



Broken Head Quarry

Enforceable Undertaking Progress Report  
Report #6 – January 2019

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## 1 Introduction

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This Report is the monthly report required to be given under clause 4.4(a) ("Reporting") of the Enforceable Undertaking given by Leadshine Pty Limited on 20 August 2018 ("**Enforceable Undertaking**"). The Enforceable Undertaking commenced operation Tuesday 28 August 2018, the date of receipt of the withdrawal of the Order 15 issued by the Department of Planning and Environment.

This is the sixth progress report under clause 4.4(a) of the Enforceable Undertaking. It relates to the period from Tuesday 1 January 2019 until Thursday 31 January 2019. The Quarry was officially closed from 3.00PM on Friday 21 December 2018 until 6 January 2019, so no activities were undertaken until 7 January 2019.

The report describes works undertaken on the following aspects:

- Planning for the undertaking of rehabilitation works;
- Landforming Works and Stormwater Management Works carried out in January 2019;
- Vegetation Work carried out in January 2019; and
- Other rehabilitation related activities carried out in January 2019.

The director of Leadshine Pty Limited (Stuart Dixon-Smith) attended at the Quarry for two days, 31 January 2019 and 1 February 2019. On 31 January 2019 a comprehensive inspection of the Quarry was undertaken by Stuart Dixon-Smith, John Ward, Quarry general manager with Andrew Norris of Martens & Associates, Leadshine's erosion and sediment control expert consultant. The main purpose of the inspection was to inspect the landforming and stormwater drainage works undertaken, and to discuss and precisely specify those works yet to be undertaken. On 1 February 2019 Stuart Dixon-Smith met with Mark Free (the Quarry's ecologist and rehabilitation monitoring consultant) and Ross Faithful (the Quarry's vegetation contractor) to inspect area to be vegetated next and plan the next vegetation activities.

## 2 Executive Summary

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Works during the month were limited due to the Quarry being closed until 7 January 2019 and the Australia Day weekend, as well as 10 days' annual leave being taken by John Ward.

Work involved finalisation of the planning for the next vegetation stage, continuation of the works on the batter on PZW21 and the creation of the wetland basin, spillway and drain in PZW9. The re-landforming of, and topsoil application on, PZW11 was also completed.

The rehabilitation section of BHQ's website was finalised and went live during January.

No planting works were undertaken during the month.

Further details are set out below.

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### 3 Rehabilitation Planning

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January 2019 involved finalising of the planning for the next revegetation campaign, to be focussed on the Westside as previously reported.

Detailed discussions for the following planting campaign were also commenced given the decision to defer the next planting campaign for reasons discussed below.

It was decided to defer shrub planting until early March 2019 due to extremely low rainfall and soil moisture at the Quarry, having received no significant rain since early October 2018 (BHQ's rainfall records for 2018-19 are available at <http://www.brokenheadquarry.com.au/upl/website/environmental-testing-/BHQRainfallDataForm201819.pdf> ). Very little rainfall is forecast for February, so the Quarry's ecologist and vegetation contractor both recommended delay to give the new plantings a better chance of survival. Leadshine has accepted that recommendation. The relevant plants have been ordered and held aside ready for planting.

Planting will be undertaken in areas PZW13 (batter above the Lilypond), PZW17 (grassed area above Process Pond), PZW18 (grassed area below Central Dam wall), part of PZW19 (south west bank of the Central Dam), PZW20 (South Bank of Central Dam, including rehabilitated watercourse), upper part of PZW23 (batter west of Westside upper access trail), part of PZW24 (plateau west of Westside upper access trail), PZW25 (area between Westside upper access trail and the limit of extraction) and PZW26 (Area above washplant dump point). Those areas are as reported in Report #5 and are marked in green on the plan of instructions provided to the contractor following:



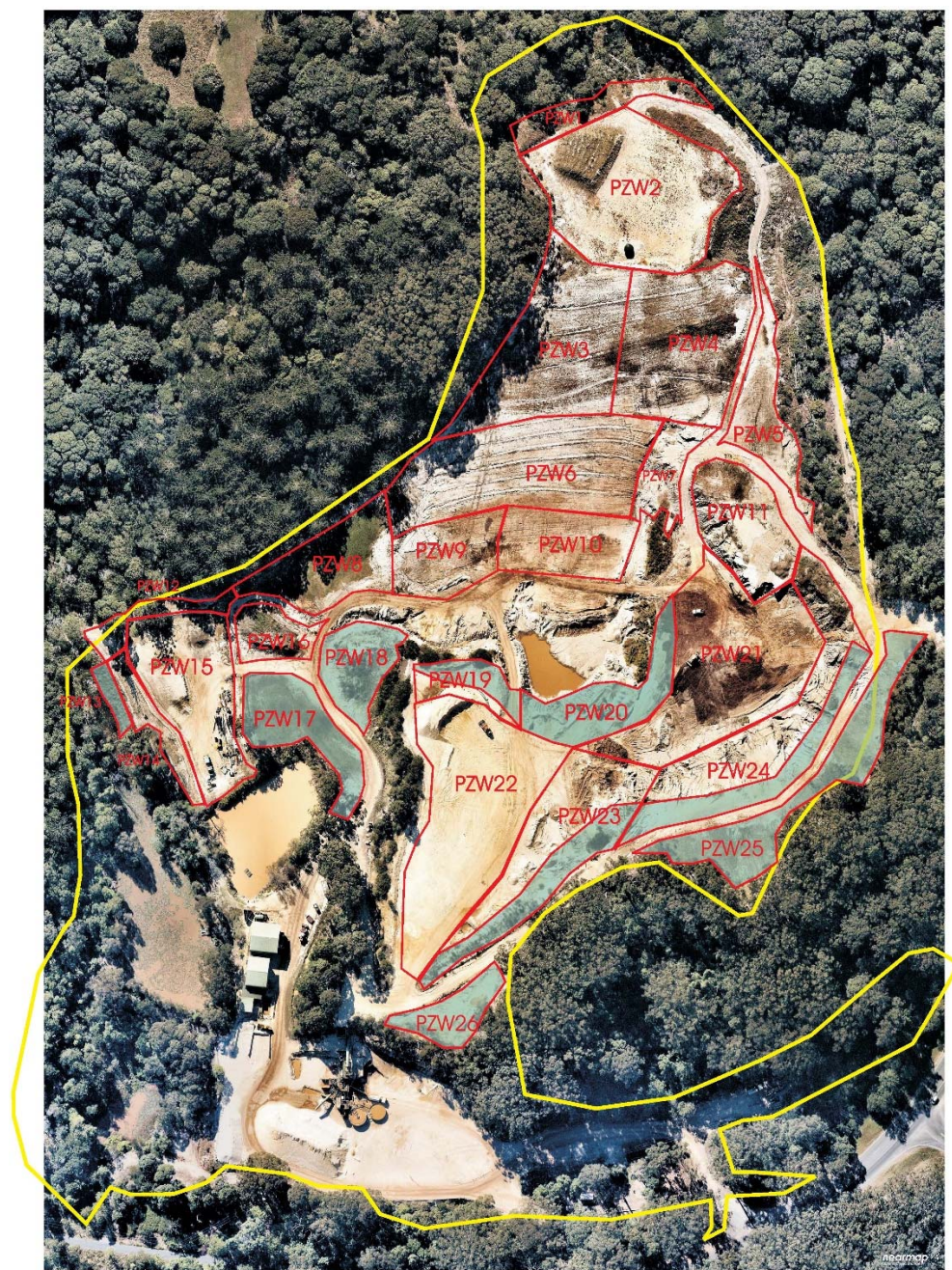




Figure 1 – Proposed planting areas March 2019

## 4 Landforming Works and Stormwater Management Works Progress

During January 2019 the Quarry's landforming and stormwater works activities were primarily focussed on the continuation of fill activities on the Westside, particularly the continuation of the batter below PZE24 from PZE23 into PZE21, and the completion of landforming of PZW11.

### 4.1 Westside batter works

The main earthwork activities during December were focussed on the Westside.

Area PZW11 was completely reprofiled and its final batter shape created and topsoil applied. Grass was not seeded due to unsuitable weather conditions over January 2019, meaning it was unlikely that any germination would be successful. Grass will be seeded when weather conditions are more conducive.



Figure 2 – PZW11 looking northeast from Central Dam bypass road



Figure 3 – PZW11 looking east from Central Dam bypass road





**Figure 4 – PZW11 looking north from PZW24 at top of new drain**





**Figure 5 – PZW11 looking west from top of PZW11 at boundary with PZW24**





**Figure 6 – PZW11 looking northwest from PZW24 at boundary with PZW24**



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Work continued in area PZW21. In particular the works previously undertaken in PZW21 has been continued further east, with the batter below PZW24 now close to complete. The bund and drain on the lower portion of PZW21 were finalised. A new drain in the midpoint of PZW21 has been installed to manage stormwater run-off from the road and other areas on PZW24 ensuring it flows to the new Central Dam without causing erosion.



**Figure 7 – Finalised batter on eastern part of PZW21 looking southwest towards boundary with PZW23**





**Figure 8 – PZW21 from PZW11 looking south, new drain in centre**





**Figure 9 – New drain in PZW21 looking south from boundary of PZW21 and PZW11**





**Figure 10 – New drain in PZW21 looking north from top at boundary of PZW24 towards PZW11**



In addition, an inlet watercourse from PZW21 into the new Central Dam that had previously been filled before the diversion bund referred to in paragraph 4.1 of Report #4 was formed had partly eroded (which triggered the need to install that bund). With the installation of the bund, the erosion source has been removed. So this eroded fill has been filled again and is now expected to be stabilised. Other more minor rilling in the southern banks of the new Central Dam have also been filled now the bund is fully installed.



**Figure 11 – PZW21 looking south from Central Dam bypass road showing repaired bank**



**Figure 12 – Zoomed in version of Figure 11**



The completion of the filling and batter works on PZW21 and drainage from the road on PZW24, being the last major landforming work at the Quarry, is now close to complete and should be finalised by the end of February 2019, or possibly by early March 2019. Some further fill works will be undertaken in PZW22 (which is very flat) to ensure it drains to the new Central Dam.



**Figure 13 – Areas of PZW21 still requiring fill to right, taken from top of new drain looking north with PZW11 at rear**



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## 4.2 Wetland works

The proposed wetland on PZW9 was completely cleared of material extracted from the new Central Dam and a dam wall, spillway and drain constructed. The dam wall has been topsoiled but not seeded. Further work is required to complete the dam wall north west of the spillway and to line required parts with clay, and to construct a macrophyte zone.

Further work is also required to the check dam system upstream of the wetland area. Detailed discussions were had with Andrew Norris as to the required works for the wetland to have the best chance of success. Work commenced on these activities on 1 February 2019, based on that input.



**Figure 14 – PZW11 looking north from PZW24 at top of new drain**

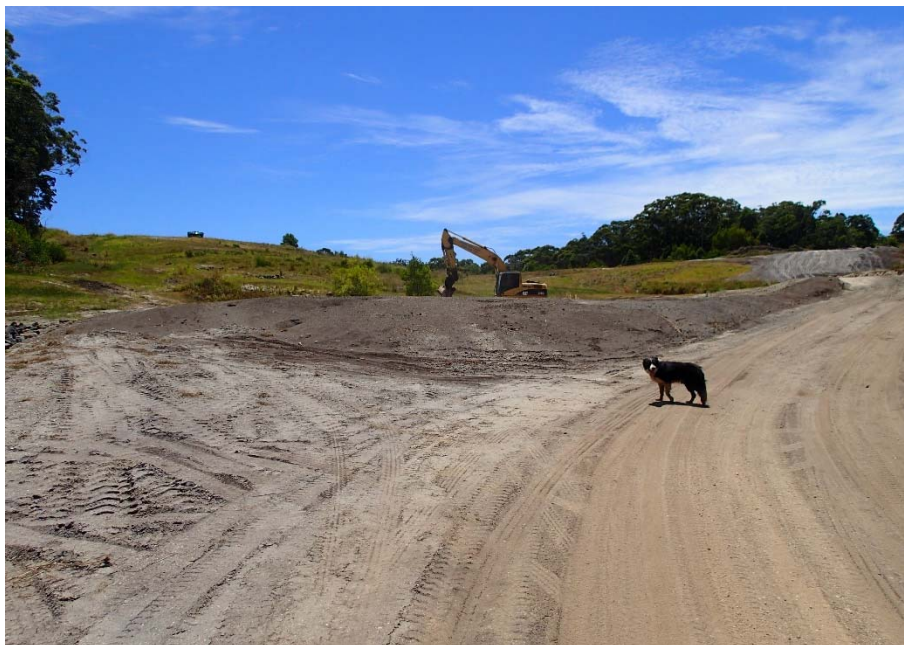


**Figure 15 – Wetland basin looking north from Central Dam bypass road**



**Figure 16 – Wetland basin wall looking northwest from Central Dam wall**





**Figure 17 – Wetland basin wall looking northeast from Central Dam approach road**



**Figure 18 – wetland spillway drain looking north**





**Figure 19 – Wetland basin spillway drain looking southwest**



**Figure 20 – Wetland basin wall and spillway looking southwest**





**Figure 21 – Wetland basin looking east from spillway**



**Figure 22 – Wetland basin and wall looking southeast from area requiring further bunding**





**Figure 23 – Wetland basin and wall looking southeast**



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#### 4.3 Central Dam valves

Manually operable valves to operate the Central Dam outlet pipes were installed on the afternoon of Christmas Eve 2018 (correction to Report #4).



**Figure 24 – Central Dam outlet pipe valves shown near spillway**



**Figure 25 – Central Dam outlet pipe valves close-up**

#### 4.4 Eastside earthworks

No earthworks were undertaken on the Eastside during the month, with earthworks equipment having been relocated to the Westside after completion of the Eastside fire trails repositioning work reported on in Report #2.

### 5 Vegetation Works Progress

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No planting work was undertaken in January 2019.

The November 2018 plantings continue to be irrigated with the water cart during January to assist in establishment. Inspection undertaken on 1 February 2019 did not reveal any significant planting losses, despite adverse weather conditions and Christmas break absences.

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## 6 Other Works

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Detailed inspection and assessment of the works undertaken to date, and works remaining to be undertaken was undertaken, by Andrew Norris of Martens & Associates. This was in the present of John Ward, who undertakes or supervises all works and detailed instructions were communicated as to both rectification of any non-compliance with existing works as well as methodology for future works. Andrew and Stuart Dixon-Smith took detailed notes and photos and a follow up report is expected from Andrew Norris.

Andrew Norris inspected the Central Dam spillway, an item under review by the Department in respect of the required spillway width and depth. He also made observations to enable catchment calculations to be undertaken so as to inform calculations of the required spillway width. Since his visit further correspondence has been exchanged in respect of dam catchment and other drainage works as a part of his off-site work. Andrew will report on the recommended spillway width and design. Leadshine will consult with the Department and implement any required work in accordance with recommendations.

On 1 February 2019 rock for drainage work instructed by Andrew Norris was ordered and delivered and further work continued on the upstream catchment of the new wetland and the rock check dams supplying it.

## 7 Other Matters

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### 7.1 Works status

The works undertaken during the month are detailed in the table attached to Annexure A and Annexure B, which Annexures are kept constantly up to date and each monthly change is shown in tracked text in the Annexure.

### 7.2 BHQ website rehabilitation page

BHQ's website page with information on the Enforceable Undertaking and rehabilitation activities (<http://www.brokenheadquarry.com.au/rehabilitation> ) was completed and went live in January 2019.



The following is a screenshot of the page:

The screenshot displays the Broken Head Quarry website. At the top left is the BHQ logo, a blue square with 'BHQ' in white and 'BROKEN HEAD QUARRY' in smaller text below it. To the right of the logo is the text 'Broken Head Quarry'. Further right, in the top right corner, is the text 'Call us today!' above the phone number '02 6685 3897'. Below the header is a dark grey navigation bar with links: 'Home', 'Products, Services & Pricing', 'PIRMP', 'Environment & Community' (highlighted in orange), 'Contact', and 'Notifications'. Below this is a lighter grey bar with more links: 'Environmental Management', 'EPA', 'EMR Reports', 'Ecological Reports', 'Environmental Testing', 'Community Consultation Committee', and 'Rehabilitation' (highlighted in orange). The main content area has a dark background and features the section title 'Enforceable Undertaking' in white. Below this title is a list of links, each preceded by a right-pointing arrow: 'BHQ Enforceable Undertaking Agreement', 'BHQ Enforceable Undertaking Progress Report #1 2018-08', 'BHQ Enforceable Undertaking Progress Report #2 2018-09', 'BHQ Enforceable Undertaking Progress Report #3 2018-10', 'BHQ Enforceable Undertaking Progress Report #4 2018-11', 'BHQ Enforceable Undertaking Progress Report #5 2018-12', and 'Blackwood letter W3 Planting Inventory area'.

### 7.3 Department Feedback

The Department issued comments and feedback on Report #4 during January 2019. Leadshine will respond separately to that in a supplement to this report to ensure this report is not delayed.

## 8 Glossary, Definitions and Locations of Features

### 8.1 Features at Broken Head Quarry

The following plan identifies key areas at Broken Head Quarry and names used to define those areas in this and other Report.



Figure 26 – Plan of major features of Broken Head Quarry

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The following waterbodies are contained at Broken Head Quarry:

- Sediment Pond No. 2 – this is the lower dam on the East Pit which has formed part of the Quarry for most of its operation.
- Sediment Pond No. 1 – this is the upper dam on the East Pit, constructed in 2014 with dam wall alterations undertaken in 2017.
- North No 1 Sediment Pond – this is the small pond on the West Pit at the north eastern edge of the limit of extraction.
- Temporary West Sediment Pond – or Central Dam – this is the pond in the centre of the West Pit which collects stormwater runoff from most of the West Pit and feeds the cut off drain.
- Process Pond – this is the main working waterbody for the Quarry, located north of the Maintenance Sheds on the West Pit. It supplied water for the sand and gravel washing plant.
- Upper Lilypond – This is a dam on the edge of the West Pit which collects natural waterflows from west and north of the Quarry and overflows from the Process Pond.
- Lower Lilypond – This is a dam on the edge of the West Pit which is downstream of the Upper Lilypond and collects natural waterflows from the Upper Lilypond.

## 8.2 Other Defined Terms

**Broken Head Quarry** means the former sand and gravel quarry operated on the land comprised in the Eastside Land and the Westside Land and consists of the following parcels of land:

- Lot 2, Deposited Plan (“**DP**”) 700806;
- Lot 1, DP 123302;
- Lot 1, DP 184443;
- Lot 1, DP 245836;
- Lot 1, DP 245605; and
- Auto Consol 12993-34.

**Department** means the NSW Department of Planning and Environment.

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**Eastside Land** means the land comprised in titles:

- Lot 1, DP 184443;
- Auto Consol 12993-34; and
- Lot 1, DP 245605.

**Enforceable Undertaking** means the enforceable undertaking given by Leadshine to the Department dated 20 August 2018 accepted by the Secretary of the Department on 27 August 2018.

**EPL 4860** means the Environmental Protection Licence (No 4860) issued to Leadshine by the Environmental Protection Authority relating to Broken Head Quarry.

**Leadshine** means Leadshine Pty Limited (ABN 21 102 229 943).

**Order** means the Order 15 order issued by the Department to Leadshine under section 121B of the *Environment Planning and Assessment Act 1979* on 11 August 2017.

**Rehabilitation Works Plans and Specifications** means the plans and notes in in Appendix 1 and Appendix 2 of the Enforceable Undertaking.

**Westside Land** means the land comprised in titles:

- Lot 1, DP 123302;
- Lot 1, DP 245836; and
- Lot 2, DP 700806.

Terms defined in the Enforceable Undertaking and not defined in this Report have the same meaning as defined in the Enforceable Undertaking.



## Annexure A Eastside Sectors



-  PZE - Planting Zone (Eastside)
-  E2 - Final Plantings
-  E3 - Supplementary Plantings



## Eastside Rehabilitation Zones

Zone	Description	Status	Activity in <del>December</del> <u>January 2018</u> and Future Plans
PZE1	North Facing Batter below future fire trail	Well vegetated with established semi mature vegetation. Unlikely any further vegetation will be required	Under observation to see if any damage from earthworks above requires remedial planting. Unlikely any further vegetation will be required. No damage sustained in earthworks activities.
PZE2	Batter below future fire trail. Comprises part of Area 1 in the Rehabilitation Works Plans and Specifications	<p>Future fire trail to be re-landformed to reduce slope of batter. Area was hydromulched in January 2018 and contains some areas with semi mature regenerated plants. However, large areas are bare soil due to landforming works.</p> <p>Once fire trail is re-landformed batter to be hydromulched and planted with shrubs selected by Mark Free.</p> <p>Rehabilitation Works Plans and Specifications requires the following action:            "REGRADE AREA TO LOWER TRACK ELEVATION TO MATCH GRADES TO SOUTH EAST. TRACK TO BE PROFILED WITH SINGLE CROSS FALL SOUTH EAST DISCHARGING TO EXISTING VEGETATED SLOPES. WHERE OUTFALL IS NOT POSSIBLE MITRE DRAINS TO BE PROVIDED AT 20 M INTERVALS.</p> <p>UNVEGETATED PORTIONS OF BATTER TO THE NORTH WEST OF TRACK TO BE REGRADE TO PROVIDE MAXIMUM 50% GRADE. BATTER TO BE TRACK ROLLED, TOPSOILED THEN REVEGETATED WITH SHORT TERM COVER CROP. FINAL REHABILITATION BY PLANTING WITH APPROVED SPECIES."</p> <p>Planting now completed and no further work considered to be required except for monitoring and maintenance.</p>	<p>Landforming works were undertaken during September 2018 in accordance with the Rehabilitation Works Plans and Specifications.</p> <p>Topsoil emplaced in October 2018 and planting undertaken in early November 2018.</p> <p>Planting now completed and no further work considered to be required except for monitoring and maintenance.</p>
PZE3	East side of future fire trail. Comprises part of Area 1 in the Rehabilitation Works Plans and Specifications	<p>Area outside of areas to be revegetated under Enforceable Undertaking. However, this area will be impacted by the re-landforming of the fire trail. Following fire trail re-landforming it is expected this will need some revegetation.</p> <p>Once fire trail is re-landformed batter to be planted with shrubs selected by Mark Free.</p>	<p>Landforming works were undertaken during September 2018 in accordance with Rehabilitation Works Plans and Specifications. <a href="#">Further rectification works to be undertaken in February 2019 as instructed by Martens &amp; Associates to ensure compliance with Rehabilitation Works Plans and Specifications</a></p> <p>Planting not required by Enforceable Undertaking, although is under consideration. Planting not undertaken in November 2018 due to possible need for further landshaping. To be reviewed after visit by Martens &amp; Associates.</p> <p><a href="#">Planting is intended to be undertaken in 2<sup>nd</sup> Quarter of 2019.</a></p>
PZE4	Lower west facing batter above Sediment Pond No 1	<p>Area landformed and hydromulched in January 2018. Grass well established with some native plants self-generating.</p> <p>Minor additional grassing to be undertaken at edges of reformed road.</p> <p>Planting now completed and no further work considered to be required except for monitoring and maintenance.</p>	<p>Minor alteration to location of road, relocating the lower access trail further west to allow for reduction of batter in area PZE5 Upper was undertaken during September 2018 in accordance with Rehabilitation Works Plans and Specifications.</p> <p>Initial stages or shrub plantings undertaken in early November 2018.</p> <p>Planting now completed and no further work considered to be required except for monitoring and maintenance.</p>
PZE5 (upper portion)	Upper west facing batter above Sediment Pond No 1. Comprises Area 2 in the Rehabilitation Works Plans and Specifications	<p>Area landformed to remove eroded slope and rilling in March/April 2018. Enforceable Undertaking requires area to be re-landformed to reduce batter and then revegetated.</p> <p>Once the batter is reformed to a reduced gradient area to be hydromulched (if required) and planted with shrubs selected by Mark Free.</p> <p>Rehabilitation Works Plans and Specifications requires the following action:            REGRADE BATTER FROM LOWER TRACK TO PROVIDE MAXIMUM 50% GRADE. UPPER TRACK WIDTH TO BE ADJUSTED TO SUIT. UPPER TRACK SINGLE CROSS FALL TO SOUTH EAST TO BE MAINTAINED</p>	<p>Landforming works were undertaken during September 2018 in accordance with the Rehabilitation Works Plans and Specifications.</p> <p><del>Mitre drain at bottom of upper trail yet to be installed.</del></p> <p>Planting undertaken in November 2018.</p> <p>Planting now completed. Some bare patches of soil exist where grass has not taken. Expect to scour these areas, apply topsoil and possibly hydromulch in 1<sup>st</sup> Quarter of 2019.</p>

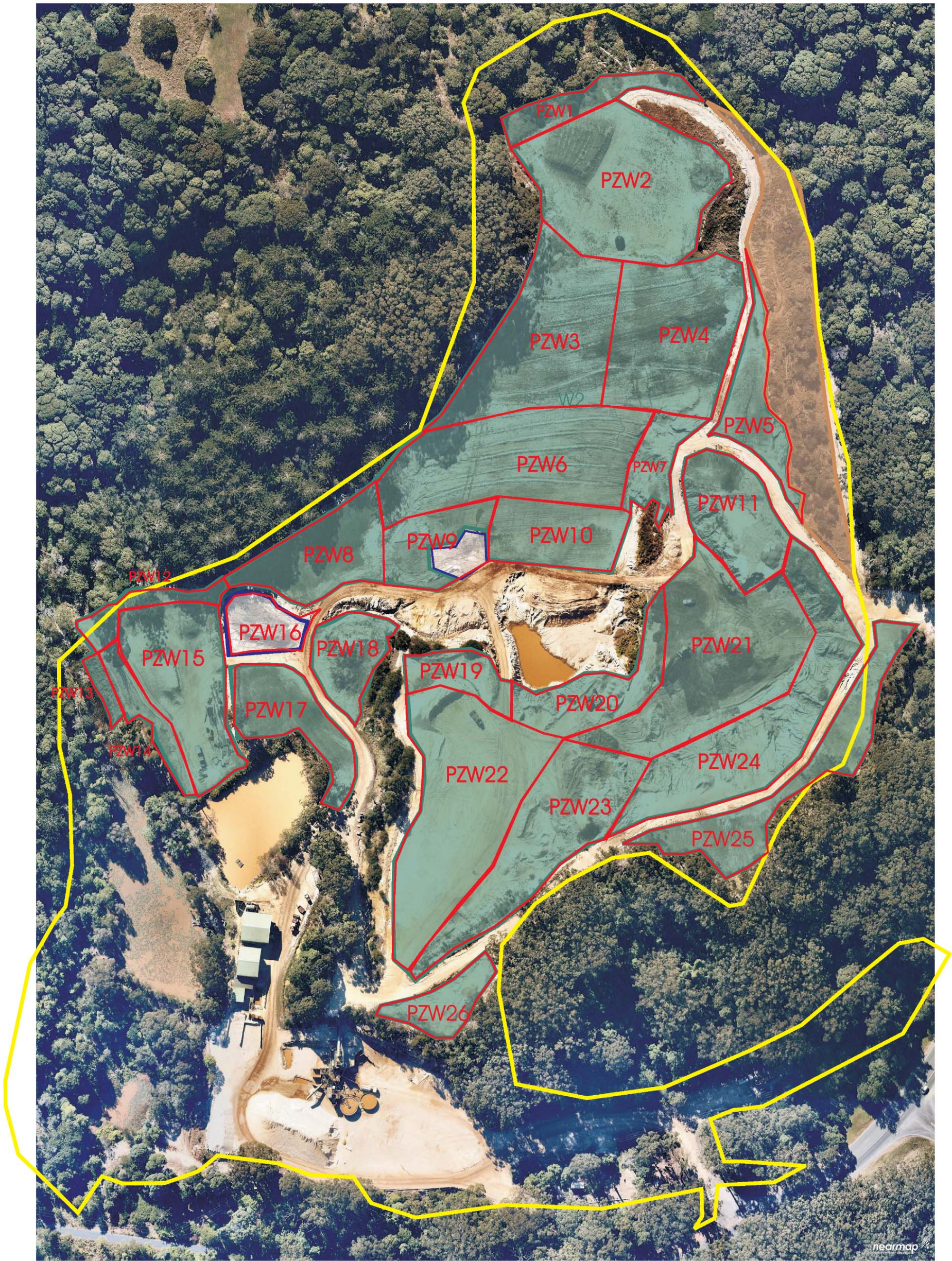
Zone	Description	Status	Activity in <del>December</del> <a href="#">January 2018</a> <sup>9</sup> and Future Plans
		<p>WITH DISCHARGE TO MITRE DRAIN AT NORTH EASTERN END OF AREA.</p> <p>LOWER TRACK TO BE REPROFIED WITH OUTFALL DRAINAGE TO REVEGETATED SLOPE TO WEST.</p> <p>Planting now completed. Some bare patches of soil exist where grass has not taken. Further monitoring required.</p>	
PZE5 (lower portion)	Southern batter facing west above Sediment Pond No 1.	<p>Site of new drain and reformed batters where topsoil store previously located, fringed by vegetated and rehabilitated areas.</p> <p>Topsoil store removed and area re-landformed and drain constructed in August 2018. Seeded topsoil spread in August 2018.</p> <p>Planting now completed and no further work considered to be required except for monitoring and maintenance.</p>	<p>Area to be monitored to see if grass germinates and strikes given sandy quality of the endemic topsoil store and monitoring for erosion. Grass strike beginning to be evident in early October 2018. Grass establishment has not been very successful and will likely require hydromulching.</p> <p>Depending on success or not of grass cover, the area may be hydromulched.</p> <p>Planting undertaken in November 2018.</p> <p>Bare patches have begun to establish grass cover, so hydromulching has been deferred and grass establishment is being monitored and assisted by water cart irrigation.</p>
PZE6	Dam wall and edges to Sediment Pond No 1	<p>No landforming works required. Large culvert from PZE5 (lower portion) drain to Sediment Pond No 1 discharges to a highly eroded bank. Downstream area to be concrete filled to prevent further erosion.</p> <p>Revegetation required.</p> <p>Dam wall to be topsoiled as required to support selected plantings. Area to be planted with grasses and other vegetation selected by Mark Free.</p>	<p>Drain concreting undertaken in November 2018.</p> <p>Planting expected to be undertaken in 2019 subject to availability of species.</p>
PZE7	Batter below level pad. Comprises Area 5b in the Rehabilitation Works Plans and Specifications	<p>Steeper batter showing some signs of rilling and erosion, but with a scattering of well-established shrubs. Hydromulched in January 2018 with limited grass cover established from that exercise.</p> <p>Bund to be constructed to stop water flowing from level pad PZE8 above. Erosion rills to be filled with seeded topsoil and plantings undertaken to assist in stabilising slope.</p> <p>Rehabilitation Works Plans and Specifications requires the following action: WHERE VEGETATION HAS NOT ESTABLISHED AND WHERE SURFACE RILLS HAVE FORMED REPROFILE WITH TOOTHED EXCAVATOR BUCKET {ACCESS FROM ROADWAY ABOVE OR ON SLOPE WHERE POSSIBLE). APPLY TOPSOIL THEN PROVIDE SHORT TERM COVER CROP. FINAL REHABILITATION BY PLANTING WITH APPROVED SPECIES.</p>	<p>Bund established during September 2018.</p> <p>Half of the eroded area successfully re-topsoiled during September 2018.</p> <p>Further topsoil emplacement, scouring with excavator bucket teeth and shrub plantings expected in <del>1<sup>st</sup> Quarter</del> <a href="#">February</a> 2019. <a href="#">Shrub plantings expected to be in April 2019.</a></p>
PZE8	Level Pad	<p>Landform finished except bund described in PZE7. Seeded in November 2017 and Hydromulched in January 2018.</p> <p>Bund to be constructed to stop water flowing to batter in PZE7 below. Area to be planted with shrubs selected by Mark Free.</p>	<p>Bund established during September 2018.</p> <p>Minor additional grassing to be undertaken at edges where new bund erected.</p> <p>Timing of shrub plantings <del>not yet determined</del> <a href="#">expected to be in April 2019.</a></p>
PZE9	Batter below access trail to settlement areas. Comprises Area 5a in the Rehabilitation Works Plans and Specifications	<p>Hydromulched in January 2018 with very limited success. Scattered shrubs developed in clusters.</p> <p>Rehabilitation Works Plans and Specifications requires the following action: WHERE VEGETATION HAS NOT ESTABLISHED AND WHERE SURFACE RILLS HAVE FORMED REPROFILE WITH TOOTHED EXCAVATOR BUCKET {ACCESS FROM ROADWAY ABOVE OR ON SLOPE WHERE POSSIBLE). APPLY TOPSOIL THEN PROVIDE SHORT TERM COVER CROP. FINAL REHABILITATION BY PLANTING WITH APPROVED SPECIES.</p>	<p>Trial emplacement of seeded topsoil from road above undertaken during September 2018 which appears to have been successful.</p> <p>Trial hydromulch to be undertaken in 1<sup>st</sup> Quarter 2019 with shrub plantings to follow.</p> <p>Further seeded topsoil to be emplaced where required in 1<sup>st</sup> Quarter 2019, followed by hydromulching and shrub planting.</p> <p>Timing of shrub plantings not yet determined.</p>

Zone	Description	Status	Activity in <del>December</del> <u>January 2018</u> and Future Plans
PZE10	Site of concrete pipe drain from above.	<p>Highly eroded and disturbed area.</p> <p>Rehabilitation of highly eroded batter and new drain to be installed, and then hydromulched and revegetated.</p> <p><u>Area filled with fill sand and seeded topsoil during September 2018.</u></p> <p><u>Concrete canvas drain installed to take discharge from concrete pipe in September 2018. Drain across access trail rocked in November 2018. Minor repairs and bunding of new drain to be undertaken before hydromulching and planting.</u></p>	<p><del>Area filled with fill sand and seeded topsoil during September 2018.</del></p> <p><del>Concrete canvas drain installed to take discharge from concrete pipe in September 2018. Drain across access trail rocked in November 2018. Minor repairs and bunding of new drain to be undertaken before hydromulching and planting.</del></p> <p>Performance observed during recent rainfall and observed to perform well, future erosion eliminated.</p> <p>Area to be hydromulched in 1<sup>st</sup> Quarter 2019 and planted with shrubs selected by Mark Free. Planting expected to be completed <u>in April</u> <del>by 1<sup>st</sup> Quarter</del> 2019.</p>
PZE11	Batter area. Comprises Area 4 in the Rehabilitation Works Plans and Specifications	<p>Partially completed batter, awaiting further fill material and topsoil.</p> <p>Rehabilitation Works Plans and Specifications requires the following action:</p> <p>EXTEND BATTER WEST AND SOUTH TO PROVIDE MAXIMUM 50% BATTER SLOPES DOWN FROM ROAD. BATTER TO BE TRACK ROLLED, TOPSOILED THEN REVEGETATED WITH SHORT TERM COVER CROP. FINAL REHABILITATION BY PLANTING WITH APPROVED SPECIES.</p> <p><u>Further fill emplacement undertaken and seeded topsoil spread during September 2018.</u></p>	<p><del>Further fill emplacement undertaken and seeded topsoil spread during September 2018.</del></p> <p>Now being monitored for drainage performance and erosion.</p> <p>Area to be planted with shrubs selected by Mark Free.</p> <p><u>Further fill emplacement and completion of batter to be undertaken in February 2019.</u></p> <p>Timing of shrub plantings not yet determined. Part of PZE12 planting extended into the northeast sector of PZE11 during the November planting campaign.</p>
PZE12	South East facing batter	<p>Landforming works complete and finished with seeded topsoil. Grass has germinated and beginning to establish.</p> <p>Planting now completed and no further work considered to be required except for monitoring and maintenance.</p> <p><u>Area planted in November 2018.</u></p> <p><u>Planting now completed and no further work considered to be required except for monitoring and maintenance.</u></p>	<p>Now being monitored for drainage performance and erosion.</p> <p><del>Area planted in November 2018.</del></p> <p><del>Planting now completed and no further work considered to be required except for monitoring and maintenance.</del></p>
PZE13	Settlement area	<p>Boggy and very wet flat area. Sedge grass and other suitable species have been established and are being monitored.</p> <p>Planting of shrubs considered difficult if not impossible due to dangerous ground conditions meaning access for planting is unsafe.</p> <p>Trial plantings conducted in November 2018 will be monitored, together with ground water conditions to establish if further plantings in PZE13 are possible or necessary.</p> <p><u>Trial plantings conducted in November 2018.</u></p>	<p>Drainage boxes were altered during September 2018 in an attempt to lower the water level within the settlement area to see if water can be better drained to improve access conditions. Subject to ongoing monitoring.</p> <p>Planting at the very south end (where the ground level is higher) is considered possible.</p> <p>Trial plantings conducted in November 2018. These will be monitored, together with ground water conditions to establish if further plantings in PZE13 are possible or necessary.</p>
PZE14	Upper reaches of Sediment Pond No 1	<p>Comprises plume from settlement area PZE13 and runoff from road. Grasses slowly establishing themselves and small shrubs and sedge clumps establishing.</p> <p>Area to be planted with grasses and shrubs selected by Mark Free.</p>	<p>Road to be stabilised with road fill and possibly some drainage works to prevent further eroded runoff.</p> <p>Timing of shrub plantings not yet determined. Timing will depend on whether more radical earthworks are required to drain the settlement area PZE13 which might involve excavation of drainage lines in PZE14.</p>
PZE15	East facing batter Comprises Area 3 in the Rehabilitation Works Plans and Specifications	<p>Batter was landformed and topsoiled with seeded topsoil in late 2017. Small patches of un-topsoiled area remain where no vegetation exists, although these are not eroding. Shrubs have established well at the boundary with Sediment Pond No 1.</p> <p><del>Bare patches to be ripped, topsoiled and hydromulched.</del></p> <p>Area to be planted with shrubs selected by Mark Free.</p>	<p><u>Inspection reveals no significant rilling or erosion and grass and low profile vegetation has taken well without any need for further topsoil or grassing.</u> Timing of <del>topsoil, hydromulch and</del> shrub plantings not yet determined, likely to be early 2019.</p> <p>Monitoring of batter has not revealed any erosion problems to date.</p> <p><u>Minor additional work and topsoil required on lower portions in conjunction with finalisation of access road alignment.</u></p>

Zone	Description	Status	Activity in <del>December</del> <u>January 2018</u> and Future Plans
		Rehabilitation Works Plans and Specifications requires the following action: ESTABLISHMENT OF VEGETATION TO BE MONITORED. WHERE VEGETATION ESTABLISHMENT IS INADEQUATE FURTHER SEEDING, HYDROMULCHING OR PLANTING TO BE UNDERTAKEN. WHERE SIGNIFICANT EROSION OCCURS (RILLS > 300 MM) FURTHER TOPSOILING, REPROFILING OR RIPPING WITH ADDITIONAL REVEGETATION WORKS TO ACHIEVE LONG TERM STABLE AND VEGETATED BATTER.	
PZE16	Flat pad former stockpile area	Stockpiles have all been removed during August 2018 and September 2018 except for topsoil awaiting emplacement in areas PZE7 through PZE12 inclusive.	Being monitored for erosion, at present no material erosion evident. Identified as one of the final areas to be topsoiled and planted, due to its suitability for, and use for, access, equipment parking and stockpile location. Expected to be ripped, topsoiled, seeded and planted in 2 <sup>nd</sup> Quarter 2019.
PZE17	Existing topsoil stockpile	Stockpile remains and occasionally is accessed to remove and screen topsoil for use in rehabilitation. Screening plant has been removed to Westside stockpile area.	Identified as one of the final areas to be rehabilitated and planted. Topsoil stockpile to be removed in 1 <sup>st</sup> Quarter 2019, then the site will be topsoiled, seeded and planted in 2 <sup>nd</sup> Quarter 2019.
"Stony Hillside"	Area identified as "stony hillside" in Mark Free monitoring report August 2018. Not shown in the plan above.	Mark Free Report identifies "Plantings on the stony hillside continue to develop slowly and there is some leaf litter buildup. Although there is little natural recruitment in these difficult conditions, a number of planted trees are very well established with Blackbutt, Turpentine, Coast banksia and Blackwood wattle forming an open canopy. Conditions will improve as leaf litter and organic material continues to build up.  It has been decided to intervene to rehabilitate this area more quickly, and to introduce some topsoil, mulch and plant suitable species to complete the rehabilitation of area RE1 as identified in Mark Free's reports. <u>This work was undertaken in November 2018. Work has been undertaken in a manner that preserves access to the spillway for inspection, water sampling and maintenance.</u>  Planting now completed and no further work considered to be required except for monitoring and maintenance.	<del>This work was undertaken in November 2018.</del> <del>Work has been undertaken in a manner that preserves access to the spillway for inspection, water sampling and maintenance.</del> <del>Planting now completed and no further work considered to be required except for</del> <del>m</del> Monitoring and maintenance <u>are ongoing.</u>



Annexure B Westside Sectors





## Westside Rehabilitation Zones

Zone	Description	Status	Activity in <del>November</del> December 2018 and Future Plans
PZW1	Northern batter of western top pad	Well vegetated and not requiring further work. To be monitored	Nil
PZW2	Western top pad	Topsoiled and hydromulched in January 2018. Contains topsoil store.	Topsoil store required to be removed. Shrub planting expected in 2 <sup>nd</sup> Quarter of 2019
PZW3	South facing batter in lowland rainforest rehabilitation area. Contains Areas 6 and 7 in Rehabilitation Works Plans and Specifications	Topsoiled and successfully hydromulched in January 2018.	Drain rehabilitation work required in 1 <sup>st</sup> Quarter 2019 <del>after inspection by Martens &amp; Associates</del> . Shrub planting expected in 2 <sup>nd</sup> Quarter of 2019
PZW4	Upper south facing batter in blackbutt rehabilitation area. Contains Areas 9, 10 and part 11 in Rehabilitation Works Plans and Specifications	Topsoiled and successfully hydromulched in January 2018.	Drain rehabilitation work required in 1 <sup>st</sup> Quarter 2019 <del>after inspection by Martens &amp; Associates</del> . Shrub planting expected in 2 <sup>nd</sup> Quarter of 2019
PZW5	Upper south east facing batter and flat area in above Area W3	Hydromulched in January 2018. Grass establishment patchy.	<u>Minor road realignment and profiling to be undertaken to eliminate need for eastern drain, followed by</u> <del>To be reviewed for further</del> topsoil application and hydromulching. Drain works on <del>west</del> eastern side of access road work required in 1 <sup>st</sup> Quarter 2019 <del>after inspection by Martens &amp; Associates</del> . Shrub planting expected in 2 <sup>nd</sup> Quarter of 2019
PZW6	Lower south facing batter	Topsoiled and successfully hydromulched in January 2018.	Drain rehabilitation work required in 1 <sup>st</sup> Quarter 2019 <del>after inspection by Martens &amp; Associates</del> . Shrub planting expected in 2 <sup>nd</sup> Quarter of 2019
PZW7	Lower south east facing batter and drain location. Contains part Area 11 in Rehabilitation Works Plans and Specifications	Hydromulched in January 2018. Grass establishment patchy. Drain rehabilitation works undertaken in September 2018	<del>To be reviewed for f</del> Further topsoil application and hydromulching <u>to be undertaken</u> . Drain works on western side of access road required in 1 <sup>st</sup> Quarter 2019 <del>after inspection by Martens &amp; Associates</del> . Shrub planting expected in 2 <sup>nd</sup> Quarter of 2019
PZW8	Flat area in lowland rainforest rehabilitation area	Grassed previously and well established. <u>Cut-off drain cleared in December 2018.</u>	Shrub planting expected in 2 <sup>nd</sup> Quarter of 2019. <del>Cut-off drain cleared in December 2018, awaiting inspection from Martens &amp; Associates.</del> <u>Planting of cleared cut off drain expected to be undertaken in April 2019</u>
PZW9	Upper wetland area	Initial establishment of wetland form undertaken in September 2018 and October 2018.	<del>To be reviewed after inspection by Martens &amp; Associates.</del> <u>Wetland basin formed and wall, spillway and drain created in January 2019.</u> Final drain rehabilitation and wetland changing and releases systems to be reviewed and implemented. Shrub planting and wetland planting expected in 2 <sup>nd</sup> Quarter of 2019.  Gradual establishment of new landform and wetland basin being undertaken, with progress work undertaken in November 2018 and December 2018.
PZW10	Flatlands and Central Dam bypass batter	Being used for storage and drying of Central Dam desilting materials. <u>Materials removed in November 2018 and December 2018.</u>	<del>Materials partially removed in November 2018 and December 2018, t</del> Topsoil to be added and grassed/hydromulched once removal and landform complete. Shrub planting and wetland planting expected in 2 <sup>nd</sup> Quarter of 2019
PZW11	North west sloping batter	Landformed and topsoiled in September 2018.	Further landform works still required, to be finalised in 1 <sup>st</sup> Quarter 2019.  Shrub planting expected in 2 <sup>nd</sup> Quarter of 2019
PZW12	Former cut off drain area	Vegetation well established except in former cut off drain.	<del>To be reviewed after inspection by Martens &amp; Associates.</del> Likely that former cut of drain to be reprofiled and vegetated and eroded areas upstream of Lilypond will be rehabilitated and vegetated
PZW13	Lilypond batter area	Landform finalised	Shrub planting expected in 1 <sup>st</sup> Quarter of 2019
PZW14	Lilypond pad west of bund	Landform finalised	Topsoil application and shrub planting expected in 1 <sup>st</sup> Quarter of 2019
PZW15	Lilypond pad east of bund	Landform finalised	Topsoil application and shrub planting expected in 1 <sup>st</sup> Quarter of 2019. <del>Possible removal or Reduction in size and partial relocation of bund to be undertaken-subject to advice</del>

Zone	Description	Status	Activity in <del>November</del> December 2018 and Future Plans
		<a href="#">Cut-off drain cleared in December 2018.</a>	<del>from Martens &amp; Associates. Minor reprofiling of pad to drain towards Process Pond or cut off drain recommended. Cut off drain cleared in December 2018, awaiting inspection from Martens &amp; Associates. Cut off drain to be vegetated in April 2019.</del>
PZW16	Lower wetland. Contains Area 14 in Rehabilitation Works Plans and Specifications	Current location of topsoil store	Topsoil to be removed and used, likely on PZW15 and wetland to be formed in 1 <sup>st</sup> Quarter of 2019 and planted in 2 <sup>nd</sup> Quarter 2019.
PZW17	Flat pad west of Process Pond	Landform finalised. Previously grassed	Shrub planting expected in 1 <sup>st</sup> Quarter of 2019
PZW18	Flat pad west of Central Dam. Contains Area 13 in Rehabilitation Works Plans and Specifications	Landform finalised. Previously grassed	Shrub planting expected in 1 <sup>st</sup> Quarter of 2019
PZW19	North facing batter and dam bank south of Central Dam	Landformed in September 2018 and topsoiled in October 2018. <a href="#">Replacement drain for runoff from batter on PZW24 and PZW21 established across PZW19 in November 2018.</a>	<del>Replacement drain for runoff from batter on PZW24 and PZW21 established across PZW19 in November 2018.</del> To be monitored to establish if hydromulching required. Shrub planting expected in 1 <sup>st</sup> Quarter of 2019
PZW20	South bank of Central Dam. Contains Area 12 in Rehabilitation Works Plans and Specifications	Landformed in September 2018 and topsoiled in October 2018. <a href="#">Old drain into Central Dam diverted and rehabilitated in November 2018.</a>	<del>Old drain into Central Dam diverted and rehabilitated in November 2018.</del> To be monitored to establish if hydromulching required. Shrub planting expected in 1 <sup>st</sup> Quarter of 2019
PZW21	Westside fill emplacement area	Landforming continuing. Currently occupied by partially complete fill and fill and topsoil stockpiles. Water diversion bund established in October 2018. <a href="#">Batter at western end of PZW21 on border with PZW23 regraded in November 2018 with drainage bund partially established. Further fill and grading work undertaken in December 2018.</a>	<del>Bund to manage waterflows across eastern end of PZW21 established in October 2018. Batter at western end of PZW21 on border with PZW23 regraded in November 2018 with drainage bund partially established. Further fill and grading work undertaken in December 2018.</del> Fill work to continue until March 2019, when final landform established, topsoil and drainage works to be established and hydromulching undertaken. Shrub planting to be carried out in 2 <sup>nd</sup> Quarter of 2019
PZW22	Blue level pad	Landform finalised, currently occupied by fill and roadbase stockpiles	Fill to be relocated to PZW21 and PZW23 and roadbase used on roads throughout BHQ by March 2019. Topsoil and hydromulch to be applied in March 2019, <a href="#">including minor reprofiled to ensure flows drain to Central Dam</a> . Shrub planting to be carried out in 2 <sup>nd</sup> Quarter of 2019
PZW23	Blue level batter	Landform largely finalised. Hydromulched in January 2018 but only upper areas were successfully grassed.	<del>Lower areas may be re-landformed to reduce batter.</del> Topsoil and hydromulch to be applied in March 2019. Shrub planting to be carried out in 2 <sup>nd</sup> Quarter of 2019
PZW24	Upper level pad	Landform largely finalised. Hydromulched in January 2018. Patchy results due to impact of ongoing earthworks in PXW 21. Bund and minor temporary drainage works established in March 2018 and have been adjusted occasionally.	<del>Final landform and further topsoil as required will be emplaced in March 2019. Bund and drainage works commenced in November 2018 and to be finalised by March 2019.</del> Shrub planting to be carried out in <del>1s</del> 2 <sup>nd</sup> Quarter of 2019
PZW25	Vegetation areas east of upper road	Landform finalised. Previously grassed	Shrub planting expected in 1 <sup>st</sup> Quarter of 2019. Possible road base application to road
PZW26	Vegetation areas south of upper road	Landform finalised. Previously grassed	Shrub planting expected in 1 <sup>st</sup> Quarter of 2019. Possible road base application to road and upgrade of drain to south of road.
Washplant	Not subject to Enforceable Undertaking provisions, but intended to be removed	Washplant removed, further infrastructure removal, safety work and works to be undertaken	<del>Washplant removed in December 2018.</del> Further infrastructure removal, safety work and works to be undertaken in 1 <sup>st</sup> Quarter 2019.

Zone	Description	Status	Activity in <del>November</del> <u>December</u> 2018 and Future Plans
Weighbridge	Not subject to Enforceable Undertaking provisions, but weighbridge and weighbridge office intended to be removed. Other accommodation and toilet facilities and water tank to remain.	Weighbridge sold and deposit received. No removal works undertaken, weighbridge still operational	Expect weighbridge to be decommissioned and removed in 1 <sup>st</sup> Quarter 2019.