

# **Rock-Hosted Mine Liability Process**

## **Mine Liability Estimation Tool User Guide**

**November 2025**

**Alberta Energy Regulator**

Manual 033: Rock-Hosted Mine Liability Process – Mine Liability Estimation Tool User Guide

November 2025

Published by

**Alberta Energy Regulator**

Suite 1000, 250 – 5 Street SW

Calgary, Alberta T2P 0R4

Telephone: 403-297-8311

Toll free: 1-855-297-8311

Email: [inquiries@aer.ca](mailto:inquiries@aer.ca)

Website: [www.aer.ca](http://www.aer.ca)

## Contents

Contents .....	i
Abbreviations .....	v
1 Introduction .....	1
1.1 About This Manual .....	1
1.2 Rock-Hosted Mineral Mine Liability Program Overview .....	1
1.3 Mine Liability Estimation Tool Purpose .....	2
1.4 Designated End Land Use and Rehabilitation Outcomes .....	2
1.5 Default and Alternative Unit Rates .....	2
1.6 More Information .....	3
2 Mine Liability Estimation Tool Overview .....	3
2.1 Mining .....	4
2.2 Mineral Processing .....	5
2.3 Data Sources .....	5
2.4 Installing the Mine Liability Estimation Tool .....	5
3 Introduction Worksheet .....	7
4 Registration Worksheets .....	8
4.1 Mining Operations Worksheet .....	8
4.1.1 Site Registration .....	9
4.1.2 Site Description .....	9
4.1.3 Environmental Sensitivities .....	11
4.1.4 Mining Summary Report .....	11
4.2 Mineral Processing Worksheet .....	12
4.2.1 Site Registration .....	12
4.2.2 Site Description and Environmental Sensitivities .....	13
4.2.3 Mineral Processing Summary Report .....	14
5 Functionality of the Mine Liability Estimation Tool .....	15
5.1 The Y or N Function .....	15
5.2 Quantities and Total Cost .....	16
5.3 Basis for Costs Estimation and Additional Information .....	16
5.4 Drop-Down Boxes .....	16
5.5 Alternative Unit Rate .....	18
5.6 Additional Items .....	18
5.7 Subtotals .....	18
5.8 Totals by Domain .....	19

5.9	Summary Report.....	19
5.9.1	Domain Cost.....	19
5.9.2	Miscellaneous Items.....	20
5.10	Finalized Mine Liability Estimate.....	20
6	Selecting Activities.....	21
6.1	Considerations.....	21
6.1.1	General.....	21
6.1.2	Infrastructure.....	23
6.1.3	Contamination and Remedial Works.....	23
6.1.4	Landforms.....	24
6.2	Examples of Activities.....	24
7	Calculations.....	25
7.1	Measurements and Estimations.....	25
7.1.1	Area.....	25
7.1.2	Length or Width.....	26
7.1.3	Haul Distance.....	26
7.1.4	Push Length and Volume.....	27
7.1.5	Height and Depth.....	28
7.2	Quantities.....	28
7.2.1	Area.....	28
7.2.2	Volume.....	28
7.2.3	Units of Measure.....	29
7.2.4	Unknown or Undetermined Values and Contingencies.....	29
7.3	Alternative Unit Rates.....	31
8	Rate Change Justification Worksheet.....	32
9	Assumptions Worksheet.....	33
9.1	Project-Specific Assumptions.....	33
9.2	Domain-Specific Assumptions.....	33
9.3	Adding Supporting Documentation.....	33
10	Finalizing and Reviewing a Rehabilitation Cost Estimate.....	34
11	Printing the Mine Liability Estimate.....	35
12	Submitting the Mine Liability Estimation.....	36
Appendix 1	Definitions.....	37
Figure 1.	Enable editing.....	6

Figure 2.	Excel 2007 trust center macro settings .....	6
Figure 3.	Excel for 2010 and 2013 trust center settings .....	7
Figure 4.	Excel 2010 and 2013 trust center macro settings .....	7
Figure 5.	The MLE tool introduction worksheet .....	8
Figure 6.	Site registration worksheet for mining operations .....	9
Figure 7.	Mining site description – summary of mine activities .....	10
Figure 8.	Environmental sensitivities .....	11
Figure 9.	Mining summary worksheet.....	12
Figure 10.	Site registration worksheet for mineral processing.....	13
Figure 11.	Mineral processing site description – summary of mineral processing activities .....	14
Figure 12.	Mineral processing summary report .....	15
Figure 13.	The application of the Y or N function .....	15
Figure 14.	Entering quantities .....	16
Figure 15.	Basis for cost estimation and relevant information.....	16
Figure 16.	Using drop-down boxes for contaminated material .....	17
Figure 17.	Using drop-down boxes for unplanned project closure plan .....	17
Figure 18.	Using drop-down boxes for dozer push.....	17
Figure 19.	Inputting an alternative unit rate .....	18
Figure 20.	Supporting information for an alternative rate .....	18
Figure 21.	Including additional items .....	18
Figure 22.	Infrastructure type subtotal .....	19
Figure 23.	Domain total costs .....	19
Figure 24.	Domain total costs summary .....	20
Figure 25.	Summary report – contingent items .....	20
Figure 26.	Finalizing the mine liability estimate .....	21
Figure 27.	Estimating the area of a building .....	25
Figure 28.	Estimating the area of a dam.....	26
Figure 29.	Estimating lengths .....	26
Figure 30.	Estimating haul distance.....	27
Figure 31.	Estimating the maximum dozer push .....	27
Figure 32.	Calculating area.....	28
Figure 33.	Calculating volume .....	28
Figure 34.	Calculating building demolition area.....	29
Figure 35.	Including alternate rates for rehabilitation work.....	31
Figure 36.	Rate justification form .....	32
Figure 37.	Entering project-specific assumptions.....	33
Figure 38.	Domain-specific assumptions.....	33
Figure 39.	Inserting an additional worksheet.....	34

Figure 40. Example of copy and paste .....	34
Figure 41. Reviewing an MLE.....	35
Figure 42. Reviewing an MLE.....	36
Table 1. MLE tool worksheets and their functions.....	3
Table 2. MLE tool review checklist .....	34

## Abbreviations

AER	Alberta Energy Regulator
<i>EPEA</i>	<i>Environmental Protection and Enhancement Act</i>
MLE	mine liability estimate
MLE tool	mine liability estimation tool
RMLP	rock-hosted mine liability process



# 1 Introduction

## 1.1 About This Manual

The guidelines in this manual will assist rock-hosted mine approval holders in preparing a mine liability estimate (MLE), including the following:

- installing and using the mine liability estimation tool (MLE tool)
- worksheet functionality
- identifying domains and rehabilitation activities
- calculating measurements, estimations, and quantities
- finalizing, reviewing, and submitting an MLE

## 1.2 Rock-Hosted Mine Liability Process Overview

The Alberta Energy Regulator (AER) has developed the rock-hosted mine liability process (RMLP) to achieve a balance between protecting Albertans from liabilities and rehabilitation costs associated with rock-hosted mineral mine operations and maximizing industry opportunities for responsible and sustainable resource development. The RMLP is one of several AER liability management solutions that ensure Alberta's energy and mineral resources are developed and closed responsibly.

The process manages rock-hosted mineral mine liabilities by collecting financial security from mine approval holders.

Approval holders must submit MLE tool data and generate an MLE report annually or when a potential change in mine liability occurs during the mine's life. The AER uses the MLE tool to help determine the security deposit amount required for a mine approval.

The AER requires that the security deposit cover 100% of the costs of undertaking rehabilitation if the approval holder defaults. This requirement minimizes potential liabilities to the province if the approval holder defaults on its rehabilitation obligations.

For more information on the RMLP, see [\*Specified Enactment Direction 005: Rock-Hosted Mine Liability Process\*](#).

### 1.3 Mine Liability Estimation Tool Purpose

The MLE tool provides mine operators with a structured means to calculate an appropriate estimate of mine liability for their operations by helping assess and quantify rehabilitation risks and liabilities.

The AER recognizes that the calculation of an appropriate MLE varies across the range of mine types and operations in Alberta. The MLE tool provides a consistent approach for all approval holders to estimate the rehabilitation costs for rock-hosted mineral resource operations in Alberta.

The MLE tool was developed with a tiered risk-based approach to calculating rehabilitation costs, where the estimate is based on the operation's nature, size, scale, and complexity.

The MLE tool comprises operations and domains to address the complexity of

- different land uses across a mine site,
- the difference between underground and surface mining operations, and
- mineral processing plants.

### 1.4 Designated End Land Use and Rehabilitation Outcomes

Before calculating an MLE, approval holders should consider the following:

- post-mining rehabilitation requirements established in the
  - *Mineral Resource Development Act* permits and licences
  - *Environmental Protection and Enhancement Act (EPEA)* approvals
  - *EPEA* mine reclamation plans
  - *EPEA* decommissioning and reclamation plans
  - final land reclamation plan
- *Mineral Resource Development Act* abandonment requirements per sections 13 and 17 of the [\*Rock-Hosted Mineral Resource Development Rules\*](#)
- [\*Directive 091: Rock-Hosted Mineral Resource Development\*](#)
- site variations and complexities appropriate to each mine site

### 1.5 Default and Alternative Unit Rates

The MLE tool uses standardized provincial rehabilitation rates by default. The use of alternative unit rates is acceptable under the following conditions:

- The information provided (assumptions, rates, scope of activities) is consistent with the information required by the MLE tool.

- A justification is provided for the alternative unit rate.
- Alternative unit rates must be provided and guaranteed to the AER for a specified duration.
- Alternative unit rates must be renewed before expiry.

Provide supporting information for alternative rates with the MLE report as an attachment. For more information on alternative rates, see sections 5.5 and 7.3.

## 1.6 More Information

For more information on the MLE tool and MLE report, contact the AER at

Alberta Energy Regulator  
 Suite 1000, 250 – 5th Street SW  
 Calgary, Alberta T2P 0R4  
 Phone: 403-297-8311 or 1-855-297-8311  
 Email: [inquiries@aer.ca](mailto:inquiries@aer.ca)  
 Website: [www.aer.ca](http://www.aer.ca)

## 2 Mine Liability Estimation Tool Overview

User information is presented in the manual in several ways:

- worksheets (table 1 and sections 3, 4, 8, and 9)
- functionality (section 5)
- activity selection (section 6)
- example calculations (section 7)

**Table 1. MLE tool worksheets**

Worksheet title	Use/function
Introduction	Select the operation type for the MLE.
Registration	Input site information (operation name, dispositions/approvals, current security, contact, etc.), site description, and environmental sensitivities.  <b>For mining:</b> mine activities (production volumes, disturbance, reclamation); environmental sensitivities (surrounding land use and issues affecting the site). <b>For mineral processing:</b> production volumes, disturbance, reclamation; environmental sensitivities (surrounding land use and issues affecting the site).
Report	Automatically populated with a summary of operations, registration information, and security deposits (i.e., the total cost calculated for each domain). Contingency, post-closure environmental monitoring, project management, and surveying calculations for the MLE can be manually adjusted.
Operations:	Input information to the domains as relevant:
<ul style="list-style-type: none"> <li>• surface</li> <li>• underground</li> </ul>	<b>Surface:</b> Infrastructure, overburden and waste, active mine and voids, and management activities.

Worksheet title	Use/function
<ul style="list-style-type: none"> <li>• surface and underground</li> <li>• mineral processing</li> </ul>	<p><b>Underground:</b> Infrastructure, overburden and waste, and subsidence and management.</p> <p><b>Surface and underground:</b> Infrastructure, overburden and waste, active mine and voids, and subsidence and management.</p> <p><b>Mineral processing:</b> For mineral processing plants (all rehabilitation activities) and associated infrastructure (including tailings, rejects, heap leach, and in situ infrastructure).</p> <p>Inputs to each domain include domain-specific assumptions, quantities, drop-down box inputs (if any), alternative unit rates (if any), the basis for the cost estimate, and additional information to clearly identify the areas and infrastructure to which the activities are being applied (i.e., mining areas, location names, yard/laydown descriptions, measurements, etc.).</p>
Assumptions	Describe any project-specific assumptions, such as the life-of-mine timeframe, post-mining land use, infrastructure to be retained (by documented agreement), and rehabilitation strategies (i.e., number of voids to remain at closure, depth of growth media, ratio of revegetation types, etc.).
Rate Change Justification	Identify and provide the basis for any alternative third-party rates provided for rehabilitation activities. The relevant domain, activity, unit of measure, unit rate, adopted rate, and justification must be identified in this worksheet. The company representative must provide pertinent information certifying that the rate change is justified based on third-party rates and that only the listed rates were adjusted in the MLE tool. <b>Third-party rates must be guaranteed to the AER by the rate provider.</b>
Definitions	The worksheet provides key definitions for terms used in the MLE tool. The definitions will help users determine the applicability of activities for the operations making up the MLE.
Cost Schedule	This worksheet lists all the rehabilitation activities in the MLE tool. It presents the activity description, unit of measure, default unit rate, and justifications and assumptions for proposed rates. The justifications and assumptions are provided only as indicators of how an activity may be undertaken and are guidance only to assist the user with information on how to apply the rate. It is recognized that different techniques and equipment may be used, and the default unit rate endeavours to accommodate such variation.

## 2.1 Mining

In the MLE tool, mining operations are categorized as

- surface,
- underground, and
- surface and underground.

Select the relevant mining operation (see section 3) regardless of whether the mined material is metalliferous or an industrial mineral. For definitions of the mining operation categories, see appendix 1.

In the MLE tool, each mining operation has a set of domains associated with the type of disturbance that must be considered for rehabilitation (e.g., infrastructure, overburden, and waste). Check each line item

for its applicability to the operation for which the liability estimate is being developed. Where required, quantities and other information must be entered into the relevant cells (see section 5).

## 2.2 Mineral Processing

The mineral processing function of the MLE tool provides the approval holder with the option to assess the liability associated with a mineral processing plant separately from the mine liability. The site registration differs from those of mining operations, with reference to each mineral processing plant and its associated infrastructure (in situ fields, tailings management facilities, heap leach facilities, refining/smelting), incorporating a set of domains associated with the type of disturbance that must be considered for rehabilitation.

## 2.3 Data Sources

Consider using the following data sources:

- site surveys, spatial and topographic data
- aerial photographs
- detailed design drawings
- mine planning/sequencing software

The choice of data sources should consider the user's requirements, existing and readily available data, and the resolution and scale required. Several sources can provide easily obtainable data to develop an MLE (e.g., pit bench widths and heights, topsoil volumes, and disturbance areas).

Consider keeping records of the measurements used to calculate quantities for future reference and validation purposes.

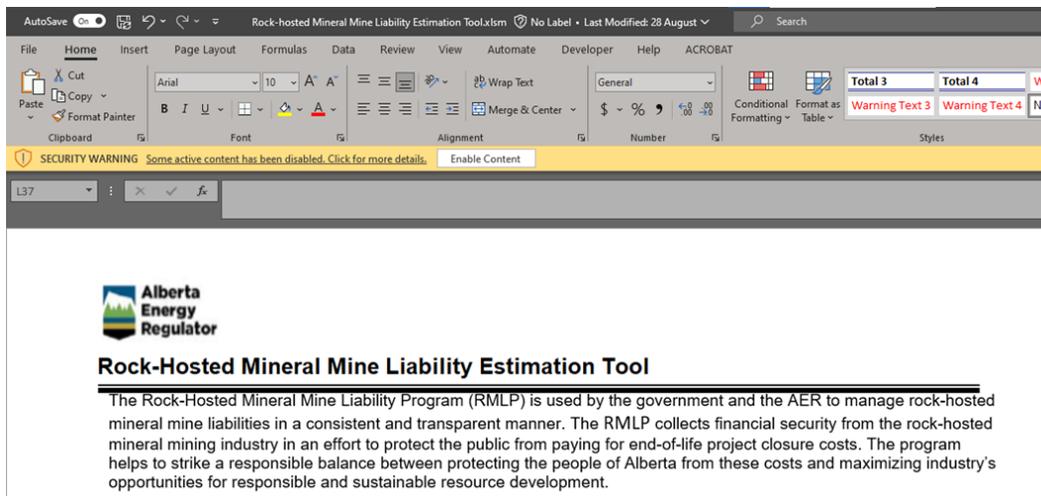
Free GIS software is available from Google (Google Earth and Google Earth Pro for registered users; <https://www.google.com/earth/about/versions/#earth-for-web>) and from QGIS Essen ([qgis.org/en/site](http://qgis.org/en/site)). Each software package has specific terms and conditions of use.

Licensed GIS software, such as MapInfo or ArcGIS, can be used to acquire data for input into the MLE tool. Mine planning/sequencing software can also be used to determine the volume of material requiring movement, such as for shaping landforms or estimating total disturbance area.

## 2.4 Installing the Mine Liability Estimation Tool

The MLE tool is available for download on the [Systems and Tools](#) webpage. To install the MLE tool, select the desired option: open or save the file.

When the MLE tool workbook opens, if required, click "Enable Content" on the security warning banner below the ribbon to make changes within the file (see figure 1).

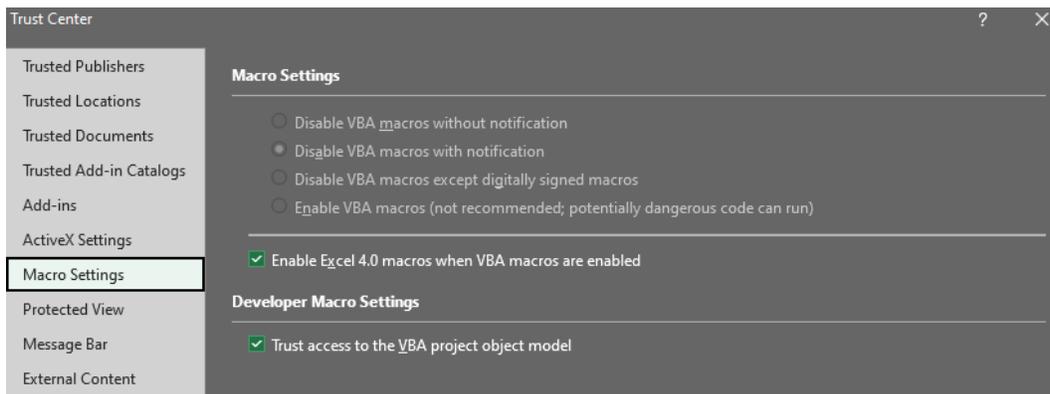


**Figure 1. Enable editing**

Enable macros in Excel to use the MLE tool workbook. See the following instructions.

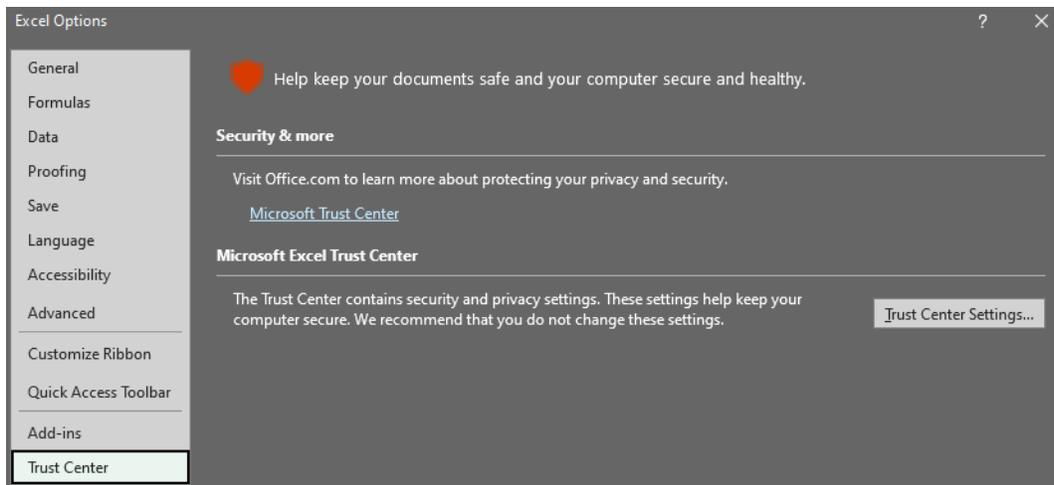
**Excel 2000 and 2003:** Navigate to the “Tools” tab in the top tool bar, hover over the “Macro” option and then select “Security.” In the security window, choose the level of security desired (e.g., medium security asks permission before running a macro).

**Excel 2007:** Open a Microsoft Excel file, click the “Office” button, and then select “Excel Options” at the bottom of the menu. Navigate to Trust Center > Trust Center Settings > Macro Settings and then select the level of security desired to run macros (see figure 2).



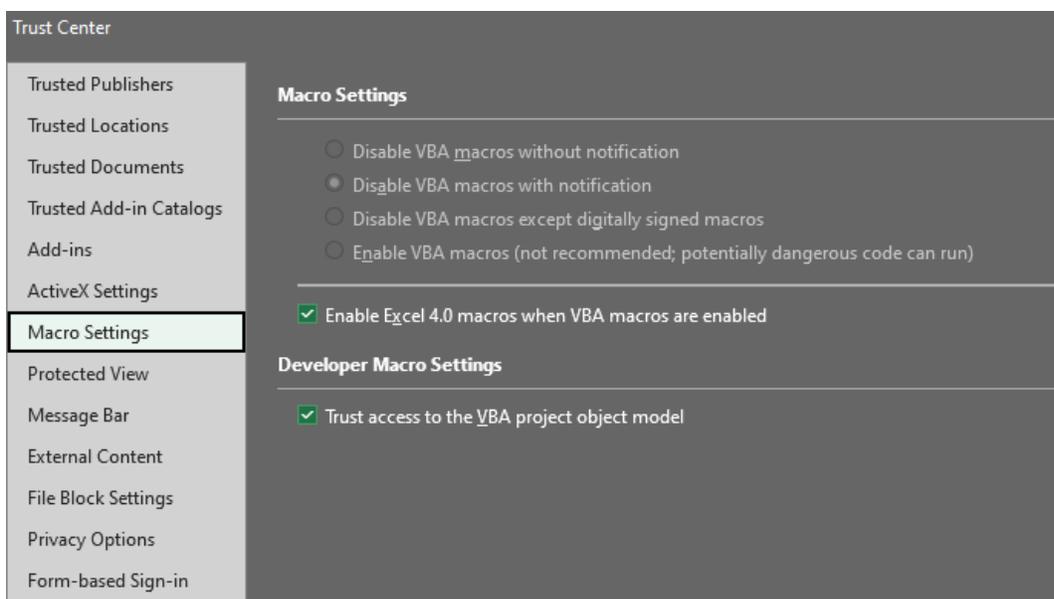
**Figure 2. Excel 2007 trust center macro settings**

**Excel for Microsoft Office MSO:** Open a Microsoft Excel file and navigate to File > Options > Trust Center > Trust Center Settings (see figure 3).



**Figure 3. Excel for 2010 and 2013 trust center settings**

In the Trust Center window, click “Macro Settings” and then select the level of security desired to run macros (see figure 4).



**Figure 4. Excel 2010 and 2013 trust center macro settings**

Worksheet screen views may differ depending on the Excel version, but the functionality of the MLE tool will remain the same.

### 3 Introduction Worksheet

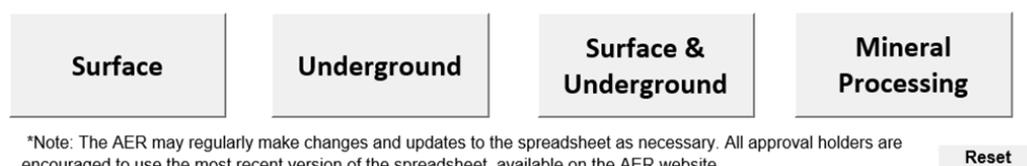
To select the type of operation at your site, click on the button on the “Introduction” worksheet that corresponds to your operation (see figure 5). This action will take you to the appropriate “Registration” worksheet.

### **Calculating an RMLP Liability Estimate**

The framework of the MLE Tool has been developed in accordance with a tiered risk-based approach to calculating rehabilitation costs whereby the outcome of the estimation will be based on the nature, size, scale and complexity of the operation. While the approval holder has the opportunity to propose unit rates\* which are not the same as those in the MLE Tool, any other unit rate proposed by the approval holder must be based on a third party cost as it is assumed that if the approval holder defaults on their responsibility to reclaim the mine or mineral processing operation(s), a contractor will be engaged by the Alberta Energy Regulator to carry out the required reclamation works..

### **Select Type of Mining/Mineral Processing Operations from Buttons Below**

By selecting the relevant type of mining/mineral processing operation (below), followed by the **ENTER** button, the worksheet relevant to the operation type will be activated. Each worksheet shows the domains likely to be present for the operation type. A worksheet must be completed, with **ALL** relevant domains, in order to estimate the total rehabilitation costs for the mineral processing, and/or mining operation.



**Figure 5. The MLE tool introduction worksheet**

You can click the “Reset” button at any time to change the type of operation being reported in a new workbook.

Registration details, assumptions, and rate change justification information for a completed operation workbook are retained. If a different operation type is selected after activating the reset function, inputs to the operation type worksheets are not retained (e.g., notes, calculations, and selections from drop-down boxes). If the same operation type is selected, the data are retained.

## **4 Registration Worksheets**

There are two “Registration” worksheets: mining operations and mineral processing. The tool will display the appropriate worksheet based on the user’s selection on the “Introduction” worksheet.

### **4.1 Mining Operations Worksheet**

The “Registration” worksheet for mining operations comprises three components:

- site registration (base information about the operation)
- a site description that summarizes the mine activities
- associated environmental sensitivities

Once all three components are complete, key registration information is transferred to the summary report.

### 4.1.1 Site Registration

Begin site registration by entering the date using the drop-down box (see figure 6). Provide the requested information for each field.

**Site Registration**

**Date** Month Year

---

Complete the following fields prior to calculating the RMLP Liability.

<b>Mine Name:</b>		
<b>Mine Owner:</b>		
<b>Mine Operator:</b>		
<b>EPEA Approval No.:</b>		
<b>EPEA Approval Expiry:</b>		
<b>MRDA Mine Permit No.:</b>		
<b>MRDA Mine Licence No.:</b>		
<b>MRDA Dump Licence No.:</b>		
<b>MPP Approval No.:</b>		
<b>Mineral Tenure Lease No.:</b>		
<b>WA Disposition No.:</b>		
<b>PLA Disposition No.:</b>		
<b>Current RMLP Security:</b>		<b>Date of last MLE Report Submission</b>
<b>Mine Contact:</b>		
<b>Position:</b>		
<b>Address:</b>		
<b>Phone:</b>		<b>Email:</b> <span style="border: 1px solid black; width: 25%;"></span>

**Figure 6. Site registration worksheet for mining operations**

### 4.1.2 Site Description

Complete the site description that appears below “Site Registration.” Enter the “Summary of Mine Activities” information for the mine permit (see figure 7).

## Summary of Mine Activities

**Total annual concentrate production (KG) or  
Total Annual Mineral /Stone Production  
(Tonne):**

**Total annual metal production (KG):**

**PLA Area (ha):**

**Mine Permit Area (ha):**

**Mine Licence Area (ha):**

**Area of disturbance (ha):**

**Reclamation in progress (ha):**

**Reclamation certifieable (ha):**  
Achieved ecosystem sustainability

**Reclamation Certified (ha):**  
Reference Rec Cert no. and date

**Tailings Disturbance Area (ha):**

**Heap Leach Disturbance Area (ha):**

**In Situ Leach Disturbance Area (ha):**

**External Dump Distrubance Area (ha):**

GIS shapefile(s) attached

Figure 7. Mining site description – summary of mine activities

### 4.1.3 Environmental Sensitivities

Identify the relevant environmental sensitivities present at the mine site (see figure 8).

**Environmental Sensitivities:**

**Reclaimed Land Use:**

(select all that apply)

- agriculture
- rangeland
- municipality development
- forestry
- cultural
- transportation
- utilities
- recreational
- natural area / wildlife habitat

**Environmental Issues affecting site**

(select all that apply)

- threatened flora
- threatened fauna
- cultural heritage items
- natural heritage features
- surface water pollution
- ground water pollution
- hydrocarbon contamination
- methane drainage / venting
- spontaneous combustion
- acid mine drainage
- within drinking water catchment

Other Relevant Issues:

Geotechnical
Co-disposal

**Figure 8. Environmental sensitivities**

### 4.1.4 Mining Summary Report

Key registration information is automatically transferred into the mining “Summary Report” worksheet (see figure 9).

You cannot edit the “Summary Report” worksheet as it is automatically populated. You must return to the “Registration” worksheet to make the necessary changes.



Create Surface  
MLE Report

### Mine Liability Estimation

Note: Sections of this page are automatically filled in from the registration page

Mine Name:

Mine Operator:

EPEA Approvals:

EPEA Approval Expiry:

EPEA Approval Holder:

MRDA Mine Permit #:

MRDA Mine Licence #s:

MRDA Dump Licence

WA Disposition #s:

PLA Disposition #s:

Current RMLP Security:       Date of last MLE Report Submission

Mine Contact:

Position:

Address:

Phone:       Email:

Figure 9. Mining summary worksheet

## 4.2 Mineral Processing Worksheet

The “Registration” worksheet for mineral processing comprises two components:

- site registration (base information about the operation)
- a site description that summarizes the mine activities and any environmental sensitivities (unlike mining operations, these two things are on the one screen)

Once both components are complete, key registration information is transferred to the summary report.

### 4.2.1 Site Registration

Begin the site registration by entering the date using the drop-down box (see figure 10). Provide the requested information for each field.

## Site Registration

**Date**

Complete the following fields prior to calculating the RMLP Liability.

<b>Plant Name:</b>	<input type="text"/>		
<b>EPEA Approval Nos:</b>	<input type="text"/>		
<b>EPEA Approval Holder</b>	<input type="text"/>		
<b>EPEA Approval Expiry</b>	<input type="text"/>		
<b>MRDA Plant Approval No.</b>	<input type="text"/>		
<b>WA Dispositions</b>	<input type="text"/>		
<b>PLA Dispositions</b>	<input type="text"/>		
<b>Current RMLP Security:</b>	<input type="text"/>	<b>Date of last MLE Report Submission</b>	<input type="text"/>
<b>Plant Contact:</b>	<input type="text"/>		
<b>Position:</b>	<input type="text"/>		
<b>Address:</b>	<input type="text"/>		
<b>Phone:</b>	<input type="text"/>	<b>Email:</b>	<input type="text"/>

**Figure 10. Site registration worksheet for mineral processing**

### 4.2.2 Site Description and Environmental Sensitivities

Complete the site description that appears below “Site Registration.” Enter the “Summary of Mineral Processing Activities” information (see figure 11). Identify the relevant environmental sensitivities present at the mineral processing site.

## Site Description

The following site specific information is requested to provide background information in the context of calculating the RMLP Liability Estimate.

### Summary of Mineral Processing Activities

Total annual concentrate production (KG):

Total annual metal production (KG):

PLA Area (ha):

Plant Approval Area (ha):

Area of disturbance (ha):

Reclamation in progress (ha):

Reclamation certifiable (ha):

Reclamation certified (ha):

Tailings Disturbance Area (ha):

Heap Leach Disturbance Area(ha):

In Situ Leach disturbance area (ha):

Rejects / Slag Disturbance Area (ha):

### Environmental Sensitivities

#### Surrounding land use:

(select all that apply)

- agriculture
- rangeland
- municipality development
- forestry
- cultural
- transportation
- utilities
- recreational
- natural area / wildlife habitat

#### Environmental issues affecting site

(select all that apply)

- threatened fauna
- cultural heritage items
- natural heritage features
- surface water pollution
- ground water pollution
- hydrocarbon contamination
- methane drainage / venting
- spontaneous combustion
- acid mine drainage
- within drinking water catchment

GIS shapefile(s) attached

Reference Amendment version and date

Other Relevant Issues:

Geotechnical
Co-disposal

**Figure 11. Mineral processing site description – summary of mineral processing activities**

### 4.2.3 Mineral Processing Summary Report

Key registration information is automatically transferred into the mineral processing report (see figure 12). You cannot edit the “Summary Report” worksheet as it is automatically populated. You must return to the “Registration” worksheet to make the necessary changes.



Create Mineral Processing MLE Report

### Mine Liability Estimation

Note: Sections of this page are automatically filled in from the registration page

Plant Name:

EPEA Approval:

Approval Holder:

Plant Operator:

Expiry of EPEA Approval:

Current RMLP Security:  Date of last MLE Report Submission:

Plant Contact:

Position:

Address:

Phone:  Email:

Figure 12. Mineral processing summary report

## 5 Functionality of the Mine Liability Estimation Tool

The MLE tool includes formulas and functionality for ease of calculation.

### 5.1 The Y or N Function

In the “Applicable (Y or N)” column, “Y” is the default. When “Y” is entered, the value in the “Total Cost” cell shows \$0, awaiting the input of quantities and associated information for that line item (see figure 13).

Selecting “N” voids the “Total Cost” cell, leaving the cell blank.

#### Surface Operations 1

**Domain 3a: Overburden & Waste** **Total Cost for Overburden & Waste Domain** **\$0**

Additional Assumptions: Record any relevant assumptions to this domain below:

		Key Rehabilitation Area Data for Domain	Enter data below manually
		Total Landform Establishment:	
		Total Growth Media Development:	
		Total Ecosystem Establishment:	

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
Contaminated Materials	Treatment of Known Sodic Soils	n		ha	\$ 2,580.00				Assumes Sodic Soil is treatable via neutralisation and does not require capping and isolation.
	Removal and disposal of plastic liner (i.e. dam, leach pad, sump etc.)	n		m2	\$ 1.00				Provisional sum for cutting using dozer ripper teeth and on-site disposal of the liner.

Figure 13. The application of the Y or N function

## 5.2 Quantities and Total Cost

When a quantity is entered for a line item, the “Total Cost” cell is populated based on the formula: quantity x default unit rate (see figure 14).

**Surface Operations 1**

Domain 1a: Infrastructure		Total Cost for Infrastructure Domain					\$70,000
Additional Assumptions: Record any relevant assumptions to this domain below:							
					Key Rehabilitation Area Data for Domain		
					Total Landform Establishment:		
					Total Growth Media Development:		
					Total Ecosystem Establishment:		

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
Termination of Services and Demolition Works	Disconnect and terminate all services (Water, electricity, gas etc at point of attachment to site)	y	2	each	\$ 35,000.00		\$70,000	1 disconnection fee for the Administration and Shops and 1 disconnection fee for the Processing Plant	For disconnection of all services, at building boundaries, physical cut at the point of attachment or distribution location. If infrastructure is not consolidated (i.e., administration, camp and workshops are in separate places), consider multiple disconnection fees.

Figure 14. Entering quantities

## 5.3 Basis for Costs Estimation and Additional Information

Where relevant, complete the column “Basis for Costs Estimation and Additional Relevant Information.” Inputs can include details on infrastructure, areas, and landforms where the activity/description occurs and for which the quantities are representative. Basic equations can be inserted in the “Quantity” column to assist in calculating quantities (see figure 15).

**Surface Operations 1**

Domain 1a: Infrastructure		Total Cost for Infrastructure Domain					\$70,000
Additional Assumptions: Record any relevant assumptions to this domain below:							
					Key Rehabilitation Area Data for Domain		
					Total Landform Establishment:		
					Total Growth Media Development:		
					Total Ecosystem Establishment:		

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
Terrain Recontouring	Major levelling / resploping to achieve approved reclaim grades – Select Push Length	n	=2*1000*2	m3	Select from List			Select Push Length Here	Major levelling/resploping to achieve approved reclaim grades.
	Minor reshaping and pushing - >50m push length and >10m in height.	n		ha	\$ 9,872.82				D10 Dozer @ \$368 per hour; hard to cut material; average operator; no rehandle; slot dozing

Figure 15. Basis for cost estimation and relevant information

## 5.4 Drop-Down Boxes

Some “Activity/Description” line items have drop-down boxes to input rates for site-specific parameters:

- haul distance (mineral/metalliferous spillage, stabilized material, topsoil, filling dams/voids, draining and removing contaminated sediments from dam/sump floors)
- volumes of hydrocarbon-contaminated material (for on-site remediation of hydrocarbons by manual land farming)
- push length (major bulk pushing to achieve grades specified in *EPEA* approval conditions)
- development of an unplanned project closure plan

The drop-down box selection determines the “Default Unit Rate” (unit rates differ for different haul distances, push lengths, etc.).

After providing a “Quantity” for the activity, choose the applicable option from the drop-down box (see figure 16 and figure 17).

Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
Load, haul and dispose of High Level contaminated material off site to a licensed landfill. Assumes haulage to a licensed landfill	y		m3	\$ 200.00		\$0		Includes load, haul and dump fees to a licensed facility.
Load, haul and disposal of Low Level contaminated material off site to a licensed landfill. Add \$50/m3 for haulage to landfill	y		m3	\$ 62.50		\$0		Includes load, haul and dump fees to a licensed facility.
Onsite remediation of hydrocarbon contaminated soils employing the "Code of Practice for Land Treatment of Soil Containing Hydrocarbons" (Select Volume from List)	y		m3	Select from List			Select Volume Here	Spreading of contaminated soils on a prepared surface and stimulation of aerobic microbial activity within the soils through aeration and/or the addition of minerals, nutrients and moisture to promote the aerobic degradation of organic chemicals - time frame of up to 24 months.

**Figure 16. Using drop-down boxes for contaminated material**

The volume of hydrocarbons to be treated as part of the rehabilitation/closure process is determined from the land contamination investigations and estimations based on observations.

Developing an unplanned project closure plan includes site assessments, data analysis, and modifications to existing mine closure plans when the end-of-mine life for an operation is earlier than expected.

Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
Development of an 'Unplanned' Project Closure Plan - for either Rock-hosted mineral Quarry Operation or Mine Operations	y		each	Select from List			Select Category Here	Provisional sum to be used to refine the conceptual closure plan into a detailed closure plan with execution strategies for rehabilitation activities.
AER tender preparation and assessment, stakeholder consultation, risk assessment facilitation and management, statutory reporting and instruments, permitting and compliance requirements, document and data management	n		each	Use alternate rate cell				Provisional sum for the AER to prepare tender documentation (i.e. demolition, waste disposal, earthworks, environmental management etc.) manage stakeholders and establish permitting and compliance requirements for closure.
Site security during closure	n		yr.	\$ 150,000.00				Provisional sum for site security measures required during closure. This includes nightly patrols and first response in the event of an incident.

**Figure 17. Using drop-down boxes for unplanned project closure plan**

Measurements or calculations of haul distance and push length are outlined in section 7. Once determined, select these calculations in the drop-down boxes (see figure 18).

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
Terrain Recontouring	Major levelling / resploping to achieve approved reclaim grades – 50 m push length	y	40000	m3	\$ 0.66		\$26,343	< 80m push Select Push Length Here < 50m push	D10 push at \$368 and 512 bcm/hr
	Minor reshaping and pushing - >50m push length and >10m in height.	n		ha	\$ 9,872.82			> 50m - 100m < push > 100m - 150m < push > 150m push	D10 Dozer @ \$368 per hour: hard to cut material, average operator, no rehandle, slot dozing
	Fill impoundments, voids etc. - Source local material, haul and spread to cap or backfill, cap thickness determined by approval. (Select Haul Distance from List)	n		m3	Select from List			Select Haul Distance Here	This item includes the volume of material requiring backfill using an excavator and scraper to fill the void and enable the establishment of rehabilitation.

**Figure 18. Using drop-down boxes for dozer push**

### 5.5 Alternative Unit Rate

The “Alternative Unit Rate” is a third-party contract rate (see section 7.3, alternative unit rates). Entering an alternative rate nullifies the “Default Unit Rate.” The “Total Cost” for the line item will be calculated using the alternative value (see figure 19).

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
Drillholes and Wells	Exploration wells. In Situ Leach boreholes / Monitoring holes and drillholes – Abandon well and drillholes as per the Metallic and Industrial Minerals Exploration Regulations(MIMER) as required	n		m	\$ 22.50				Where multiple occurrences exist, this is the rate for the total cumulative depth of all wells and drillholes (e.g. two drillholes at 100m depth each = 200m). Assumes a per metre rate which may include a variety of works (i.e. cut casing and install cap, install poly pipe to facilitate back-filling, grout preparation, grouting and capping). 300mm diameter well, excavate casing, cement hole, cap and backfill / cover
	Deep wells – Production water well abandonment Large Diameter	n		m	\$ 185.98				
	Reclaim drill pad and access road	n	2	ha	\$ 300.00	\$ 280.00		insert additional information here	

Figure 19. Inputting an alternative unit rate

When an alternative rate is entered, the “Basis for Costs Estimation and Additional Relevant Information” cell (as shown in figure 20) is coloured red with a prompt to provide information to support the alternative rate. Figure 20 shows the cell with information added.

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
Drillholes and Wells	Exploration wells. In Situ Leach boreholes / Monitoring holes and drillholes – Abandon well and drillholes as per the Metallic and Industrial Minerals Exploration Regulations(MIMER) as required	n		m	\$ 22.50				Where multiple occurrences exist, this is the rate for the total cumulative depth of all wells and drillholes (e.g. two drillholes at 100m depth each = 200m). Assumes a per metre rate which may include a variety of works (i.e. cut casing and install cap, install poly pipe to facilitate back-filling, grout preparation, grouting and capping). 300mm diameter well, excavate casing, cement hole, cap and backfill / cover
	Deep wells – Production water well abandonment Large Diameter	n		m	\$ 185.98				
	Reclaim drill pad and access road	n	2	ha	\$ 300.00	\$ 280.00		Based on Drillmaster Contracting quote 01/05/2024	

Figure 20. Supporting information for an alternative rate

### 5.6 Additional Items

Additional activities not listed within the “Activity/Description” can be included in the “Additional Items” section. Add an item by changing the “N” to “Y” and entering a quantity, unit of measure, unit rate, and supporting information in the “Basis for Costs Estimation and Additional Relevant Information” cell (see Figure 21).

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information
Additional Items	Removal of lightening rods at explosive magazine	y	1	Allow	This is	\$ 6,000.00	\$6,000	Provisional quote from ABC Demolitions #01052025
	Other 2 <insert>	n		Allow	deliberately			
	Other 3 <insert>	n		Allow	left blank			
Additional Items Subtotal							\$6,000	

Figure 21. Including additional items

### 5.7 Subtotals

Once all the necessary selections and inputs described in the preceding sections are complete, the “Total Cost” for each line item for the infrastructure type is summed and displayed in the greyed “Subtotal” line (see figure 22).

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
Roads and Parking Areas Decommissioning and Abandonment	Unsealed roads / vehicle parking lot areas – minor works including deep rip and trim with 16M Grader	y	15	ha	\$ 788.69		\$11,830	Light vehicle roads	Assumes ~6 m road width - 16H Grader @ \$212 per hour.
	Unsealed roads / access roads / vehicle parking lot areas with windrows and/or small earthen berms – minor earthworks and deep rip and trim	n		ha	\$ 3,695.26				Assumes average push distance of 15m on level ground; D8 Dozer @ \$368/hr and productivity of 338 BCM/hr
	Unsealed roads / vehicle parking lot areas – Minor earthworks, final trim and deep rip	y	3	ha	\$ 4,012.52		\$12,038	Exploration access roads	D8 Dozer @ \$368/hr push distance less than 20m on level ground; subsoil
	Unsealed roads / vehicle parking lot areas – Minor earthworks, final trim and deep rip.	y	3	ha	\$ 4,732.52		\$14,198	Exploration access roads through treed areas	D10 Dozer @ \$368 per hour; road width 30m, depth 0.5 m, push distance 30m; hard compacted material; subsoil to soft rock
	Subsoil Leveling	n		ha	\$ 1,811.00				D10 Dozer @ \$368/hr
	Topsoil Leveling - using grader 16M to level top soil over subsoil	n		ha	\$ 7,183.50				D10 Dozer @ \$332 per hour and 16H Grader @ \$212 per hour (50% utilisation) - tree/shrub seed.
	Remove stabilized material (aggregate etc.) from roadways and disposal on-site/locally (haul distance >1.5 km but <3 km)	y	1250	m3	\$ 4.60		\$5,750	> 1km but <= 2km Decommission a bulk pad 50m x 50m and >0.5m deep	D10 Rip and push into void at \$270/hr, 0.2ha/hr, 150mm deep. 657 Scrapers cut to spoil at \$430/hr, 130BCM/hr/machine, water truck and grader at \$0.75/m3
<b>Roads and Parking Areas Decommissioning and Abandonment Subtotal</b>							<b>\$43,815</b>		

Figure 22. Infrastructure type subtotal

### 5.8 Totals by Domain

All the infrastructure type subtotal lines in a domain are totalled in the last row of the table titled “Total Cost for [XXX] Domain” (see figure 23).

	Site security during closure	y	2	yr.	\$ 150,000.00		\$300,000		Provisional sum for site security measures required during closure. This includes nightly patrols and first response in the event of an incident.	
	HAZMAT Clean-up - cleaning and decontaminating plant and equipment, chemical storage locations, oil and grease traps, tanks, vessels, and pipe work etc	n		each	\$ 100,000.00				Provisional sum to perform the site clean-up and ensuring the demolition program is not interrupted due to potential contamination of waste streams.	
	Removal and disposal of radiation devices	y	1	each	\$ 25,000.00		\$25,000		Provisional sum for removal and disposal of monitoring devices on conveyors using a radiation source (i.e., Americium – 241, Plutonium – 238, Caesium - 137 etc).	
<b>Miscellaneous Items Subtotal</b>							<b>\$325,000</b>		#N/A	
Mobilization and Demobilization	Mobilization & Demobilization for exploration programs	n		item	\$ 10,000.00				Assumes an exploration program of 10 or fewer holes and local contractors within 250 km are available to undertake rehabilitation of disturbance generated by dedicated exploration companies. Apply once per exploration pad.	
	Mobilization & Demobilization for small mine or quarry	n		item	\$ 40,000.00				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.	
	Mobilization & Demobilization (Distance to site <150 km)	y	1	item	\$ 100,000.00		\$100,000		May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.	
	Mobilization & Demobilization (Distance to site >150 km but <500 km)	n		item	\$ 150,000.00				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.	
	Mobilization & Demobilization (Distance to site >500 km but <1000 km)	n		item	\$ 300,000.00				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.	
	Mobilization & Demobilization (Distance to site >1000 km)	n		item	\$ 500,000.00				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.	
<b>Mobilization and Demobilization Subtotal</b>							<b>\$100,000</b>			
Additional Items	Removal of cattle gates for post closure access by land owner	y	4	Allow	This is	\$ 3,500.00	\$14,000	Estimated from machine and labour rates	This item includes <<to be added by the operator>>	
	Other 2 <insert>	n		Allow	deliberately				This item includes <<to be added by the operator>>	
	Other 3 <insert>	n		Allow	left blank				This item includes <<to be added by the operator>>	
<b>Additional Items Subtotal</b>							<b>\$14,000</b>			
<b>Total Cost for Management Activities</b>								<b>\$439,000</b>		

Figure 23. Domain total costs

### 5.9 Summary Report

#### 5.9.1 Domain Cost

The total cost for each domain is automatically populated in the “Summary Report” worksheet (e.g., surface summary report and totalled under “Security Deposit” [see figure 24]).

Domain	Security Deposit
Domain 1: Infrastructure	6,924,005.00
Domain 3: Overburden & Waste	788,000.00
Domain 4: Active Mine & Voids	1,110,000.00
Domain 5: Subsidence & Management	1,572,000.00
<b>Subtotal (Domains and Miscellaneous Items)</b>	<b>\$10,394,005.00</b>

**Figure 24. Domain total costs summary**

### 5.9.2 Miscellaneous Items

The summary report includes calculated costs for miscellaneous items. Based on the characteristics of the operations for the MLE, the miscellaneous items (including project management and environmental monitoring) in the “Summary Report” worksheet are automatically calculated based on the domain totals shown in figure 24. The recommended default rate is 10%.

Users may adjust the percentages by editing the rate (see figure 26). The line item cost will automatically recalculate. Adjustments should consider the RMLP and, where clarity is required, be made in consultation with the AER.

Figure 25 shows an example where a 15% contingency rate is applied to an operation because of inadequate information about the design criteria to manage the geochemical risks of a legacy waste rock dump and associated seepage. The environmental monitoring percentage is reduced to 5% due to site layout, successful and proven rehabilitation strategies based on monitoring to date, and existing groundwater modelling and analysis.

Adjustments to these miscellaneous amounts must be made in the “Summary Report” worksheet, with a justification in the “Rate Change Justification” worksheet.

Contingency	15%	\$1,559,100.75
Post Closure Environmental Monitoring	5%	\$519,700.25
Project Management and Surveying	10%	\$1,039,400.50

**Figure 25. Summary report – contingent items**

### 5.10 Finalized Mine Liability Estimate

The total security deposit required for the mining or mineral processing operation is automatically calculated based on the subtotals (domains and miscellaneous items), excluding the goods and services tax.

The company representative must check the boxes below the estimate indicating whether unit rates have been altered (approved alternative rates have been used) and the proposed rehabilitation design

is consistent with the project approval conditions. The representative must provide their name and role/responsibility, then date and sign the form declaring the MLE to be a true and accurate reflection of the total mine liability security held for the operations using the best available information (see figure 26).

Domain		Security Deposit
Domain 1: Infrastructure		6,924,005.00
Domain 3: Overburden & Waste		788,000.00
Domain 4: Active Mine & Voids		1,110,000.00
Domain 5: Subsidence & Management		1,572,000.00
<b>Subtotal (Domains and Miscellaneous Items)</b>		<b>\$10,394,005.00</b>
Contingency	15%	\$1,559,100.75
Post Closure Environmental Monitoring	5%	\$519,700.25
Project Management and Surveying	10%	\$1,039,400.50
<b>Total Security Deposit for the Mining Project (excl. of GST)</b>		<b>\$13,512,206.50</b>

Note: GST is not included in the above calculation or as part of MLE security deposits required by the AER.

- Alterations have been made to unit prices within this spreadsheet. (Attach a separate sheet providing details of changes).
- The proposed rehabilitation design is generally consistent with the development consent for the project.

This Registration Form, Summary Report and calculation pages are to be printed and attached as an appendix to the RM submission.

This mine security calculation has been estimated using the best available information at the time. It is a true and accurate reflection of the total rehabilitation liability in relation to the site EPEA approval.

John Doe	May 15, 2025
Company Representatives Name	Date
VP Environment	
Company Representatives Role / Responsibility	Signature

Figure 26. Finalizing the mine liability estimate

## 6 Selecting Activities

### 6.1 Considerations

Consider the following when selecting appropriate activities in the MLE tool for rehabilitating disturbances resulting from your mining and mineral processing operation.

#### 6.1.1 General

General items for consideration include the following:

- post-mining land use (i.e., grazing, cropping, industrial, etc.)

- revegetation strategies (i.e., direct seeding, hydroseeding, tube stock, addition of fertilizer/biosolids, amelioration, and protective fencing)
- availability and application of topsoil/growth media
- availability of other suitable rehabilitation materials (i.e., competent rock, low-permeability materials, organic amendments, etc.)
- groundwater contamination
- post-mining landform profiles
- steep slope stabilization
- void design and management
- major earthworks – large volumes of material to be moved
- minor reshaping – small volumes of material to be moved to achieve landform design
- water management to maximize soil conservation and minimize potential erosion (i.e., contour banks, drainage channels, sediment dams, rock drains, etc.)
- repatriation of heritage items and management requirements
- cost and requirement to access public, municipal, or Crown land to complete rehabilitation
- mobilization and demobilization distance (round trip) to the closest regional centre for demolition and earthworks equipment
- boreholes – backfill open boreholes or grout with concrete and cap and seal boreholes (depending on sealing requirements)
- remove and dispose of drill cores, stakes, tags, sample bags, flagging tape, drill chips, and other waste
- contamination management
- unsealed roads, including access trails, exploration roads, vehicle parking areas, sumps, and areas of bulk sampling – minor earthworks, final trim, and deep rip
- substrate preparation and revegetation of disturbed areas
- erosion, sediment, drainage controls, and ongoing management
- weed and pest animal control
- monitoring and maintenance

### 6.1.2 Infrastructure

Infrastructure-related items for consideration include the following:

- site services connection points (i.e., water, power, communications, sewage, etc.)
- power lines and type for which the site has liability (poles or tower/lattice structures)
- types of buildings – substation, demountable (on piles), small (single storey/level), light industrial (single storey/level with a raised roof to the height of another level), industrial (multistorey/level with a gantry crane, or other heavy infrastructure requiring removal), comminution, processing/preparation plant, hopper, etc.
- positioning of conveyors (on ground, elevated, overhead)
- concrete thickness (assume <300 mm for small and light industrial buildings, >300 mm for all other buildings unless known) and disposal pathway (crushing or disposal)
- fences for removal and disposal
- stacker or reclaimer type (radial, luffing, bucket wheel) and presence of rails and ballast – in the case of a small mine or quarry, the stacker might be better classified as a conveyor due to the scale and absence of hydraulics for raising, lowering, or rotating
- silos, reclaim tunnels, tanks (aboveground and underground), pipes, pumps and pontoons, asphalt, evaporation fans or other water transfer and management infrastructure, radiation devices
- rail loop and loading facilities, including rail loading bins
- number and size of portals, adits, mine shafts and openings, and ventilation fan shafts requiring sealing
- type of unabandoned boreholes
- dams to be retained (landowner agreements)
- dam sediments requiring removal
- sump and void backfill

### 6.1.3 Contamination and Remedial Works

Contamination-related items for consideration include the following:

- contamination requirements – assessment (Phase 1/2), water disposal, high- and low-level contaminated material requiring removal or off-site treatment, material requiring on-site remediation, asbestos requiring removal, sodic soils requiring treatment
- requirement to remove aggregate from stabilized areas and the depth of removal (typically 0.5 m)

- presence and types of roadworks (roads, access trails, haul roads, vehicle parking areas)
- requirements for deep ripping and trimming minor disturbance areas
- existing rehabilitation areas requiring repair and to what extent (minor or significant topsoil replacement, repair of erosion rills and gullies, or redesign and reconstruction of landform areas; see section 7)
- ongoing management requirements for successfully rehabilitated areas
- buffer lands and successfully rehabilitated areas requiring pest management
- undisturbed areas and land management requirements

#### 6.1.4 Landforms

Landform-related items for consideration include the following:

- final pit or void characteristics and long-term physical and chemical stability
- tailings and waste rock characteristics and environmental risk capacity
- equipment requirements for undertaking rehabilitation work (i.e., small plant for tailings dam works due to low shear strength, etc.)
- requirement for rock drains to manage surface water
- highwall treatment strategy (i.e., considering public safety, coal seams and acid rock drainage potential areas, geotechnical stability, public infrastructure, etc.)
- warning signs, safety barriers, or trenching requirements (near voids, etc.)
- creek diversion stabilization, armouring, and maintenance requirements

## 6.2 Examples of Activities

The “Cost Schedule” worksheet lists the rehabilitation activities that might be required for decommissioning and rehabilitating operations at a mine site or mineral processing plant. The following are examples of the decommissioning and rehabilitation activities that can be required for certain disturbance areas.

### **Dams**

- clean water dams retained after closure
- drain and remove contaminated sediments
- on-site treatment of contaminated water
- remove the pump and pontoon

- remove and dispose of the liner
- load and haul material to fill dams, voids, and sumps to achieve a free-draining landform

### Underground-Specific Infrastructure

- demolish and remove vent raise fans, electrical substation, and hoist
- abandon portals/adits or small adits
- abandon and rehabilitate ventilation fan shafts
- install temporary or preabandonment seal over adit
- temporary security fence around steep section of highwall (use for shafts as required)
- purchase and erect warning signs
- maintenance and monitoring of abandoned adits or portals
- boreholes (i.e., cap and abandon service boreholes for underground operations, underground mine workings drainage, stope drainage, gob drainage, surface-to-in-seam gas drainage, and vertical gas drainage)

## 7 Calculations

This section describes the measurements and quantities that users need to determine for input to the MLE tool.

### 7.1 Measurements and Estimations

#### 7.1.1 Area

Calculate the area (e.g., a building to demolish or a dam liner to remove) by measuring around the item (see figure 27 and figure 28).

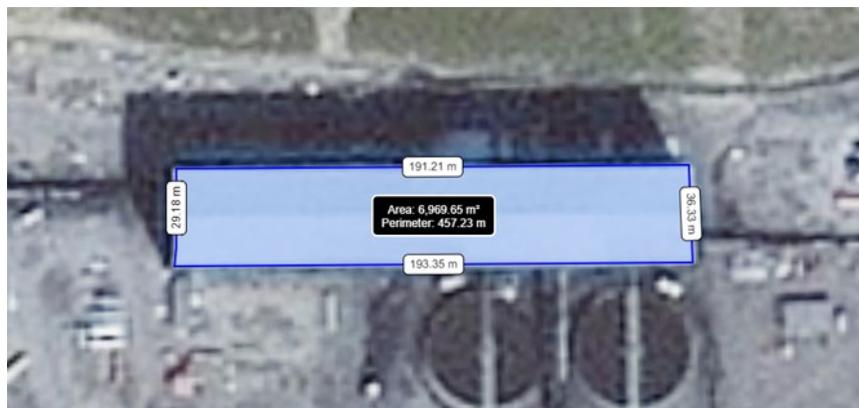


Figure 27. Estimating the area of a building



**Figure 28. Estimating the area of a dam**

### 7.1.2 Length or Width

Calculate the length or width of items like conveyors, roadways, and pipelines by measuring between the start and end points (see figure 29).



**Figure 29. Estimating lengths**

### 7.1.3 Haul Distance

To calculate haul distance (kilometres [km]), measure the path within existing roadways along the approximate centreline of the road between the two locations, considering other landforms and accessibility (see figure 30), then double this length to identify the haul distance. In the following example, the soil for the landform requires haulage  $>5$  km (i.e.,  $5.86 \text{ km} \times 2 = 11.72 \text{ km}$ ).



**Figure 30. Estimating haul distance**

### 7.1.4 Push Length and Volume

Calculate the dozer push length by measuring the length between the material to be pushed and the approximate centre of the landform where the material is to be spread (see figure 31). A push length of >50 m and <75 m has been measured for pushing or levelling the dam wall (i.e., 58.64 m).



**Figure 31. Estimating the maximum dozer push**

In addition to push length, the push volume is required for the MLE tool. Push volume is calculated based on the length (e.g., the total berm length/perimeter), width, and height/depth. Calculate push volumes (e.g., on a dump) by multiplying the area of the dump or other area to be pushed by the push depth (estimate based on current operations).

To calculate push volumes (m<sup>3</sup>) for a berm, use the following formula:  $\frac{1}{2} \times \text{width (base)} \times \text{height} \times \text{length (of berm)}$

Example: for a berm of 560 m long by 3 m high and a 10 m base width, the push volume is  $\frac{1}{2} \times 10 \text{ m} \times 3 \text{ m} \times 560 \text{ m} = 8400 \text{ m}^3$ .

### 7.1.5 Height and Depth

Determine the height and depth of buildings, sumps, berms, dam walls, etc., using contour data, reported measurements from drawings and reports, or estimates by operations personnel.

## 7.2 Quantities

### 7.2.1 Area

Measure area in square metres ( $\text{m}^2$ ) or hectares (ha) (in the “Unit” column). Where conversion is required,  $10\,000 \text{ m}^2 = 1 \text{ ha}$ . Figure 32 shows how to enter a conversion calculation for  $\text{m}^2$  to ha in the “Quantity” cell.

Contaminated Mine Tailings, Rejects and Slag Pile Mitigation	Reshaping, capping of a tailings impoundment facility unlikely to present difficulties due to chemistry – reactive materials (Selenium / ARD / AMD / PAF / NMD / carbonaceous / saline), and physical properties (i.e., shear strength, etc.) – where the mine waste stream is geochemically benign and / or the strength condition within the upper 4 - 6 m meets the target shear strength profile and an acceptable trafficability	n		ha	\$ 48,025.90				This includes sourcing, hauling, spreading, moisture conditioning and compaction of a suitable volume material with the appropriate chemical and physical properties. This rate assumes suitable capping material is available on site within 10 km, and an average cap thickness of approximately 1 m including growth media. Water quality from runoff, seepage etc. meets site-specific environment water quality values.
	Clean capping / sealing of impoundment/structure to facilitate water quality from runoff, seepage etc. meeting site-specific environment water quality values.	n		m3	\$ 1.50				Clean cap from stockpile (i.e., shale / clay, competent drainage materials etc.) and / or additional requirements (i.e., geofabric / composite lining etc.)
	Clean capping / sealing of impoundment/structure to facilitate water quality from runoff, seepage etc. meeting site-specific environment water quality values.	n		m3	\$ 0.68				Clean cap direct placement (i.e., shale / clay, competent drainage materials etc.) and / or additional requirements (i.e., geofabric / composite lining etc.)
	Reshaping, capping / sealing of tailings impoundment facility likely to present moderate difficulties due to chemistry – reactive materials (Selenium / ARD / AMD / PAF / NMD / carbonaceous / saline), or physical properties – not significantly hydrophilic, shear strength, etc. limiting equipment choice and an acceptable trafficability	y	=170000/ 10000	ha	\$ 108,000.00			\$1,836,000	This item includes sourcing, hauling, spreading, moisture conditioning and compaction of a suitable volume of material to cap / cover facilities where the tailings or rejects base is at a strength that enables economically efficient construction methods with small crusher/screener. This rate assumes suitable capping material is available on site within 10 km, and an average cap thickness of approximately 2 m including growth media. This may require additional materials (such as capillary breaks, geofabric, etc.), specific material types (e.g. acid neutralising / consuming materials, competent rock etc.), and associated activities (i.e., load / haul / place / crush / screen / borrow etc.). Costs for haulage of specialised materials must be added separately if required.

Figure 32. Calculating area

### 7.2.2 Volume

Measure volume in cubic metres ( $\text{m}^3$ ), litres (L), or megalitres (ML) (see the “Unit” column). Where conversion is required,  $1 \text{ m}^3 = 1000 \text{ L}$  and  $1\,000\,000 \text{ L} = 1 \text{ ML}$ .

Generally, volume = length x width x depth (see figure 33) or volume = mass/density.

Reclamation Activities	Source, haul, pile and spread soils (includes organics) - haul distance >2 km but <5 km	y	3,750	m3	\$ 5.04			\$18,905	> 2km but <= 5km 25ha being topsoiled with 15cm average depth
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Figure 33. Calculating volume

### 7.2.3 Units of Measure

Mass is measured in tonnes (t) (1000 kilograms (kg) = 1 t).

Length is measured in metres (m), kilometres (km), or linear metres (Lm) (1000 m = 1 km).

The m<sup>2</sup>/floor is a measure of the area of the building multiplied by the number of floors in the building (~3 – 4 m height) (see Figure 34).

Demolish and remove industrial buildings housing workshops and servicing areas etc. (does not include rock-hosted mineral processing plants, or refinery upgrading buildings/structures) and disposal on-	y	15,000	m <sup>2</sup>	\$ 137.53		\$2,062,901	Needs to be calculated per floorlevel (Assume 1 floorlevel = 3-4 m). Does not include transport costs to disposal facility or equivalent.
Demolish and remove rock-hosted mineral processing plants, and refinery upgrading buildings/structures (include the area of each floor of the structure) and disposal on-site/locally	y	=29940*3	m <sup>2</sup> /floor	\$ 58.60		\$5,263,007	Needs to be calculated per floorlevel (Assume 1 floorlevel = 3-4 m). Does not include transport costs to disposal facility or equivalent.

**Figure 34. Calculating building demolition area**

The unit of measure “each” refers to countable items (i.e., the number of objects referenced in the description, such as overpasses, small tanks, Phase 1 and Phase 2 contamination assessments, mobile treatment units, boreholes, trees, signs, dams, mobilizations, and demobilizations. Only a basic count is required.

### 7.2.4 Unknown or Undetermined Values and Contingencies

Some values may be unknown due to the absence of predictable rates or the inability to predict how soils, geology, geotechnics, rock mechanics, nutrients, ecology (and populations), legacy contamination, process changes, etc., can influence rehabilitation methodologies. Some examples of quantities required in the MLE tool where the values might be unknown or undetermined are provided below:

- **Existing rehabilitation repair:** minor, moderate, major, or total failure of landform – unknown extent, magnitude required in recently rehabilitated areas.
- **Minor earthworks and maintenance of subsidence areas or the re-establishment of natural watercourses or drainage channels following subsidence:** applicability unknown due to changing geology, uncertainty regarding the extent of workings currently being mined (interaction with historic workings), or mining methods.
- **Pest management on buffer lands, undisturbed and rehabilitated areas, or land management of undisturbed areas (rehabilitation, weeds, wildlife, and erosion and sediment control works):** unknown due to ongoing changing ecology (and populations), programs are usually only conducted as required (infrequent and not scheduled).
- **Long-term maintenance of watercourse diversion – channel constructed through backfilled or competent material:** unknown due to absence of soils dispersion characterization in older diversions, newly constructed channel not yet experiencing a wet season.

For these aspects, extrapolation should be practically applied based on current experience, considering site conditions, predictions in technical reports, monitoring results to date, etc. Some examples are provided below.

**Example 1:** This example illustrates how repairs for a rehabilitated waste dump can be extrapolated based on previous experience with similar facilities.

A mine has recently completed the rehabilitation of a 25 ha waste dump using similar rehabilitation materials and methods as a previously rehabilitated 10 ha waste rock dump of the same waste rock type. No monitoring has been conducted on the 10 ha waste rock dump, but ten erosion features about 10 m long, 2 m wide, and 3 m deep have opened up at the surface and require extensive repair (such as backfill). Smaller rills and gullies are also visible on ~4 ha of the 10 ha area, which could lead to further rehabilitation failure.

Based on this information, the following area for repair of the 10 ha waste rock dump can be calculated:

- Total failure of landform for the rehabilitation is  $10 \times 10 \text{ m} \times 2 \text{ m} \div 10 \times 10 \text{ 000 m}^2/\text{ha} = 0.002 \text{ ha}$  (~0.2%)
- Moderate damage to rehabilitation is ~4 ha (~40%)

Therefore, extrapolating the rate of repair for the 25 ha waste rock dump:

- Total expected failure of landform is  $0.2\% \times 25 \text{ ha} = 0.05 \text{ ha}$
- Moderate damage to rehabilitation is  $\sim 40\% \times 25 \text{ ha} = \sim 10 \text{ ha}$

**Example 2:** This example illustrates how long-term maintenance of a watercourse diversion can be extrapolated.

A 1560 m watercourse diversion has been designed and constructed, according to relevant best practice guidelines, considering regional geomorphology and material characterization testing results. The diversion was built 70% in competent natural material and 30% in backfilled material. The section constructed in backfill material is scheduled to be rock armoured next year. Since being built, three rain events have occurred, causing minor erosion on ~10% of the channel section in the competent material and erosion on ~50% of the channel section in the backfill material. Based on this, the long-term maintenance of the watercourse diversion can be extrapolated:

- competent material  $70\% \times 1560 \text{ m} = 1092 \text{ m}$  (competent) @ 10% eroded = 109.2 m
- backfilled material  $30\% \times 1560 \text{ m} = 468 \text{ m}$  (backfill) @ 50% eroded = 234 m
- total repair = 343.2 m

### 7.3 Alternative Unit Rates

An “Alternative Unit Rate” should reflect independent third-party contract rates (guaranteed to the AER) for rehabilitation activities required in the project approval conditions. If the alternative unit rate applies only to partial rehabilitation, it must be supplemented with rehabilitation activities in the MLE tool or “Additional Items” to address the remaining required work. The rates should accurately reflect current market prices and account for the work required to achieve the final landform, land use, and rehabilitation objectives.

Provide the basis for alternative rates and relevant information with the MLE submission. There are two methods of capturing alternative rates in the MLE tool:

- In the “Alternative Unit Rate” column for the rehabilitation activity, insert the alternative rate provided or calculated based on the third-party information. In the “Basis for Costs Estimation and Additional Relevant Information” column, insert the company name and the date of the quote for reference.
- In the “Additional Items” infrastructure type for the relevant domain, enter the description of the works for which a quotation has been received. In the “Applicable (Y or N)” column, change “N” to “Y.” Enter the number of works required in the “Quantity” column, “each” in the “Unit” column, and the estimate in the “Alternative Unit Rate” column. In the “Basis for Costs Estimation and Additional Relevant Information” column, enter the relevant landform or area, company name, and the date of the quote as reference (see Figure 35).

Additional Items									
Cap/cover for mine waste as per design based on recent study	y	1	<<to be added by the operator>>	This is	\$ 345,000.00	\$345,000	For Waste Cell A, cost based on Gold Digger study dated 05/07/2024. Monitoring and project management cost removed.	This item includes the capping of Waste Cell A with clay, subsoil and soil.	
Other 2 <insert>	n		<<to be added by the operator>>	deliberately				This item includes <<to be added by the operator>>	
Other 3 <insert>	n		<<to be added by the operator>>	left blank				This item includes <<to be added by the operator>>	
Additional Items Subtotal						\$345,000			

**Figure 35. Including alternate rates for rehabilitation work**

The “Description/Notes” column describes how the rates in the MLE tool were derived. Reviewing the applicability of each “Default Unit Rate” and activity “Description/Note” is a fundamental step in using the MLE tool.

Approval holders should review the specifics of the rehabilitation activity described and adjust the default rates (by inserting an alternative rate) where the proposed rehabilitation activities differ from those presented in the MLE tool.

The approval holder is responsible for reviewing and adjusting rates accordingly, making the rates for each rehabilitation activity suitable for the specific site and the nature and scale of the operations.

## 8 Rate Change Justification Worksheet

When a rate change is made, enter the following information in the “Rate Change Justification” worksheet:

1. Insert the domain number. For example, 4a in “Underground Operations” relates to subsidence and management.
2. Insert the activity for which a changed rate has been sourced (see the relevant line item and use that activity or description).
3. Enter the AER unit rate from the relevant line item or the “Cost Schedule” worksheet, and then in the “Adopted Rates” column, add the rate sourced from the third party and guaranteed to the AER.
4. In the “Justification” column, describe why a third-party rate is being used. For example, certain mine tailings may dry out quickly with high enough shear strength and trafficability, and costs less to rehabilitate than \$108 000/ha.
5. Read the conditions of the form (see figure 36) and ensure the inputs comply. Complete the company representative information. Sign and date.
6. Depending on the complexities associated with the alternative rates and the effect this has on the total estimate, the AER may also require a detailed quote or report to be attached to the MLE to ensure sufficient information is provided to justify the rate. These could include a mine abandonment design report, a highwall geotechnical report, or a similar document (refer to section 9.3, adding supporting documentation).

### Justification for Change of Rates in the AER's Rock-Hosted Mine Liability Estimator

Domain	Activity	AER unit/rate	Adopted Rates	Justification

*In completing the RMLP Liability Estimation Tool, we are seeking an adjustment to the rates currently utilised in the RMLP Estimator. A justification for the rate change by a third party has been included and I confirm that only the rates identified in the above table have been altered in the RMLP.*

John Doe ..... 15-May-25  
 Authorization Representatives Name ..... Date

VP Environment .....  
 Authorization Representatives Role / Responsibility ..... Signature

Figure 36. Rate justification form

## 9 Assumptions Worksheet

### 9.1 Project-Specific Assumptions

As described in section 2, the worksheets, and in table 1, project-specific assumptions should be recorded (e.g., life of mine, post-mining land use, infrastructure to be retained by documented agreement, rehabilitation strategies, number of voids at closure, etc.). Enter this information in the “Assumptions” worksheet (see figure 37).

### Assumptions and rehabilitation requirements

List or record any assumptions made when completing this tool:

Life of Mine is 2035
The railyard near the explosives magazine is owned by AltaLink and is not part of the mine liability.
Post mining the land use will be forested except for the level surfaces of Waste Dump 1 & 2 which will be grazing areas.

Figure 37. Entering project-specific assumptions

### 9.2 Domain-Specific Assumptions

Enter assumptions specific to a domain in the “Basis for Costs Estimation and Additional Relevant Information” column for the associated line item or at the top of that domain (see figure 38).

#### Surface Operations 1

<b>Domain 1a: Infrastructure</b>				<b>Total Cost for Infrastructure Domain</b>			<b>\$12,804,205</b>		
<b>Additional Assumptions:</b> Record any relevant assumptions to this domain below:									
All infrastructure built for the purpose of mining will be demolished and removed - there are no agreements in place to transfer infrastructure.				Key Rehabilitation Area Data for Domain					
				Total Landform Establishment:					
				Total Growth Media Development:					
				Total Ecosystem Establishment:					
Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
Termination of Services and Demolition Works	Disconnect and terminate all services (Water, electricity, gas etc at point of attachment to site)	y	2	each	\$ 35,000.00		\$70,000	1 disconnection fee for the Administration and Shops and 1 disconnection fee for the Processing Plant	For disconnection of all services, at building boundaries, physical cut at the point of attachment or distribution location. If infrastructure is not consolidated (i.e. administration, camp and workshops are in separate places), consider multiple disconnection fees.

Figure 38. Domain-specific assumptions

### 9.3 Adding Supporting Documentation

Include any supporting documentation on a separate worksheet in the MLE tool workbook by clicking on the “Insert sheet” sign (plus button) to the right of the “Definitions” worksheet tab (see Figure 39). Information and pictures can also be copied and pasted into the new worksheet (i.e., sheet 1) (see figure 40).



Figure 39. Inserting an additional worksheet

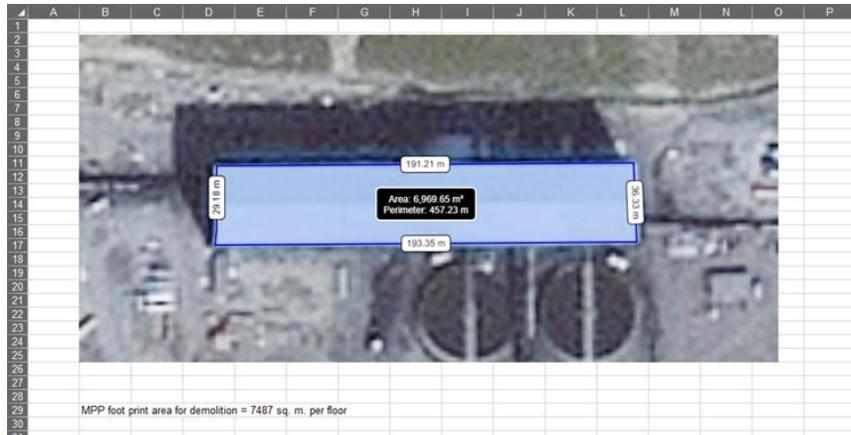


Figure 40. Example of copy and paste

## 10 Finalizing and Reviewing a Rehabilitation Cost Estimate

Use the following checklist to review the MLE for accuracy and completeness. The checklist highlights information for verification.

Table 2. MLE tool review checklist

Subject	Checks	Complete? (Y/N)
Totality of operations reflected	<ol style="list-style-type: none"> <li>All infrastructure included:                             <ul style="list-style-type: none"> <li>buildings</li> <li>tanks</li> <li>bins/hoppers</li> <li>reclaim tunnels</li> <li>conveyors</li> <li>explosive magazines</li> <li>water/sewage treatment areas</li> </ul> </li> <li>All landforms included:                             <ul style="list-style-type: none"> <li>tailings dams</li> <li>rejects emplacements and co-disposals</li> <li>waste rock dumps – in pit and out of pit</li> <li>open cuts/pits</li> <li>stockpiles</li> </ul> </li> <li>All underground infrastructure included                             <ul style="list-style-type: none"> <li>portals and adits (including historic/legacy)</li> </ul> </li> </ol>	

Subject	Checks	Complete? (Y/N)
	<ul style="list-style-type: none"> <li>• ventilation shafts</li> <li>• vent fans and winders</li> <li>• service and gas boreholes</li> </ul> <p>4. roads, storage areas, and laydowns (including historic/legacy)</p> <ul style="list-style-type: none"> <li>• haul roads</li> <li>• access roads (where required)</li> </ul> <p>5. dams</p> <p>6. other lands (undisturbed areas)</p>	
Activities chosen	For each area of disturbance, the rehabilitation activities chosen will achieve the project approval conditions. See section 6.	
Rates used and justifications	For each alternative rate use, ensure it complies with section 7.3 and that the “Rate Change Justification” worksheet has been completed.	
Assumptions	Ensure any assumptions related to rehabilitation outside of liability and other key information on strategies, completed rehabilitation, and extrapolations (see section 7) are captured in section 9.	
All applicable items costed	Once all appropriate rehabilitation activities for the operations are selected and each domain has been reviewed, for each item where “Y” has been retained in the “Applicable (Y or N)” column, ensure there is an amount entered in the “Total Cost” column. Costs will not be calculated if a drop-down box is not activated (see figure 41).	

No ‘Total Cost’ for this line item though relevant and calculated.  
**Dropbox for ‘Selected Haul Distance Here’ needs to be addressed**

Remove stabilized material (aggregate etc.) from roadways and disposal on-site/locally (Select Haul Distance from list)	y	1250	m3	Select from List			Select Haul Distance Here	This item includes the scraping and removal of the volume of stabilized material from the road, laydown or other surface using an excavator, dozer and grader to enable the establishment of rehabilitation.
							Decommission a bulk pad 50m x 50m and >0.5m deep	

Figure 41. Reviewing an MLE

## 11 Printing the Mine Liability Estimate

**Print the workbook:** Select “File” and click “Print.” Under “Settings,” select the arrow next to “Print Active Sheets” and select the appropriate option.

**Print only completed rows:** At the top of the “Summary Report” tab for each type of mining/processing plant, there is a “Create Surface and Underground MLE Report” button (see figure 42). This action generates a PDF file with only completed lines (i.e., items where “Y” is selected). Using this function expedites the review process as only activities with associated costs are presented.



## Mine Liability Estimation

Note: Sections of this page are automatically filled in from the registration page

Mine Name:

Mine Operator:

Create Surface  
MLE Report

Click button to create  
pdf report once MLE is  
complete.

Figure 42. Reviewing an MLE

## 12 Submitting the Mine Liability Estimation

Email the MLE to the AER at [RMLPSubmissions@aer.ca](mailto:RMLPSubmissions@aer.ca).

## Appendix 1 Definitions

Term	Meaning
<b>adit</b>	An entrance to an underground mine that is horizontal or nearly horizontal and that can also be used to drain water and ventilate the mine.
<b>amelioration</b>	The addition of materials to change the physical or chemical properties of soil, tailings, or other materials.
<b>armouring</b>	Application of a self-sustaining mechanism for erosion control typically using rock.
<b>approval</b>	An approval issued by the Alberta Energy Regulator under the <i>Environmental Protection and Enhancement Act</i> , <i>Water Act</i> , <i>Public Lands Act</i> , or <i>Mineral Resource Development Act</i> for an activity, including renewal of an approval.
<b>backfill</b>	The act of placing material to refill an excavation or void (such as a surface pit, underground stope, or dam).
<b>ballast (rail)</b>	A free-draining coarse aggregate or metallurgical slag that supports railway tracks and allows for drainage.
<b>borehole</b>	A hole made by drilling or boring, excluding sampling and coring using handheld equipment.
<b>capillary break</b>	A layer of coarse material between finer-textured materials to prevent the vertical movement of water (and associated salts) by surface tension from the lower finer-textured material into the upper finer-textured material (such as topsoil or growth media). It can also limit root penetration into the underlying seal, and more than one capillary break can be present within a cover design.
<b>capping/sealing</b>	The application of material (such as clay) in a usually engineered design to seal off underlying material (such as waste, contaminated soil, or spoil) to prevent exposing this material to the environment and outside conditions.
<b>contaminated</b>	The condition where potentially hazardous substances are present at concentrations above background or recommended land use levels and where assessment shows it poses, or is likely to pose, an immediate or long-term hazard to human health or the environment.
<b>contour banks</b>	Earthen structures constructed across cultivated slopes.
<b>crusher/crushing plant</b>	Equipment that crushes ore or rock (also referred to as a mill).
<b>demountable</b>	A prefabricated structure or building produced off site and transported to the site. It is designed to be movable rather than permanently installed.
<b>dewater</b>	Removing or draining groundwater or surface water from a structure by pumping or evaporation.
<b>diversion</b>	A drain or channel for diverting stormwater runoff around a site or landform.
<b>earthworks</b>	A construction made of earth (such as cut-and-fill operations for roads, dams, and landforms) the operations connected with excavations and embankments of earth using heavy equipment.

<b>evaporation fans</b>	Fans used to evaporate water as an alternative to discharging water off site.
<b>excavation</b>	The removal of the ground surface layer to a depth greater than 500 mm.
<b>financial security</b>	A letter of credit, cash, surety bond, or other security instrument in the amount determined in the RMLP Annual Report and in a form approved by the director.
<b>gas drainage</b>	A method of reducing the in situ gas content of the seam to acceptable limits by drilling holes in the seam or surrounding strata ahead of mining.
<b>gob/stope</b>	The space remaining following ore extraction from an underground mine.
<b>groundwater</b>	Water that occurs beneath the ground surface in the saturated zone.
<b>haul road</b>	Roads used by haul trucks to transport mine materials (product and waste).
<b>HAZMAT</b>	Anything that when produced, stored, moved, used, or otherwise dealt with without adequate safeguards to prevent it from escaping, can cause injury or death or damage to life, property, or the environment.
<b>heritage item</b>	Any heritage items listed in one or more of the following: <ul style="list-style-type: none"> <li>• the UNESCO World Heritage List</li> <li>• Alberta Register of Historic Places (<a href="https://hermis.alberta.ca/arhp/">https://hermis.alberta.ca/arhp/</a>)</li> <li>• any other item identified by the Alberta Energy Regulator</li> </ul>
<b>leach</b>	Dissolution and removal of a soluble substance from a substrate.
<b>overburden</b>	Topsoil or strata overlying a mineralized deposit or coal seam.
<b>portal</b>	The surface entry to an adit, including the structure surrounding the immediate entrance.
<b>mineral processing plant</b>	A facility for extracting metals from mined ore.
<b>rehabilitation</b>	Encompasses all closure functions, including reclamation, abandonment, remediation, demolition, and monitoring.
<b>rehabilitation repair</b>	After damage or failure, to restore to a good or sound condition. Disturbed land returned to a safe, stable, productive, and self-sustaining condition, such as eroded areas.
<b>remediation</b>	Measures to repair, clean up, or mitigate pollution, contamination (soil or water), or adverse environmental effects.
<b>reshaping</b>	The process of raising or lowering the ground level to achieve a final landform design.
<b>revegetation</b>	The act or process of re-establishing and redeveloping vegetation in disturbed areas with appropriate species.
<b>scalp</b>	To plane down the surface or remove surface material.
<b>shaft</b>	A vertical or inclined excavation in rock to provide access to an ore body. Shafts are usually equipped with a hoist at the top to lower and raise a conveyance for moving workers and materials. Shafts are also used to move air through the mine for ventilation.
<b>subsidence</b>	Movement of strata downward resulting from the extraction of coal, metals, or minerals, incorporating vertical ground movement (strain) and differential vertical movement (tilt).

<b>surface mining</b>	Surface mining occurs where mineral deposits are close to the surface and typically involves blasting and removing surface layers of soil and rock to reach the mineral deposit (also known as open-pit or open-cast mining).
<b>tailings</b>	A mineral processing plant waste material comprising water, chemicals, and other minerals after most of the recoverable valuable minerals have been extracted.
<b>underground (mining)</b>	Excavation of mineral resources without removing the overlying strata and includes associated surface and underground infrastructure.
<b>void</b>	The surface feature that remains after excavation (i.e., the final mine pit at end of the mine's life).