Report

Final Landform

Client	TiGa Minerals & Metals Limited
Site	Barrytown Mineral Sands Project
Date	25 Jul 2022
Doc No.	BJL5790-06

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VERSION MANAGEMENT

Process	Name	Date	Version
Author	Edison Hung	13 July 2023	3
Peer Review By	Stephen Miller	14 July 2023	4
Draft Issued To	John Berry	14 July 2023	4
Final Review By	Jacqueline London	25 July 2023	5
Final Issued To	John Berry	25 July 2023	5

1 FINAL LANDFORM CALCULATION

1.1 Define Rehabilitation Boundary

First the rehabilitation boundary is defined, within this area, rehabilitation is assigned (with peaks and troughs). This formed by removing area east of the northeastern corner of the workshop/processing plant of Coates Mining Boundary Polygon. Figure 1.1 shows the outline of the rehabilitation zone. This polygon has a 10 m offset from the edge of housing estate and Northeast Dam. It is with the understanding that the Northeast Dam is a conceptual design and therefore there will change to the final landform polygon.

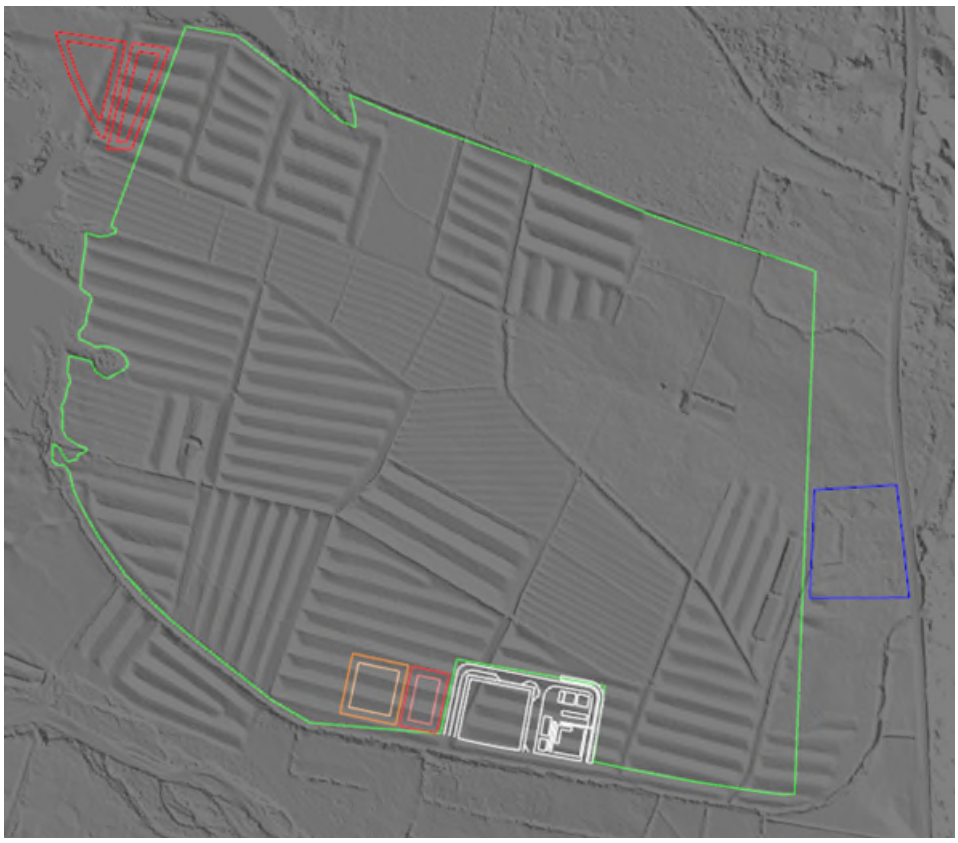

Figure 1.1 Rehabilitation Boundary (in Green)

1.2 Cut and Fill Neutral Surface

The second step is to create a cut and fill neutral surface within the rehabilitation boundary. Four points are created to form a triangulation, then by clipping the triangulation with the rehabilitation boundary, we can calculate the cut and fill volume between the natural topography and the surface. By adjusting the four points with trial and error, a cut and fill neutral plan can be formed. Figure 1.2 shows neutral cut and fill volume (with <10% difference between cut and fill).

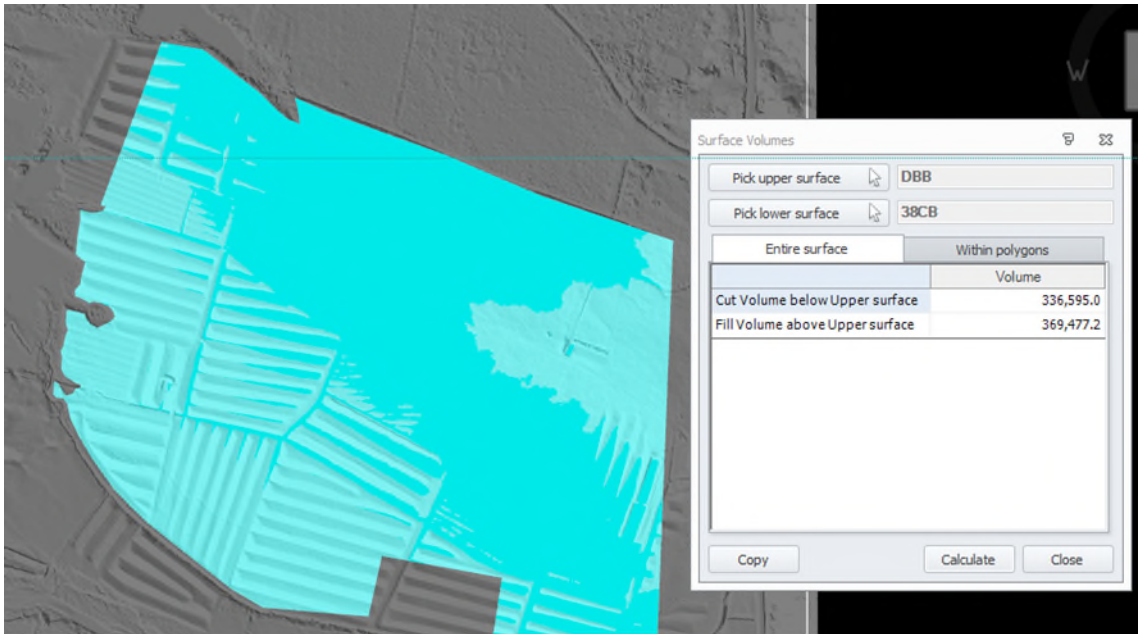

Figure 1.2 Cut and Fill Calculation

1.3 Calculate Final Landform Volume

Total product, overburden, ore tonnages are obtained from "BTS Schedule 4". Material density is then obtained from the block model "22 HM MRE 20x20x1_jme_adapted.bmf" to obtain the average height difference pre and post mining. In the calculation, it is assumed that swell and compaction ratio is negligible. The calculation shows that on average post mining is 1.2 m lower than pre mining surface.

	Option 1										
	Total	5,973,104	tonnes				Assume Swell and Compaction ratio is negligible				
	Topsoil	596,928	tonnes	445,468	t/m³						
	OB	1,082,495	tonnes	557,987	t/m³		Mining Area	690,667	m²		
	Topsoil Placement	483,512	tonnes				Soil Density	1.34	t/m³		
	OB Placement	1,082,495	tonnes				Silt Density	2.08	t/m³		
	Ore	4,293,681	tonnes	2,081,941	t/m³		Gravel Density	1.94	t/m³		
	Sand	3,113,140	tonnes	1,496,702	t/m³		Sand Density	2.08	t/m³		
	Oversize	509,328	tonnes	262,540	t/m³						
	Slimes	671,213	tonnes	322,698	t/m³						
Final Product	Garnet	286,138	tonnes								
Final Product	Ilmenite	259,224	tonnes								
Final Product	Zircon Diluted	10,271	tonnes								
	Insitu										
	Average Topsoil Depth	0.645	m								
	Average Waste Depth	0.808	m								
	Average Ore Depth	3.014	m								
	Average Excavation	4.467	m								
	Backfill										
	Average Topsoil Depth	0.645	m								
	Average Waste Depth	0.808	m								
	Average Ore Depth	1.780	m								
	Average Backfill	3.233	m								
	Average Removed Dept	1.234	m								
	Average Backfill	72.3741%	%								

Figure 1.3 Calculation of average difference between pre and post mining

1.4 Create Backfill Level Surface and Peaks and Troughs Post Mining Surface

By reducing the cut and fill neutral surface by the average post mining reduction depth (1.2 m), a backfill level surface can be obtained. Draw a guide drainage string, drape to the backfill level surface and reduce the Z level by 2.5 m. By projecting this string up by 5 m at 5º on both sides, post mining trough is created. Repeat this process to cover the final rehabilitation zone.

Figure 1.4 shows the cut and fill volume between backfill level surface and rehabilitation surface. This should show a cut and fill neutral result.

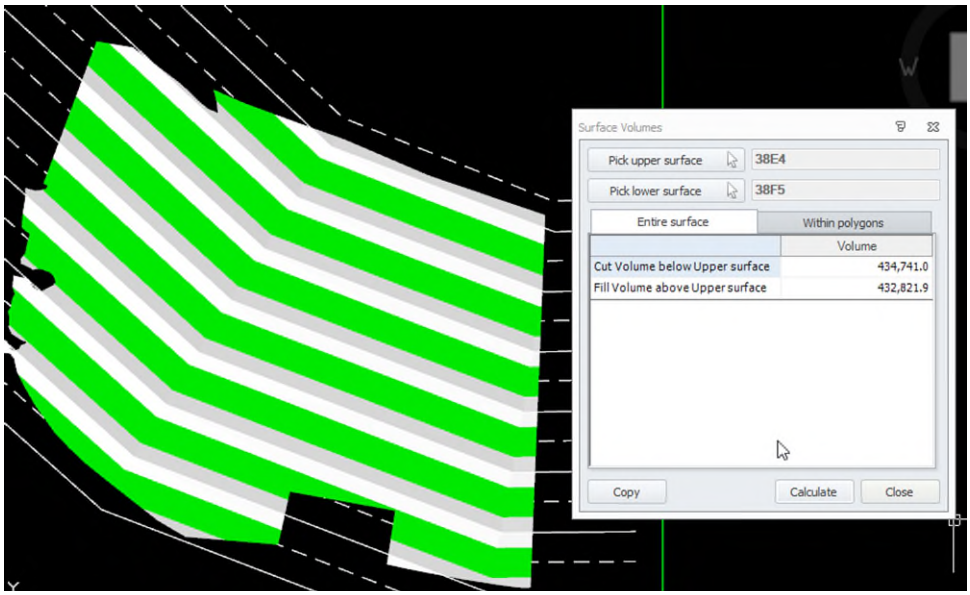

Figure 1.4 Cut and Fill Neutral Between Backfill Level Surface and Rehabilitation Surface

The full project contour level surface with elevations (RL) can be found in Appendix A .

1.5 Create Eastern End Wall

To allow for the water to drain away from the housing estate, a 5º slope from east to west into the peak and trough is designed. Figure 1.5 shows the plane view of the Eastern Endwall.

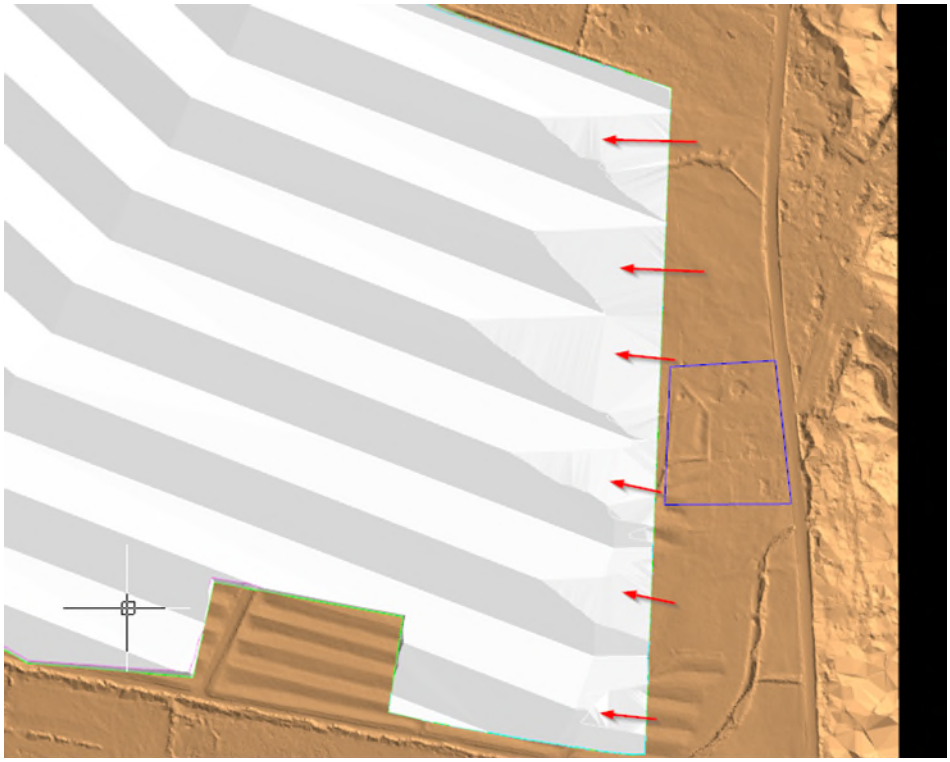

Figure 1.5 Eastern End Wall into Rehabilitated Landform

1.6 Create Contour

After the rehabilitation surface is created, contour can be created. In the plot, the major contour is assigned as 5.0 m (z axis) while the minor contour is assigned as 1.0 m (z axis)

Appendix A Contour Rehabilitation Surface

palaris	Barrytown Sands Project			
BJL5790	Contour Rehabilitation Surface (RL)			
Drawn: Edison Hung	Scale: 1:4000	Coordinate System: NA		
Reviewed: Stephen Miller	Date: 14/07/23	Doc ID: Draft	Version No: 03	


1,461,500E
1,462,000E
NORTH
Water Management Dam
5,327,000N
5,326,500N
5,326,000N
Permanent Hardstand
1:4000
0
100
200
300
400
palaris
Barrytown Sands Project
BJL5790
Contour Rehabilitation Surface (RL)
Drawn: Edison Hung
Scale: 1:4000
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