PROCESS POND WATER TREATMENT & RELEASE

Broken Head Quarry

Leadshine Pty Ltd t/a Broken Head Quarry

PO Box 165, Byron Bay, NSW 2481

March 2020

ENV Solutions Pty Ltd
PO Box 248
Ballina NSW 2478
0435 857 751

13th March 2020
Stuart Dixon-Smith

Dear Stuart,

Re: Process Pond Water Treatment & release (March 2020)

ENV Solutions Pty Ltd (ENV) were engaged by Leadshine Pty Ltd (Leadshine) to treat release surface waters collected in the western 'process pond' at the Broken Head Quarry (the 'site'). The site is located in Suffolk Park, NSW (Lot 1, DP184443 and Lot 1, DP123302), a plan outlining relative location is presented in Figure 1 (**Attachment 1**) where relative position of the process pond is presented in Figure 2 (**Attachment 1**).

Following initial system checks, baseline process pond can be described as being slightly below neutral and of a low clarity (Process Pond Baseline; pH = 5.77, Turbidity (estimate) = 350 NTU). The process pond level indication marker was shown to be at 16 (equating to approximately 3,326 m^3).

On this basis, utilising knowledge developed following historic water treatment methodologies, pH dosing using 50% Caustic (50% NaOH) commenced on the morning of the 3rd of March 2020. Treating for a period of approximately 9 hours, handheld pH checks showed pH to have increased to 6.84 (within EPL 4860 discharge threshold 6.5 – 8.5).

Jar tests were then conducted on the morning of the 4th of March 2020. Here, 0.25% neat Poly Aluminium Chloride (PACH) solution was prepared and added to process pond raw water (PACH Concentration; Jar 1 = 12.5 mg/L, Jar 2, 25 mg/L, Jar 3 = 37.5 mg/L, Jar 4 = 50 mg/L). Here, 12.5 mg/L tests appeared to settle quickly. Additional jar tests were conducted at 6.25 mg/L where it was determined 15 L PACH would be more than sufficient in settling suspended solids. Processes were implemented and the treatment system was left to dose for approximately 7 hours.

Following PACH additions, process pond visual clarity appeared to be excellent (Figure 3, **Attachment 1**). Handheld pH checks were conducted where baseline pH was measured at 7.20 and Turbidity appeared to be significantly reduced (when compared to baseline).

As a result, a pre-discharge validation sample was collected on the 4th of March 2020. The sample was placed into an '*esky*', '*iced*' and sent to NATA accredited Environmental Analysis Laboratory (EAL) in Lismore NSW. Here, all samples have been analysed for *pH* and *Total Suspended Solids* (TSS) where results are presented in **Attachment 2**.

Presented in table 1, process pond results (post treatment) were shown to be compliant when compared discharge criteria specified in the Environmental Protection Licence (table 1). A s result, waters collected waters were deemed suitable for discharge and were released on the 5th of March (to the sediment boundary zone).

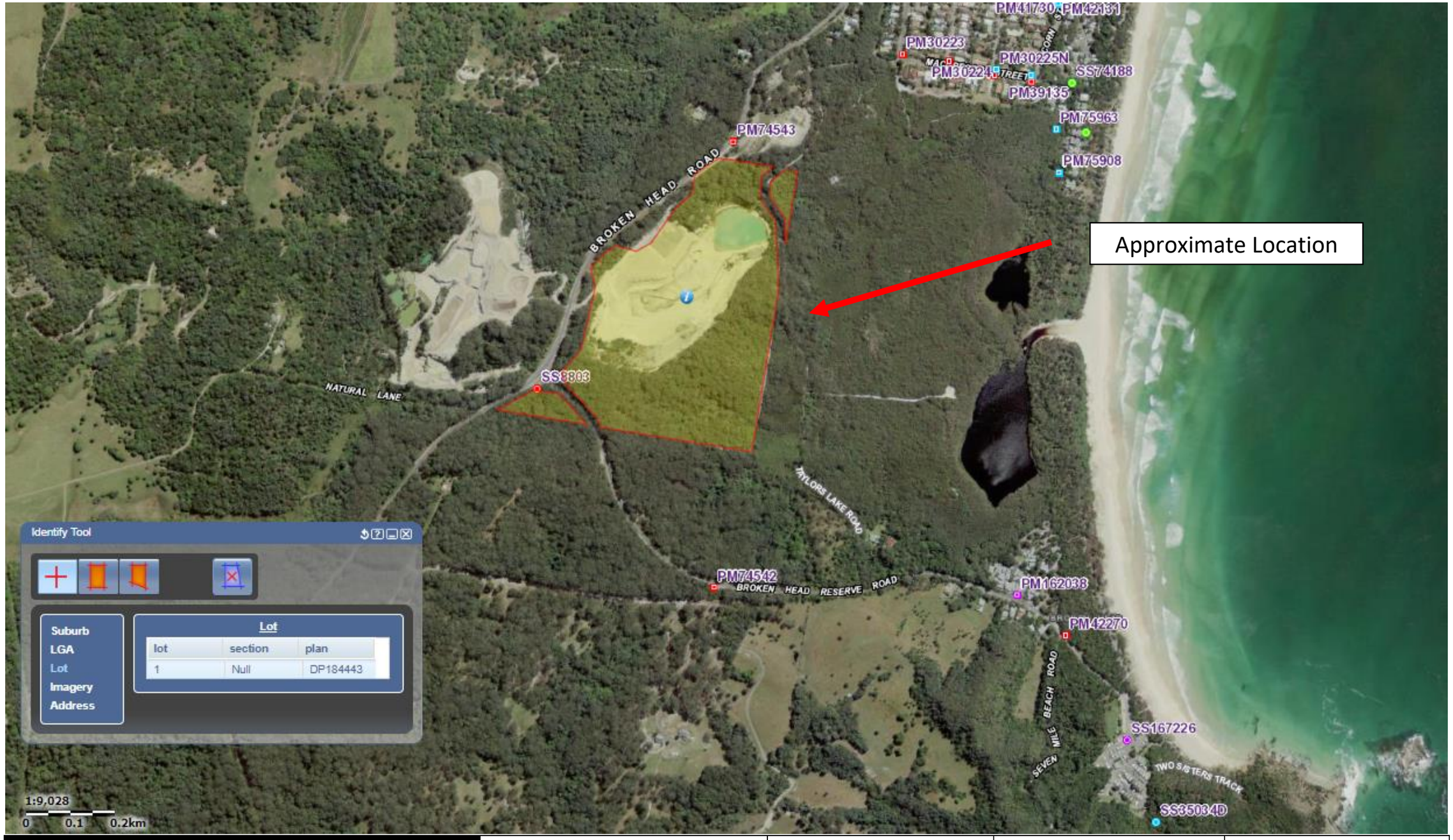
Table 1: Process Pond (Post Treatment) against EPL 4860

Analyte	Process Pond (Post Treatment)	EPL 4860
pH	7.30	6.5 – 8.5
Total Suspended Solids	11	50

Should you have any queries please don't hesitate to contact me directly.

Yours faithfully,

Robert Mitchell
Chief Operating Officer
ENV Solutions Pty Ltd



ENV Solutions Environmental Engineering Solutions	pH: 0448 110 070 Email: rob@envsolutions.com.au Mail: PO Box 248 Ballina, NSW 2478 Job No.: 18080 Project: WQ Statement of Compliance	**Figure 1 (Attachment 1) – Site Location Plan**	Client: Leadshine Pty Ltd Date: 10/04/2019 By: Robert Mitchell	Legend Reproduced from Six Maps (Accessed, 2019)

ENV Solutions Environmental Engineering Solutions	pH: 0448 110 070 Email: rob@envsolutions.com.au Mail: PO Box 248 Ballina, NSW 2478 Job No.: 18080 Project: WQ Statement of Compliance	**Figure 2 (Attachment 1) – Process Pond**	Client: Leadshine Pty Ltd Date: 13/03/2020 By: Robert Mitchell	Legend Reproduced from Six Maps (Accessed, 2019)

Process Pond (Post Treatment) – At Dischage Point

Process Pond (Post Treatment) – Indicative Water Sample

ENV Solutions Environmental Engineering Solutions	pH: 0448 110 070 Email: rob@envsolutions.com.au Mail: PO Box 248 Ballina, NSW 2478 Job No.: 18080 Project: WQ Statement of Compliance	**Figure 3 (Attachment 1) – Water Quality (Process Pond Post Treatment)**	Client: Leadshine Pty Ltd Date: 13/03/2020 By: Robert Mitchell	Legend

RESULTS OF WATER ANALYSIS

1 sample supplied by Env Solutions Pty Ltd on 4/03/2020 . Lab Job No. J1409.
Samples submitted by Rob Mitchell. Your Job: 18080

PO Box 248 BALLINA NSW 2478

Parameter	Methods reference	Sample 1 PROCESS
	Job No.	*J1409/1*
pH	APHA 4500-H^+-B	7.30
Total Suspended Solids (mg/L)	GFC equiv. filter - APHA 2540-D	11

Notes:

1. 1 mg/L (milligram per litre) = 1 ppm (part per million) = 1000 µg/L (micrograms per litre) = 1000 ppb (part per billion).
2. Analysis performed according to APHA (2017) 'Standard Methods for the Examination of Water & Wastewater', 23rd Edition, except where stated otherwise.
3. Analysis conducted between sample arrival date and reporting date.
4. ** NATA accreditation does not cover the performance of this service.
5. .. Denotes not requested.
6. This report is not to be reproduced except in full.
7. All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions (refer scu.edu.au/eal or on request).
8. Results relate only to the samples tested.
9. This report was issued on 05/03/2020.

NATA
WORLD RECOGNISED ACCREDITATION
Accreditation No. 14960
Accredited for compliance with ISO/IEC 17025 - Testing

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster
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PO Box 157 (Military Road)
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Submitting Client Details

Quote Id:
Job Ref: 18080
Company: ENV Solutions Pty Ltd
Contact: robert Mitchell
Phone: 0448 110 070
Mobile: 0448 110 070
Email: rob@envsolutions.com.au
Postal address:

Billing Client Details

□ Tick if same as submitting details
ABN: 58 600 788 814
Company: ENV Solutions Pty Ltd
Contact: Robert Mitchell
Phone: 0448 110 070
Mobile: 0448 110 070
Email: rob@envsolutions.com.au
Postal address: 45 - 65 Smith Drive, West Bal

Payment Method:

□ Purchase Order
□ Cheque
□ Credit/Debit Card (EAL staff will phone for details)
□ Invoice (prior approval)

Relinquished: Robert Mitchell Date: 3/03/2020
Received: Date:

Preservation: **none** - freezer bricks - ice - acidified - filtered - other
Condition on receipt: **ambient** - cool - frozen - other

In submitting samples, the Client agrees to the EAL Laboratory Services Terms and Conditions. These Terms and Conditions are available on the EAL website: scu.edu.au/eal, or on request.

Comments:
24 Hour Turn Around

Likelihood and nature of Hazardous material:

Lab ID	Sample ID	Sample Depth	Sampling Date	Sampler	Your Client	Crop ID	Total number of samples: Sample Type (e.g. water, leaf, soil)	Sample Analysis Request: Price list code (e.g. SW-PACK-06): pH	Total Suspended Solids				
1	PROCESS	NA	3/03/2020	RM	18080		Water	x	x				