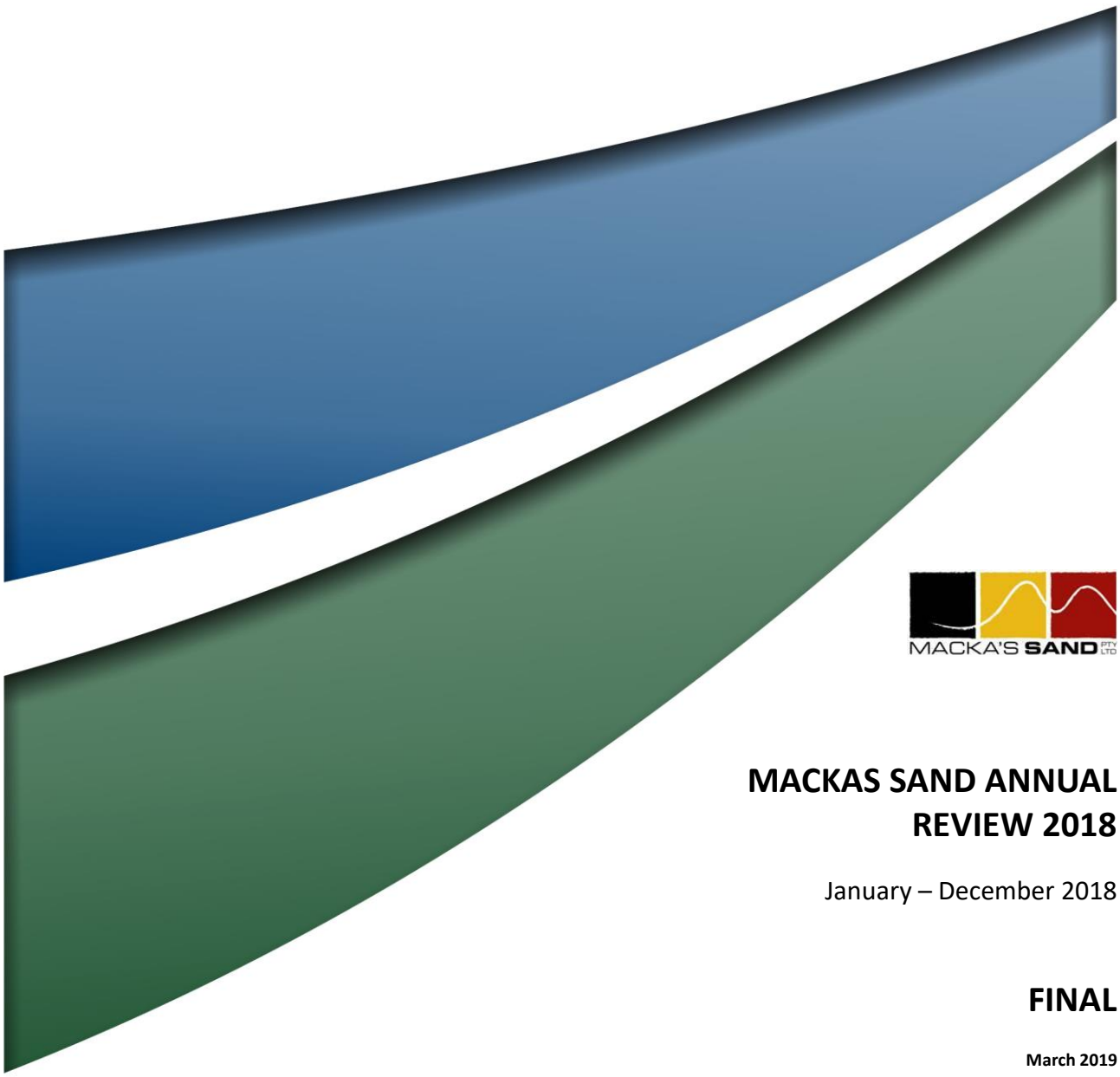
Environmental & Social Consultants



MACKA'S SAND PTY LTD

MACKAS SAND ANNUAL REVIEW 2018

January – December 2018

FINAL

March 2019

MACKAS SAND ANNUAL REVIEW 2018

January – December 2018

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Mackas Sand Pty Ltd

Project Director:	Bret Jenkins
Project Manager:	Rod Williams
Report No.	1646/R85
Date:	March 2019

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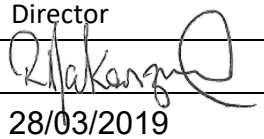
Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
1	B Jenkins (Umwelt (Australia) Pty Limited)	26/03/2019	R Mackenzie (Mackas Sand Pty Limited)	28/03/2019

Annual Review Title Block

Name of operation	Mackas Sand Project
Name of operator	Mackas Sand Pty Limited
Development Consent / Project Approval No.	PA 08_0142 (as modified)
Name of holder of development consent / project approval	Mackas Sand Pty Limited
Mining lease No.	No Mining Lease applicable to site under the *Mining Act* (1992).
Name of holder of mining lease	N/A
Water licence #	N/A
Name of holder of water licence	N/A
MOP/RMP start date	N/A
MOP/RMP end date	N/A
Annual Review start date	1 January 2018
Annual Review end date	31 December 2018
I, Robert Mackenzie, certify that this audit report is a true and accurate record of the compliance status of Macka's Sand Pty Ltd for the period 1 January 2018 to 31 December 2018 and that I am authorised to make this statement on behalf of Macka's Sand Pty Ltd. *Note.* *a) The Annual Review is an 'environmental audit' for the purposes of section 122B (2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.* *b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement – maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents – maximum penalty 2 years imprisonment or $22,000, or both.*	
Name of authorised reporting officer	Mr Robert Mackenzie
Title of authorised reporting officer	Director
Signature of authorised reporting officer	
Date	28/03/2019

Distribution Details

Distribution List
Department of Planning and Environment
Department of Industry – Crown Land & Water
Hunter Water Corporation
Mackas Sand Community Consultative Committee
General Public (via Mackas Sand Website)

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1.0 Statement of Compliance

Mackas Sand Pty Limited (Mackas Sand) operate the Mackas Sand Project (the Project), a sand quarry on Lot 218 / DP 1044608 and Lot 220 / DP 1049608, located approximately 25 kilometres (km) north-east of Newcastle, near Salt Ash in the Port Stephens Local Government Area (LGA) of New South Wales (NSW). The Mackas Sand directors have operated sand extraction operations in the area since 1992. Lot 218 and Lot 220 are owned by the Worimi Local Aboriginal Land Council, with the Project being operated under agreement with Mackas Sand.

This Annual Review has been prepared to provide a summary of Mackas Sands' operational performance against the approvals listed in **Table 1.1** over the period 1 January to 31 December 2018 (referred to hereafter as the reporting period).

The compliance of the operation against relevant approvals was managed during the reporting period by Mackas Sand and is summarised in **Table 1.1**.

The statement of compliance in **Table 1.1** is based on compliance information provided by Mackas Sand. Umwelt (Australia) Pty Limited (Umwelt) has relied on this information in combination with other information sources such as; environmental monitoring documentation, discussions with Mackas Sand personnel, site inspection(s) and our general understanding of the operation. In preparing this report Umwelt has not sought to undertake a full compliance audit, including secondary verification of the collated documentary evidence with relevant government agency staff, construction personnel or operational staff, site records etc.

Non-compliances recorded during the reporting period have been ranked according to the risk matrix included in **Table 1.2** and a brief description of each is provided in **Table 1.3**. Further information is provided in **Section 11.0**.

It is noted that an Independent Environmental Audit (IEA) was undertaken during the reporting period. The IEA identified a total of:

- six non-compliances against conditions of PA 08_0142;
- four non-compliances against commitments of PA 08_0142;
- one non-compliance against EPL 13218; and
- one non-compliance against EPBC Approval 2011/6214.

A copy of the IEA together with Mackas Sand proposed action plan to address non-compliances and observations was submitted to the Department of Planning and Environment (DPE) on 17 April 2018, for the acceptance of the Secretary. Of these non-compliances only the conservation agreement matter has not been fully addressed. Further details on the audit findings can be found in **Section 10**.

Table 1.1 Statement of Compliance

Relevant approval	All conditions complied with?
Development consent PA 08_0142	No – refer to **Table 1.3**
Environment Protection Licence EPL 13218	No – refer to **Table 1.3**
EPBC Approval 2011/6214	No
Hunter Water Corporation Regulation 2015 Clause 15(1)	No

The non-compliances for the reporting period are detailed below in **Table 1.3**.

Table 1.2 Compliance Status Key (NSW Government, 2015)

Risk Level	Colour Code	Description
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non-compliant	Non-compliance with: Potential for serious environmental consequences, but is unlikely to occur Potential for moderate environmental consequences, but is likely to occur.
Low	Non-compliant	Non-compliance with: Potential for moderate environmental consequences, but is unlikely to occur Potential for low environmental consequences, but is likely to occur.
Administrative non-compliance	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

Table 1.3 Non-compliances during the reporting period

Relevant Approval	Condition No.	Condition Description (Summary)	Compliance Status	Comment	Where addressed in Annual Review
PA08_0142 **EPBC Approval 2011/6214**	Schedule 3 Condition 4B (c) Condition 5(b)	Laden truck movements exiting the site do not exceed 14 per hour during the period from 5am to 6am, Monday to Friday (except for Public Holidays)	Administrative	Two extra truck movements exited Lot 218 during the hours of 5am and 6am on 15 November 2018. DPE were notified of the exceedance on 6 December 2018, with a detailed report provided to DPE on 18 December 2018. DPE issued a warning letter on 30/1/19. No further action has been requested or undertaken.	**Section 11.0**
PA08_0142	Schedule 3 Condition 13	Implementation of the approved Mackas Sand the Air Quality Monitoring Program	Administrative	Samples during January and February were not collected within 30+/-2 days from the previous collection date.	**Section 11.0**
PA 08_0142	Schedule 3 Condition 18	Mackas Sand is required to prepare and implement the Soil and Water Management Plan	Administrative	Groundwater monitoring parameters above levels nominated in the Soil and Water Management Plan. DPE have been notified of the issue and no further action has been requested or undertaken.	**Section 11.0**
PA_0142	Schedule 3 Condition 28	Mackas Sand is required to make suitable arrangements to provide appropriate long-term security of the biodiversity area	Administrative	Mackas Sand submitted a finalised copy of the Mackas Sand Conservation Agreement during the reporting period however, the Mackas Sand Conservation Agreement was not finalised to the satisfaction of the Secretary as at the end reporting period.	**Section 6.4**

Relevant Approval	Condition No.	Condition Description (Summary)	Compliance Status	Comment	Where addressed in Annual Review
PA 08_0142	Schedule 3 Condition 33D	Operate a video camera adjacent to the Alternative access road to monitor time and direction of travel vehicles as they enter and leave Lot 218.	Administrative	The video camera damaged by a fire on 14 April 2018.	**Section 11.0**
PA 08_0142	Schedule 5 Conditions 2	Mackas Sand is required to notify DPE within 24 hours of detecting an exceedance of the limits/performance criteria within PA 08_0142, or the occurrence of an incident which causes (or may cause) material harm to the environment. Within 6 days of the notifying the Department and relevant agencies of an exceedance or incident, Mackas Sand will provide a written report summarising the exceedance/incident.	Administrative	Truck numbers – Detailed report not provided within 6 days of DPE notification. Elevated groundwater results - Notification and detailed report not provided within specified timeframe. Shed Fire – Notification and detailed report not provided within specified timeframe. DPE issued a warning letter	**Section 11.0**

2.0 Introduction

Mackas Sand was granted PA08_0142 on 20 September 2009 by the Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to operate sand extraction operations at Lot 220 and Lot 218. It is estimated that in excess of 21 million tonnes of sand resource will be extracted from Lot 218 and Lot 220, with Lot 218 having an indefinite extraction life due to the ongoing movement of sand from the adjoining mobile dunes.

A modification to PA 08_0142 (MOD 1) was approved on 30 September 2013 by the NSW Planning Assessment Commission (PAC) under delegation of the Minister for the former Planning and Infrastructure (DPI), now Department of Planning and Environment (DPE). The modification included a reduction in extraction level during operations, and the approval of an alternate route to access Lot 218. The alternate route connects directly from Lot 218, northward to Nelson Bay Road, as depicted within **Figure 2.1.**

A second modification to PA 08_0142, (MOD 2), was approved by the PAC on 16 March 2016. The modification allows for an increase in maximum hourly truck movements from Lot 218 via the approved alternate access road.

Mackas Sand has engaged Umwelt to assist with the preparation of this Annual Review document for the reporting period to meet the requirement of PA 08_0142 (as modified), Schedule 5, Condition 4. The report has been produced in accordance with the NSW Government *Annual Review Guideline: Post-approval requirements for State significant mining developments (October, 2015)*. Requirements for the Annual Review under PA 08_0142 (as modified) are presented in **Table 2.1.**

Table 2.1 Project Approval Conditions for the Annual Review

Project Approval Condition	Section of Document
4. By the end of March each year, or other timing agreed by the Secretary, the Proponent shall review the environmental performance of the Project to the satisfaction of the Secretary. This review must:	**This Document**
a) describe the development (including any rehabilitation) that was carried out in the past calendar year, and the development that is proposed to be carried out over the next year	**Section 4.0**
b) include a comprehensive review of the monitoring results and complaints records of the project over the past calendar year, which includes a comparison of these results against the: • relevant statutory requirements, limits or performance measures/criteria • requirements of any plan, program or strategy required under this approval • monitoring results of previous years • relevant predictions in the EA and the EA (MOD 1).	**Section 6.0**

Project Approval Condition	Section of Document
c) identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance	**Section 1.0 and Section 11.0**
d) identify any trends in the monitoring data over the life of the project	**Section 6.0 and Section 7.0**
e) identify any discrepancies between the predicted and the actual impacts of the Project, and analyse the potential cause of any significant discrepancies	**Section 6.0 and Section 7.0**
f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the Project.	**Section 6.0 and Section 12.0**

2.1 Quarry Contacts

The Mackas Sand Quarry Manager is responsible to the regulatory authorities for all aspects of environmental compliance at the site including day-to-day site environmental management and reporting such as monitoring and supervision of environmental works. The details of the Quarry Manager are listed in **Table 2.2.**

Table 2.2 Personnel Responsible for Rehabilitation and Environmental Management during 2018

Name	Position	Company	Contact Phone No.
Robert Mackenzie	Quarry Manager	Mackas Sand Pty Ltd	(w) 02 4982 6227 (m) 0408 490 911

Image Source: Nearmap (Feb 2018)

0 1 2 4km

1:85 000

Legend

- Lot Boundaries
- Approval Areas
- Approved Site Access (not-utilised)
- Approved Site Access (utilised)
- Approved Alternate Site Access (utilised)

FIGURE 2.1

Locality Plan

3.0 Approvals and Management Plans

3.1 Status of Approvals, Licences and Permits

The operation of the sand quarry during the reporting period was regulated by a range of approvals and licences. **Table 3.1** provides a list of the relevant approvals, licences and their status for reporting period.

Table 3.1 Current Approvals, Licences and Permits

Approval	Development	Date Granted	Expiry Date	Status	Authority
Project Approval 08_0142 (as modified)	Sand Extraction Operations from Lots 218 and 220, Salt Ash	20 September 2009	31 December 2029	Current	DPE
Department of Environment Approval EPBC 2011/6214	Construction and use of Alternate Access Road (Lot 218)	29 November 2013	31 December 2029	Current	DoEE
Environment Protection Licence 13218	Mackas Sand	24 December 2009	Renewed annually	Current	EPA
Hunter Water Regulation (2015) Approval	Mackas Sand	7 June 2012	31 December 2029	Current	NOW

No changes were made to the above approvals, licences and permits during the reporting period.

3.2 Management Plans

In accordance with PA 08_0142 (as modified), Mackas Sand is required to implement a range of environmental management plans and Environmental Management Strategy (EMS). **Table 3.2** identifies the environmental management strategy and plans and their approval status as at the end of the reporting period.

Mackas Sand operated under a set of DPE approved environmental management plans during the reporting period. As a result of the IEA which was finalised in early 2018 and in accordance with the PA 08_0142 (as modified) these documents are reviewed and if necessary revised to the satisfaction of the Secretary. Should the revision be substantial, consultation with applicable stakeholders will also be undertaken.

A revision of the Mackas Sand Rehabilitation Bond was also triggered and is further discussed in **Section 8.0** of this document.

Operations are undertaken in accordance with the approved management plans, until such time as the revised plans are approved by DPE.

Table 3.2 Status of Management Plans

Management Strategy / Plan	Revision Date of the Approved Plan	Relevant Agency	Comment
Environmental Management Strategy (EMS)	July 2016	DPE	
Noise Management Plan (NMP)	November 2018	DPE	Plan updated during 2018. Secretary satisfaction has been received.
Air Quality Management Plan (AQMP)	June 2018	DPE	Plan updated during 2018. Secretary satisfaction has been received.
Soil and Water Management Plan (SWMP)	November 2014	DPE	Revised and submitted to the Secretary for their satisfaction during reporting period
Unexploded Ordnance Management Plan (UOMP)	September 2011	DPE	
Landscape and Rehabilitation Management Plan	September 2017	DPE	Revised and submitted to the Secretary for their satisfaction during reporting period
Aboriginal Cultural Heritage Management Plan (ACHMP)	July 2016	DPE	
Non-Indigenous Heritage Management Plan (IHMP)	July 2016	DPE	
Drivers Code of Conduct (DCoC)	December 2017	DPE	
Pollution Incident Response Management Plan (PIRMP)	August 2017	EPA	
EPBC Landscape Management Plan	December 2013	DoEE	
Operations Management Procedures	January 2014 [Draft]	Hunter Water Corporation	

Note: All references to management plans within this document refer to the current DPE approved version of the management plan unless specified

4.0 Operations Summary

A summary of the operations undertaken at Mackas Sand Quarry during the report period is included in the following sections.

4.1 Mining Operations

During the reporting period, sand extraction was undertaken at both Lot 218 and Lot 220, with no significant operational changes during the reporting period, when compared to previous years. An overview of the operations for each Lot is below.

Mackas Sand notes that no hydrocarbon spills were recorded during the reporting period.

4.1.1 Front End Loader Breakdowns

Mackas Sand experienced one Front-End-Loader gear box failure and two cab mount replacements during the reporting period. The manufacturers of the Front-End-Loader advised that these failures are due to extremely harsh operating conditions (i.e. soft dry sand).

Mackas Sand continues to investigate equipment modifications and operational procedural changes to minimise the impact that these harsh operating conditions have on the loaders and the business overall.

4.1.2 Lot 218

Sand extraction operations at Lot 218 commenced during February 2015 following the construction of an alternate haul route, as approved by Modification 1 of the Project Approval. During the reporting period sand continued to be extracted from the dune face using front end loaders, screened and stockpiled before being transported offsite by road truck via the alternate haul route. No trucks used the Lavis Lane haul route to enter or exit the site.

The extraction activities continued to progress to the east and west adjacent to the northern (i.e. landward) extraction boundary. With the extraction activities primarily undertaken at the eastern and western extremities of the extraction area, as the approved sand resource has not been exhausted in either location (i.e. reached the full extent of the extraction boundary). Extraction activities are therefore continuing to progress in a linear fashion. The western operations are approximately 1.5 km from the nearest residential receiver at Lavis Lane.

An automated traffic light system at the weighbridge servicing Lot 218 is used to manage vehicle movement compliance with the requirements of PA 08_0142 (as modified).

In addition to this traffic light system, Mackas Sand completes a secondary monthly validation process on the weighbridge logs to confirm compliance with truck movement Project Approval conditions.

4.1.3 Lot 220

Sand extraction operations in Lot 220 commenced during November 2009. During the reporting period, sand continued to be extracted primarily from the dune face in the south-eastern portion of Lot 220, which is more than 250 m away from the nearest residential receiver (R27). A mobile screen and stacker remained in operation to process sand excavated by front end loader before being transported offsite by truck.

Approximately 3 ha of land was cleared during the reporting period at Lot 220. If not directly applied to areas being prepared for rehabilitation, topsoil is salvaged and stockpiled until required for re-use on site.

4.2 Extraction Depth and Extent Survey Control

Mackas Sand has continued to use physical markers to complete visual checks of the extraction depth at both Lot 218 and Lot 220. These visual checks have been supported by quarterly surveys. These surveys have confirmed that the extraction activities during the reporting period remained above the maximum extraction depth and also within the extraction boundary at Lot 218 and 220. Copies of the quarterly surveys are provided in **Appendix 1**.

4.3 Production Limits

During the reporting period a total of 997,313 tonnes of product was transported from Lot 218 and 994,831 tonnes of product were transported from Lot 220. This is below the 1,000,000 tonnes per annum for each Lot permitted under PA 08_0142 (as modified).

Table 4.1 provides the annual amount of product transported for the 2017 and 2018 reporting years and a forecast for the 2019 reporting period. The 2017 and 2018 tonnages provided are based on the weighbridge data. A monthly summary of product transported from both Lots can be found in **Appendix 2**.

4.3.1 Hours of operations

Mackas Sand confirms that the extraction and haulage activities during the reporting period complied with the operating hours as detailed Schedule 3, Condition 9 of the Project Approval (as modified).

Mackas Sand is not proposing to undertake sand extraction operations within 250m of R27. Quarrying operations at 220 are generally undertaken between 6:00am and 5:30pm Monday to Friday. Therefore the need to hold an extended hours agreement with the owners of R27 has not been trigger, as per Schedule 3, Condition 9 a of the Project Approval (as modified).

Quarrying operations at 218 are permitted 24 hours / 7 days a week.

Mackas Sand holds agreements with the specified residences on Nelson Bay Road and Oakvale Drive for extended trucking hours, in accordance with Schedule 3, Condition 9 a of the Project Approval (as modified). Copies of these agreements have previously been provided to the DPE.

Table 4.1 Production Summary 2018 (Lot 218 and Lot 220)

Material	Approved Limit (Source – PA 08_0142 (as modified))	2017 Reporting Period (Actual Tonnes)	2018 Reporting Period (Actual Tonnes)	2019 Reporting Period (Forecast Tonnes)	Compliance with Approved Limit
Total Saleable Product from Lot 218	1,000,000 tonnes from Lot 218	996,663.82	997,313	1,000,000	Yes
Total Saleable Product from Lot 220	1,000,000 tonnes from Lot 220	994,496.26	994,831	1,000,000	Yes
Total Saleable Product from Lot 218 and 220 combined	2,000,000 tonnes of product in a calendar year (1,000,000 tonnes from Lot 218; 1,000,000 tonnes from Lot 220).	1,991,160.08	1,992,144	2,000,000	Yes

4.4 Construction & Demolition Activities

Mackas Sand continued to import Excavated Natural Material (ENM) during the reporting period. ENM continues to be used onsite to construct trafficable surfaces and extension of haul routes within the Lot 218 and 220 extraction areas to:

- Allow for heavy vehicle movements; and
- Minimise trucks being bogged in the dune sand environment.

Mackas Sand expects to continue to import nominal volumes of ENM for the ongoing development of internal haul roads during the next reporting period.

There were no construction or demolition activities undertaken during the reporting period at Lot 218 or 220.

4.5 2019 Report Period Extraction Operations

2019 is expected to see a continuation of sand extraction operations at both Lot 218 and Lot 220 in accordance with statutory approvals.

Mackas Sand does not expect any significant changes to mining methods during the next reporting period.

Quarrying operations at Lot 220 will continue to be undertaken more than 250m from R27.

5.0 Actions required from previous Annual Review

In accordance with Schedule 5, Condition 4 of PA 08_0142 (as modified), the 2017 Annual Review was submitted to DPE on 29 March 2018.

DPE acknowledged their satisfaction with the 2017 Annual Review on 13 December 2018 and requested the following be included in future Annual Review documents.

> '*Status update of implementation of Umwelt's recommendations relating to ongoing restriction of grazing and doing further weed control and slashing, to enhance the biodiversity offset areas in achieving the completion criteria*'

A summary of Mackas Sand management commitments made in the 2017 Annual Review, DPE's response of 13 December 2018, and a response to each is provided in **Table 5.1**

Table 5.1 Mackas Sand Response to Actions identified in 2017 Annual Review

2017 Annual Review Section	Action	Response	Status	2018 Annual Review Section
6.1	Mackas Sand will ensure that the noise generated by the project does not exceed the prescribed criteria.	Annual noise monitoring confirmed that Mackas Sand was complying with the noise limits during the monitoring period.	Completed	6.1
6.1	The annual attended noise monitoring program will continue in accordance with the Project Approval and EPL 13218.	Mackas Sand continued the attended noise monitoring program in accordance with the Project Approval and EPL 13218.	Completed	6.1
6.1	Mackas Sand will liaise with DPE and EPA regarding the installation of a TEOM air quality monitoring unit at R27, if a written request is received.	No written request was received from the owner of R27 during the reporting period.	Not Triggered	6.2
6.2	Continue monthly dust deposition monitoring at DDG1 and DDG2 to detect any impacts due to sand extraction operations at Lot 220 and Lot 218.	Depositional Dust monitoring results are provided in this document	Completed	6.2

2017 Annual Review Section	Action	Response	Status	2018 Annual Review Section
6.4	The VCA will be re-submitted as a final to OEH during 2018	Mackas Sand submitted the VCA to OEH on three occasions during 2018. Mackas Sand will submit a revised VCA to OEH during 2019.	Completed and Ongoing	**6.4**
6.9	Mackas Sand Code of Conduct will be provided to all contract heavy vehicle drivers and external contracting truck operators	Ongoing requirement to provide Code of Conduct document to all companies prior to commencing work at Mackas Sand	Ongoing	**6.9**
10	The results of the 2017 IEA will be included in the 2018 Annual Review.	A summary of the IEA and identified non-compliances is provided in this document	Completed	**10.0**
N/A	Implementation of recommendations for the biodiversity offset areas	The need and implementation status of recommended management measures associated with the biodiversity offset area has been considered.	Complete	**6.4**

6.0 Environmental Performance

The following sections provide a summary of environmental monitoring and management undertaken during the reporting period. In accordance with the *Annual Review Guideline* (NSW Government, 2015) this report contains a summary of environmental monitoring data where it is required to explain trends or environmental performance during the reporting period.

It is noted that environmental monitoring data has also been published on the Mackas Sand website (http://www.Mackassand.com.au) in accordance with Schedule 5, Condition 10 of the Project Approval.

A range of environmental monitoring is required to be undertaken by the Development Consent, EPL and management plans.

Figure 6.1 shows the Mackas Sand environmental monitoring locations.

Image Source: Nearmap (Feb 2018)

0 0.5 1 2km
1:45 000

Legend

- Lot Boundaries
- Approval Area
- Approved Site Access (not-utilised)
- Approved Site Access (utilised)
- Approved Alternate Site Access (utilised)
- Noise Monitoring Location
- Dust Monitoring Location
- Groundwater Monitoring Location
- Residential Receivers
- Williamtown RAAF BOM Meteorological Station

FIGURE 6.1

Mackas Sand Monitoring Locations

File Name (A4): R85_V1/1646_494.dgn

6.1 Noise

Noise management is undertaken in accordance with the Noise Management Plan (NMP) (Umwelt, November 2018). The NMP sets out the procedures and management measures to monitor, mitigate and assess the Project's noise impacts.

The NMP was revised during the reporting period following the submission of the 2017 Annual Review and IEA. The revised NMP was approved by DPE in November 2018.

Mackas Sand holds agreements with the specified residences on Nelson Bay Road and Oakvale Drive for extended trucking hours and noise levels above that stated in the PA 08_0142 (as modified). Copies of these agreements have been provided to the DPE. Attended noise monitoring is undertaken at five representative receiver locations, as shown on **Figure 6.1.**

6.1.1 Environmental Assessment Predictions

Operational Noise

A Noise Impact Assessment (2009) was developed in support of the Mackas Sand Project Environmental Assessment (2009). The Noise Impact Assessment concluded that operational noise would remain within project specific noise criteria during all operational periods at all residential receivers nearest to Lot 218 and Lot 220, if project specific controls were put in place whilst operations were within 250 m of R27. Controls included limiting work to daytime only (7am – 6pm Monday – Saturday and 8am-6pm on Sundays and Public Holidays).

Sleep Disturbance

Predicted noise levels are expected to be less than the project specific noise criteria. The Noise Impact Assessment further stated that predicted noise levels are expected to comply with the recommended sleep disturbance noise goals at all residential receivers of 41dB(a) $L_{A1,}$ 1 minute.

The noise impact assessment criteria specified in the PA 08_0142 (as modified) Schedule 3 Conditions 4, that relate to operational noise generated specifically by sand quarrying are set out in **Table 6.1.**

Alternate Access Road Traffic Noise

Noise impact assessment criteria specified in the PA 08_0142 (as modified) Schedule 3 Condition 4A, that relate to the Alternate Access Road is shown in **Table 6.3.**

Table 6.1 Industrial Noise Impact Assessment Criteria, dB(A)

Location	Day[1] LAeq, 15 min	Evening[1] LAeq, 15 min	Night[1] LAeq, 15 min	Night[1] LA1, 1 min
R18 – 300 Nelson Bay Road	39	39	40	45
R1 –Lavis Lane residence	39	39	39	45
R19 – 316 Nelson Bay Road	36	36	37	45
R26 – Residence opp. Oakvale Farm	36	36	35	45
R27 – Hufnagl residence	36	35	35	45
R17 – 287 Nelson Bay Road	35	35	36	45
All other residences	35	35	35	45

Table 6.2 Alternate Access Road Noise Impact Assessment Criteria dB(A)

Location	Shoulder[1] LAeq, 15 min	Day [1] LAeq, 15 min	Evening[1] LAeq, 15 min
2344 Nelson Bay Road, Williamtown	38	40	40
2353 Nelson Bay Road, Williamtown	39	41	41
2367 Nelson Bay Road, Williamtown	36	38	38
2368 Nelson Bay Road, Williamtown	38	40	40
All other residences	35	35	35

Note 1: Day time is 7.00am to 6.00pm Monday to Saturday and 8.00 am to 6.00 pm Sundays and Public Holidays, evening is 6.00pm to 10.00pm (NSW Industrial Noise Policy (INP) EPA, 2000). Shoulder is the period from 5am to 7am on Monday to Friday, but only for the use of the Alternate access road (see condition 4A of schedule 3 of Project Approval 08_0142 MOD 2).

As noted in PA 08_0142 Schedule 3, Condition 4, the noise limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences/land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Road Traffic Noise

The following noise criteria were assigned to road traffic from trucks servicing the Mackas Sand quarry using Lavis Lane, Oakvale Road and Nelsons Bay Road in PA 08_0142 (as modified), Schedule 3 Condition 7.

Table 6.3 Traffic Noise Impact Assessment Criteria, dB(A)

Road	Day/Evening	Night - Shoulder
Lavis Lane, Oakvale Drive	60 LAeq (1 hour)	55 LAeq (1 hour)
Nelson Bay Road	60 LAeq (15 hour)	55 LAeq (9 hour)

6.1.2 Noise Monitoring Results

In accordance with the NMP and EPL 13218 and Mackas Sand Noise Monitoring Program, noise compliance monitoring is undertaken on an annual basis by a suitably qualified consultant. The noise monitoring is generally undertaken during the winter to early spring months as this is when noise propagation from the premises is likely to be at its worst.

During the reporting period monitoring was undertaken over four days being, 10 August, 7 and 10 September and 10 October 2018, at locations shown on **Figure 6.1.** These locations are representative of the nearest sensitive receivers to the extractive and haulage operations in accordance with NSW Industrial Noise Policy (EPA, 2000) and Australian Standard 1055:1:1997. For example, measurements of industrial noise levels at Site 6 are taken to be representative of industrial noise levels received at Site 5, as Site 5 is slightly farther than Site 6 from Lot 218 and from the Alternative Access Road. In determining compliance, since noise levels reduce with increasing distance from a noise source, it is deemed that the noise level at receivers located further from Site 6, for example at Site 5 being located in approximately the same direction, would therefore be lower noise levels than measured at Site 6.

Table 6.4 2018 Night Time Industrial Noise Levels – Sand Extraction Activities versus Noise Criteria, dB(A)

Location	LAeq, 15 minute		LA1,1 minute	
	Noise criteria	Mackas Sand noise level contribution	Noise criteria	Mackas Sand noise level contribution
Site 1	35	<30	45	38
Site 2	35	<30	45	<40
Site 4	36	Not Audible	45	Not Audible
Site 5[1]	35	Not Audible	45	Not audible
Site 6	35	Not Audible	45	Not audible

Note [1]: Based on noise levels measured at Site 6

Table 6.5 2018 Day Time Industrial Noise Levels – Sand Extraction Activities versus Noise Criteria, dB(A)

Location	LAeq, 15 minute	
	Noise criteria	Mackas Sand noise level contribution
Site 1	36	<30
Site 2	36	Not Audible
Site 4	35	Not audible

Location	LAeq, 15 minute	
	Noise criteria	Mackas Sand noise level contribution
Site 5[1]	35	Not audible
Site 6	35	Not audible

Note [1]: Based on noise levels measured at Site 6

Table 6.6 2018 Evening Industrial Noise Levels –Sand Extraction Activities versus Noise Criteria, dB(A)

Location	LAeq, 15 minute	
	Noise criteria	Mackas Sand noise level contribution
Site 1	35	Not Audible
Site 2	36	Not Audible
Site 4	36	Not Audible
Site 5[1]	35	Not Audible
Site 6	35	Not Audible

Note [1]: Based on noise levels measured at Site 6

Table 6.7 2018 Industrial Noise Levels – Alternate Access Road to Lot 218

Location	Period	LAeq, 15 minute	
		Noise criteria	Mackas Sand noise level contribution
Site 5	Day Time	41	<38
Site 6	Day Time	40	<38
Site 5[1]	Night Time/Shoulder	39	<38
Site 6	Night Time/Shoulder	38	<38
Site 5[1]	Evening	41	<29
Site 6	Evening	40	29

Note [1]: Based on noise level measured at Site 6

Table 6.8 Mackas Sand 1 hour Night and Day Time Road Traffic Noise Level Contribution versus Noise Criteria, dB(A)

Road	Period	Noise criteria LAeq, 1hour	Noise level contribution LAeq,1hour	
			Cnr Oakvale Dr and Nelson Bay Rd (Site 4)	2353 Nelson Bay Road (Site 6)
Lavis Lane, Oakvale Drive as measured at corner of Oakvale and Nelson Bay Road	Night	55	54	53
	Day	60	53	52

6.1.3 Trends in Data

The 2018 attended noise monitoring indicates that Mackas Sand was complying with the industrial and traffic noise criteria at all sites in accordance with PA 08_0142, Schedule 3 Conditions 4 to 8, and EPL 13218 Condition L3.

This result is consistent with the long term trend associated with annual attended noise monitoring.

6.1.4 Proposed Improvements or Actions for the Next Reporting Period

No additional management or mitigation measures are proposed to be implemented which are outside the NMP.

6.2 Air Quality

Air quality monitoring is undertaken in accordance with the approved Air Quality Management Plan (AQMP) (Umwelt, June 2018) which sets out the procedures and mitigation measures for the management of dust. The air quality monitoring network consists of two dust deposition gauges (DDG1 and DDG2), which are used to measure depositional dust on a monthly basis (refer to **Figure 6.1**)

Particulate Matter (PM_{10}) and Total Suspended Particulate (TSP) monitoring are not currently undertaken. The trigger for commencing PM_{10} and TSP monitoring is the receipt of a written request from Resident R27, the nearest residential receiver to operations at Lot 220. As of the end of the reporting period, R27 had not issued such a request.

Previous years have demonstrated that Aeolian transport of dune sand during periods of high winds result in conditions where deposition levels can naturally exceed the air quality impact assessment criteria of 4 g/m^2/month and thereby producing false positive exceedance results.

6.2.1 Environmental Assessment Predictions

An Air Quality Impact Assessment (2009) was developed in support of the Mackas Sand Project Environmental Assessment (2009) (EA). The Air Quality Impact Assessment considered the direct and cumulative air quality impacts associated with the Project's ongoing operations. Modelling was undertaken which concluded that dust control measures at Lot 218 and Lot 220 would be required to remain within relevant compliance limits for PM10, TSP and Depositional Dust. As noted in the EA, the primary source of the dust generation at Mackas Sand was predicted to be from Wheel Generated Dust (Haulage).

Air Impact Assessment Criteria are specified in Schedule 3 Condition 11 of PA 08_0142 (as modified). These criteria are used to assess the environmental performance of the Project and are represented in **Table 6.9** to **Table 6.11.**

Table 6.9 Long term Impact Assessment Criteria for Particulate Matter

Pollutant	Averaging period	Criterion
Total suspended particulate (TSP) matter	Annual	90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	30 µg/m^3

Table 6.10 Short term Impact Assessment Criterion for Particulate Matter

Pollutant	Averaging period	Criterion
Particulate matter < 10 µm (PM_{10})	24 hour	50 µg/m^3

Table 6.11 Long term Impact Assessment Criteria for Deposited Dust

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m^2/month	4 g/m^2/month

6.2.2 Air Quality Monitoring Results

Twelve depositional dust gauge samples were collected during the reporting period on approximately a monthly basis. The monthly and annual average results for DDG1 and DDG2 are shown **Table 6.12** and **Table 6.13**.

As noted in **Table 1.3**, depositional dust gauges were collected outside of the 30 +/- 2 day exposure period as noted within AS/NZS 3580.10.1:2003 during January and February 2018. Mackas identified this issue as a result of a non-compliance recorded during the IEA and was rectified in March 2018. As noted in **Table 6.12** and **Table 6.13**, depositional dust gauges were collected within the 30 +/- 2 day window from March 2018 onwards.

Table 6.12 Total Dust Deposition Levels at DDG 1 – Lot 220 (g/m^2/month)

Sample date:	Exposure Period (Days)	Ash Content g/m^2/month	Total Insoluble Matter g/m^2/month
25/01/2018	34	0.4	0.9
28/02/2018	34	1.3	3.4
29/03/2018	29	0.5	0.9
26/04/2018	28	0.3	0.3
26/05/2018	30	0.2	0.2
26/06/2018	31	0.7	1.3
26/07/2018	30	0.2	0.4
26/08/2018	31	1.2	2.5
27/09/2018	32	0.6	1.1
26/10/2018	29	0.5	0.8
26/11/2018	31	0.6	0.9
27/12/2018	31	1.0	2.7
		Annual Average	**1.6**

Table 6.13 Total Dust Deposition Levels at DDG 2 – Lot 218 (g/m2/month)

Sample date:	Exposure Period (Days)	Ash Content g/m².month	Total Insoluble Matter g/m².month
25/01/2018	34	0.9	1.3
28/02/2018	34	1.5	2.1
29/03/2018	29	1.3	1.7
26/04/2018	28	1.0	1.1
26/05/2018	30	0.5	0.6
26/06/2018	31	0.3	0.5
26/07/2018	30	0.2	0.3
26/08/2018	31	1.2	1.6
27/09/2018	32	3.3	4.6
26/10/2018	29	1.2	1.6
26/11/2018	31	2.1	2.1
27/12/2018	31	3.7	4.5
		Annual Average	**1.7**

6.2.3 Trends in Data

The monthly results during the reporting period for DDG1 range from 0.2 g/m²/month and 3.4 g/m²/month, with an annual average 1.6. While the monthly results for DDG2 varied from 0.3 g/m²/month and 4.6 g/m²/month, with an annual average of 1.7.

The annual average dust levels are less than the maximum increase in deposited dust level criterion of 2 g/m^2/month at both gauges. These annual average results are also below the annual average criteria of 4 g/m^2/month. The operations are therefore compliant with the depositional dust impact assessment criteria.

There were no complaints received in relation to dust during the reporting period.

Table 6.14 provides a comparison of annual average deposition dust monitoring data for the previous five years. This shows the 2018 annual average is at the lower end of this historical range of results. This result indicates Mackas Sand operations have complied with the depositional dust criteria for the last five years.

Table 6.14 Annual averages for dust deposition 2012 -2018

	Total Insoluble Solids (g/m2/month)	
Year	**DDG1 (Lot 220)**	**DDG2 (Lot 218)**
2018	1.6	1.7
2017	2.0	2.5
2016	1.3	1.6
2015	1.7	10.0*
2014	1.4	2.1

**High value during 2015 was due to an extreme storm event during April 2015. Refer to 2015 Annual Review for further details.*

6.2.4 Proposed Improvements or Actions for the Next Reporting Period

No additional management or mitigation measures are proposed to be implemented which are outside the approved AQMP.

6.3 Meteorology

Meteorological data is collected from the Bureau of Meteorology station at the nearby Williamtown RAAF Base (Station 061078). As shown on **Figure 6.1**, Station 061078 is located approximately 5.3 km north-west of Lot 218 and 7.8 km west of Lot 220 and has been active prior to the commencement of operations at Lot 218 and Lot 220.

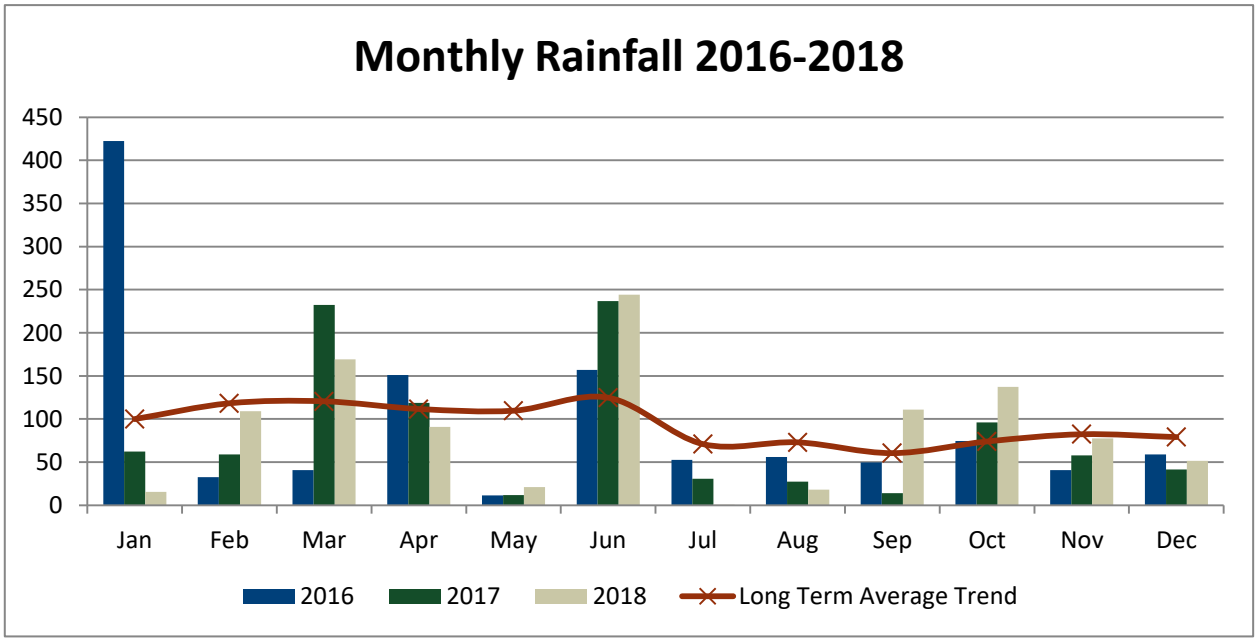
6.3.1 Rainfall

Rainfall data for 2018 is summarised in **Table 6.15**, while **Figure 6.2** provides a comparison of monthly rainfall from 2016-2018. During the reporting period, 1,046 millimetres (mm) of rainfall was recorded across 96 rain days. Approximately 23% of the annual recorded rainfall was experienced during June.

Table 6.15 Monthly Rainfall and Number of Rain Days during 2018

Month	Rainfall (mm)	Highest Daily (mm)	Rain Days (i.e. >0.2 mm)
January	15.4	6.8	4
February	109.0	54.0	10
March	169.2	122.0	9
April	91.0	27.2	11
May	21.1	11.2	4
June	244.2	50.6	18
July	0.6	0.4	1
August	18.2	11.2	3
September	111.0	34.0	11
October	137.4	38.6	11
November	77.6	48.2	5
December	51.4	19.4	9
TOTAL	**1046**	**122**	**96**

Figure 6.2 Monthly Rainfall 2016-2018



6.3.2 Temperature

Minimum and Maximum daily and 2018 average minimum and maximum temperatures are summarised below in **Table 6.16**. January was generally the warmest month of the year experienced at Mackas Sand with a maximum daily temperature of 43.9°C. June was generally the coolest month of the year experienced at Mackas Sand with a minimum daily temperature of -0.9°C.

Table 6.16 Monthly Minimum and Maximum Daily Temperatures during 2018

Month	Minimum Temperature (°C)	Average Minimum Temperature (°C)	Average Maximum Temperature (°C)	Maximum Temperature (°C)
January	12.3	18.3	30.6	43.7
February	12	18.3	29.1	39
March	11.5	18.4	27.8	38.7
April	11.6	15.2	26.3	33.8
May	5.8	9.5	21.3	27.6
June	3.7	8.4	17.1	20.8
July	-0.9	5.4	19.5	25.2
August	0.4	6.2	19.7	25.2
September	5.2	9.5	21.3	32.8
October	6.1	14	23.1	31.2
November	10.1	15.8	26.5	37.1
December	12.8	17.4	29.9	38.8

6.3.3 Wind Speed and Direction

During the summer months, (generally defined as the 6 month period from January to March and October to December), winds prevailed from the North-East/East-North-East. During the winter months, (generally defined as the 6-month period from April to September), winds prevailed from the North-West/West-North-West direction. Seasonal wind roses are provided in **Appendix 3.**

6.4 Landscape and Biodiversity Offset

In accordance with the project approval Mackas Sand holds an approved Landscape Management Plan (LMP) (Umwelt, September 2017). The LMP sets out the procedures and management requirements associated with the rehabilitation, ecological and biodiversity offset area.

The LMP was revised during the reporting period and submitted to the Secretary for their satisfaction.

6.4.1 Environmental Assessment Predictions

A detailed ecological assessment was undertaken to support of the Mackas Sand Project Environmental Assessment (2009) (EA). This assessment identified the existing natural environment and likely impacts of the proposal on the biodiversity of the area, particularly on threatened species, populations and communities.

No threatened flora species, endangered flora populations or threatened ecological communities were observed in the study area during surveys undertaken for the ecological assessment. Four threatened fauna species were identified and fourteen threatened or endangered fauna species are considered to have potential habitat in the study area.

The ecology impacts are limited to the clearance of vegetation primarily at Lot 220, but also the alternate access road to Lot 218. To address these impacts a pre clearance procedure, rehabilitation of Lot 220 and the establishment of a biodiversity area to offset the impact on two orchids (i.e. Newcastle Doubletail *(Diuris praecox)* and Leafless Tongue-orchid *(Cryptostylis hunteriana)*) and a number of fauna species were recommended.

6.4.2 Impact Assessment Criteria

The rehabilitation, ecological and biodiversity impact assessment criteria are associated with following the procedures as detailed in the LMP, being:

1) Ecological pre-clearance surveys
2) Limiting vegetation impacts to the approved areas (e.g. extraction area and haul roads)
3) Salvage of topsoil and woody debris for rehabilitation of the extraction area at Lot 220
4) Weed management
5) Bushfire management
6) Rehabilitation of the extraction area at Lot 220
7) Monitoring the performance and progression of the rehabilitation areas

8) Arranging for the long term security of the biodiversity offset area.

6.4.3 Monitoring Results

6.4.3.1 Rehabilitation and Ecological

The alternate access road to Lot 218 has been constructed. As the alternate access road is in use, rehabilitation of the alternate access road and subsequent rehabilitation performance monitoring has not been commenced.

During the reporting period, Mackas Sand implemented the following land management procedures in accordance with the LMP at Lot 220:

- Ecological pre-clearance surveys
- Identified the limiting vegetation clearance in advance of the sand extractions operations
- Salvage of topsoil and woody debris for rehabilitation of the extraction area at Lot 218
- Continue to add to the total area of land under rehabilitation at Lot 220. See **Section 8.0** for further details
- Monitoring the performance and progression of the rehabilitation areas.

6.4.3.2 Biodiversity Offset

Mackas Sand in consultation with OEH is seeking to establish a Conservation Agreement with OEH to offset the impacts of construction of the alternate access road. The Conservation Agreement is the mechanism by which the security of the biodiversity offset area in perpetuity.

During the reporting period Mackas Sand submitted a draft Conservation Agreement to OEH on two occasions. Mackas Sand will continue to liaise and work with OEH to finalise this agreement. Subject to any further comments from OEH as well as OEH review and/or processing timeframes, Mackas Sand expects the agreement to be finalised in 2019.

Monitoring of the biodiversity offset area is undertaken generally during August / September to align with the peak flowering season of the Newcastle Doubletail *(Diuris praecox)* and Leafless Tongue-orchid *(Cryptostylis hunteriana)*. During the reporting period monitoring was undertaken on 14 August 2018 and 7 September 2018. While the timing of the monitoring is design to target and monitor the orchid population numbers, the following additional ecological information is also collected:

- Habitat Assessment - including dominant flora species in each stratum, groundcover, evidence of disturbance and dieback, presence of standing and fallen dead timber and hollow-bearing trees.
- Vegetation Structure Assessment - Two permanent 50 m transects have been established at the eastern section of the Lot and are surveyed to monitor structural change to vegetation assemblage and habitat surrounding known orchid populations.
- Photo Monitoring – Five photo monitoring points have been established to monitor structural development in vegetation assemblage.
- Exotic Species Monitoring and Management – Monitoring and management of Whiskey Grass population and other exotic species.

A summary of 2018 monitoring results are provided below.

Orchid Monitoring

The results of the monitoring data for Newcastle doubletail (*Diuris praecox*) and Sand doubletail (*Diuris arenaria*) between 2014 and 2018 are shown in **Table 6.17** and **Table 6.18**.

Table 6.17 Results of *Diuris praecox* Searches 2014 - 2018

	2014	2015	2016	2017	2018
Date of survey	27 August 2014	26 August 2015	26 August 2016	25 August 2017	7 September 2018
Number of stems	64	69	39	93	20
Maximum flowers per stem	9	10	7	8	9
Minimum flowers per stem	0	0	0	0	0
Mean flowers per stem	4.2	4.7	2.7	3.4	4.3

Table 6.18 Results of *Diuris arenaria* Searches 2014 - 2018

	2014	2015	2016	2017	2018
Date of survey	10 September 2014	11 September 2015	14 September 2016	7 September 2017	7 September 2018
Number of stems	72	156	200	150	119
Maximum flowers per stem	7	9	7	5	6
Minimum flowers per stem	1	0	0	0	0
Mean flowers per stem	2.2	2.4	2.7	1.3	1

Habitat Assessment Monitoring

The results of the 2018 habitat monitoring are shown in **Table 6.19** below. The table also shows the accumulated results since baseline surveys in 2014.

Table 6.19 Results of Habitat Assessment for 2014 - 2018

Habitat Attribute	2014	2015	2016	2017	2018
Disturbances					
Weeds (density/species)	Low/whiskey grass (*Andropogan virginicus*)	Low/whiskey grass (*Andropogan virginicus*)	Low/whiskey grass (*Andropogon virginicus*)	Low/whiskey grass (*Andropogon virginicus*)	Low/whiskey grass (*Andropogon virginicus*)
Pests	Nil identified	Nil Identified	Nil Identified	Nil Identified	Nil Identified
Fire	Evidence of previous	Nil since 2014	Nil since 2015	Nil since 2016	Nil since 2017
Grazing	Cattle	Cattle	Cattle	Cattle	Ground vegetation and small shrubs impacted by cattle grazing
Erosion	Minor (Aeolian)	Minor (Aeolian)	Minor (Aeolian)	Minor (Aeolian)	Minor (Aeolian)
Logging	Historic (cut stumps)	Nil since 2014	Nil Since 2014	Nil logging; Vegetation removed to install fence*	Nil logging - Vegetation removed by grazing
Features (Relative Abundance)					
Fallen timber/logs	Moderate	Moderate	Moderate	Moderate	Moderate
Stags	Nil	Nil	Nil	Nil	Nil
Ground cover (litter)	Moderate	Moderate	Common	Common	Moderate
Mistletoe	Nil	Nil	Scarce	Few	Few
Dieback	Nil	Nil	Nil	Nil	Minor canopy dieback
Loose bark on trees	Moderate	Moderate	Moderate	Moderate	Few
Tree Hollows					
Number of trees with hollows	12	12	12	12	12
Size classes present	Very small (vs), small (s), medium (m), large (l) and very large (vl)	vs, s, m, l, vl	vs, s, m, l, vl	vs, s, m, l, vl	vs, s, m, l, vl

*Vegetation removed along northern and western boundary – approx. 5m – 7m in width along with additional areas to stock pile.

Vegetation Structure Assessment, Exotic Species and Photo Monitoring

The results of the 2018 vegetation structure monitoring are shown in **Table 6.20**. The table also shows the accumulated results since baseline surveys in 2014.

Table 6.20 Results of 50 metre Transect Data

% Cover	Transect 1 (2016)	Transect 1 (2017)	Transect 1 (2018)	Transect 2 (2016)	Transect 2 (2017)	Transect 2 (2018)
Canopy Cover						
Native Over-storey	12%	12%	6%	31%	34%	18%
Native Mid-storey	5%	4.5%	4%	1%	1%	0.1%
Ground Cover						
Native Grass	14%	20%	16%	16%	12%	6%
Native Shrubs	8%	24%	8%	2%	2%	2%
Native other (eg. Forbs)	32%	22%	10%	44%	46%	8%
Exotic	12%	4%	6%	10%	12%	4%
Bare Earth	36%	34%	62%	34%	34%	80%

Action in response to DPE Comment on the 2017 Annual Review

Mackas Sand has fenced the perimeter of the biodiversity offset area using a combination of electric and wire fencing material to restrict the grazing of this area by cattle.

In light of the 2018 monitoring data, Umwelt does not recommend that weed control and / or slashing of the biodiversity offset area is required at this time.

6.4.4 Trends in Data

6.4.4.1 Orchids

Table 6.17 and **Table 6.18** show that there are annual fluctuations present in the monitoring data for Newcastle doubletail (*Diuris praecox*) and Sand doubletail (*Diuris arenaria*) between 2014 and 2018.

These annual fluctuations are expected given the nature and response of these cryptic species to a range of environmental conditions. The 2018 results are consistent with the previous results. These annual fluctuations will be used as a guide to inform the decisions regarding the ongoing management and reporting which Mackas Sand expect will form part of the Conservation Agreement.

The environmental conditions leading up to monitoring in 2018 produced a warm, dry autumn and winter period, similar to those experienced in 2017. These environmental conditions aren't typically favourable for orchids flowering.

6.4.4.2 Habitat Assessment

The 2018 monitoring detected little change in the provision of habitat structures such as hollow bearing trees and fallen logs. The understorey is considered highly modified and a decrease in vegetation condition and structure was observed where cattle were present within the Biodiversity Offset Area. Impacts of cattle movement such as trampling, rubbing on trees and snapped stems were also observed throughout the area. A reduction in native vegetation and litter cover was also observed, exposing patches of bare earth. Areas with exposed soil substrate demonstrated dry soil conditions and a decrease in soil stability. The 2018 results are consistent with the previous results except the percentage of observed bare earth was significantly increased in both transects, and native grasses and other native plants (forbs etc.) showed a decline compared to previous survey results.

6.4.4.3 Vegetation Structure, Exotic Species and Photo Monitoring

In 2018 the vegetation structure is one of a highly modified understory of groundcover vegetation. On comparing to previous years the groundcover vegetation in 2018 was generally more sparse and lacked the diversity of grasses, forbs, shrubs, sedges and rushes that were previously dominant.

The extent of Whiskey Grass in 2018 was not able to be determined due to highly modified understory. As a result, management of exotic species is not recommended.

The 2018 photo monitoring shows a change in the understory structure compared to 2017 and are consistent with the vegetation structure an exotic species monitoring.

Umwelt noted that cattle were present in the Biodiversity Offset Area when the first round of monitoring was undertaken on the 14 August 2018. Mackas Sand were immediately notified of this and the cattle were removed on the same day. Mackas Sand advised that there were a pack of wild dogs in the area and advised that these dogs may have chased the cattle into the Biodiversity Offset Area.

2018 monitoring results indicate that the cattle have caused a decline in the condition of the Biodiversity Offset Area, primarily in the understory and groundcover vegetation, compared to previous years. The orchid numbers however are consistent with previous years. Future monitoring events will identify if there are long term impacts or benefits from this cattle incursion on the regeneration of both native and exotic species recorded previously within the Biodiversity Offset Area.

6.4.5 Proposed Improvements or Actions for the Next Reporting Period

Management activities should consider the recovery of and long term survivability of these threatened species with respect to the colonising potential of weed species following disturbance. Further controls that Umwelt recommends Mackas Sand should consider implementing include:

- Installing a permanent stock proof fence around the perimeter
- Installing padlocked gate through which all access is gained
- A management period prior to winter to target recovering and colonising weed species (such as whiskey grass and bitou bush) and to assist in maintaining the habitat requirements for these orchid species
- Continue to seek to finalise the Conservation Agreement in consultation with OEH.

Rehabilitation monitoring is discussed further in **Section 8.0**.

6.5 Aboriginal Heritage

6.5.1 Aboriginal Cultural Heritage Management

In accordance with the project approval Mackas Sand holds an approved Aboriginal Cultural Heritage Management Plan (ACHMP) (Umwelt, July 2016). The ACHMP sets out the procedures and management requirements associated with the Aboriginal Cultural Heritage matters and consultation regarding the rehabilitation, ecological and biodiversity offset matters as well as the establishment of the Aboriginal Cultural Heritage Group as the primary consultation mechanism for ongoing Aboriginal Cultural Heritage management matters for the project.

It is noted that the Mackas Sand extraction area is owned by the Worimi Local Aboriginal Land Council (Worimi LALC), who at the time of the environmental assessment dedicated a significant area of remnant coastal vegetation adjacent to the sand extraction area to permanent conservation status. Worimi LALC members are members of the ACHG.

6.5.2 Environmental Assessment Predictions

A detailed Aboriginal Cultural Heritage Assessment (ACHA) was prepared to support of the Mackas Sand Project Environmental Assessment (2009) (EA). The study area was determined to have high Aboriginal cultural significance through consultation undertaken with Aboriginal stakeholders.

The ACHA determined that the sand extraction operations at Lot 218 may uncover buried former soil horizons within the transient sand dunes that may contain archaeological material. As these soil surfaces are distributed discontinuously at varying depths across and within the dune field, significant logistical and safety issues have been experienced with traversing the transient sand dunes with mechanical sampling equipment prior to extraction occurring. As such, it has not been possible to safely undertake a typical sub-surface sampling program prior to extraction of the sand, in order to accurately identify where the remnant soil horizons occur prior to extraction commencing.

In contrast, all of Lot 220 consists of stabilised soils which will be impacted by the proposal, making it safe and achievable to undertake further archaeological investigations where required. One area of Potential Archaeological Deposit (PAD) was identified in the low-lying central area of Lot 220. Impacts to the area of PAD in the central section of this site were expected to be minimal, as any impact is limited to the construction of up to two vehicle access tracks across the narrowest sections of the PAD area. The key impacts associated with the proposal will occur in the elevated dunes and associated slopes that have been assessed as unlikely to contain PAD, although may contain low densities of archaeological material. Removal of vegetation on this site will also cause destruction of integral components of the Aboriginal cultural landscape.

6.5.3 Aboriginal Cultural Heritage Impact Assessment Criteria

The Aboriginal cultural heritage impact assessment criteria are associated with the following procedures as detailed in the ACHP:

1) Establishment of an Aboriginal Cultural Heritage Group (ACHG)

2) Cultural awareness training

3) The recording and salvage of Archaeological sites and PADs

4) Monitoring inspections by the ACHG

5) Analysis and interpretation of results of mitigation activities

6) Care and control of salvaged material

6.5.4 Aboriginal Cultural Heritage Results

Mackas Sand has established an ACHG and the plant operators have completed cultural awareness training as part of the induction process. This training is supplemented by the plant operator(s) also attending and participating in the ACHG meeting and the monitoring inspections by the ACHG.

An ACHG inspection was undertaken at Lot 218 and 220 during September 2018. A total of 13 stone artefacts were identified during the inspection at Lot 218. No artefacts were identified during the inspection at Lot 220. All 13 artefacts from Lot 218 were analysed and further stored on-site for reburial in the nominated keeping place by the ACHG as part of the inspection which is scheduled for 3 April 2019. The ACHG has previously indicated there is no need to bag materials from Lot 220 for later analysis, however any artefacts are to be stored and returned to Lot 220 as part of the site rehabilitation process.

6.5.5 Trends in Data

Table 6.21 shows that number of artefacts that were salvaged at Lot 218 and Lot 220 from 2016 to 2018. Low numbers of artefacts continue to be reported at both Lots 218 and 220.

Table 6.21 Artefact Counts Lots 218 and 220

Year	Number of Artefacts Salvaged	
	Lot 218	Lot 220
2016	38	26
2017	9	0
2018	13	0

6.5.6 Proposed Improvements or Actions for the Next Reporting Period

No additional management or mitigation measures are proposed to be implemented which are outside the ACHMP. The ACHG will discuss the opportunity to revise the ACHMP to more closely reflect safe artefact recovery practices that have been developed for Lot 218.

6.6 Non-Aboriginal Heritage

The Mackas Sand Environmental Assessment (2009) (EA) identified an alignment of World War II era tank traps traversing a section of Lot 220. These tank traps are also believed to exist beneath the mobile sand dunes on north-eastern end of Lot 218. No other historical heritage items were identified within the study area.

The tanks traps within the Lot 220 extraction area have been temporarily relocated during a previous reporting period. They will be returned to their original position when they will not restrict extraction and / or rehabilitation activities. No tanks traps were uncovered at Lot 218 during the reporting period.

No actions or impacts in relation to non-Aboriginal heritage occurred during the 2018 reporting period.

No additional management or mitigation measures are proposed to be implemented.

6.7 Erosion and Sediment Control

In accordance with the project approval Mackas Sand holds an approved Soil and Water Management Plan (SWMP) (Umwelt, November 2014), which sets out the procedures and management requirements.

The SWMP was revised during the reporting period and submitted to the Secretary for their satisfaction.

The Mackas Sand Environmental Assessment (2009) (EA) identified that small quantities of surface run-off will be generated from access roads and small parking areas. With this surface run-off readily managed through the establishment of table drains and flow dissipation structures, such as level spreaders along each access road. Rainwater tanks will be connected to the roofs of any permanent buildings to collect rainfall runoff.

Mackas Sand's experience in relation to the extraction area is that the sand is highly permeable. This in combination with the extraction area being the lowest point in the landscape results in there being negligible potential for the operation to generate runoff or impact on surface waters.

Mackas Sand completed an extensive road sealing program during 2017. This effectively eliminated the potential for erosion and sediment transport along the Lot 218 alternate and Lot 220 access roads. Spoon drains and localised erosion sediment controls are located near the entrance to the sand extraction areas where the road has not been sealed.

No additional erosion and sediment control works were completed during the 2018 reporting period.

No additional management or mitigation measures are proposed to be implemented which are outside the SWMP.

6.8 Waste Management

The Mackas Sand Environmental Assessment (2009) (EA) identified that wastes from the Project include sand processing and ablution wastes.

During the reporting period sand processing wastes (i.e. screen waste) have consisted of sand aggregates, fallen vegetation and litter. These wastes have been incorporated into the final landform of the site as per the EA.

No additional management or mitigation measures are proposed to be implemented.

6.9 Traffic

Traffic Management at Mackas Sand is undertaken in accordance with the approved Drivers Code of Conduct (DCoC) (Umwelt, December 2018). The DCoC applies to drivers of all project-related vehicles, including trucks that haul sand from Mackas Sand operations on Lot 218 and Lot 220.

The DCoC details:

- potential safety issues on site and when on public road haulage routes;
- times of heavy traffic;
- school bus travel times and bus stop locations;
- potential interactions with traffic and fauna on roads;
- emergency and accident contact details (including details for care of injured fauna);
- local road condition updates;
- measures to minimise truck noise impacts; and
- measures to minimise movement to site prior to 5am weekdays.

As part of standard site procedure, the DCoC is sent to all contracting companies for their distribution to drivers. All haulage contractors are required to read / understand the DCoC before gaining access to the site.

6.9.1 Environmental Assessment Predictions

A detailed Traffic Assessment was prepared by GHD to support a modification to the Mackas Sand Project and was included as an appendix within the Environmental Assessment (July 2015) (EA) (i.e. Modification 2). The modification allows for an increase in maximum hourly truck movements from Lot 218 via the approved alternate access road. All other traffic aspects remained unchanged from that approved as part of the 2009 EA. No changes to the transport routes were sought by this modification.

The traffic impact assessment concluded that the site access and the intersection with Nelson Bay Road will continue to operate with spare capacity from 2015 to 2035 and that the existing road network will continue to operate with minimal negative impacts as a result of the proposed modification to the approved truck movements.

6.9.2 Monitoring Results

6.9.2.1 Vehicle Movements

As part of standard site procedure, the DCoC is sent to all contracting companies.

Transport of product material was undertaken generally in accordance with the hourly limits specified in the Project Approval during the reporting period, with the exception of two laden truck movements (being two trucks which exited Lot 218 between 5-6am on 15 November 2018). Further details regarding these two extra truck movements can be found in **Section 11.0**.

Mackas Sand also notes that fire in the shed damaged the video equipment required under Schedule 3, Condition 33D of the Project Approval during April 2018. While the video equipment was inoperable Mackas Sand, continued to manage and monitor its operation via the weighbridge and associated video equipment, in accordance with Schedule 3 Condition 33E. No non-compliances with Schedule 3 Condition 33E were identified during this period. Further details regarding this matter can be found in **Section 11.0**.

Mackas Sand is not aware of any traffic accidents involving truck entering or departing via the Lot 218 or Lot 220 access roads intersection with Nelson Bay Road.

6.9.2.2 Road Haulage

Condition 33 of Schedule 3 of Project Approval 08_0142 (as modified) states that all vehicles entering and leaving the site are covered and that all loaded vehicles leaving the site are cleaned of materials that may fall on the road, before they leave the site.

Mackas Sand notes there were no non-compliances with Condition 33 of Schedule 3 during the reporting period.

6.9.2.3 Fauna Strikes

Conditions 33B and 33C of Schedule 3 of Project Approval 08_0142 (as modified) details the requirement for the DCoC to be assessed in each Annual Review. This shall include details of all fauna injured or killed by vehicle strikes, time and date of any such strike, species involved, action taken immediately following the strike and any consequent measures put in place to prevent or minimise a recurrence of fauna strikes.

There were no reports made to Mackas Sand management of any fauna injured or killed during the reporting period.

6.9.3 Trend in Data

During the reporting period Mackas Sand has achieved almost 100% compliance with its traffic movements.

6.9.1 Proposed Improvements or Actions for the Next Reporting Period

No additional management or mitigation measures are proposed to be implemented which are outside the approved DCoC.

7.0 Water Management

Mackas Sand does not extract groundwater for use at either Lot 218 or Lot 220 and does hold any licences for the extraction of groundwater for use at either Lot 218 or Lot 220. Water management needs on-site are negligible and are limited to surface runoff from the sealed access road. The remainder of the site is comprised of sand which is free draining. There is no surface water runoff at either of the Lots that requires diversion or specific management.

The potential major water demands for the Project are the wash plant and dust suppression associated with the minimisation of vehicle generated dust emission. Mackas Sand has however, effectively minimised its water demand to nil, as the wash plant has not been constructed and the access roads have been sealed. As noted in Section 2.5 of the SWMP, Mackas Sand will keep a record of any extraordinary water usage on-site and will compile and present this information as part of the Annual Review.

No extraordinary water usage was recorded at Mackas Sand during the reporting period.

7.1 Surface Water

There are no surface flow or drainage lines on either Lot 218 or Lot 220 due to the high permeability of the underlying sand. As a result, there is no surface water that can be monitored to establish baseline conditions other than in low-lying areas that may intermittently flood following an intense rainfall event due to the infiltration rate being exceeded (i.e. perched water). As this water is intermittent and reports to the local groundwater, it is considered that these areas would have water quality that is consistent with that recorded in the groundwater monitoring bores.

7.2 Groundwater

In accordance with the Project Approval, Mackas Sand holds an approved Soil and Water Management Plan (SWMP) (Umwelt, November 2014), which sets out the procedures and management requirements for groundwater.

The SWMP was revised during the reporting period and submitted to the Secretary for their satisfaction.

The groundwater monitoring network consists of six bores, which are monitored each quarter. The location of the monitoring bores is shown on **Figure 6.1**.

7.2.1 Environmental Assessment Predictions

The Mackas Sand Environmental Assessment (2009) identified that the sand extraction areas are located on the Stockton Sandbeds, which form part of the Tomago-Tomaree-Stockton groundwater source that is managed in accordance with the Hunter Water (Special Areas) Regulation 2003, Tomago-Tomaree-Stockton Groundwater Management Plan 1996 and Water Sharing Plan for the Tomago-Tomaree-Stockton Groundwater Sources 2003.

A Groundwater Impact Assessment was developed in support of the Mackas Sand Project Environmental Assessment (2009). The EA predicted that the sand extraction operations at Lot 218 and Lot 220 would have a negligible impact at both locations under average rainfall conditions.

The EA does not include information on groundwater quality impacts. The assessment findings for the temporary reduction in extraction level (i.e. Modification 1 of the Project Approval) are unchanged from the 2009 EA.

7.2.2 Impact Assessment Criteria

7.2.2.1 Groundwater Level

To ensure adequate protection of the underlying groundwater resource, the SWMP includes a Maximum Extraction Depth Map for Lot 218 and Lot 220, which satisfies the requirements of Schedule 2, Conditions 7 and 7A of the Project Approval. The standing water level in the six bores is measured each quarter and compared to the predictions shown in **Table 7.1**.

Table 7.1 shows the predicted maximum groundwater levels at each groundwater monitoring bore.

Table 7.1 Predicted Maximum Groundwater Levels

Groundwater Monitoring Bore	Approximate Predicted Maximum (mAHD)
SP1	3.6
SP2	2.8
SP3	2.6
SP4	1.25
SP5	3.6
BL158	3.7

7.2.2.2 Groundwater Quality

The SWMP includes a suite of groundwater monitoring parameters and trigger levels which are measured each quarter, as shown in **Table 7.2**.

Table 7.2 Groundwater Quality Investigation Trigger Values

Parameter	Units	Minimum	Maximum
pH	pH Unit	4.5**	8.5*
Conductivity	µS/cm	NA	600**
Turbidity	NTU	NA	50**
Arsenic	mg/L	NA	0.01*
Manganese	mg/L	NA	0.1*
Iron	mg/L	NA	5.70**

*These values are based on NHMRC, NRMMC 2011.

**These values are based on long term groundwater monitoring from a previous operation in the local area.

7.2.3 Groundwater Monitoring Results

During the reporting period, four regular monitoring events were undertaken in accordance with the SWMP. One additional extraordinary monitoring event was also undertaken exclusively at SP4 in

August 2018 as part of a groundwater monitoring investigation. The 2018 monitoring results are shown in **Table 7.3** to **Table 7.9.**

The results are compiled and compared against the trigger values in provided in **Table 7.1** and **Table 7.2**, the minimum / maximum range and trends in the previous results.

7.2.3.1 Groundwater Level

Table 7.3 shows the recorded groundwater levels for the reporting period.

Table 7.3 Groundwater Levels (mAHD)

Sample Date	Groundwater Monitoring Bore (mAHD)					
	SP1	SP2	SP3	SP4	SP5	BL158
Approximate Predicted Maximum (mAHD)	**3.6**	**2.8**	**2.6**	**1.25**	**3.6**	**3.7**
23-Apr-18	1.28	2.05	1.60	0.61	2.36	1.61
26-Jun-18	1.69	2.54	2.53	1.14	2.98	2.10
25-Sep-18	1.67	2.80	1.99	0.88	2.72	1.88
10-Dec-18	1.38	2.38	1.89	0.72	2.55	1.73

7.2.3.2 Groundwater Quality

Table 7.4 to **Table 7.9** shows the recorded groundwater quality for the reporting period.

Table 7.4 Groundwater Quality – pH

Sample Date	Groundwater Monitoring Bore (pH)					
	SP1	SP2	SP3	SP4	SP5	BL158
Trigger Value Minimum/ Maximum	**4.5/8.5**	**4.5/8.5**	**4.5/8.5**	**4.5/8.5**	**4.5/8.5**	**4.5/8.5**
23-Apr-18	5.50	5.60	5.37	4.90	5.80	5.30
26-Jun-18	5.40	5.44	4.94	4.66	5.16	5.12
1-Aug-18*				4.85		
25-Sep-18	5.55	5.26	4.97	5.01	5.34	4.99
10-Dec-18	5.54	5.52	5.20	5.42	5.50	5.12

Note : * Additional SP4 monitoring event due to standpipe replacement

Table 7.5 Groundwater Quality – Conductivity (µs/cm)

Sample Date	Groundwater Monitoring Bore (µs/cm)					
	SP1	SP2	SP3	SP4	SP5	BL158
Trigger Value Maximum	600	600	600	600	600	600
23-Apr-18	350	96	180	1000	98	650
26-Jun-18	296	86	223	829	263	555
1-Aug-18*				549		
25-Sep-18	262	75	226	418	128	602
10-Dec-18	251	92	146	356	90	484

Note : * Additional SP4 monitoring event due to standpipe replacement

Table 7.6 Groundwater Quality – Turbidity (NTU)

Sample Date	Groundwater Monitoring Bore (NTU)					
	SP1	SP2	SP3	SP4	SP5	BL158
Trigger Value Maximum	50	50	50	50	50	50
23-Apr-18	6.9	2.9	7.6	15.0	7.7	1.0
26-Jun-18	27.0	4.6	4.6	4.6	4.2	0.8
1-Aug-18*				22.0		
25-Sep-18	140.0	5.8	4.8	0.1	6.2	0.4
10-Dec-18	330.0	4.2	2.6	6.1	15.0	0.3

Note : * Additional SP4 monitoring event due to standpipe replacement

Table 7.7 Groundwater Quality – Arsenic (mg/L)

Sample Date	Groundwater Monitoring Bore (mg/L)					
	SP1	SP2	SP3	SP4	SP5	BL158
Trigger Value Maximum	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**
23-Apr-18	<0.001	<0.001	<0.001	0.001	<0.001	<0.001
26-Jun-18	<0.001	<0.001	<0.001	0.001	0.003	<0.001
1-Aug-18				0.001		
25-Sep-18	<0.001	<0.001	<0.001	0.001	0.001	<0.001
10-Dec-18	<0.001	<0.001	<0.001	<0.001	0.002	0.001

Note : * Additional SP4 monitoring event due to standpipe replacement

Table 7.8 Groundwater Quality – Manganese (mg/L)

Sample Date	Groundwater Monitoring Bore (mg/L)					
	SP1	SP2	SP3	SP4	SP5	BL158
Trigger Value Maximum	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**
23-Apr-18	0.005	0.011	0.005	0.37	0.013	0.015
26-Jun-18	0.006	0.011	0.002	0.179	0.103	0.011
1-Aug-18				0.103		
25-Sep-18	0.004	0.014	<0.001	0.061	0.037	0.010
10-Dec-18	0.008	0.012	0.002	0.033	0.013	0.007

Note : * Additional SP4 monitoring event due to standpipe replacement

Table 7.9 Groundwater Quality – – Iron (mg/L)

Sample Date	Groundwater Monitoring Bore (mg/L)					
	SP1	SP2	SP3	SP4	SP5	BL158
Trigger Value Maximum	**5.70**	**5.70**	**5.70**	**5.70**	**5.70**	**5.70**
23-Apr-18	0.05	0.70	0.16	34	0.46	1.80
26-Jun-18	0.05	0.64	0.13	31.7	3.40	1.51
1-Aug-18				18.2		
25-Sep-18	0.09	0.71	0.16	10.4	1.59	1.15
10-Dec-18	0.55	0.82	0.10	3.88	0.38	0.86

Note : * Additional SP4 monitoring event due to standpipe replacement

Groundwater level measurements and groundwater quality monitoring data for the current and previous reporting period are provided in **Appendix 4**.

7.2.4 Trends in Data

In accordance with Section 5.4 of the SWMP, if groundwater monitoring results exceed the nominated investigation trigger values and predictions of Table 5.5 of the approved SMWP, the Quarry Manager is required to further investigate.

If results are within 10% of the nominated trigger value, the Quarry Manager will further interrogate and explore any reasons for the elevated result. If results are greater than 10% of the nominated trigger value, the Quarry Manager will further interrogate and explore any reasons for the elevated result and provide a notification to DPE and relevant agencies of any findings of this investigation.

Mackas Sand provided notification to DPE and relevant agencies on 7 November 2018 and 21 December 2018 during the reporting period. Details of these notifications are summarised below. As part of the investigation which informed the notification on 7 November 2018, additional monitor at SP4 was undertaken on 1 August 2018.

7.2.4.1 Groundwater Level

During the reporting period the groundwater level at all locations was below the approximate Predicted Maximum Groundwater Level. It is considered that recorded groundwater levels are consistent with predictions within the EA.

The groundwater results since 2014 are shown graphically in **Appendix 4**. Since 2014 the groundwater levels generally show similar rising and falling trends over time. It is noted that quantum of change between individual readings at different monitoring locations is not consistent. The cause of this variability is however unclear. However, it is hypothesised that this may be due to localised topographical or vegetation influences. As Mackas Sand does not extract any groundwater for it use in the operation, it is unlikely that these changes are due to the sand extraction operations.

SP4 recorded a new minimum level of 1.14 mAHD during the reporting period. This was an increase of approximately 0.03m from the previous recorded minimum of 1.11 mAHD, but below the Predicted Maximum groundwater level of 1.25 mAHD.

7.2.4.2 Groundwater pH

All pH results for the reporting period remained within the SWMP specified trigger value range.

The groundwater pH results since 2014 are shown graphically in **Appendix 4**. The results for the reporting period are within the previous range of results, except for SP4 between April to September which were up to 0.39 pH units below the historical minimum of 5.05. Between December 2017 and June 2019 the pH levels went from 5.80 to 4.66 and have since risen to 5.42 in December 2018.

7.2.4.3 Groundwater Conductivity

The conductivity results during the reporting period at SP1-3 and SP5 remained below the trigger value of 600 µs/cm. In April 2018 the conductivity results for SP4 and BL158 spiked above 600 µs/cm trigger value and have since declined to levels below the trigger value.

SP4 recorded a maximum of 1,000 µS/cm in April and 829 µS/cm during June 2018. SP4 was inspected following the receipt of these results and it was identified the steel casing for SP4 had been broken – presumably by cattle. The casing at SP4 was replaced and re-sampled on 1 August 2018. Monitoring results for the additional round of sampling returned to below the EC trigger value. A summary of the investigation undertaken by Mackas Sand and actions taken as result of the investigation were provided to DP&E on 7 November 2018.

Monitoring results at BL158 recorded a maximum of 650 µS/cm in April and 602 µS/cm during September 2018. These results exceeded the investigation trigger level by less than 10% and as such, Mackas Sand undertook a secondary review of these results. Operations at Lot 218 remain over 1km away from BL158 and Mackas Sand does not consider these results are influenced by its operations.

SP1 also displayed a spike in conductivity in April but below the 600 µs/cm trigger value.

New minimum conductivity level of 75 µs/cm was recorded at SP2, 10 µs/cm below the previous minimum. New maximum conductivity level was recorded at SP1 (350 µs/cm), 124 µs/cm above the previous maximum, SP4 (1000 µs/cm) 511 µs/cm above the previous maximum, and BL158 (485 µs/cm) 165 µs/cm above the previous maximum.

7.2.4.4 Groundwater Turbidity

The turbidity results for SP2-5 and BL158 during the reporting period remained below the specified trigger value and were generally consistent with historical records.

Elevated results were recorded at SP1 during September (140 NTU) and December (330 NTU) 2018. Mackas Sand reviewed these results and investigated whether its operations may have influenced these results. As the turbidity measurements recorded at SP2-4, it is believed that the elevated result are localised / specific to SP1. A summary of the investigation undertaken by Mackas Sand and actions taken as result of the investigation were provided to DP&E and relevant agencies on 7 November and 21 December 2018.

Further investigation into this issue has revealed a similar situation occurred in 2010/2011 and was believed to be due to the sampling methodology (i.e. the use of a bailer). As a result, a pump sampling arrangement was introduced. The subsequent turbidity results dropped by one to two orders of magnitude at all groundwater monitoring bores. Mackas Sand notes that in early 2018 it engaged a contractor to collect the groundwater samples. The contractor has advised that it uses a bailer to collect the groundwater samples. The September and December 2018 turbidity results at SP1 are therefore considered to be a false-positive result.

7.2.4.5 Groundwater Arsenic

During the reporting period the arsenic result all locations was an order of magnitude below the trigger level.

The groundwater arsenic results since 2014 are shown graphically in **Appendix 4**. The arsenic results during the reporting period were typically below the limit of detection <0.001 mg/L, which is consistent with previous results.

7.2.4.6 Groundwater Manganese

During the reporting period manganese results at all monitoring locations were an order of magnitude below the trigger level, except for two monitoring results at SP4 and one at SP5. SP4 recorded results of 0.37 mg/L during April and 0.179mg/L in June 2018, while SP5 recorded a result of 0.103mg/L in June 2018.

SP4 was inspected following the receipt of these results and it was identified the steel casing had been broken – presumably by cattle. The casing was replaced and re-sampled on 1 August 2018. Monitoring results for the additional round of sampling returned to manganese concentrations below the trigger value. A summary of the investigation undertaken by Mackas Sand and the actions taken as result of the investigation were provided to DP&E on 7 November 2018.

The SP5 manganese monitoring for June 2018 was 0.03mg/L above the trigger level of 0.1mg/L and was within 10% of the trigger value. Operations onsite at the time of sampling were consistent with normal operations and no unusual activities were identified onsite at the time. It was noted to review the next round of monitoring results to identify any trends. The manganese results for September and December returned to and continued to trend below the trigger level. No cause has been identified for this anomaly.

7.2.4.7 Groundwater Iron

During the reporting period the iron result for all bores was below the trigger level with the exception SP4 during April, June, August and September 2018.

SP4 was inspected following the receipt of these results and it was identified the steel casing had been broken – presumably by cattle. The casing was replaced and re-sampled on 1 August 2018 with a result of 18.2mg/L, a reduction in approximately 40% from the June 2018 result. The iron result recorded in December 2018 at SP4 has since returned to be below the trigger level and is within the range of previous results.

The groundwater iron results since 2014 are shown graphically in **Appendix 4**. All iron results for the reporting period are within the historical minimum and maximum, with the exception of BL158 where a new maximum of 1.80 mg/L was recorded, 0.18 mg/L above the previous high and SP4 as discussed above.

7.2.5 Proposed Improvement or Actions Next Reporting Period

Mackas Sand will investigate with the groundwater sampling contractor the use of a low flow pump for groundwater sampling as opposed to manually bailing the bores.

No additional management or mitigation measures are proposed to be implemented which are outside the approved SWMP.

8.0 Rehabilitation

8.1 Rehabilitation of Disturbed Land

In accordance with Schedule 3, Condition 24 of the Project Approval (as modified), progressive rehabilitation of disturbed areas at Lot 220 is being undertaken in a manner that is generally consistent with the final landform in the EA, in alignment with statutory conditions and requirements within plans.

8.1.1 Lot 218

Rehabilitation requirements at Lot 218 include the establishment of a vegetative bund on the western edge of the extraction area as the site is governed by the natural movement of sand into the extraction area.

As active quarrying occurred within the western portion of the pit during 2018, the bund has not yet been constructed and vegetated. The objective of the bund is to provide a physical barrier between the mobile sand and native vegetation on the landward side of the mobile dunes.

8.1.2 Lot 220

Rehabilitation at Lot 220 is being undertaken progressively as sand extraction and operating space on the active quarry floor permits. Ongoing short term rehabilitation strategies are primarily focused on maximising the availability and viability of biological resources for use in rehabilitation activities, including the salvage and reuse of material for habitat enhancement and the management of topsoil.

Approximately 4 ha of land in the southern section and 1 ha in the northern section of Lot 220 was undergoing landform establishment preparations (i.e. topsoil placement) for rehabilitation as at the end of the reporting period. Mackas Sand is targeting a Spring 2019 or Autumn 2020 seeding window. It is expected that this 5 ha will transition to an active rehabilitation status during 2019 /2020 and contribute to the 3.3 ha that is currently in the active rehabilitation category.

Other works include the utilisation of vegetative material cleared ahead of sand extraction operations. No additional rehabilitation was completed during the report period. **Table 8.1** and **Figure 8.1** show the status of rehabilitation at Lot 220.

Table 8.1 Summary of Rehabilitation Status at Mackas Sand (Lot 220)

	2017 Report Period (ha)	2018 Report Period (ha)	2019 Report Period (ha) (forecast)
Total Mine Footprint	24.9	29.2	33
Total Active Disturbance	21.6	25.9	25.7
Land being prepared for rehabilitation	0	5*	5
Land under active rehabilitation	3.3	3.3	8.3**
Completed Rehabilitation	0	0	0

*Undergoing preparations as at end of 2018 reporting period

**Active rehabilitation may commence in Spring 2019 or Autumn 2020

Image Source: Nearmap (Feb 2018)
Data Source: Department of Finance, Services & Innovation (2017)

0 100 250 500m
1:10 000

Legend

- Lot 220 LPI Boundary
- Lot 220 Approved Operational Area
- Rehabilitation Area
- Land Prepared for Rehabilitation

FIGURE 8.1

Lot 220 Rehabilitation Status

File Name (A4): R85/1646_508.dgn
20190322 13.33

8.2 Annual Rehabilitation Inspection

The annual rehabilitation inspection of Lot 220 was undertaken during spring 2018. Spring monitoring is undertaken to track current rehabilitation processes and to further inform any rehabilitation management actions required onsite. Management actions may include:

- Infill planting; and
- Weed Management

Key observations made during the 2018 rehabilitation monitoring inspection included:

- Approximately half of the rehabilitation established to date contains a mix of native shrubs, juvenile trees and ground cover species that are indicative of the surrounding vegetation community type. However, the rehabilitation observed is low quality and not considered to be trending towards the structural or floristic composition of the community required to be present in the final landform;
- Continued salvaging of tree hollows and subsequent installation within Lot 220 rehabilitation areas;
- Approximately half of the rehabilitation area was dominated by weed species such as including red natal grass (*Melinis repens*), kikuyu grass (*Pennisetum clandestinum*), bitou bush (*Chrysanthemoides monilifera*), farmer's friend (*Bidens pilosa*), Large-leaved Pennywort (*Hydrocotyle bonariensis)* and *Acanthospermum australe;*
- Long-term topsoil stockpiles observed in the northern portion of Lot 220 are dominated by weed growth; and
- Topsoil in southern area of Lot 220 is being directly returned to land being prepared for rehabilitation.

A number of recommendations were made following the rehabilitation inspection and included:

- Weed management within Northern section of Lot 220;
- Consolidation of smaller stockpiles to a maximum height of 5 m;
- Install signposting for topsoil stockpiles being kept for longer than 3 months; and
- Undertake vegetation infill works (including seeding and/or planting) in northern area of Lot 220 up to 300 stems/ha.

Mackas Sand will provide an update of the actions completed against the rehabilitation monitoring recommendations in the next annual review document. Mackas Sand developed a scope of works and sought a number of proposals to engage a rehabilitation specialist to assist with future rehabilitation works and its ongoing management.

8.3 Rehabilitation Trials and Research

No rehabilitation trials were undertaken during the report period.

8.4 Proposed Improvements or Actions for the Next Reporting Period

During the reporting period, Mackas Sand will engage a rehabilitation contractor to assist in the establishment, development and ongoing management of rehabilitation onsite at Lot 220.

Mackas Sand will continue to salvage tree hollows and spread over rehabilitation areas.

Mackas Sand will continue to identify opportunities to rehabilitate areas which are no longer required for operational purposes / activities.

9.0 Community

9.1 Community Complaints

Mackas Sand did not receive any community complaints during the 2018 reporting period.

9.2 Community Liaison

The Mackas Sand Community Consultative Committee (CCC) met once during the report period, as agreed by the CCC. The CCC meeting was held on 18 April 2018. CCC representatives act as a point of contact to provide feedback between Mackas Sand and wider community. Members of the Mackas Sand CCC are included in **Table 9.1**.

Table 9.1 Mackas Sand CCC Members for the 2018 Report Period

Name	Organisation
Ms Margaret Macdonald-Hill	Chairperson
Mr Robert Mackenzie	Mackas Sand
Ms Julie Towers	Community Representative
Mr Stephen Hufnagl	Community Representative
Mr Kent Samson	Community Representative
Mr Cliff Johnson	Port Stephens Council representative
Mr Andrew Smith*	Worimi Aboriginal Land Council
Mr Rod Williams	Umwelt (Australia) Pty. Ltd.

*Ms Lizzie Slater represented Worimi Aboriginal Land Council at 2018 CCC meeting due to Mr Andrew Smith's absence.

General items discussed during the 2018 CCC meeting included:

- Update provided on status of 2016 and 2017 Annual Review documents;
- Update provided on 2017-2018 compliance status and actions taken to resolve outstanding issues;
- Request from community representative for PSC to fill in potholes along Oakvale Rd; and
- Agreement to move CCC meetings to an Annual frequency, unless an extraordinary meeting is requested.

10.0 Independent Audit

In accordance with Schedule 5, Condition 5 of PA 08_0142, OnSite Environmental Management was engaged by Mackas Sand to undertake an IEA of Mackas Sand Project during the reporting period. The audit focused on Mackas Sand compliance with approvals and licences for the operational period between 2015 and 2017.

The final audit report was provided to Mackas Sand on 14 April 2018. The final audit report and Mackas Sand's response audit report being provided to DPE on 17 April 2018. The Department noted their satisfaction with the IEA in a letter dated 14 December 2018.

The auditor assessed compliance against the conditions and commitments within PA 08_0142 (as modified), EPL13218 and EPBC 2011/6214. The IEA identified a total of 14 non-compliances and made 7 recommendations.

Mackas Sand response to the identified non-compliances and status of each action as at the end of the 2018 reporting period is summarised in **Table 10.1**. Note: Risk levels of non-compliances were not provided as part of the Independent Audit Report. Of these non-compliances only the conservation agreement has not been fully addressed.

The audit recommendations, together with Mackas Sand's response and the status of each recommendation as at the end of the 2018 reporting period is summarised in **Table 10.2**.

The next IEA is scheduled to be undertaken in late 2020 or early 2021.

Table 10.1 Mackas Sand IEA non-compliance Summary

Non-Compliance	Audit Finding	Status	Response
PA 08_0142 S2C7; PA 08_0142 S3C2(d); SoC 1.1.5; and EPL 13218 L5.1	Mackas Sand breached the maximum operational extraction depth at Lot 218 & 220 during the previous audit period.	Noted – Completed	Mackas Sand entered into a voluntary undertaking with the Department of Planning and Environment to implement additional management measures and controls regarding this matter. It is considered that the voluntary undertaking appropriately addresses this issue.
PA 08_0142 S3 C4B; and SoC 1.6.3	Mackas Sand did not comply with hourly truck movement conditions during the previous audit period.	Noted – Completed	Mackas Sand implemented additional management measures and controls regarding this matter, as discussed with DPE at the time of the non-compliance. It is considered that the measures implemented have appropriately addressed this issue.
PA 08_0142 S3 C13; and EPL 13218 M2.2	Mackas Sand did not sample depositional dust gauges on a monthly (30+/- 2 days) basis during the audit period.	Noted – Completed	Mackas Sand reviewed their depositional dust sampling procedure and notification system during the reporting period. As noted in **Section 6.2** Mackas Sand has remained compliant with this condition since March 2018.

Non-Compliance	Audit Finding	Status	Response
PA 08_0142 S3 C 28B	No appropriate long term security for the Biodiversity Offset Area has been agreed upon by Mackas Sand and OEH to the satisfaction of the Secretary.	Ongoing	Mackas Sand engaged a consultant to complete the agreement during the reporting period. The conservation agreement was provided to the landowner(s) / mortgagee(s), as relevant for their review and signature and re-submitted OEH for their review and acceptance in mid-2018. OEH provided feedback to Mackas Sand in August 2018 requesting additional amendments. Mackas re-submitted a revised document addressing feedback in December 2018.
PA 08_0142 S5 C2; and SoC 1.13.1	Mackas Sand did not report exceedances or incidents associated with non-compliances against truck movement times during the previous audit period.	Noted	Mackas Sand is committed to continual improvement in regard to reporting and notifying relevant agencies of exceedances and/or incidents in a timely manner.
SoC 1.2.5	The Weed Management Plan (incorporated into the Landscape Management Plan) did not reference the Biosecurity Act 2015	Noted – Completed	Mackas Sand revised and submitted the Landscape Management Plan to DPE for comment during the reporting period. Mackas Sand received comment from the Department in December 2018. Mackas Sand will resubmit a revised LMP addressing the Department's comments during the next reporting period.
EPL 13218 M1.1	The formatting of environmental monitoring data was inconsistent with the guidelines of 'P*ublishing and providing pollution monitoring data'*.	Noted – Completed	Mackas Sand notes that all required monitoring data was published in a timely manner. The formatting of the monitoring reports was also revised during the reporting period.
EPBC 2011/6214 Condition 6	Mackas Sand did not publish annual compliance reports required under EPBC 2011/6214 by the required date.	Noted – Completed	Mackas Sand clarified the identification of this non-compliance with DoEE during the reporting period. DoEE reviewed this condition and did not consider this non-compliant against this condition.

Table 10.2 Mackas Sand IEA Recommendations

Ref	Recommendation	Status	Response
Rehabilitation Reporting	Maps of the areas extracted, rehabilitated and planned for rehabilitation recorded in the annual review table should be included in the annual review.	Completed	Refer to **Section 8.0** of this document
Rehabilitation Reporting	Reporting of rehabilitation in the annual reviews is noted to contain ambiguities in the wording and should be clarified in future reports. For clarity it is recommended that the DPE 2015 Annual Review Guidelines, Table 8, be used.	Completed	Refer to **Section 8.0** of this document.
Dust Suppression Recording	The visual recording of dust and water cart usage and driver behaviour monitoring etc. is undertaken but not recorded formally. No records of the usage of dust suppression or of visual inspection available. It is suggested a simple check sheet or similar is prepared and filled in by Supervisors on regular trips to and from the office etc. and/or by the watercart driver.	Noted	Mackas Sand considers the existing site procedure adequate. As noted in **Section 6.2**, bitumen sealing of haul road during 2017 notably reduced wheel generated dust emissions.
Air Quality Monitoring	Additional training on the correct procedure for monitoring in accordance with AS 3580.10.1 should be undertaken.	Noted	Consistent with the identified non-compliance, Mackas Sand reviewed their depositional dust sampling procedure during the reporting period. As noted in **Section 6.2** Mackas Sand has remained compliant with this condition since March 2018.
Website	The structure of the site makes information hard to find and labelling is not consistent. Suggest either group into years or group into report types required and add each new report into those sections.	Completed	Website layout was revised during the reporting period.
Website	Ensure that data on monitoring is reviewed and exceedances reported as required by the COA, SOC and EPL.	Noted	Monitoring Data continues to be reviewed on a monthly and quarterly basis. No additional measures required.

Ref	Recommendation	Status	Response
Audit Timing	Given the large volume of data to be reviewed and the requirement to publish the Annual Review in March of the following year, it is recommended that the independent audit be scheduled to April of the following year. This would allow the review of all 3 Annual Reviews reports. The next audit would therefore be scheduled to occur in 2021 for the years 2018, 2019, 2020.	Noted - Ongoing	Noted.

11.0 Incidents and Non-compliances during the Report Period

For a full summary of non-compliances identified during the Independent Environmental Audit, reference is made to **Section 10.0** of this document.

11.1 Incidents, Notifications and Non-Compliances

As noted in **Section 10.0,** Mackas Sand identified 7 administrative non-compliances during the reporting period. Further details of which are provided in **Sections 11.1.1** to **11.1.4**.

11.1.1 Additional Truck Movements from Lot 218

In accordance with Schedule 3 Condition 33E of PA 08_0142 (as modified), Mackas Sand records the time of arrival, time of dispatch, weight of load and vehicle identification as they enter and leave Lot 218. Vehicle movements are reviewed on a monthly basis during the reporting period to confirm compliance with truck movements as per Schedule 3, Condition 4B.

The monthly review of the November 2018 weighbridge log, on 4 December identified that two additional trucks exited Lot 218 between 5am and 6am on the 15 November 2018. The subsequent investigation identified that a software and programming issue at the weighbridge in combination with a recently commenced trial of using swipe cards at the weighbridge did not appropriately count laden outbound truck movements. The computer system error occurred when three drivers used a swipe card to exit the site instead of manually entering information via the inbound and outbound weighbridge terminals. This resulted in the computer system not counting three trucks during the hour. The swipe card trial was subsequently suspended following the identification of this issue. Mackas Sand may recommence this trial at a later date if additional and feasible safeguards can be implemented. All other vehicle movements during the reporting period were in accordance with Schedule 3, Condition 4B of PA 08_0142 (as modified). DPE issued a warning letter for failing to comply with Schedule 3, Condition 4B on 30 January 2019.

Mackas Sand notes this was also a non-compliance against Condition 5(b) of EPBC 2011/6214 Approval. DoEE were notified of this exceedance in accordance with the reporting requirements under the EPBC 2011/6214 approval.

11.1.2 Air Quality Monitoring Timing

During January and February 2018, Depositional Dust Gauges were collected with exposure periods of 34 days. AS/NZS 3580.10.1 however states that for routine monitoring events the period of exposure is 30 +/- 2 days. In response sampling staff were advised of the sampling frequency / period and since the identification of this issue, Mackas Sand remained compliant with sampling procedures since identification of this issue.

11.1.3 Groundwater Water Monitoring Program Notification

Elevated iron results were recorded with the groundwater at SP4 during April and June 2018. The subsequent investigation identified the steel casing for SP4 had been broken – presumably by cattle. Following the repair/replacement of the casing an additional round of monitoring was undertaken at SP4. The casing was replaced and re-sampled on 1 August 2018 with a result of 18.2mg/L, a reduction in approximately 40% from the June 2018 result. The iron result recorded in December 2018 at SP4 has since

returned to be below the trigger level and is within the range of previous results. Mackas Sand notified DPE and other relevant agencies of the monitoring results and subsequent repair/replacement of the casing in a letter on 7 November 2018.

11.1.4 Shed Fire near Lot 218

In accordance with Schedule 3 Condition 33D, Mackas operates a video camera in a shed adjacent to the alternate access road, approximately 100 m from its intersection with Nelson Bay Road. This video equipment was damaged on 14 April 2018 by a fire. The subsequent police investigation prevented Mackas Sand from accessing the shed to confirm the functionality of the video camera and associated recording equipment. Mackas Sand accessed the shed on 16 April 2018 and identified the video camera / recording equipment was not operating. DPE were notified of the incident on 16 May 2018, with the video equipment replaced on 31 May 2018. Mackas Sand notes that during this time all trucking movements were monitored and tracked in accordance with Schedule 3, Condition 33E, via the primary truck movement controls (i.e. the weighbridge and associated video system at the weighbridge). DPE issued Mackas Sand with a warning letter for failing to notify the Department in accordance with Schedule 5, Condition 2 and 3 of PA 08_0142 on 25 May 2018 (i.e. incident reporting timeframes).

11.1.5 Finalisation of the Voluntary Conservation Agreement

In accordance with Schedule 3, Condition 28B, Mackas Sand is required to make suitable arrangements to provide a long-term security of for the Biodiversity Offset Area. During the reporting period Mackas Sand submitted a revised Conservation Agreement to OEH on two occasions. As of the end of the reporting period, Mackas Sand was awaiting finalisation of the agreement from OEH. Mackas Sand will continue to liaise and work with OEH to finalise this agreement. Subject to any further comments from OEH as well as OEH review and/or processing timeframes, Mackas Sand expects the agreement to be finalised in 2019.

11.2 Regulatory Correspondence

A summary of official regulatory correspondence received during the reporting period outside the scope of non-compliances identified in **Section 11.1** is provided in **Table 11.1**.

Table 11.1 Regulatory Compliance Correspondence Summary

Date	Agency	Summary
28/3/2018	DPE	DPE issued Mackas Sand with a Warning Letter for failure to implement the approved SWMP. DPE requested that the SWMP be revised and submitted to DPE by 27 April 2018. Mackas Sand submitted a copy of the revised SWMP for comment and approval to DPE on 27 April 2018.
14/6/2018	DoEE	Mackas Sand requested clarification from DoEE in response to the non-compliance identified against Condition 6 of EPBC 2011/6214 by the IEA auditor. DoEE provided an email response on 14 June 2018 and determined that Mackas Sand was compliant with this condition.
31/8/2018	DPE	Following a site inspection from DPE on 16 August 2018, DPE requested the installation of GPS units on machinery undertaking extractive operations. Mackas Sand provided a response to DPE on 14 November 2018 requesting a meeting to discuss this matter

12.0 Activities Proposed in the 2019 Report Period

The anticipated environmental management activities for Mackas Sand during the 2019 report period are included in **Table 12.1**. Additional environmental management activities may be undertaken if identified during the next reporting period.

Table 12.1 Environmental Management Activities proposed for 2019

2018 Document Section	Area/Nature of Activity	Action Proposed
6.4	Offset	Mackas Sand will consider: • Consider installing a permanent stock proof fence around the perimeter; • Consider installing padlocked gate through which all access is gained; • Consider a management period prior to winter to target recovering and colonising weed species (such as whiskey grass and bitou bush) and to assist in maintaining the habitat requirements for these orchid species. Continue to seek to finalise the Conservation Agreement in consultation with OEH.
6.4	Offset	Mackas Sand will implement the necessary recommendations from the 2017 & 2018 Offset Monitoring Report. Progress against these recommendations will be reported in the next Annual Review document.
7.2	Groundwater	Investigate with the groundwater sampling contractor the use of a low flow pump for groundwater sampling.
8	Rehabilitation	Mackas Sand will implement the rehabilitation recommendations as noted above. Progress against these recommendations will be reported in the next Annual Review document.
8	Rehabilitation	Mackas Sand will engage a rehabilitation contractor to assist in the establishment, development and ongoing management of rehabilitation of Lot 220. Mackas Sand will continue to salvage tree hollows and spread over rehabilitation areas. Mackas Sand will continue to identify opportunities to rehabilitate areas which are no longer required for operational purposes / activities.

13.0 References

ANZECC (2000) *National Water Quality Management Strategy Vol 1.*

NHMRC, NRMMC (2011) *Australian Drinking Water Guidelines Paper 6 – National Water Quality Management Strategy.*

NSW Environment Protection Agency (NSW EPA) (2014) *Protection of the Environment Operations (Waste) Regulation 2014.*

NSW Government (2015) *Annual Review Guideline: Post-approval requirements for State significant mining developments.*

OnSite Enviromental Management (2018) *Mackas Sand Pty Ltd – MP 08_0142 Independent Environmental Audit 2015, 2016, 2017.*

Umwelt (Australia) Pty Limited (2011) *Determination of Maximum Predicted Groundwater Level and Maximum Extraction Level at Lot 218 and Lot 220, Salt Ash.* Prepared for Macka's Sand Pty Limited.

Umwelt (Australia) Pty Limited (2012) *Environmental Assessment of Modifications to Macka's Sand Extraction Operations on Lot 218 and Lot 220, Salt Ash*. Prepared for Macka's Sand Pty Limited.

Umwelt (Australia) Pty Limited (2014) *Macka's Sand Ecological Monitoring Program for Lot 220 DP 1049608, Salt Ash.* Prepared for Macka's Sand Pty Limited.

Umwelt (Australia) Pty Limited (2017) *Mackas Sand Lot 218 Offset Monitoring Report 2017.* Prepared for Macka's Sand Pty Limited.

Umwelt (Australia) Pty Limited (2017) *Mackas Sand Lot 220 Rehabilitation Monitoring Report 2017.* Prepared for Macka's Sand Pty Limited.

Umwelt (Australia) Pty Limited (2017) *Mackas Sand Annual Review 2017.* Prepared for Macka's Sand Pty Limited.

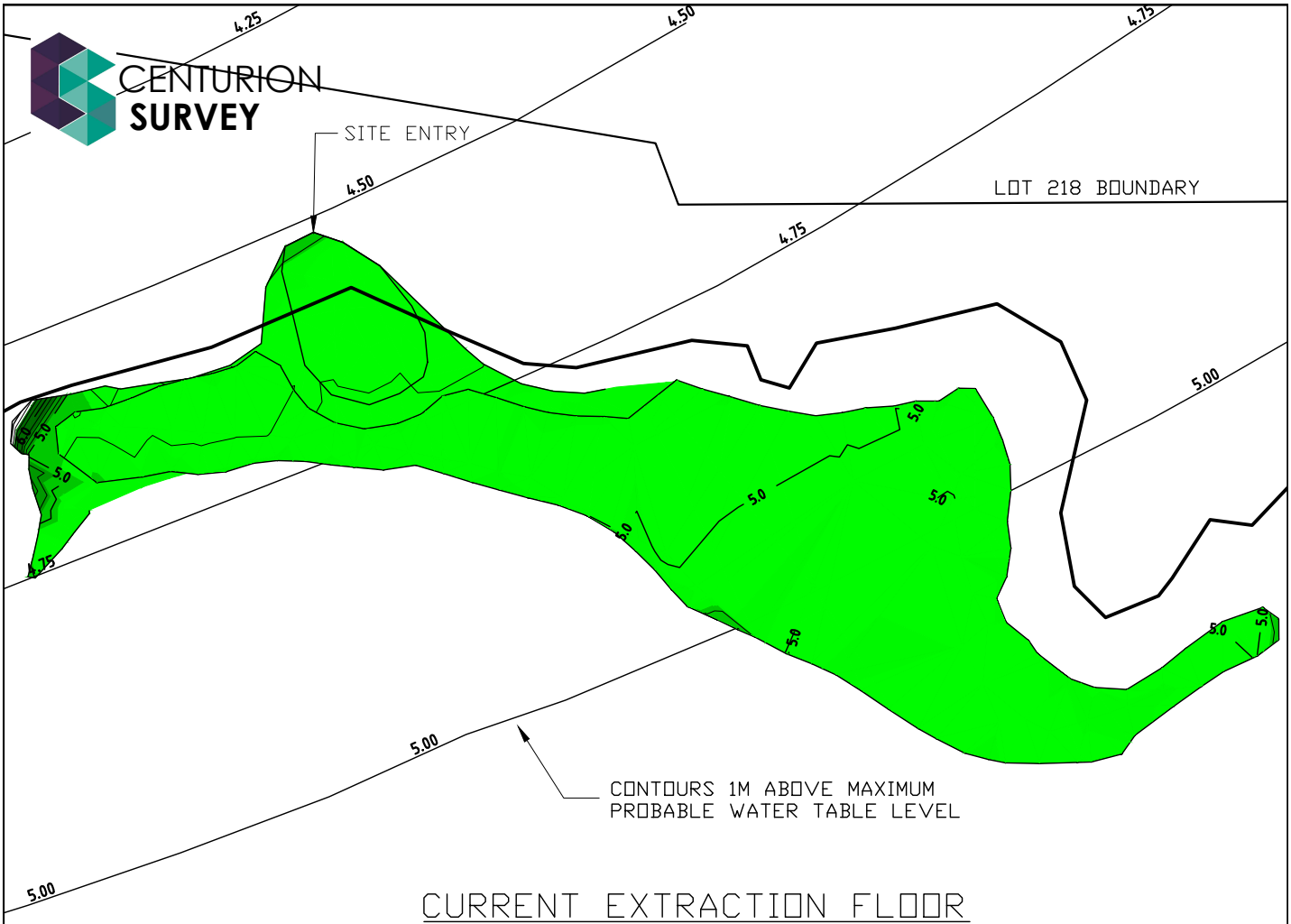
Umwelt (Australia) Pty Limited (2018) *Mackas Sand Environmental Noise Monitoring Report 2018.* Prepared for Macka's Sand Pty Limited.

Umwelt (Australia) Pty Limited (2019) *Mackas Sand EPBC 2011/6214 2018 Annual Compliance Report.* Prepared for Macka's Sand Pty Limited.

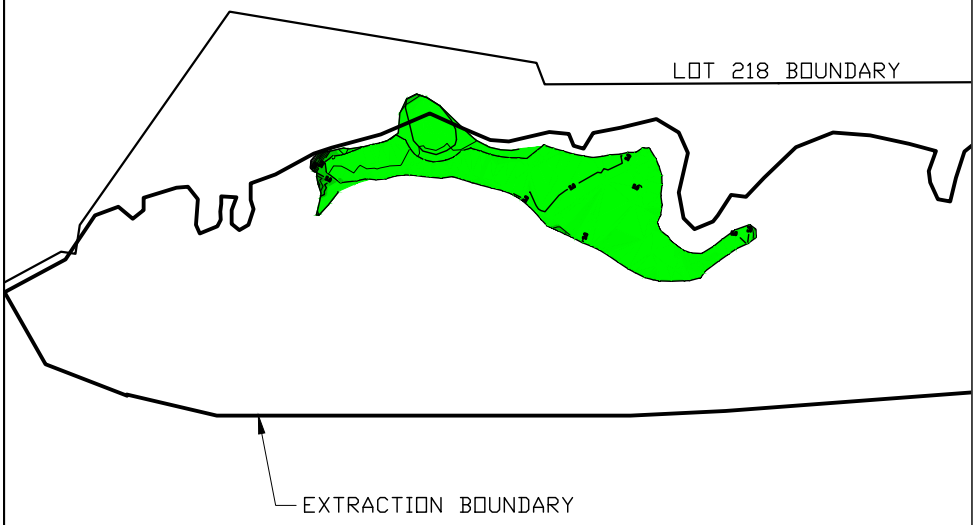
APPENDIX 1

Quarterly Extraction Level Survey Plans of the Lot 218 and 220 Extraction Area

CENTURION SURVEY



CURRENT EXTRACTION FLOOR LEVELS 26/03/2018



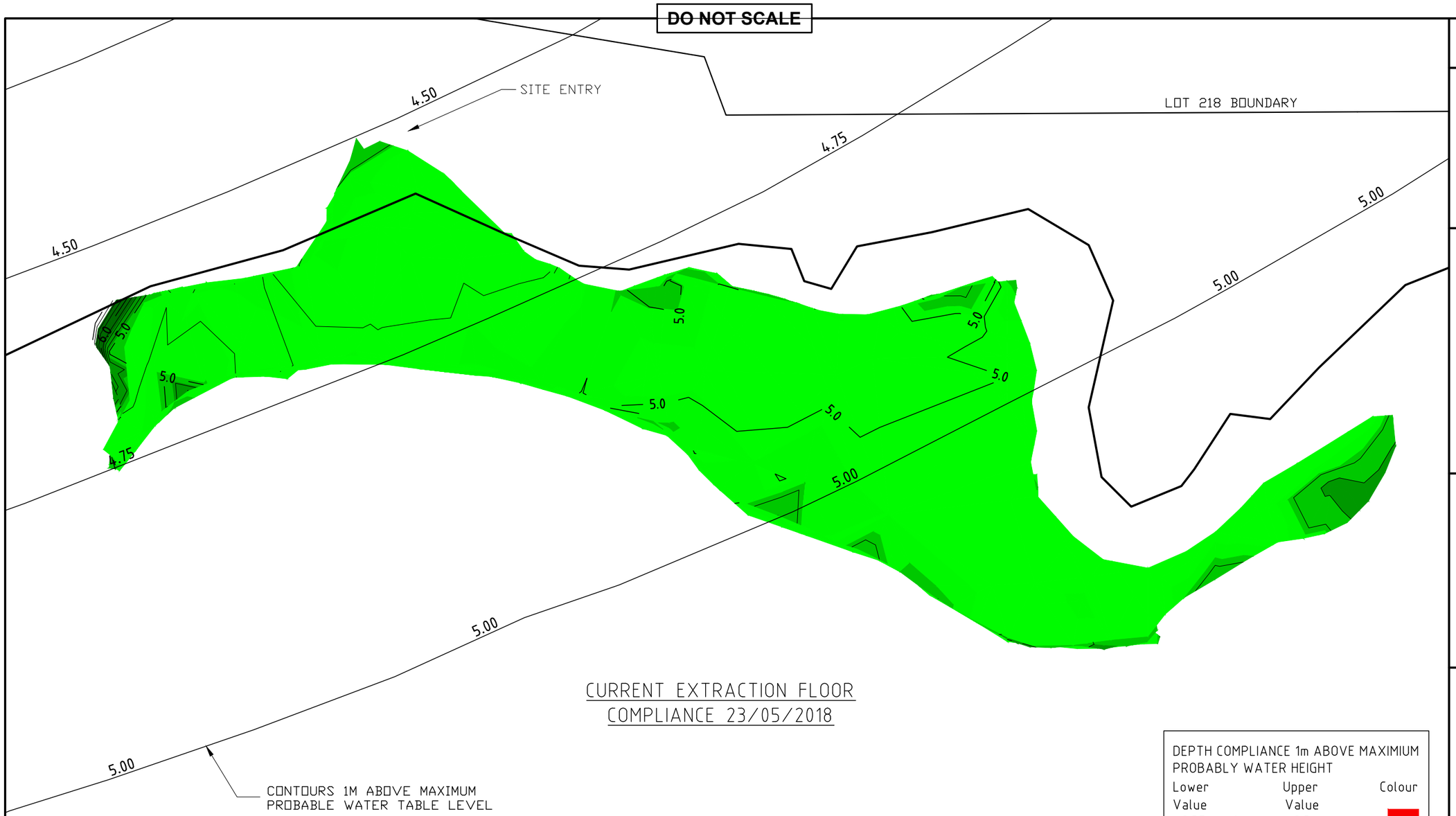
SITE PLAN

DEPTH COMPLIANCE 1m ABOVE MAXIMIUM PROBABLY WATER HEIGHT

Lower Value		Upper Value		Colour
-0.35	to	-0.3	m	
-0.3	to	-0.2	m	
-0.2	to	-0.1	m	
-0.1	to	0.0	m	
0.0	to	0.1	m	
0.1	to	0.2	m	
0.2	to	0.5	m	
0.5	to	1.0	m	
1.0	to	2.0	m	

SITE: **LOT 218 DP 1044608**	**218MAR2018** DRAWING NO.		**0014** PROJECT NO.	**26/03/2018** DATE.
TITLE: **CURRENT EXTRACTION LEVELS**	**NOT TO SCALE** SCALE AT A4.	**CEJ** DRAWN.	**CEJ** CHECKED.	**A** REVISION.

DO NOT SCALE



CURRENT EXTRACTION FLOOR
COMPLIANCE 23/05/2018

EXTRACTION BOUNDARY

NOTES:
1. DUE TO THE CONSTANT TRAFFIC AND WHEEL RUTTING IT IS IMPOSSIBLE TO REPORT THE SURFACE COMPLIANCE FOR THE ACCESS ROAD AS IT CHANGES WITH EVERY VEHICLE MOVEMENT. ON AVERAGE THE ACCESS ROAD DEVIATED AN ESTIMATED +/- 0.2m FROM THE REQUIRED LEVEL.
2. THE SURFACE LEVEL EITHER SIDE OF THE ACCESS ROAD IS COMPLIANT AS AT 23/05/2018.

DEPTH COMPLIANCE 1m ABOVE MAXIMUM PROBABLY WATER HEIGHT

Lower Value		Upper Value		Colour
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-0.3	to	-0.2	m	
-0.2	to	-0.1	m	
-0.1	to	0.0	m	
0.0	to	0.1	m	
0.1	to	0.2	m	
0.2	to	0.5	m	
0.5	to	1.0	m	
1.0	to	2.0	m	

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SURVEYED:	CJ
DRAWN:	CJ
CHECKED:	MH
DATUM:	AHD
ISSUE DATE:	2/07/2018
REVISION:	A

CLIENT & JOB:

MACKAS
SAND & SOIL
SALT ASH

COMPLIANCE
REPORTING

CENTURION SURVEY PTY LTD

ABN: 66 605 045 314
P: (02) 4967 5927
M: 0429 987 821
Unit 11 56 Industrial Dr
Mayfield NSW 2304

TITLE:

LOT 218
EXTRACTION LEVEL
COMPLIANCE

STATUS:

MAY 2018

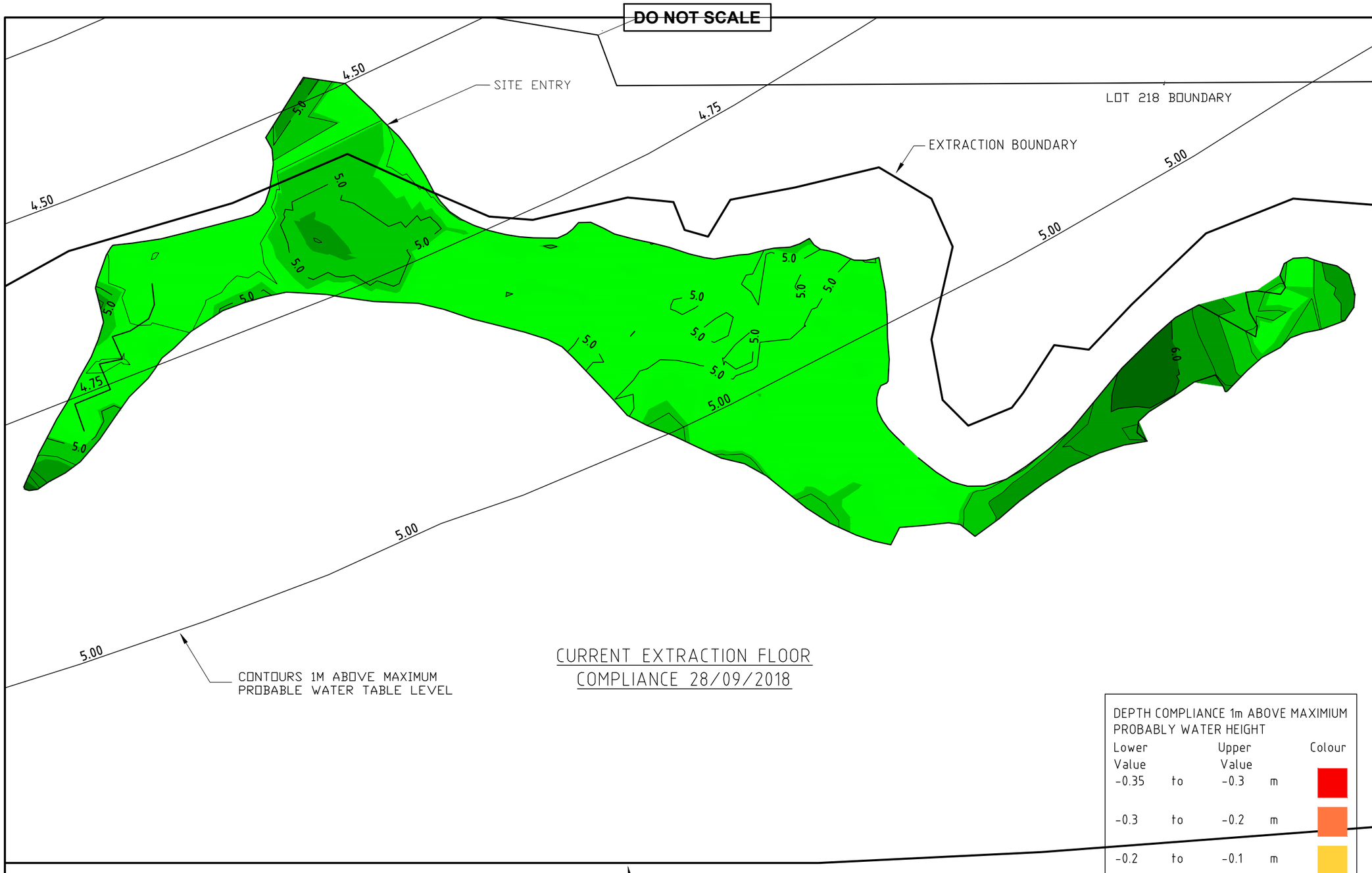
DRAWING NUMBER:

0014EC218-01

SHEET 1 OF 1 SHEETS

A3

DO NOT SCALE



CURRENT EXTRACTION FLOOR
COMPLIANCE 28/09/2018

NOTES:
1. DUE TO THE CONSTANT TRAFFIC AND WHEEL RUTTING IT IS IMPOSSIBLE TO REPORT THE SURFACE COMPLIANCE FOR THE ACCESS ROAD AS IT CHANGES WITH EVERY VEHICLE MOVEMENT. ON AVERAGE THE ACCESS ROAD DEVIATED AN ESTIMATED +/- 0.2m FROM THE REQUIRED LEVEL.
2. THE SURFACE LEVEL EITHER SIDE OF THE ACCESS ROAD IS COMPLIANT AS AT 28/09/2018.

DEPTH COMPLIANCE 1m ABOVE MAXIMIUM PROBABLY WATER HEIGHT

Lower Value		Upper Value		Colour
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-0.3	to	-0.2	m	
-0.2	to	-0.1	m	
-0.1	to	0.0	m	
0.0	to	0.1	m	
0.1	to	0.2	m	
0.2	to	0.5	m	
0.5	to	1.0	m	
1.0	to	2.0	m	

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DRAWN:	CJ
CHECKED:	MH
DATUM:	AHD
ISSUE DATE:	28/09/2018
REVISION:	A

CLIENT & JOB:

MACKAS
SAND & SOIL
SALT ASH

COMPLIANCE
REPORTING

CENTURION SURVEY PTY LTD

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TITLE:

LOT 218
EXTRACTION LEVEL
COMPLIANCE

STATUS:
SEPTEMBER 2018

DRAWING NUMBER:
0014EC218-02

SHEET 1 OF 1 SHEETS

A3

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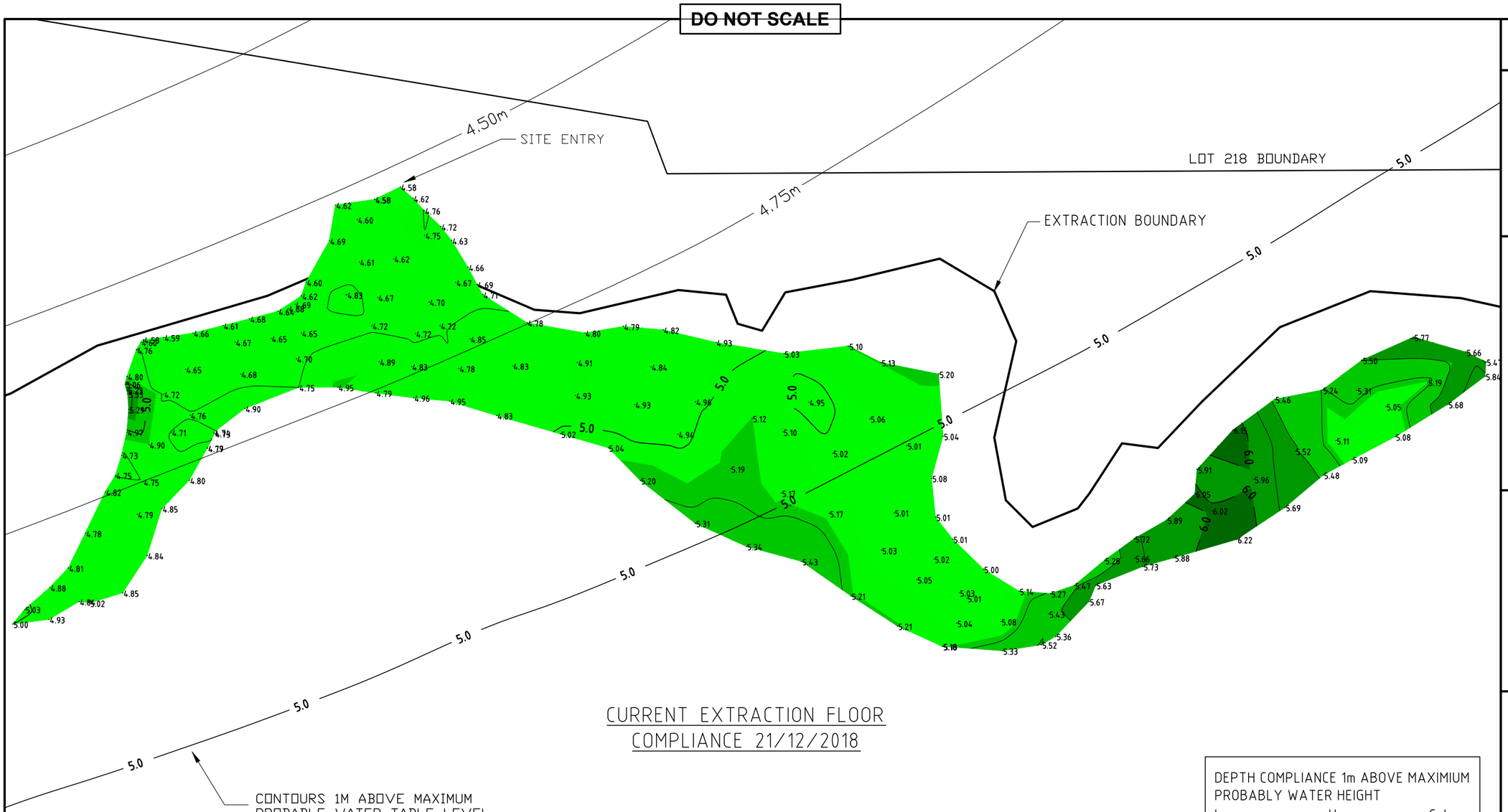

CURRENT EXTRACTION FLOOR
COMPLIANCE 21/12/2018

CONTOURS 1M ABOVE MAXIMUM
PROBABLE WATER TABLE LEVEL

EXTRACTION BOUNDARY

NOTES:
1. DUE TO THE CONSTANT TRAFFIC AND WHEEL RUTTING IT IS IMPOSSIBLE TO REPORT THE SURFACE COMPLIANCE FOR THE ACCESS ROAD AS IT CHANGES WITH EVERY VEHICLE MOVEMENT. ON AVERAGE THE ACCESS ROAD DEVIATED AN ESTIMATED +/- 0.2m FROM THE REQUIRED LEVEL.
2. THE SURFACE LEVEL EITHER SIDE OF THE ACCESS ROAD IS COMPLIANT AS AT 21/12/2018.

DEPTH COMPLIANCE 1m ABOVE MAXIMUM PROBABLY WATER HEIGHT

Lower Value		Upper Value		Colour
-0.35	to	-0.3	m	
-0.3	to	-0.2	m	
-0.2	to	-0.1	m	
-0.1	to	0.0	m	
0.0	to	0.1	m	
0.1	to	0.2	m	
0.2	to	0.5	m	
0.5	to	1.0	m	
1.0	to	2.0	m	

SCALE:
NOT TO SCALE

FILE:	0014_CS_LOT_218_Compliance_181221.dwg
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DRAWN:	CJ
CHECKED:	MH
DATUM:	AHD
ISSUE DATE:	29/12/2018
REVISION:	A

CLIENT & JOB:

MACKAS
SAND & SOIL
SALT ASH

COMPLIANCE
REPORTING

CENTURION SURVEY PTY LTD

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TITLE:

LOT 218
EXTRACTION LEVEL
COMPLIANCE

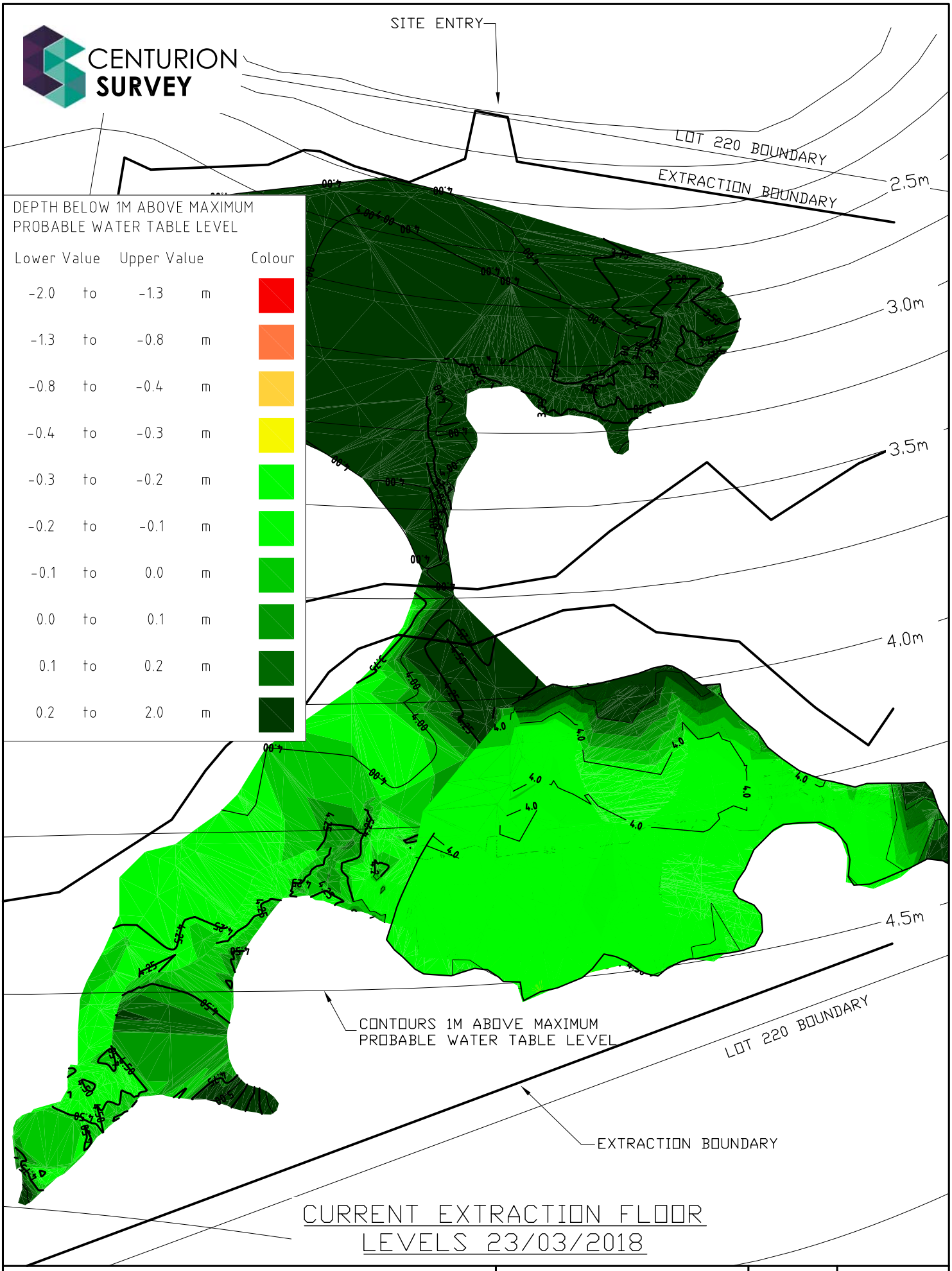
STATUS:
DEC 2018

DRAWING NUMBER:
0014EC2018-12

SHEET 1 OF 1 SHEETS

A3

CENTURION SURVEY



CURRENT EXTRACTION FLOOR LEVELS 23/03/2018

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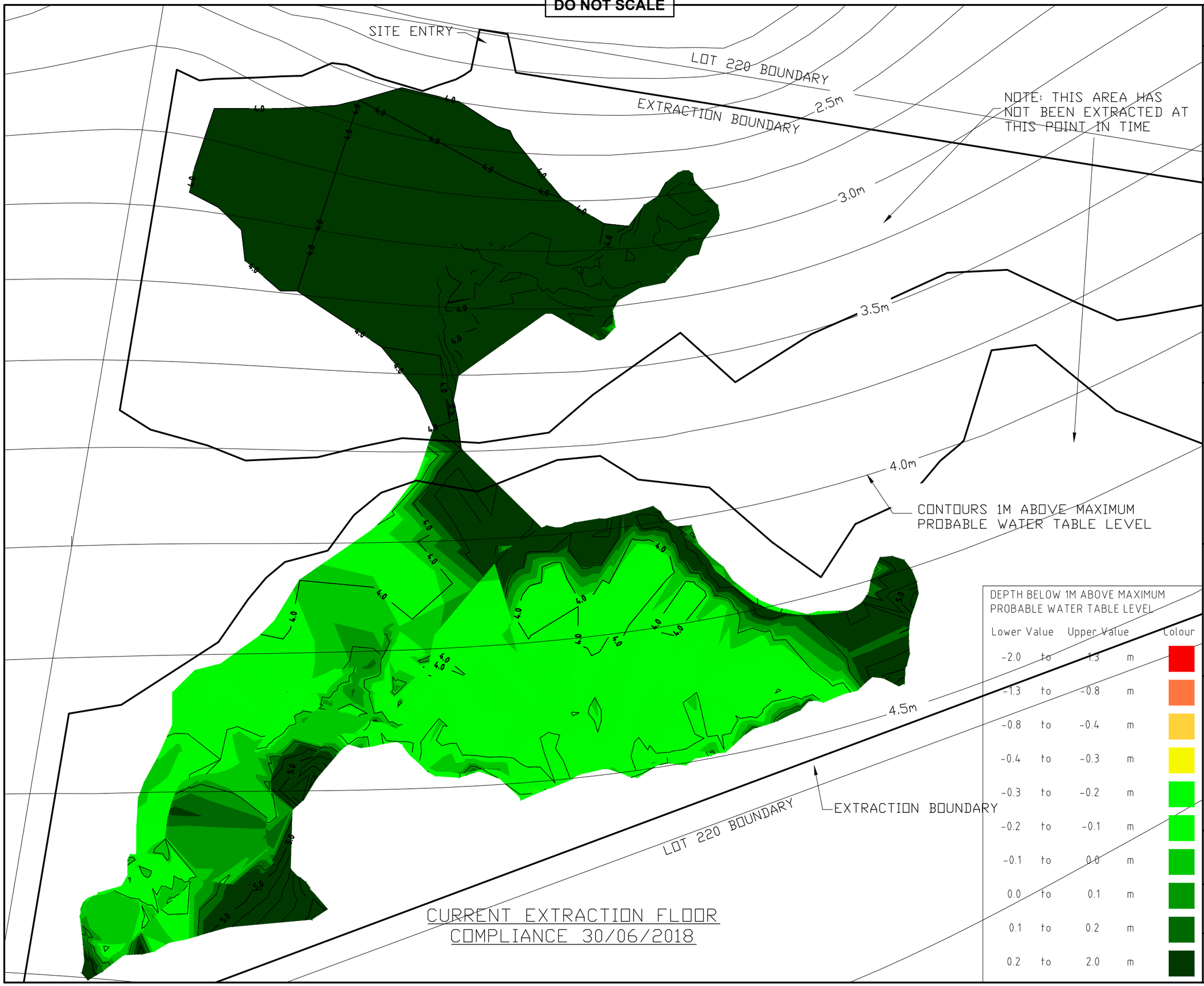
DO NOT SCALE



DEPTH BELOW 1M ABOVE MAXIMUM PROBABLE WATER TABLE LEVEL

Lower Value		Upper Value		Colour
-2.0	to	-1.3	m	
-1.3	to	-0.8	m	
-0.8	to	-0.4	m	
-0.4	to	-0.3	m	
-0.3	to	-0.2	m	
-0.2	to	-0.1	m	
-0.1	to	0.0	m	
0.0	to	0.1	m	
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0.2	to	2.0	m	

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SURVEYED:	CJ
DRAWN:	CJ
CHECKED:	MH
DATUM:	AHD
ISSUE DATE:	2/07/2018
REVISION:	A

CLIENT & JOB:

MACKAS
SAND & SOIL
SALT ASH

COMPLIANCE
REPORTING

CENTURION SURVEY PTY LTD

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Unit 11 56 Industrial Dr
Mayfield NSW 2304

TITLE:

LOT 220
EXTRACTION LEVEL
COMPLIANCE

STATUS:

JUNE 2018

DRAWING NUMBER:

0014EC220-01

SHEET 1 OF 1 SHEETS

A3

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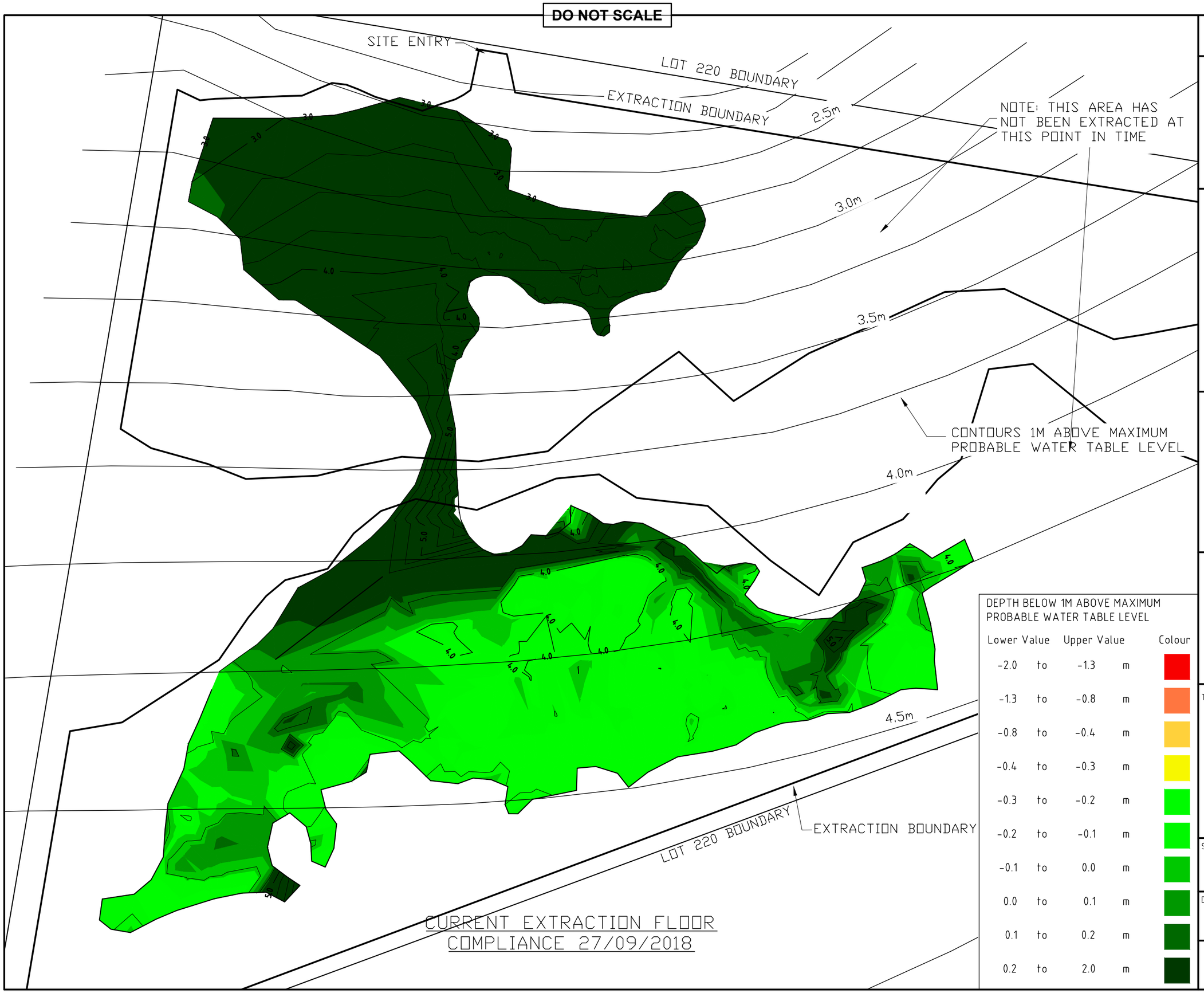

DEPTH BELOW 1M ABOVE MAXIMUM PROBABLE WATER TABLE LEVEL

Lower Value		Upper Value		Colour
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-1.3	to	-0.8	m	
-0.8	to	-0.4	m	
-0.4	to	-0.3	m	
-0.3	to	-0.2	m	
-0.2	to	-0.1	m	
-0.1	to	0.0	m	
0.0	to	0.1	m	
0.1	to	0.2	m	
0.2	to	2.0	m	

SCALE:
NOT TO SCALE

FILE:	0014_CS_LOT_220_Compliance_180927.dwg
SURVEYED:	CJ
DRAWN:	CJ
CHECKED:	MH
DATUM:	AHD
ISSUE DATE:	27/09/2018
REVISION:	A

CLIENT & JOB:

MACKAS
SAND & SOIL
SALT ASH

COMPLIANCE
REPORTING

CENTURION SURVEY PTY LTD

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M: 0429 987 821
Unit 11 56 Industrial Dr
Mayfield NSW 2304

TITLE:

LOT 220
EXTRACTION LEVEL
COMPLIANCE

STATUS:
SEPTEMBER 2018

DRAWING NUMBER:
0014EC220-02

SHEET 1 OF 1 SHEETS

A3

DO NOT SCALE

SITE ENTRY

LOT 220 BOUNDARY

EXTRACTION BOUNDARY

NOTE: THIS AREA HAS NOT BEEN EXTRACTED AT THIS POINT IN TIME

2

2.5m

3

3.0m

3.5m

4.0m

4.25m

NOTES:

1. LEVEL OBSERVATIONS SHOWN WERE RECORDED ON 21/12/2018
2. THE OBSERVATIONS WERE ONLY MADE IN THE OPERATIONAL AREAS ON THE SITE
3. IT WAS VISUALLY OBSERVED THAT SIGNIFICANT REHABILITATION HAD BEEN COMMENCED.
4. ONCE COMPLETED THE FINISHED LEVEL OF THE REHABILITATED SURFACE WILL BE RECORDED.

EXTRACTION LIMIT CONTOURS (0.3M BELOW 1M ABOVE MAXIMUM PROBABLE WATER TABLE LEVEL)

LOT 220 BOUNDARY

EXTRACTION BOUNDARY

CURRENT EXTRACTION FLOOR COMPLIANCE 21/12/2018

DEPTH BELOW 1M ABOVE MAXIMUM PROBABLE WATER TABLE LEVEL

Lower Value		Upper Value		Colour
-2.0	to	-1.3	m	
-1.3	to	-0.8	m	
-0.8	to	-0.4	m	
-0.4	to	-0.3	m	
-0.3	to	-0.2	m	
-0.2	to	-0.1	m	
-0.1	to	0.0	m	
0.0	to	0.1	m	
0.1	to	0.2	m	
0.2	to	2.0	m	

SCALE: NOT TO SCALE

FILE:	0014_CS_LOT_220_Compliance_181221.dwg
SURVEYED:	MH & JW
DRAWN:	CJ
CHECKED:	MH
DATUM:	AHD
ISSUE DATE:	29/12/2018
REVISION:	A

CLIENT & JOB:

MACKAS
SAND & SOIL
SALT ASH

COMPLIANCE REPORTING

CENTURION SURVEY PTY LTD

ABN: 66 605 045 314
P: (02) 4967 5927
M: 0429 987 821
Unit 11 56 Industrial Dr
Mayfield NSW 2304

TITLE:

LOT 220
EXTRACTION LEVEL
COMPLIANCE

STATUS:

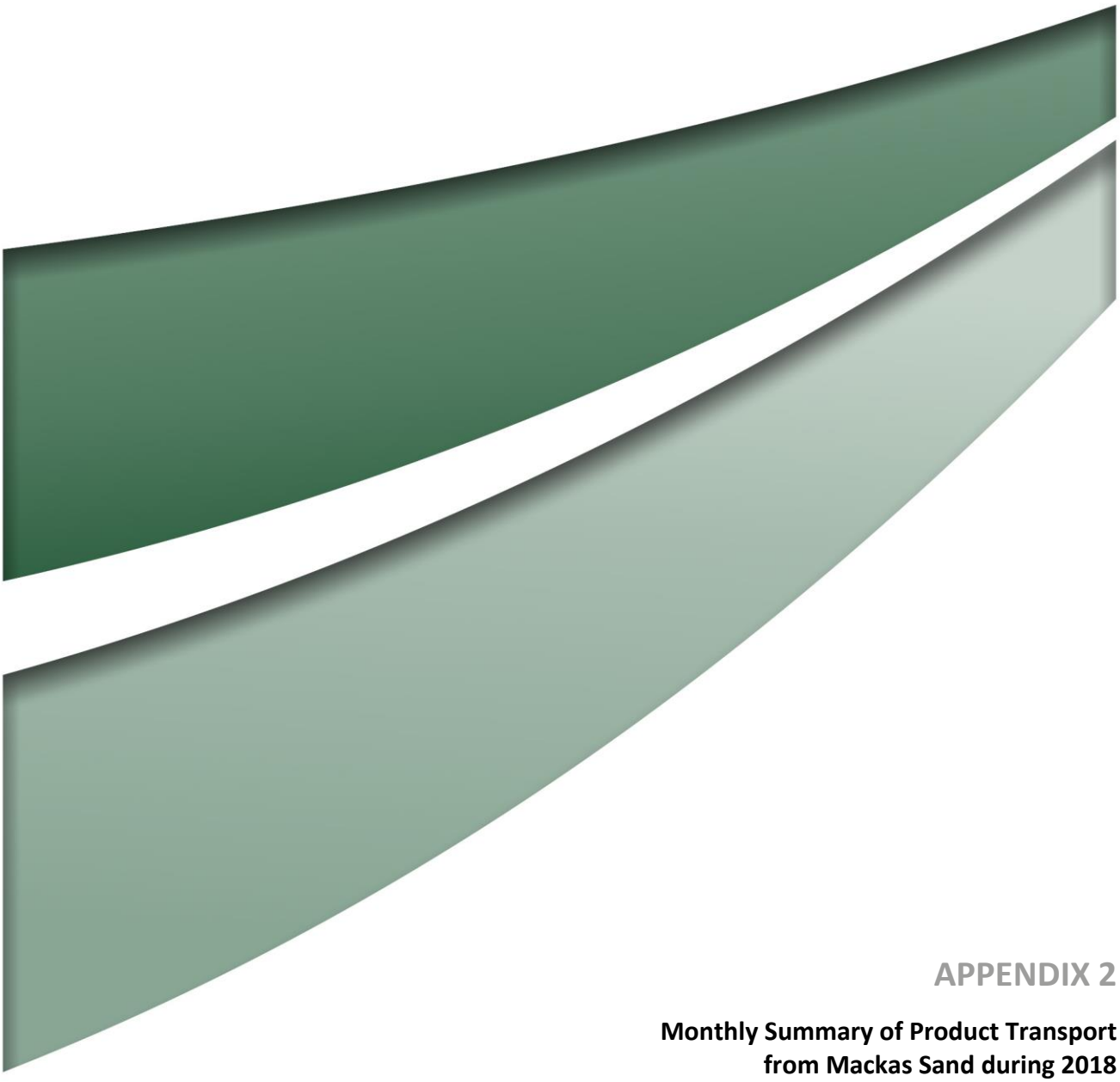
DEC 2018

DRAWING NUMBER:

0014EC2018-12

SHEET 1 OF 1 SHEETS

A3



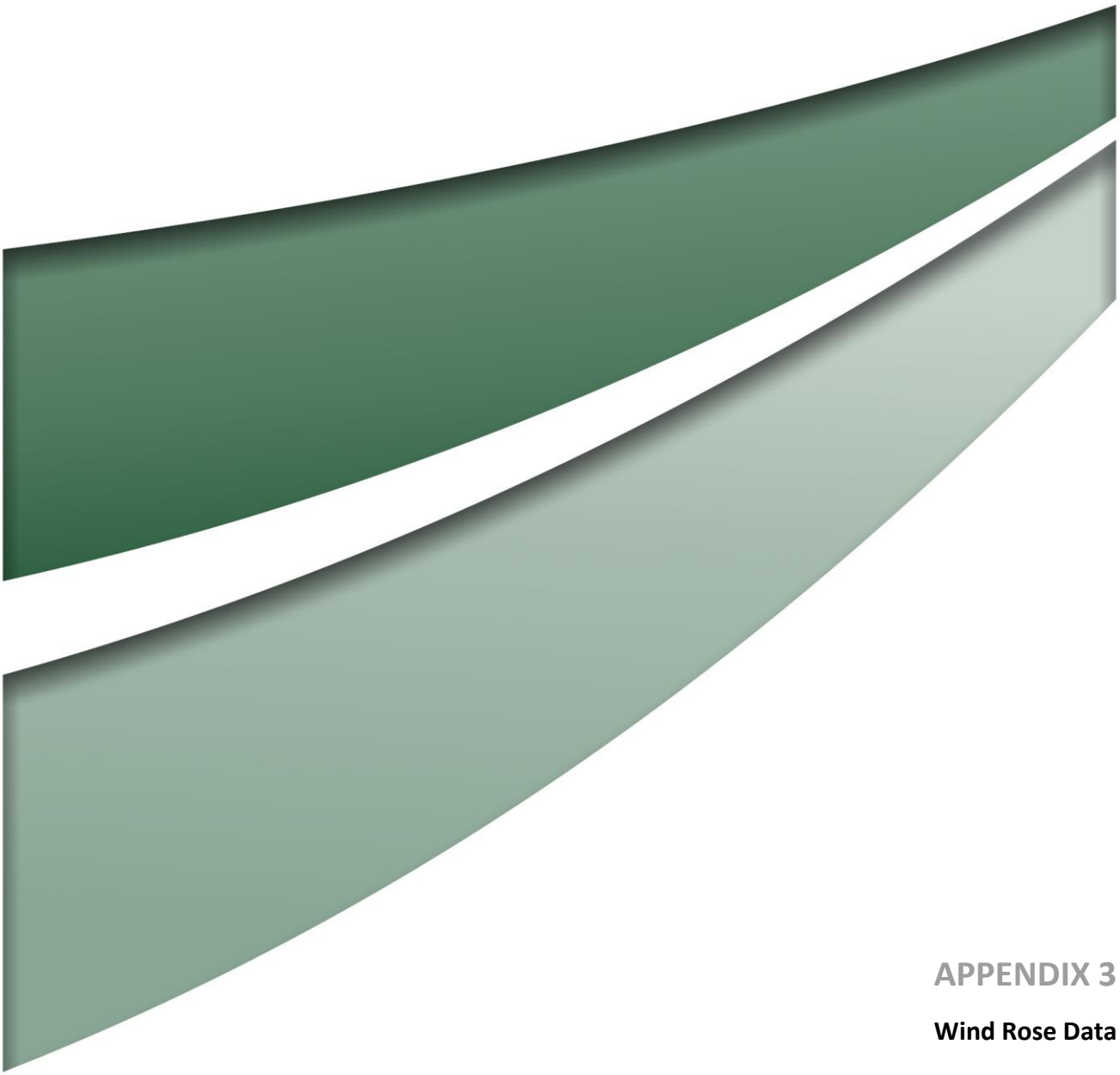
APPENDIX 2

Monthly Summary of Product Transport from Mackas Sand during 2018

2018 Transport Summary

Table 1.1 2018 Monthly Transport Summary

Month	Lot 218 (tonnes)	Lot 220 (tonnes)
January	60,991.60	67,125.74
February	91,625.18	81,551.49
March	100,087.50	84,971.03
April	86,707.48	86,871.31
May	106,578.92	99,515.17
June	81,787.78	75,944.37
July	94,152.34	97,586.84
August	92,983.60	95,536.50
September	82,923.30	88,699.98
October	81,523.33	86,125.69
November	79,698.02	104,527.51
December	38,253.56	78,851.80
Total	997,312.61	994,830.53



APPENDIX 3

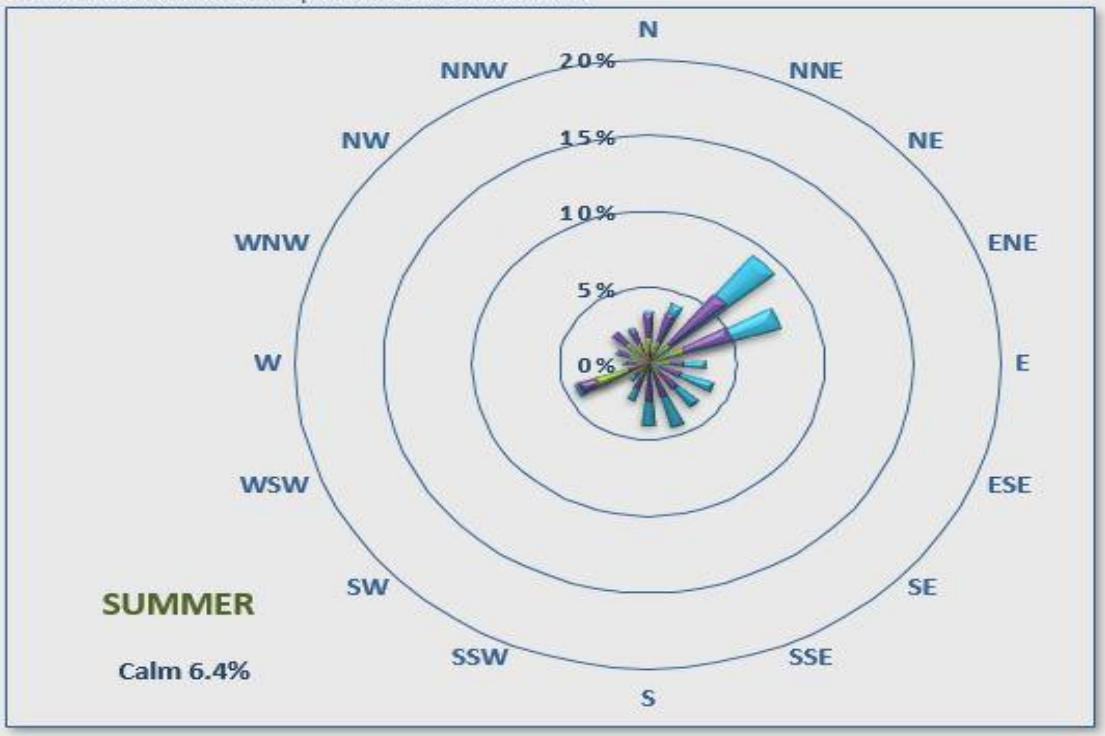
Wind Rose Data

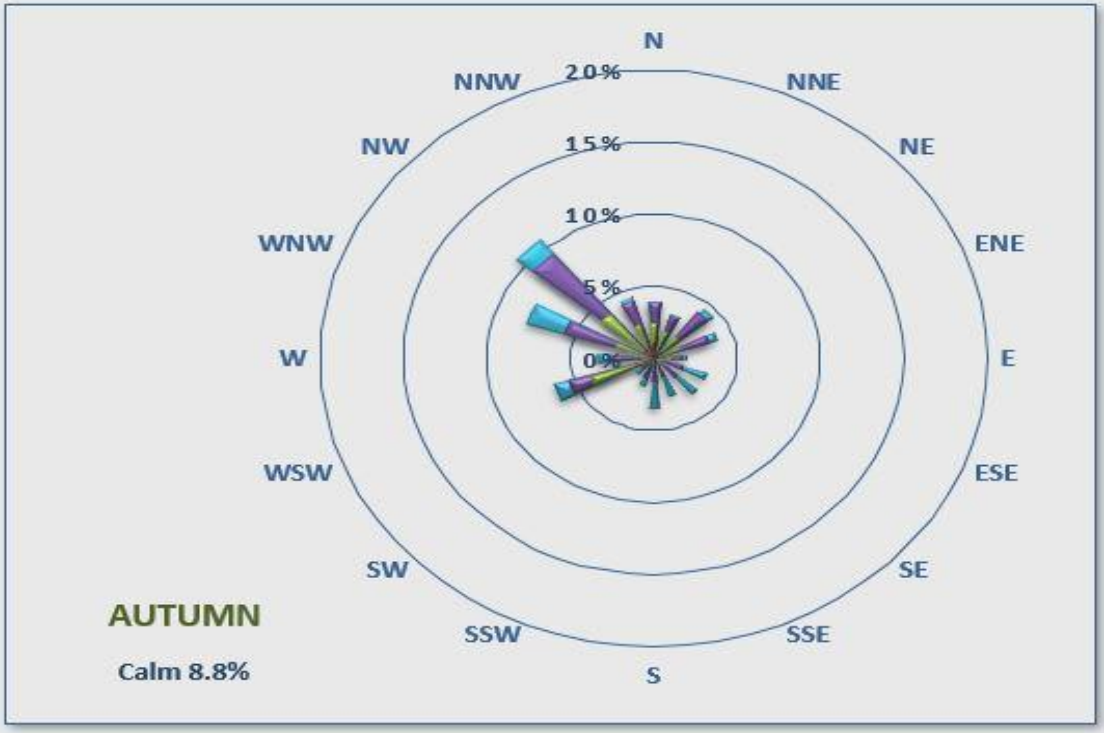
SEASONAL WIND SPEED ANALYSIS

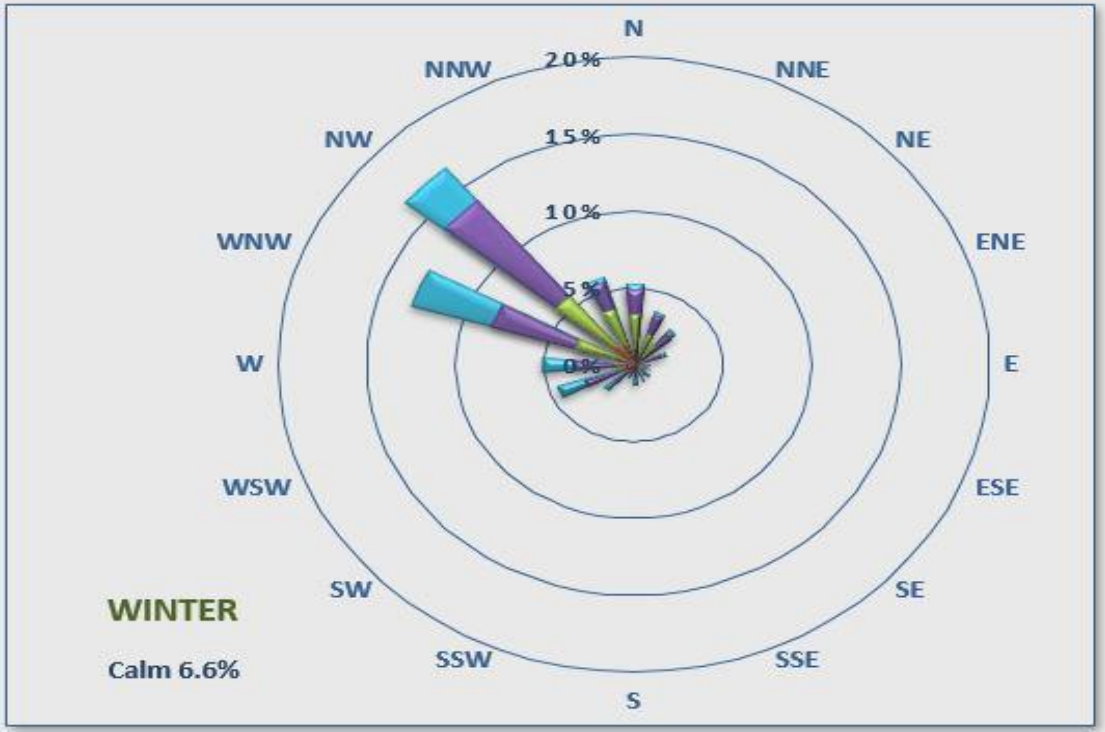
Williamtown Airport

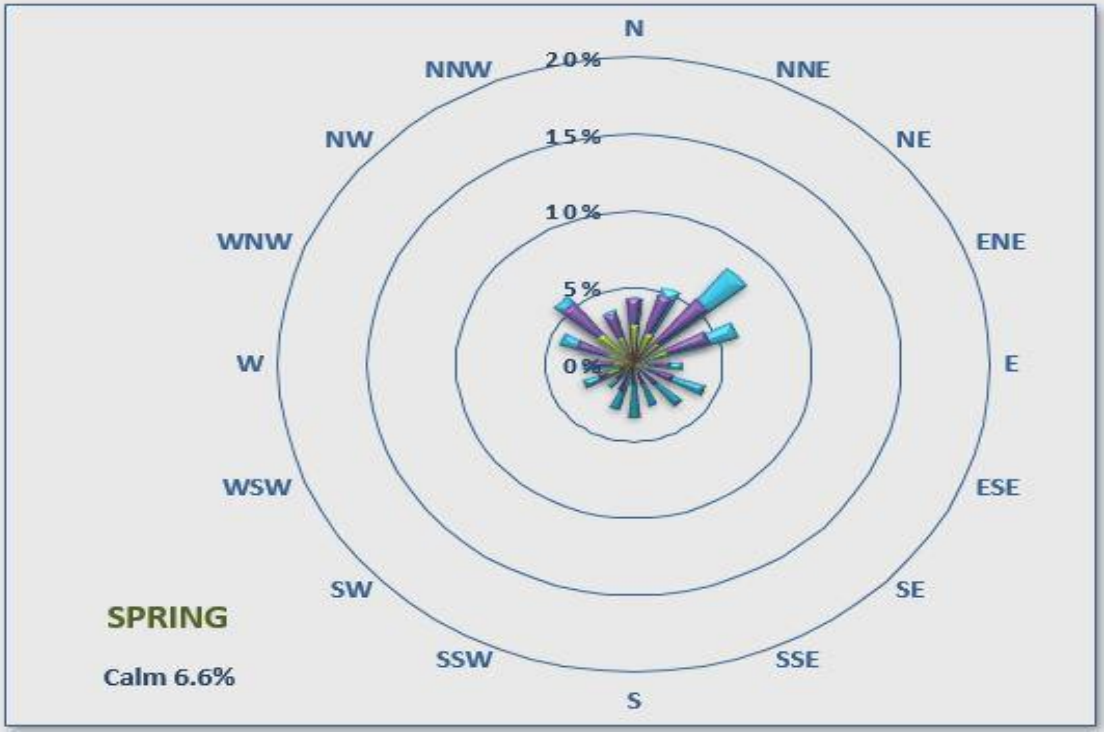
Wind Speed (m/s)
0.5 to < 0.9
0.9 to < 1.7
1.7 to < 3.0
3.0 to < 4.5
4.5 to < 6.0

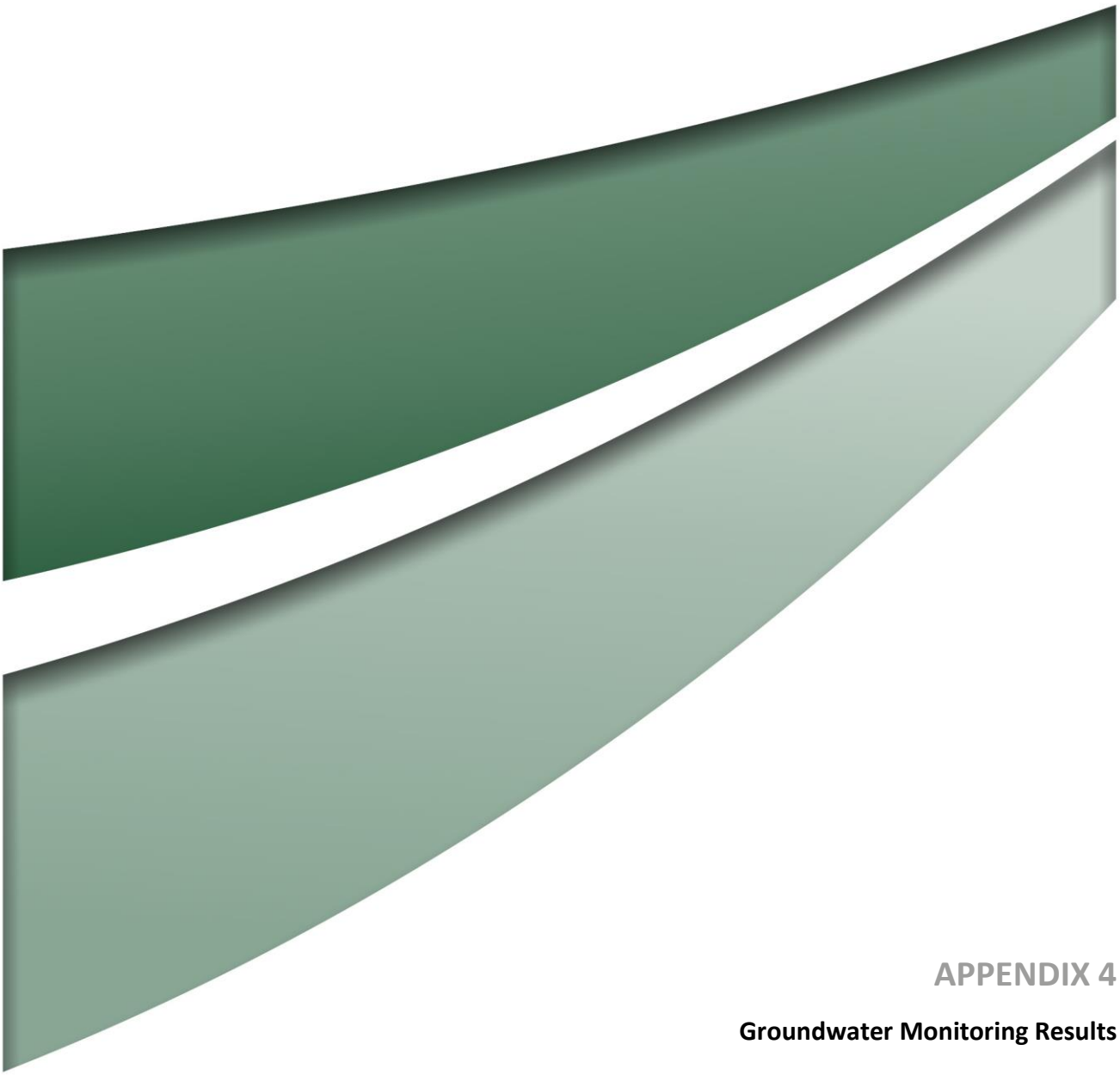
Data Source: Williamtown Airport 01 Jan 2018 to 31 Dec 2018





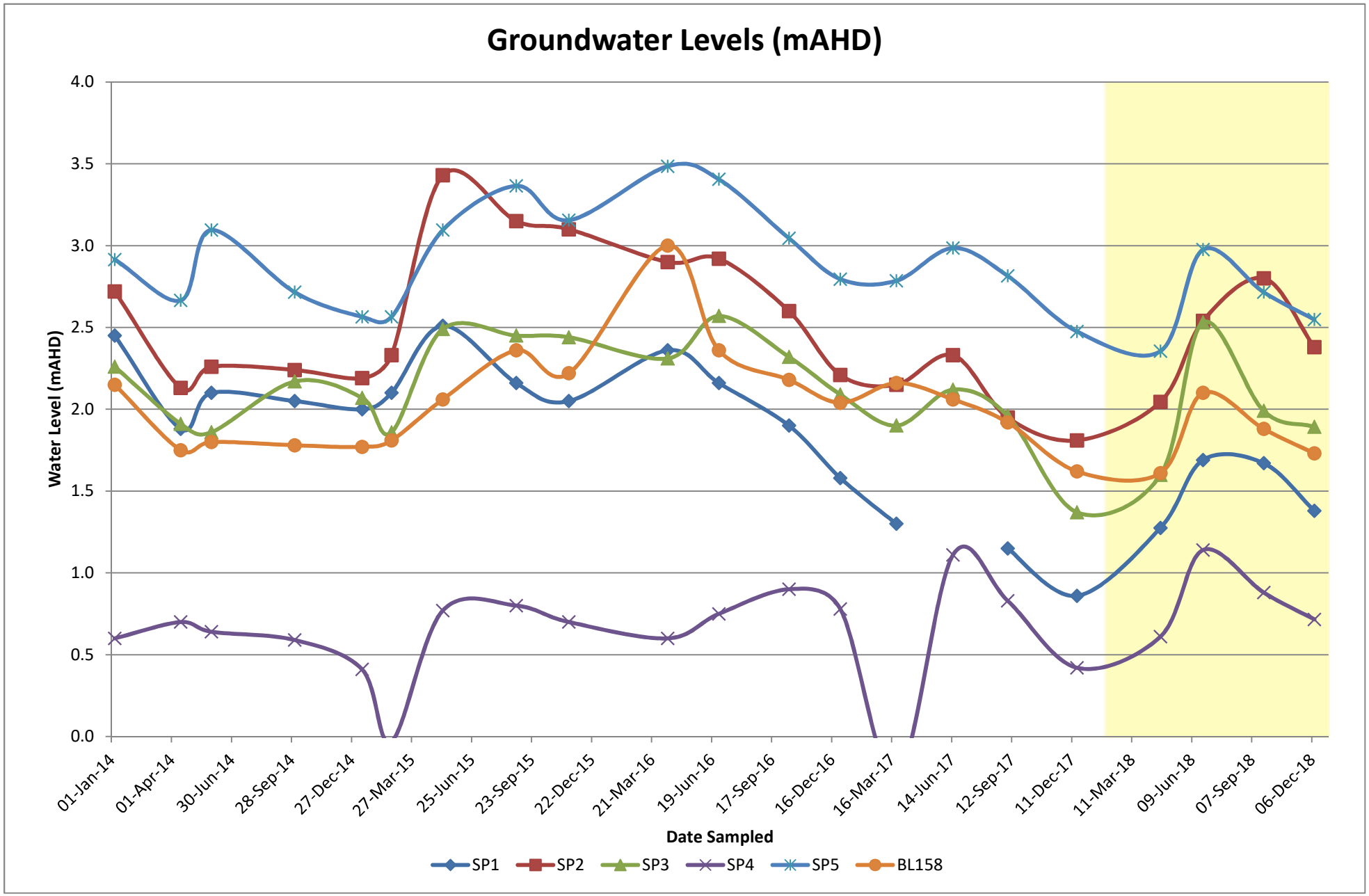


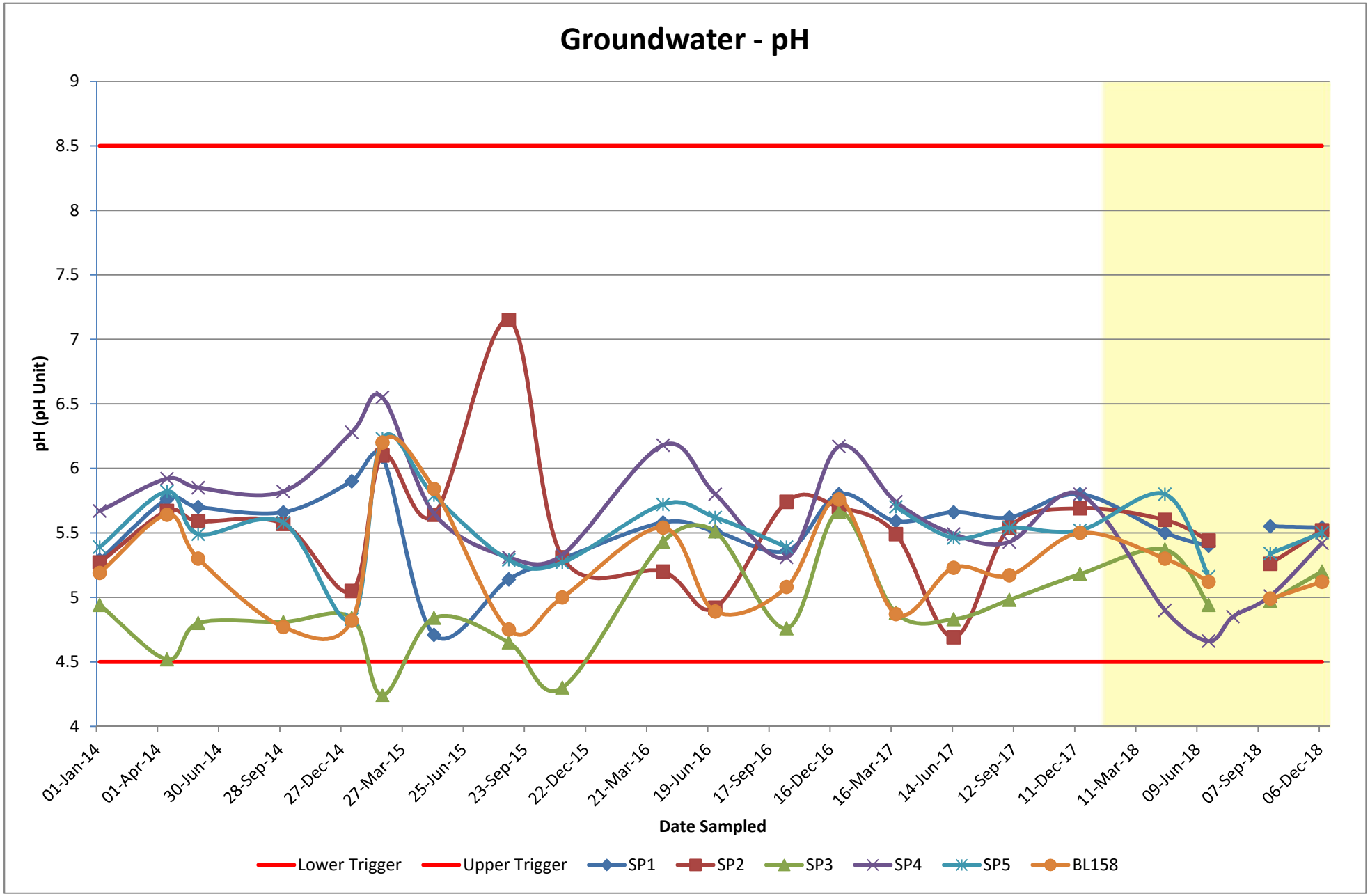


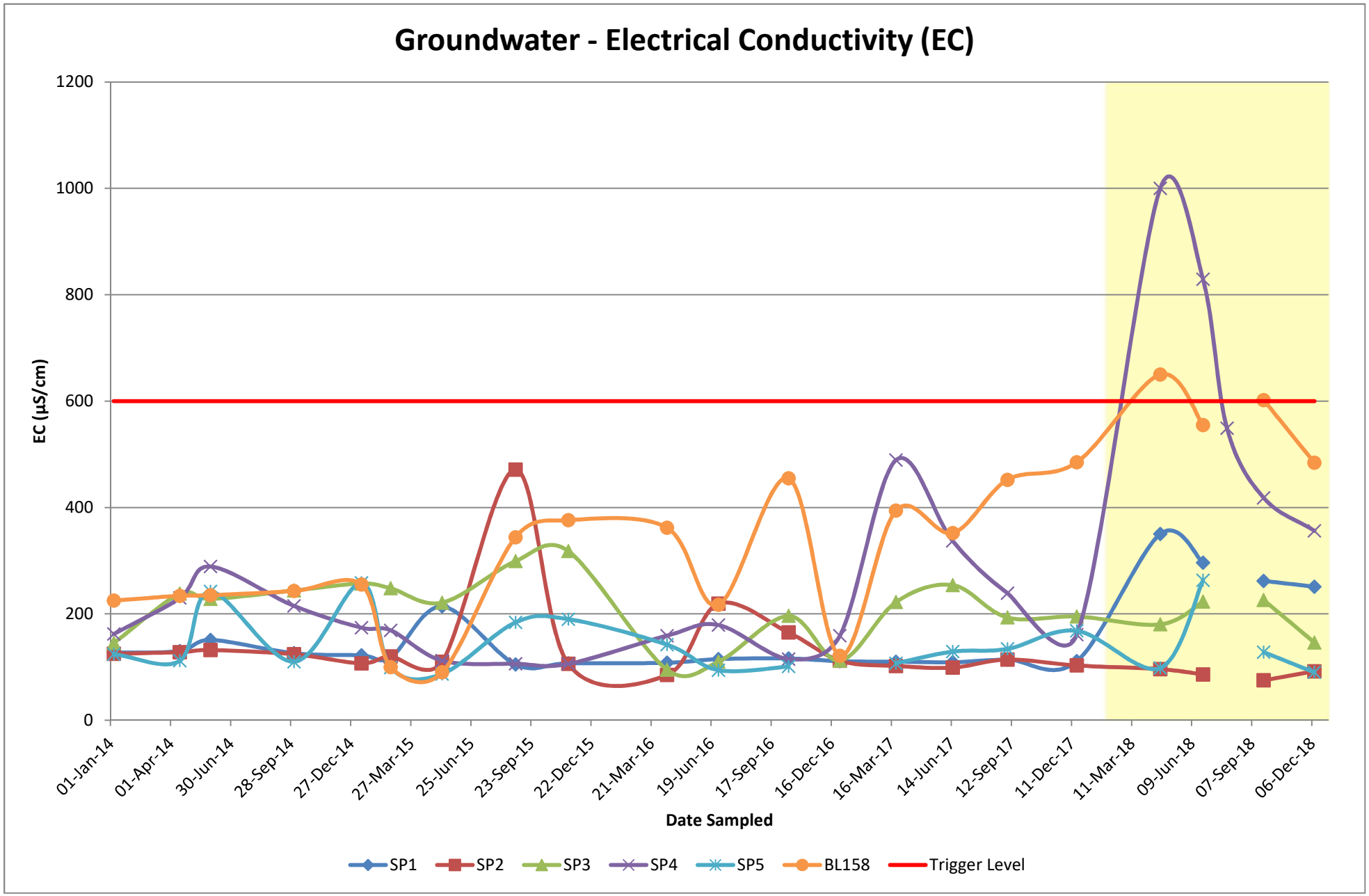


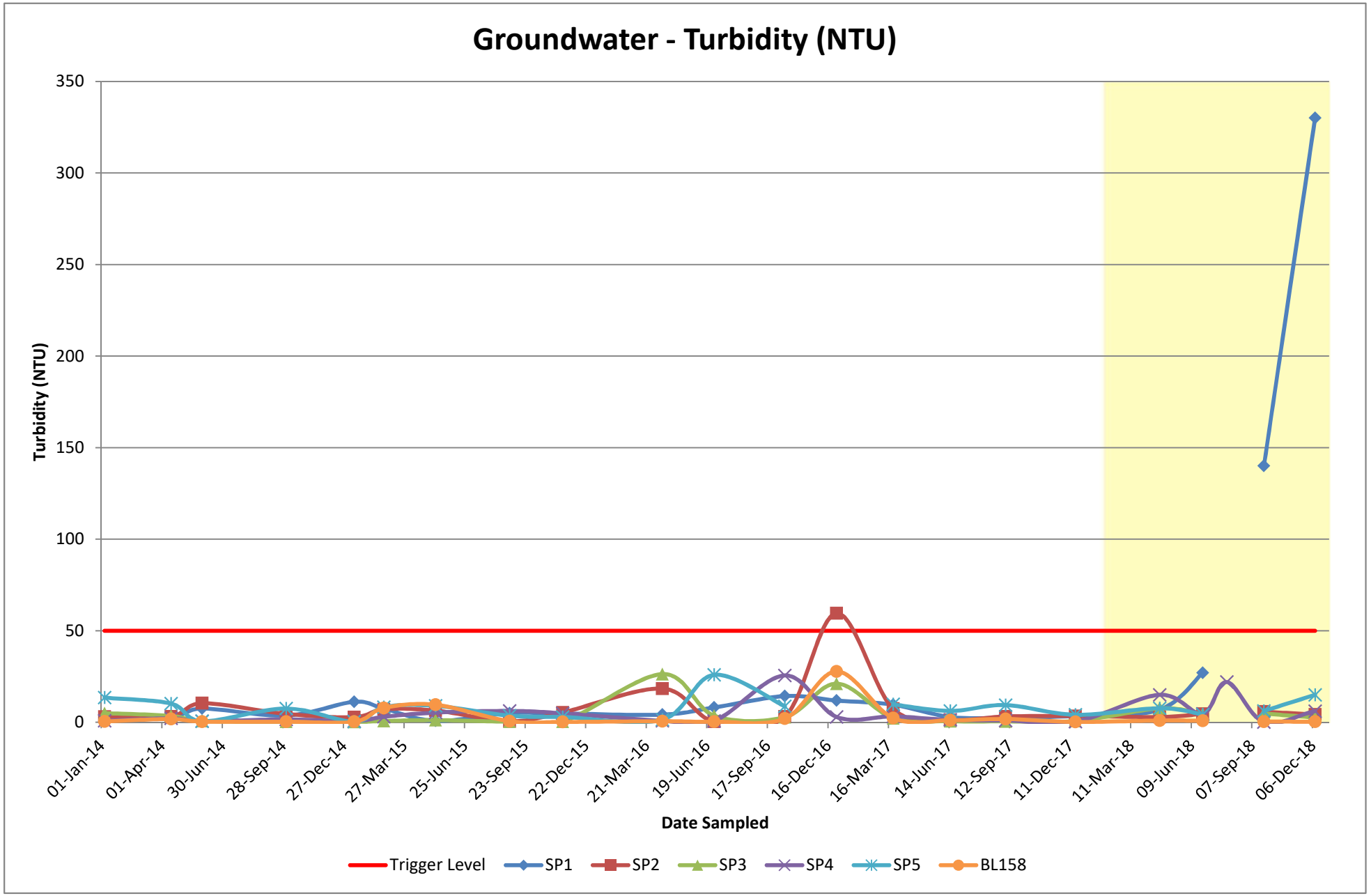
APPENDIX 4

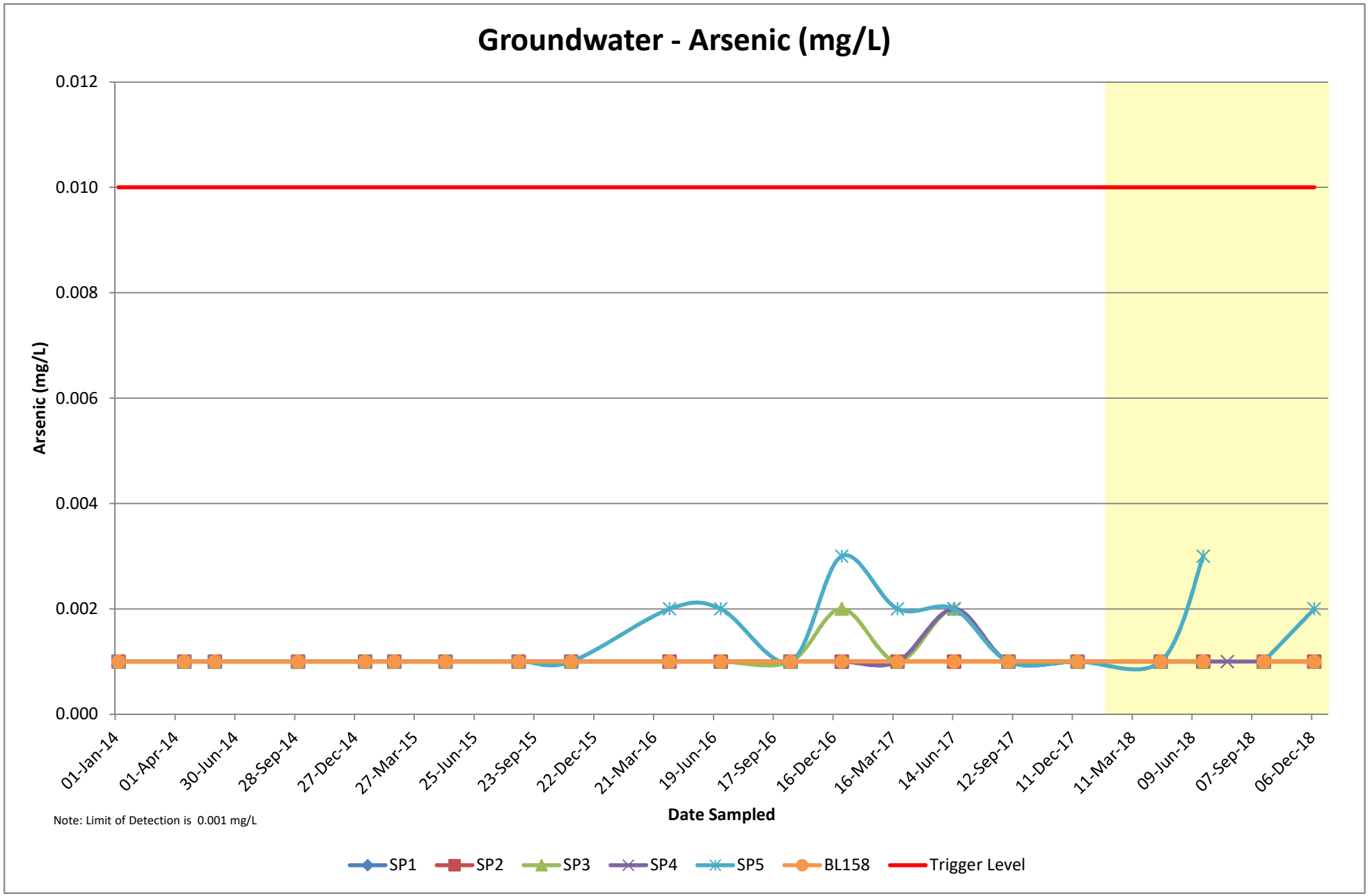
Groundwater Monitoring Results

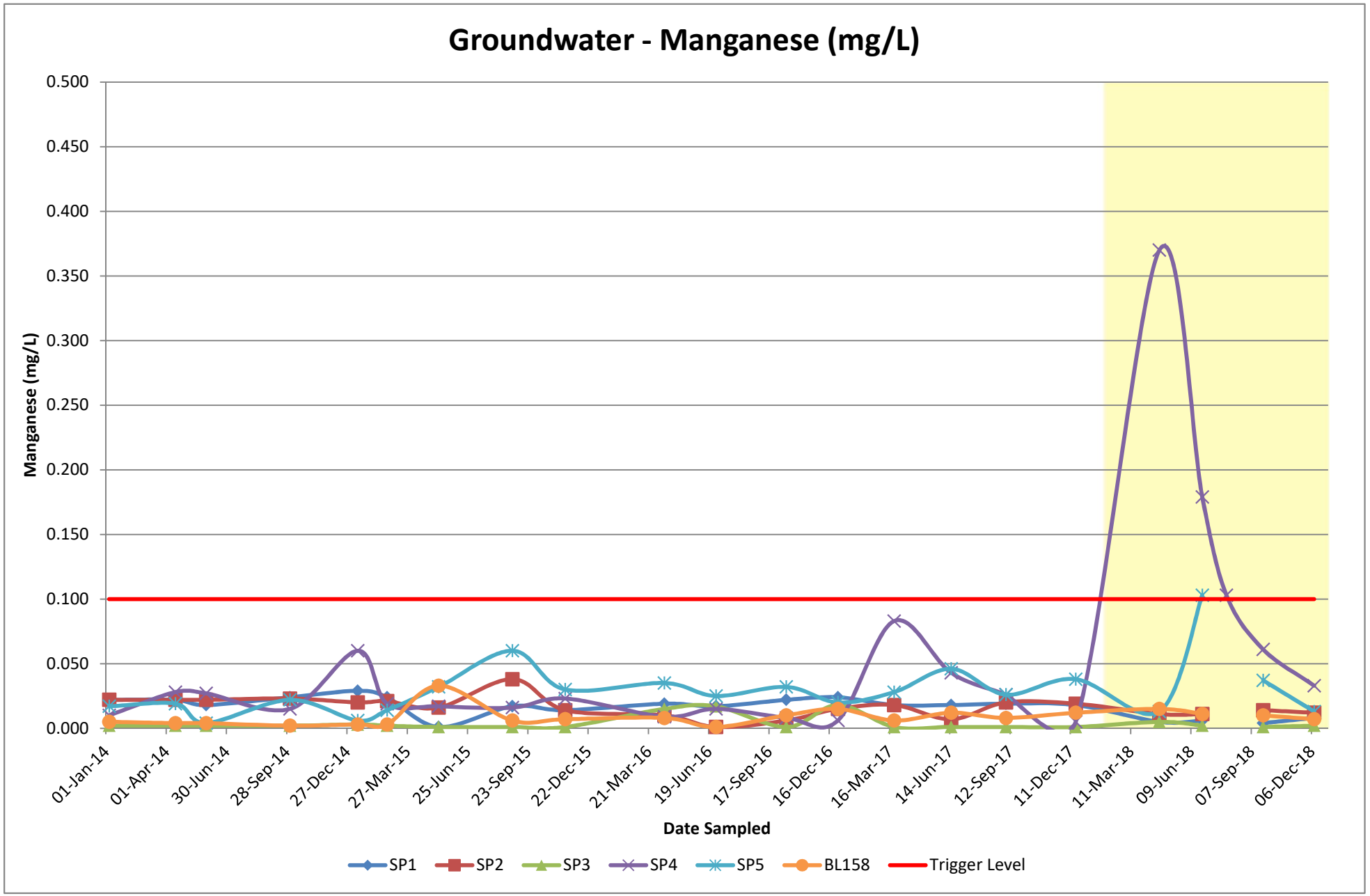

Groundwater Levels (mAHD)
Water Level (mAHD)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
01-Jan-14
01-Apr-14
30-Jun-14
28-Sep-14
27-Dec-14
27-Mar-15
25-Jun-15
23-Sep-15
22-Dec-15
21-Mar-16
19-Jun-16
17-Sep-16
16-Dec-16
16-Mar-17
14-Jun-17
12-Sep-17
11-Dec-17
11-Mar-18
09-Jun-18
07-Sep-18
06-Dec-18
Date Sampled
SP1
SP2
SP3
SP4
SP5
BL158

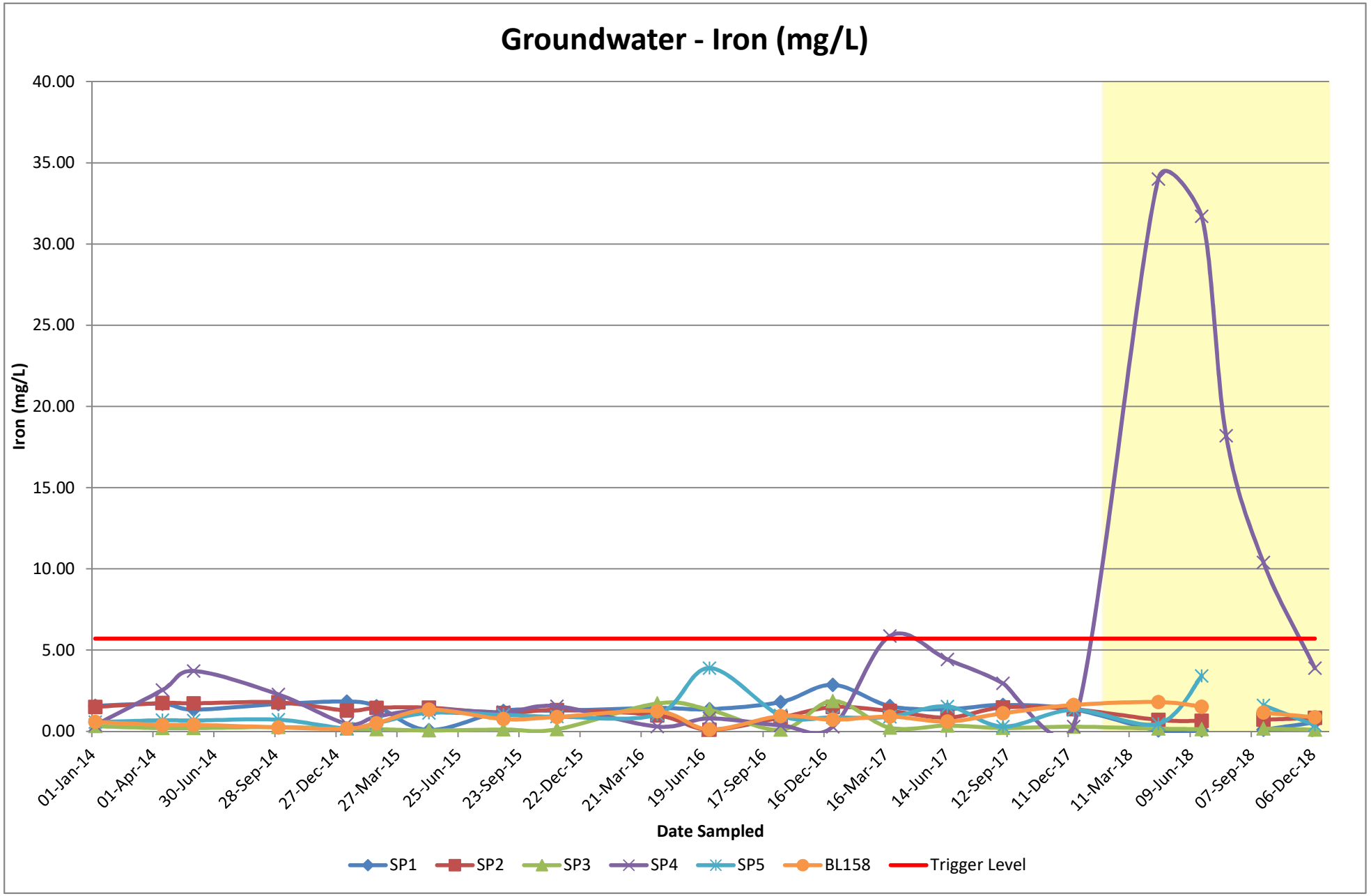

Groundwater - pH
pH (pH Unit)
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
01-Jan-14
01-Apr-14
30-Jun-14
28-Sep-14
27-Dec-14
27-Mar-15
25-Jun-15
23-Sep-15
22-Dec-15
21-Mar-16
19-Jun-16
17-Sep-16
16-Dec-16
16-Mar-17
14-Jun-17
12-Sep-17
11-Dec-17
11-Mar-18
09-Jun-18
07-Sep-18
06-Dec-18
Date Sampled
Lower Trigger
Upper Trigger
SP1
SP2
SP3
SP4
SP5
BL158

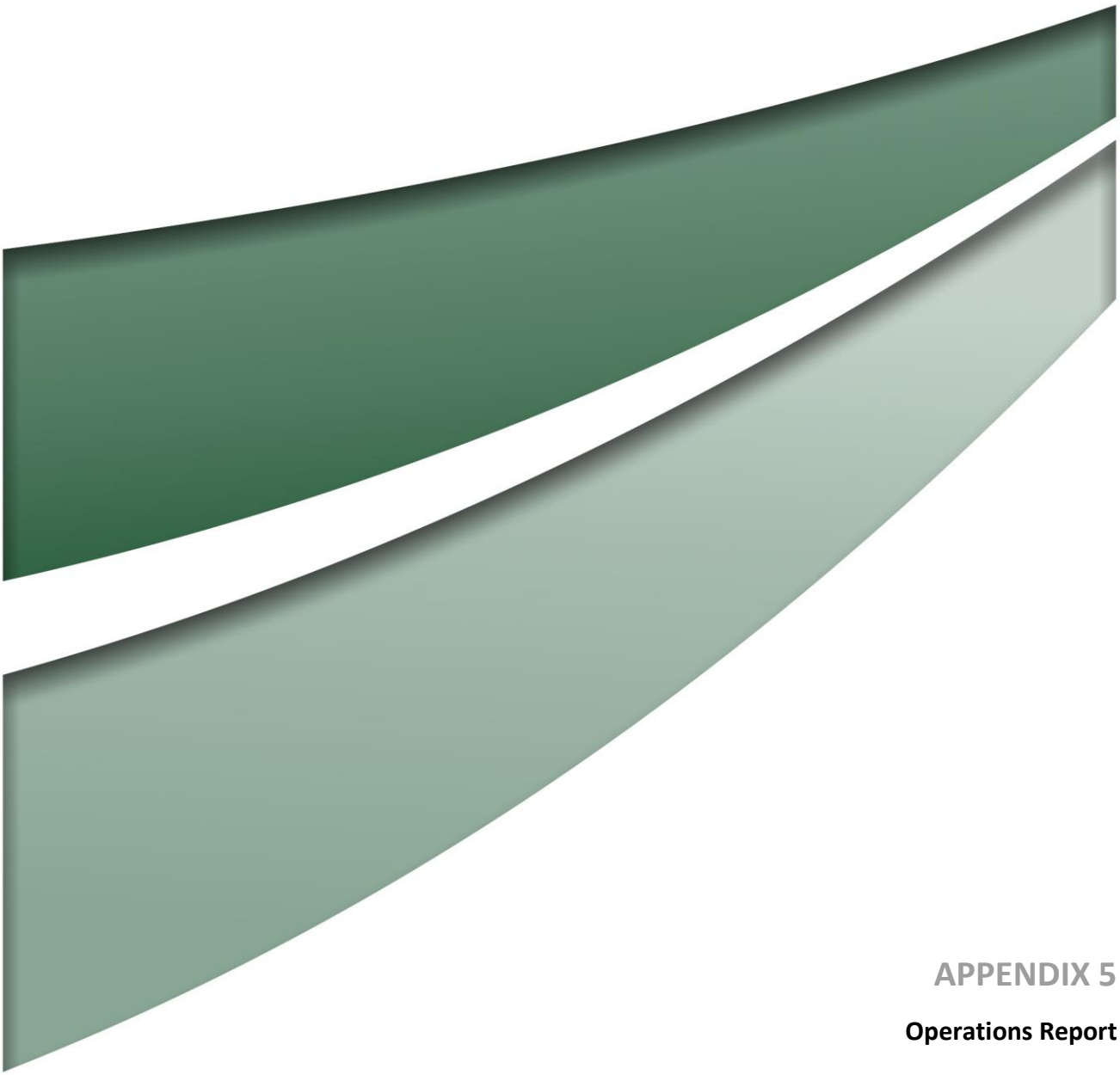

Groundwater - Electrical Conductivity (EC)
EC (µS/cm)
1200
1000
800
600
400
200
0
01-Jan-14
01-Apr-14
30-Jun-14
28-Sep-14
27-Dec-14
27-Mar-15
25-Jun-15
23-Sep-15
22-Dec-15
21-Mar-16
19-Jun-16
17-Sep-16
16-Dec-16
16-Mar-17
14-Jun-17
12-Sep-17
11-Dec-17
11-Mar-18
09-Jun-18
07-Sep-18
06-Dec-18
Date Sampled
SP1
SP2
SP3
SP4
SP5
BL158
Trigger Level


Groundwater - Turbidity (NTU)
Turbidity (NTU)
350
300
250
200
150
100
50
0
01-Jan-14
01-Apr-14
30-Jun-14
28-Sep-14
27-Dec-14
27-Mar-15
25-Jun-15
23-Sep-15
22-Dec-15
21-Mar-16
19-Jun-16
17-Sep-16
16-Dec-16
16-Mar-17
14-Jun-17
12-Sep-17
11-Dec-17
11-Mar-18
09-Jun-18
07-Sep-18
06-Dec-18
Date Sampled
Trigger Level
SP1
SP2
SP3
SP4
SP5
BL158


Groundwater - Arsenic (mg/L)
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Arsenic (mg/L)
01-Jan-14
01-Apr-14
30-Jun-14
28-Sep-14
27-Dec-14
27-Mar-15
25-Jun-15
23-Sep-15
22-Dec-15
21-Mar-16
19-Jun-16
17-Sep-16
16-Dec-16
16-Mar-17
14-Jun-17
12-Sep-17
11-Dec-17
11-Mar-18
09-Jun-18
07-Sep-18
06-Dec-18
Date Sampled
Note: Limit of Detection is 0.001 mg/L
SP1
SP2
SP3
SP4
SP5
BL158
Trigger Level


Groundwater - Manganese (mg/L)
Manganese (mg/L)
0.500
0.450
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
01-Jan-14
01-Apr-14
30-Jun-14
28-Sep-14
27-Dec-14
27-Mar-15
25-Jun-15
23-Sep-15
22-Dec-15
21-Mar-16
19-Jun-16
17-Sep-16
16-Dec-16
16-Mar-17
14-Jun-17
12-Sep-17
11-Dec-17
11-Mar-18
09-Jun-18
07-Sep-18
06-Dec-18
Date Sampled
SP1
SP2
SP3
SP4
SP5
BL158
Trigger Level


Groundwater - Iron (mg/L)
Iron (mg/L)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
01-Jan-14
01-Apr-14
30-Jun-14
28-Sep-14
27-Dec-14
27-Mar-15
25-Jun-15
23-Sep-15
22-Dec-15
21-Mar-16
19-Jun-16
17-Sep-16
16-Dec-16
16-Mar-17
14-Jun-17
12-Sep-17
11-Dec-17
11-Mar-18
09-Jun-18
07-Sep-18
06-Dec-18
Date Sampled
SP1
SP2
SP3
SP4
SP5
BL158
Trigger Level



APPENDIX 5

Operations Report

umwelt
Environmental & Social Consultants

MACKA'S SAND PTY LTD

OPERATIONS REPORT

Approval for Extractive Industry in the
North Stockton Catchment Area

FINAL

March 2019

OPERATIONS REPORT

Approval for Extractive Industry in the North Stockton Catchment Area

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Mackas Sand Pty Ltd

Project Director:	Bret Jenkins
Project Manager:	Rod Williams
Report No.	R85a
Date:	March 2019

Newcastle

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This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
1	Bret Jenkins	26/03/2019	Robert Mackenzie	28/03/2019

Table of Contents

Figures

1.0 Introduction

1.1 Project Background

Macka's Sand Pty Ltd (Macka's Sand) was granted Major Project Approval 08_0142 in September 2009 by the Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979* to operate sand extraction operations at Salt Ash, approximately 25 kilometres north-east of Newcastle, New South Wales (NSW) (refer to **Figure 1.1**).

Macka's Sand has approval to extract and process sand from Lot 218 and Lot 220. Lot 220 has an identified resource of 9.6 million tonnes however Lot 218 has a potentially indefinite extraction life due to the ongoing movement of sand from the mobile dunes into the approved extraction area. At the time of preparing this report, sand extraction was being undertaken on both Lot218 and Lot 220.

1.2 Scope

In accordance with Condition 3 & 4 of Clause 9 of the NOW Approval under Clause 10(1) of the *Hunter Water Regulation 2015* (the 'NOW Approval'), Mackas is required to submit an annual report to summarise compliance against this approval.

Condition 3 & 4 of Clause 9 of the NOW Approval states:

(3) On the date on which the AEMR is submitted in accordance with subclause (1), the Approval Holder must also submit the following to HWC and Office of Water;

- *a) 'an electronic copy of the monitoring results for groundwater levels and quality during the past year collected in accordance with the Soil and Water Management Plan, and*
- *b) A written report (**Operations Report**)addressing whether the Approval Holder has achieved compliance with:*
    - *i. the requirements for the method of Extractive Operations in Clause 3 of the Schedule;*
    - *ii. the Operations Management Procedure;*
    - *iii. the Hydrocarbon Spill Procedure; and*
    - *iv. the requirement for the progressive replacement of topsoil provided in Clause 6(3) of the Schedule*

(4) The Operations Report must:

- *a) identify any non-compliance during the previous year, and*
- *b) identify what actions were, or are being, taken to ensure compliance.*

The details of compliance with the above conditions are detailed in the sections below.

This report has been prepared by Umwelt (Australia) Pty Limited (Umwelt) on behalf of Macka's Sand. The reporting requirements for Macka's Sands are outlined in the DPI – Water (formerly New South Wales Office of Water (NOW)) Approval to undertake extraction works within the North Stockton Catchment Area. This report has been prepared to provide a summary of the performance of Macka's Sand during the 2018 calendar year.

Image Source: Nearmap (Feb 2018)

0 1 2 4km

1:85 000

Legend

- Lot Boundaries
- Approval Areas
- Approved Site Access (not-utilised)
- Approved Site Access (utilised)
- Approved Alternate Site Access (utilised)

FIGURE 1.1

Locality Plan

2.0 Statement of Compliance

This report has been prepared to provide a summary of the performance of the Mackas Sand operation over the period 1 January to 31 December 2018 (i.e. the compliance review period). The compliance status of the Macka's Sand operation against the NOW Approval and associated operations management procedure was managed during the reporting period by Mackas Sand.

This report specifically addresses and summarises compliance in accordance with Condition 3(b) of Clause 9 of the NOW Approval and its associated conditions.

In preparing this report, Umwelt (Australia) Pty Limited (Umwelt) has relied on this information in combination with other information sources such as environmental monitoring documentation, discussions with Macka's Sand representatives, and our general understanding of the operation.

In preparing this report, Umwelt has not sought to undertake a full compliance audit, including secondary verification of the collated documentary evidence with relevant government agency staff, construction personnel or operational staff, site records, etc.

No non-compliances were identified the 2018 Operations Report period.

3.0 Requirements for the Method of Extractive Operations

3.1 Laser Level Monitoring

As part of a compliance audit campaign on NSW sand quarries (DPE, 2015), DPE identified that one of the most common non-compliances related to the implementation of adequate controls to manage extraction depth.

As a result, Macka's Sand has engaged Centurion Civil to undertake quarterly surveys of the extraction area. Through the survey process compliance with the extraction depth and area is determined. Quarterly survey plans demonstrating compliance are provided in **Appendix 1** of the 2018 Annual Review.

3.2 Machinery and Equipment

Mackas have advised that all site machinery and equipment were maintained in a proper and efficient condition during the reporting period. Mackas experienced one Front-End-Loader gear box failure and two cab mount replacements during the reporting period. The manufacturers of the Front-End-Loader has advised that these failures are due to extremely harsh operating conditions (i.e. soft dry sand) in which the loaders operate.

Clause 3 (2) of the NOW approval states that 'the approval holder must remove all machinery used in the Extractive Operations from the Land at the end of each day's operation'. Macka's Sand has approval to operate for 24 hours a day. However, all mobile machinery not anticipated to be in active use is to be removed from Lot 218 or Lot 220. Vehicle storage locations are located outside of the North Stockton Catchment Area.

3.3 Storage of Contaminants

Macka's Sand has advised that during the report period, no hydrocarbon materials or other potential contaminants were stored on either Lot 218 or Lot 220, within the North Stockton Catchment Area.

3.4 Refuelling

Refuelling of vehicles occurs at the Macka's Sand and Soil administration and maintenance facility, or at the vehicle storage area at the Alternate Access Route, as appropriate.

Macka's Sand uses sieves and/or stackers at Lot 220 and Lot 218 that have limited mobility and are not considered to be vehicles. This relocatable plant is moved once or twice a year as the sand extraction face advances. Offsite refuelling of plant with limited mobility is not considered feasible.

As noted within Section 4.2.1 of the Operations Management Procedure, refuelling of plant with limited mobility occurs within the extraction areas via the usage of mobile refuelling equipment.

In order to minimise the risk of fuel spills, and the impact of spills should they occur, refuelling equipment consists of a fuel tank, spill catch tray and spill kit. An additional mobile spill kit is located within the extraction area to enable prompt clean up in the event of an accidental spill during refuelling activities.

4.0 Operations Management Procedure

The Operations Management Procedure outlines the standard methods and practices of utilisation of plant and equipment at the site. Macka's Sand has advised that the works at the site were undertaken in accordance with the Operations Management Procedure during 2018.

Hydrocarbon Spill Procedure

Macka's Sand has advised that the works at the site were undertaken in accordance with the Hydrocarbon Spill Procedure during 2018. No spills were recorded during 2018.

Any spills, should they occur, will be managed in accordance with Section 4.3.3 of the Operational Management Procedure to prevent fuel from contaminating the North Stockton groundwater source.

Any contaminated material to be disposed of will be done so in accordance with relevant waste management requirements.

5.0 Rehabilitation

Rehabilitation at Lot 220 is being undertaken progressively as sand extraction and operating space on the active quarry floor permits.

Approximately 4 ha of land in the southern section and 1 ha in the northern section of Lot 220 was undergoing landform establishment preparations (i.e. topsoil placement) for rehabilitation as at the end of the reporting period.

Prior to seeding, land undergoing preparation for rehabilitation are required to be surveyed to ensure they comply with final landform heights as noted within the Macka's Sand Landscape Management Plan, in accordance with Part 2 Clause 6 of the Hunter Water Regulations approval.

Activities undertaken during the reporting period were generally consistent with the Landscape Management Plan.

6.0 Non-compliance Summary

No non-compliances were identified within the 2018 Operations Report period.

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