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To be initialled and dated by the person who actions the issue of the documents.
The Isaac River project has been the subject of a concept study and subsequent development of a more detailed mining plan by Xenith Consulting (Xenith) on behalf of Bowen Coking Coal Ltd during 2019 and 2020.

The two open pits are relatively small, and the coal is steeply dipping, so a terrace mining approach using a single 350-tonne excavator has been planned. The coal has been planned to be washed at the nearby Red Mountain coal preparation plant, which is readily accessible on existing roads but across mining leases controlled by other companies.

A total of 23Mbcn of waste is to be stripped, facilitating the mining of 1.8Mt of open cut ROM coal and 0.8Mt by highwall mining using the “Addcar” system.

A total of 7 distinct options for the mining plan and sequence have been investigated. The selected option “7d” involves the mining of the Leichhardt Pit first and then the Vermont Trench located immediately to the south. Highwall mining has been planned to occur in each pit prior to backfill. The post-mining landform for the selected mine plan option is shown in Figure 1.1.

![Figure 1.1 – Option 7 Post-Mining Landform](image)

The out-of-pit dump has been designed to manage a suite of issues relating to the financial performance of the project as well as providing favourable environmental outcomes including a “pasture” land use outcome.

On the back of the selected mining plan, a range of options for different degrees of rehabilitation have been considered. The selected option includes full rehabilitation of all pit void slopes and backfill above the 195RL so as to avoid long-term ponding of water runoff as shown in Figure 1.2. While not the cheapest option, this approach has been selected because it provides favourable environmental outcomes without creating an unbearable impost on the project economics.
Figure 1.2 – Final Landform Proposed
SUMMARY OF 2019 CONCEPTUAL STUDY

Xenith was supplied with drillhole data by Bowen Coking Coal Ltd (BCC) along with seismic data acquired by the previous holders (Aquila Resources Ltd) and additional historic open file data. The exploration data was modelled in the Ventyx Minescape Geological software program and seam structure and quality grids were created. A resource model was constructed from the geological model and a Maiden Resource for the Isaac River Project was signed off by Troy Turner from Xenith to BCC on 9th October 2018. The Maiden Resource was subsequently announced on the ASX on the 1st November 2018 by BCC. Historic coal quality data from Aquila Resources’ drilling campaigns was provided to MResources with which to assess possible product coal types. (NOTE: Subsequently, exploration has included the Vermont seam as a target, and a later JORC Resource has been reported in August 2019.)

A margin rank exercise has been undertaken to understand the likely extents of an economic pit shell based on mining the Leichhardt Seam only. The walls of the pit used design parameters prevalent in the Bowen Basin.

Figure 2.1 – Margin Rank Plot (Concept Study)

A simple pit design has been created to estimate the waste and coal quantities. In addition, coal quality drill hole data has been used to estimate likely coal product tonnages and examine marketing potential.
Due to the coal seam dip (around 30%), the envisaged mining method employs a 350-tonne diesel hydraulic excavators and 220-tonne rear dump trucks for both waste stripping and coal mining. In order to access some in-pit spoil room, the mining sequence has been envisaged to be along strike using a terrace mining approach. Terrace mining is the most commonly employed method in steep-dipping deposits in Australia.

500,000 tonnes per year of ROM coal has been planned to be hauled to the Red Mountain preparation plant via the Daunia main coal haul road, where it is to be toll-washed.

Out-of-pit waste dumping totals 7.6Mbcm, which is 35% of the truck-excavator waste. Most of this occurs in year 1 but also continues throughout the mine life as a 50m wide corridor is to be left along the final highwall to enable a highwall mining operation as the open-cut life comes to an end. An indicative footprint for the out-of-pit dump is displayed in Figure 2.2.

The out-of-pit dump area has been calculated using an assumed 20% swell of the waste material and an overall slope of 15% on the dump tent. This estimation has been performed in a simplified manner – no detailed “dig and dump” scheduling has been performed.

Table 2-1 – Key Outcomes for Conceptual Open Pit

<table>
<thead>
<tr>
<th>Item</th>
<th>units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>ha</td>
<td>30.8</td>
</tr>
<tr>
<td>Waste Volume</td>
<td>Mbcm</td>
<td>22.8</td>
</tr>
<tr>
<td>Insitu Coal (LHD seam)</td>
<td>Mt</td>
<td>2.00</td>
</tr>
<tr>
<td>ROM Coal (LHD seam)</td>
<td>Mt</td>
<td>2.03</td>
</tr>
<tr>
<td>Average Insitu Strip Ratio</td>
<td>bcm/t</td>
<td>11.4</td>
</tr>
</tbody>
</table>
Highwall Mining using the “Addcar” system has been planned to occur in the Leichhardt Seam (LHD) to a maximum penetration distance of 300m. An indicative recovery parameter of 43% has been applied in estimating the 760,000 ROM tonnes to be won by this approach.

The conceptual coal quality modelling arrived at the conclusion that two coal products could be produced from two-stage washing of the LHD Seam:

1. A low-ash semi-hard coking product, and
2. A high-quality thermal product.

Alternatively, a single PCI product could be produced.

Financial modelling has been carried out, including estimates of capital and operating expenditure and revenue based on both product scenarios. Various input parameters have been tested, and the overall conclusion was reached that the project was worthy of continued study.
3 OPTIMISATION OF MINING PLAN

3.1 Case by Case Study

Xenith has investigated a number of concept-level options for the development of the Isaac River asset. The options have been aimed at understanding the value of Vermont Seam (VEM) coal and the value of incorporating highwall mining as a way of maximising the free cashflow from the asset.

The key driver in deciding between cases is understood to be the desire for Bowen Coking Coal to realise financial benefit from the asset in the shortest practicable timeframe.

This section provides a high-level description of each option, with accompanying key physical results. The purpose is to describe the overall journey of optimising the approach to mining, that led to the final version of the plan (Option 7). The decision making and justification between case to case are discussed in the next section (section 3.2).

This series of options has been examined in the Spry software package, wherein the spoil dumping plan was also able to be modelled and the merits of each option weighed on this basis.

Based on Option 7, a number of rehabilitation options have been considered. These have been called “7b” to “7e”.

3.1.1 Option 1 – LHD OC only, No HWM

Option 1 considered Open Cut (OC) of (LHD) seam only, no Highwall Mining (HWM) to be performed.

A small variation of Option 1A was as per Option 1 but with highwall optimised by truncating the NW corner and excluding high-ratio (~18:1) LHD coal, with a view to optimising project cashflow.

There were no environmental constraints available at the time when developing and reviewing this option, thus the out-of-pit dump design was driven by spoil fit as a result of the large in-pit final void.
Figure 3.1 – Option 1: Pre-Mining

Figure 3.2 – Option 1: Post-Mining
3.1.2 Option 2 – LHD OC with HWM

Option 2 considered Open Cut (OC) and Highwall Mining (HWM) of LHD seam.

A small variation of Option 2A was as per Option2 but with highwall optimised by truncating the NW corner and excluding high-ratio (~18:1) LHD coal, with a view to optimising project cashflow.

The dump design was driven largely by spoil fit, as a result of the large in-pit final void.

**Figure 3.3 – Option 2: Pre-Mining**

**Figure 3.4 – Option 2: Post-Mining**
3.1.3 Option 3 – LHD and VEM OC, No HWM

Option 3 considered both Open Cut (OC) of LHD and VEM seams, with no Highwall Mining (HWM) to be performed. The pit design has been modified to include the VEM pit and highwall materials, including truncating the NW corner and excluding high-ratio (~18:1) LHD coal, which has resulted in improved financial outcomes for this option. This is the final version of the open pit design – all later options have been based on these same reserves.

Smaller area of disturbance and better spoil fit has been achieved by increasing the proportion of in-pit dumping.

**Figure 3.5 – Option 3: Pre-Mining**

![Pre-Mining Diagram](image1)

**Figure 3.6 – Option 3: Post-Mining**

![Post-Mining Diagram](image2)
3.1.4 Option 4 – LHD and VEM OC with VEM HWM only

Option 4 considered OC LHD and VEM seams, with only VEM highwall mining. It aimed at adding additional comparison to evaluate the value of highwall mining in the VEM pit.

Figure 3.7 – Option 4: Pre-Mining

Figure 3.8 – Option 4: Post-Mining
3.1.5 Option 5 – LHD and VEM OC with both HWM

Option 5 considered open-cut mining of the LHD and VEM seams, with highwall mining in both seams. The LHD Pit was to be developed first so that the highwall mining could occur and be tested in practice to ensure practical and financial feasibility before committing to excavate the VEM trench.

It eliminated the eastern-most HWM block in the LHD Pit in order to open up additional in-pit dumping room prior to the commencement of highwall mining.

Figure 3.9 – Option 5: Pre-Mining

Figure 3.10 – Option 5: Post-Mining
3.1.6 Option 6 – LHD and VEM OC blend, with HWM single campaign

Option 6 considered simultaneous open-cut mining of the LHD and VEM seams, with one continuous highwall mining campaign in both LHD and VEM seams.

This option examined in detail to optimise the financial outcomes through managing the mining sequence.

The dumping location and shape has also been modified to cope with the provided environmental constraints. The out-of-pit dump design in this option has been developed to take account of the water flow in response to the contours in the natural topography. Runoff to the south from the out-of-pit dump has been eliminated.

Figure 3.11 – Option 6: Pre-Mining

Figure 3.12 – Option 6: Post-Mining
Option 7 – LHD first, then VEM, with HWM single campaign

Option 7 considered open-cut mining of LHD first then the VEM seam, with highwall mining of both LHD and VEM seams in one campaign with a 1-month relocation time.

This is the final version of the mining plan, where VEM trench waste has been dumped into the LHD Pit void to mitigate costs of final landform reshaping and contribute to a better overall landform outcome. The backfill to RL200 also happened in LHD void as the final landform to reduce the size of out-of-pit dump and in-pit void. Advice from consultants CDM Smith is that backfill must occur to a level of 195RL in order to avoid long-term ponding of runoff water in the bottom of the pit void, so a level of 200RL has been planned in the LHD Pit.

In addition, the ERE to the east of the out-of-pit dump has been taken into account. After careful consideration, it was determined that there was sufficient waste spoil room in the dumping plan as shown in Figure 3.14 to allow the dump footprint to remain clear of the ERE.

Figure 3.13 – Option 7: Pre-Mining
3.1.8 Summary of Key Physical Results

Table 3-1 – Key Physicals of Options

<table>
<thead>
<tr>
<th>Option</th>
<th>1</th>
<th>1A</th>
<th>2</th>
<th>2A</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<tbody>
<tr>
<td>Description</td>
<td>LHD No HWM</td>
<td>LHD No HWM</td>
<td>LHD LHD HWM</td>
<td>LHD LHD HWM</td>
<td>LHD + VU No HWM</td>
<td>LHD + VU VU HWM</td>
<td>LHD + VU LHD + VU HWM</td>
<td>LHD + VU HWM (Blend)</td>
<td>First LHD, VU LHD+VU HWM</td>
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<tr>
<td>Open Cut Waste Stripping (Mbcm)</td>
<td>26.8</td>
<td>18</td>
<td>26.8</td>
<td>18</td>
<td>22.9*</td>
<td>22.9*</td>
<td>22.9*</td>
<td>22.9*</td>
<td>22.9*</td>
</tr>
<tr>
<td>Open Cut Coal Tonnage (Mt)</td>
<td>2.0</td>
<td>1.58</td>
<td>2.0</td>
<td>1.58</td>
<td>1.8</td>
<td>1.8</td>
<td>1.8</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Open Cut Strip Ratio (bcm/t)</td>
<td>13.4</td>
<td>11.4</td>
<td>13.4</td>
<td>11.4</td>
<td>12.6</td>
<td>12.6</td>
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<tr>
<td>HWM Coal Tonnes (Mt)</td>
<td>-</td>
<td>-</td>
<td>0.49</td>
<td>0.5</td>
<td>-</td>
<td>0.39</td>
<td>0.9</td>
<td>0.9</td>
<td>0.84</td>
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<td>5.7</td>
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<td>5.7</td>
<td>5.7</td>
<td>5.7</td>
<td>5.7</td>
<td>5.2 (1.4 in VU)</td>
<td>11.2***</td>
</tr>
<tr>
<td>Waste Dumped Out-of-Pit (Mbcm)</td>
<td>15.9</td>
<td>12.3</td>
<td>16.4</td>
<td>12.3</td>
<td>17.2</td>
<td>17.2**</td>
<td>17.2**</td>
<td>17.7</td>
<td>11.7</td>
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<tr>
<td>Total Coal Tonnage (Mt)</td>
<td>2.0</td>
<td>1.58</td>
<td>2.5</td>
<td>2.1</td>
<td>1.8</td>
<td>2.2</td>
<td>2.7</td>
<td>2.7</td>
<td>2.65</td>
</tr>
<tr>
<td>Overall Strip Ratio (bcm/t)</td>
<td>13.4</td>
<td>11.4</td>
<td>10.8</td>
<td>8.6</td>
<td>12.6</td>
<td>10.4</td>
<td>8.5</td>
<td>8.5</td>
<td>8.6</td>
</tr>
</tbody>
</table>

*Note: LHD open cut highwall was brought up-dip for options 3-7.

** Includes ~3.5Mbcm to fill the VEM trench back to topo, which should really be classed as in-pit dumping.

*** Includes ~860kBCM to fill the VEM trench back to RL +195 from LHD Inpit dump.
3.2 Landform and Rehabilitation

Mining plan Option 7 has been selected as the go-forward case by Bowen Coking Coal on the advice of Xenith, as it provides the best balance of financial outcomes, environmental outcomes and overall risk management. Four rehabilitation options have been modelled based on the Option 7 mine plan at the end of mine life. Options for the dozing of pit crests and backfilling from the out-of-pit dump has been modelled in order to bring the bottom of the in-pit void up to RL200 in the LHD Pit.

In addition to the above four options, Option 7a was considered as a “do nothing” option whereby no further reshaping would occur at the completion of mining. It was rejected as not providing a satisfactory land use outcome.

3.2.1 Option 7b: LHD and VEM pits – Western Ramp Rehabilitation

Reshaping options have been modelled including dozing of the LHD Pit crests and in-pit dump tipheads to an overall slope of 1:6. To optimise costs, some waste has been recovered from the out-of-pit dump and backfilled at slope toes. A stable access slope has been established in the western end of the VEM Pit, but no additional reshaping has been performed on this pit.

This option, while yielding a better land use outcome, was ultimately rejected as the VEM Pit has not been reshaped to a stable wall profile and the floor of the void was below 195RL.

Figure 3.15 – Option 7b: Rehab Work in LHD and VEM Pits
3.2.2 Option 7c: LHD Rehab & VEM backfill

This option incorporated backfill of the VEM Pit to above 195RL, however did not include wall reshaping. It was rejected due to the incomplete wall reshaping.

Figure 3.16 – Option 7c: Rehab Work in LHD and VEM Pits

Figure 3.17 – VEM Pit Void Fill after Rehab Work
3.2.3 Option 7d: Both LHD and VEM pits Rehabilitation

This option was an extension of Option 7c. Reshaping of the VEM Pit has been incorporated to arrive at a final landform that provides stable slopes and a favourable land use outcome, while managing the financial impacts of the waste movements necessary to achieve the landform.

This option was not the cheapest one considered, however has been adopted as the “go forward” plan for the above reasons.

Figure 3.18 – Option 7d: Rehab Work in LHD and VEM Pits

3.2.4 Option 7e: 100% Backfill of both LHD and VEM pits

Using Option 7A as a starting profile, the material movements and costs necessary to backfill both pit voids to natural surface have been estimated at 10.7 million bcm, equivalent to 12.8 million loose cubic metres of waste material based on a swell factor of 1.2. As a small mining project, the economics cannot support movement of this volume, so this option has been rejected.

3.2.5 Discussion of Rehabilitation Options

Table 3-2 summarises the physical material movements necessary to achieve the final landform associated with each rehabilitation option (7a to 7e). The quantities have been estimated using industry-standard mining software including DeswikCAD and 3d-Dig and as such high confidence has been placed in the estimates.

Option 7a, while the cheapest option, has been rejected as it does not provide a post-mining land use outcome acceptable to Bowen Coking Coal. To a lesser degree, the same can be said of Option 7b, whereby the VEM trench has been left practically untouched while the LHD pit has received considerable effort to create a stable final landform.
In Option 7c, the VEM pit has been backfilled to 195RL, however the pit walls remain in place. Given the high cost of trucking out-of-pit waste back into the pit to achieve the backfill, this option was rejected. Not only was this option high in cost but it also did not produce a final land use outcome acceptable to Bowen Coking Coal.

Option 7d has been adopted as the preferred option because it can be achieved in a reasonably cost-effective manner and produces a stable final landform suitable for post-mining land use as pasture. Bowen Coking Coal is proud to propose this option as representative of best practice in current mining practice in Australia.

Option 7e has been rejected outright as being cost-prohibitive, while not producing a land use outcome materially superior to Option 7d.

Table 3-2 – Summary of Rehabilitation Options

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Unit</th>
<th>Opt 07a</th>
<th>Opt 07b LHD Rehab &amp; VER Western ramp Rehab</th>
<th>Opt 07c LHD Rehab &amp; VER backfilled to 195 RL</th>
<th>Opt 07d Both LHD and VU pit rehab</th>
<th>Opt 07e 100% backfilled to topo</th>
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</thead>
<tbody>
<tr>
<td>Blasted Volume</td>
<td>Mbcm</td>
<td>0</td>
<td>0.4</td>
<td>0.7</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Trucked Volume</td>
<td>Mbcm</td>
<td>0</td>
<td>0.6</td>
<td>1.0</td>
<td>0.1</td>
<td>10.7</td>
</tr>
<tr>
<td>Dozed Volume</td>
<td>Mbcm</td>
<td>0</td>
<td>0.4</td>
<td>0.7</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total Volume</td>
<td>Mbcm</td>
<td>0</td>
<td>1.5</td>
<td>1.8</td>
<td>1.6</td>
<td>10.7</td>
</tr>
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<td>Costs</td>
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<td>0.3</td>
<td>0.3</td>
<td>0.6</td>
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<td>Indicative Blasting Cost</td>
<td>$M</td>
<td>0.00</td>
<td>1.7</td>
<td>2.7</td>
<td>0.3</td>
<td>30.0</td>
</tr>
<tr>
<td>Indicative Trucking Cost</td>
<td>$M</td>
<td>0.00</td>
<td>0.5</td>
<td>0.5</td>
<td>0.9</td>
<td>0.0</td>
</tr>
<tr>
<td>Indicative Dozing Cost</td>
<td>$M</td>
<td>0.00</td>
<td>2.6</td>
<td>3.5</td>
<td>1.8</td>
<td>30.0</td>
</tr>
<tr>
<td>Total Indicative Rehab Cost</td>
<td>$M</td>
<td>0.00</td>
<td>2.6</td>
<td>3.5</td>
<td>1.8</td>
<td>30.0</td>
</tr>
</tbody>
</table>
3.3 Decisions and Justifications

3.3.1 ROM and Dam Placement – Economic and Environment

ROM pad has been located north of the pit crest, immediately south of the out-of-pit dump as shown in Figure 3.19.

**Figure 3.19 – Location of ROM Pad and Dams**

The location of the ROM pad has been selected based on the following:

- Ready access to the wash plant is available through an existing road network
- Ready access to the mining area, as a heavy-vehicle road would be needed from the MIA to the pit in any case
- Minimises the overall disturbance area for mine infrastructure

The water management dams have been carefully located by consideration of the natural surface contours and the out-of-pit dump design. The plan for water management maintains separation of mine-affected water and surface runoff.
3.3.2 Open Cut/Highwall Mining Method Selection and Transition – Economic and Environment

Highwall mining, using the “Addcar” system, has been incorporated into the plan in order to materially lower the strip ratio of the ROM coal recovered from the pit. Once a final highwall has been exposed, the additional coal won by highwall mining typically comes at a much lower cost than the open-cut coal.

Relocation costs for highwall mining equipment are high, so the mine plan evolved to utilise the highwall mining equipment in one continuous campaign instead of two separate visits to site.

All highwall mining “portals” have been planned to be sealed via the backfilling/reprofiling of the pits so that none are accessible from the final landform surface.

3.3.3 Mining Sequence Optimisation – Highwall Mining

3.3.3.1 Economic Impact of the VEM Trench vs LHD Pit

The VEM trench is not economic to mine in the absence of subsequent highwall mining. The LHD Pit is by far the more profitable, so the selected mine plan manages this risk by delaying the excavation until the (near) completion of the LHD Pit and also by utilising the VEM waste to backfill the Leichhardt Pit in a cost-effective way due to the short hauls involved.

3.3.3.2 Associated Risk – Mining Sequence vs Highwall Mining Costs

The selected mine plan manages many risks, the key one being the feasibility of the highwall mining as discussed in the preceding section.

In order to manage the costs of highwall mining, it would be necessary to carefully manage the open cut mining schedule to ensure that the highwall mining campaign is not interrupted. In-pit dumping in each pit can only occur once any highwall mining for each section of highwall has been completed.

3.3.4 Dump Design Evolution

Throughout the concept study and subsequent work, the shape and size of the out-of-pit dump has been progressively refined in response to:

1. Providing sufficient out-of-pit spoil room to accommodate the planned volumes in the mine plan options.
2. Avoiding the disturbance of footprint within areas flagged as environmentally sensitive.
3. Managing the direction of surface water runoff and maintaining the separation of mine-affected and clean water.
4. Maintaining geotechnical stability of the planned highwall mining panels until highwall mining has been completed.
5. Providing for a stable final landform with a favourable land use outcome eg. pasture.
6. Minimising waste haulage costs, and
7. Minimising the overall area of disturbance.
A geotechnical assessment of the proposed final landform has been carried out by Blackrock Mining Solutions Pty Ltd and issued under the signature of Ty Grantham (RPEQ). The assessment has concluded that the proposed landform “meets the requirements of the PRCP guidelines from a geotechnical perspective”.

**Table 4-1 – Summary of 2-D Geotechnical Analysis Results**

<table>
<thead>
<tr>
<th>Final Landform</th>
<th>Slope</th>
<th>FoS</th>
<th>Acceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leichhardt (LHD) Pit</td>
<td>Lowwall</td>
<td>4.13</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Highwall</td>
<td>4.23</td>
<td>Yes</td>
</tr>
<tr>
<td>Vermont (VEM) Pit</td>
<td>Lowwall</td>
<td>4.50</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Highwall</td>
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<td>Yes</td>
</tr>
<tr>
<td>Out-of-Pit Dump</td>
<td>West</td>
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<td>Yes</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>3.77</td>
<td>Yes</td>
</tr>
</tbody>
</table>

GLE/Morgenstem-Price FoS reported
The optimisation approach described above considered all cases and Option 7d has been selected as the preferred mining and rehabilitation plan. The rehabilitation cost is not insignificant for a project of this scale, but the selected option provides for a sustainable environmental outcome that returns the disturbed area to a beneficial use and with a stable landform.