



Planning &
Environment

Rehabilitation Cost Estimation Tool Handbook

***Mining Act 1992
and Petroleum
(Onshore) Act 1991***

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Disclaimer

The information contained in this publication is based on knowledge and understanding at the time of writing (June 2017). However, because of advances in knowledge, users are reminded of the need to ensure that the information upon which they rely is up to date and to check the currency of the information with the appropriate officer of the Department of Planning and Environment or the user's independent advisor.

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1 Introduction

1.1 Background

The NSW Department of Planning and Environment, Division of Resources and Geoscience (the Department) is responsible for the regulation of mineral and coal exploration and mining pursuant to authorisations granted under the *Mining Act 1992* and petroleum exploration and production operations pursuant to petroleum titles granted under the *Petroleum (Onshore) Act 1991*. Both Acts allow the Minister for Resources (or delegate) to impose and vary security deposit conditions on authorisations and petroleum titles (referred to collectively in this document as authorisations) to cover the obligations of the authorisation holder. The security deposit is required for the fulfilment of obligations under the authorisation, including those related to rehabilitation, and obligations that may arise in the future.

Authorisation holders are required to submit a Rehabilitation Cost Estimate (RCE) whenever a potential change in rehabilitation liability occurs and at other key points throughout the tenure of an authorisation. The RCE is used by the Division of Resources and Geoscience (DRG) to assist in determining the amount of the security deposit required for the authorisation.

The Department's Rehabilitation Security Deposits policy requires that the security deposit cover the government's full costs in undertaking rehabilitation in the event of default by the authorisation holder. This requirement is intended to minimise potential liabilities to the state in the event that the authorisation holder defaults on their rehabilitation obligations.

1.2 Purpose

The objective of the Rehabilitation Cost Estimation Tool (the RCE Tool) is to provide exploration and mine operators with guidance on calculating an appropriate RCE for their operations by assisting in the assessment and quantification of rehabilitation risks and liabilities according to the *Mining Act 1992*.

The RCE Tool does not apply to the sealing of petroleum wells associated with exploration and production activities under the *Petroleum (Onshore) Act 1991*. Petroleum title holders can use the RCE Tool for guidance on calculating an appropriate RCE for disturbance associated with their activities. However, it is the expectation that a separate estimate is submitted for the sealing of petroleum wells, with the RCE prepared by a suitably qualified expert in consideration of the scale, nature, risks and age associated with petroleum wells specific to the petroleum title.

It is acknowledged that the calculation of an appropriate RCE varies across the wide range of mine types and exploration operations in NSW. With this in mind, the intent of the RCE Tool's 'workbook' approach is to work towards all authorisation holders having a consistent approach to estimating the rehabilitation costs for coal and mineral resource operations in NSW.

These guidelines have been prepared to assist NSW exploration and mining operators in the preparation of a RCE, including:

- how to install and use the RCE Tool
- functionality of the worksheets
- identifying domains and rehabilitation activities
- calculating measurements, estimations and quantities
- finalising, reviewing and submitting a RCE.

The RCE Tool has also been divided into a series of operations and domains in order to best address the complexity of:

- different land uses across a mine site
- the difference between an underground and an open-cut mining operation
- operations specific to exploration.

The framework of the RCE Tool has also 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.

1.3 Approved land use and rehabilitation outcomes

Prior to calculating a RCE, authorisation holders using the RCE Tool should have regard to:

- post-mining rehabilitation commitments established as part of the development consent issued under the *Environment Planning and Assessment Act 1979* and associated conditions of authorisations issued under the *Mining Act 1992*
- the specific rehabilitation approach and outcomes nominated in the Mining Operations Plan
- the relevant Rehabilitation Objectives and Completion Criteria for each domain
- the rehabilitation outcomes contained in the following documents associated with an Exploration Activity Approval:
 - Form [ESF4: Application to Conduct Exploration Activities](#)
 - Review of Environmental Factors or Environmental Impact Statement (where required)

- Rehabilitation Objectives and Completion Criteria prepared in accordance with the [Exploration Code of Practice: Rehabilitation](#)
- Rehabilitation Management Plan prepared in accordance with the [Exploration Code of Practice: Rehabilitation](#)
- site variations and complexities appropriate to the individual site.

1.4 Changes from the previous version of the RCE Tool

The major changes to the RCE Tool (the former ESB26) are:

- Mining operations are segregated by the type of mining operation (open cut, open cut and underground, and underground) instead of by the material being mined as per previous version (i.e. metal, coal and hard rock/alluvial/quarry operations).
- Exploration authorisations are captured in a dedicated workbook in the RCE Tool.
- All relevant domains for each type of operation are combined on a single linear worksheet. Previously domains were on separate worksheet tabs (i.e. one worksheet per domain).
- Cost schedule has been updated based on 2015–16 third party industry rates.
- Other activities have been added to provide greater detail and a wider range of rehabilitation activities for consideration.
- The 'Justifications and Assumptions for Proposed Rates' column has been updated to assist in understanding the application of the rehabilitation activity.
- A definitions worksheet has been added to the RCE Tool.
- A number of formatting and security changes have been added.

1.5 Option of using alternative tools/prices

The use of alternative tools or unit prices is acceptable where:

- the number of domains is beyond the number provided in the RCE Tool
- information provided (assumptions, rates, scope of activities) is consistent with information required by the RCE Tool
- the tool has similar functionality to the RCE Tool rates and scope of works are consistent with what is outlined in the RCE Tool.

■ Note that alternative rates require justification.

1.6 More information

For more information on a RCE or the RCE Tool, contact the Environmental Sustainability Unit:

516 High Street Maitland NSW 2320

Postal address: PO Box 344 Hunter Region Mail Centre NSW 2310

Telephone: 02 4931 6590

Email: minres.environment@industry.nsw.gov.au

Website: www.resourcesandenergy.nsw.gov.au

2 Using the RCE Tool

2.1 Mining

The RCE Tool separates mining operations into Open Cut, Underground, and Open Cut and Underground. The relevant type of mining operation should be selected whether the material being mined is metalliferous, minerals, coal, aggregate, sand or other. For further clarification, open cut and underground mining descriptions are located in Appendix 1.

Within the RCE Tool, each mining operation is separated into a series of domains associated with the type of disturbance that must be considered for rehabilitation, for example infrastructure, tailings and rejects, and overburden and waste. Each line item must be checked for applicability to the operation for which the rehabilitation estimate is being developed. Where required, quantities and other information are to be entered into the relevant cells (see Section 2.4.4).

Rehabilitation costs associated with exploration within mining leases should be addressed in relevant management precincts within the mining operations sheets in the RCE Tool.

2.2 Exploration

The exploration function of the RCE Tool is to be used for exploration authorisations only. The site registration and description pages differ from that of mining operations (i.e. no reference to Mining Operations Plans; refers to holder of the exploration authorisation instead of mine owner) and there is a single domain to capture all associated rehabilitation activities.

The 'All Rehabilitation Activities' domain features management precincts including:

- termination of services and demolition works
- contaminated materials
- boreholes
- roads and tracks
- earthworks/structural works
- rehabilitation
- maintenance of rehabilitated areas

- maintenance of other land
- sundry items
- third party project management.

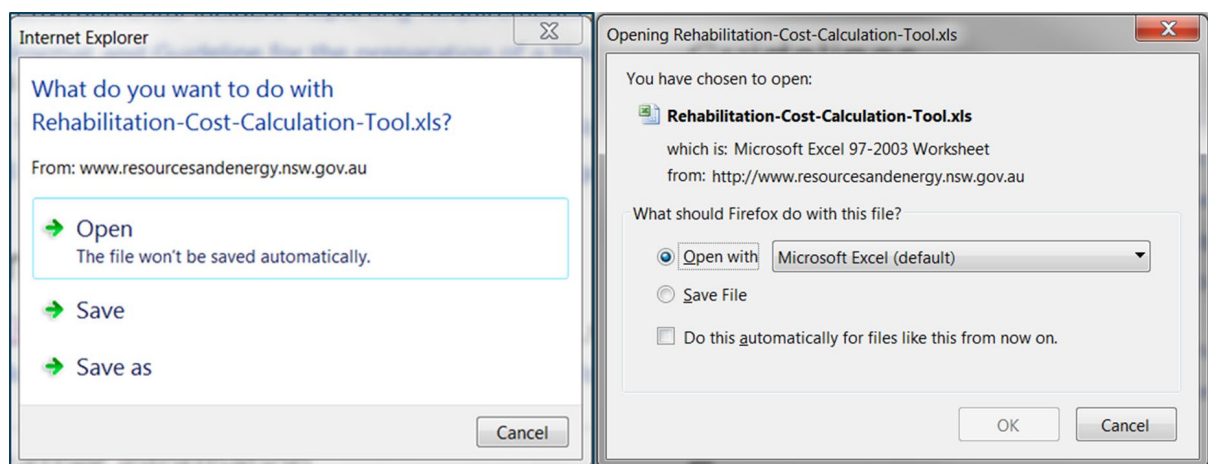
When the exploration function of the RCE Tool is used, three exploration domain pages are presented. These additional spreadsheets have been added to assist in the functionality of the RCE Tool for larger exploration programs or exploration sites with multiple programs. Where the additional spreadsheets are not required, leave fields in the relevant spreadsheets blank.

2.3 Preparation

2.3.1 Installation and commands

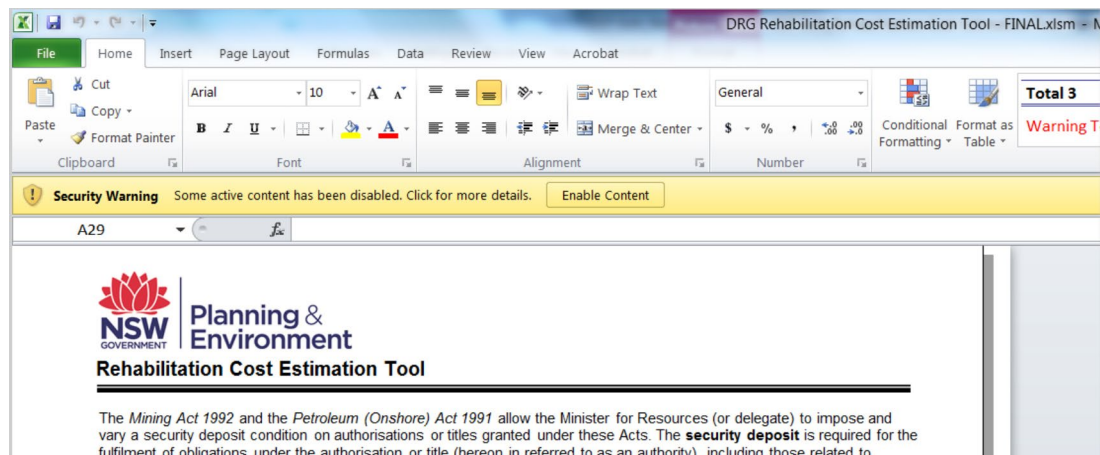
To install the tool, click on the link for the form at www.resourcesandenergy.nsw.gov.au/miners-and-explorers/rules-and-forms/pgf/environmental-guidelines and select the desired option to open or save the file as shown in Figure 1. Where required, review any security warnings or messages and scan the file.

Figure 1. Opening and saving the RCE Tool



When the workbook opens, if required click on 'Enable Content' at the top of the workbook to begin making changes within the file (see example in Figure 2).

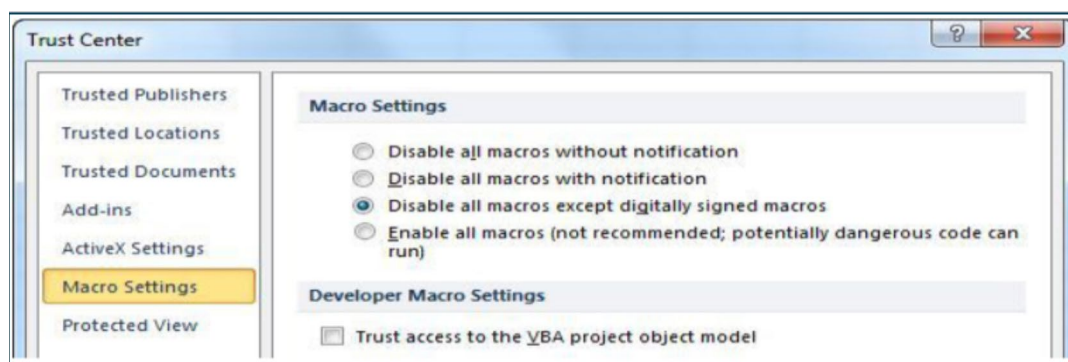
Figure 2. Enable editing



Macros are a set of instructions that can be used to perform some specific tasks in Microsoft Office applications. To enable macros on the workbook, follow the instructions below shown in Figures 3 and 4:

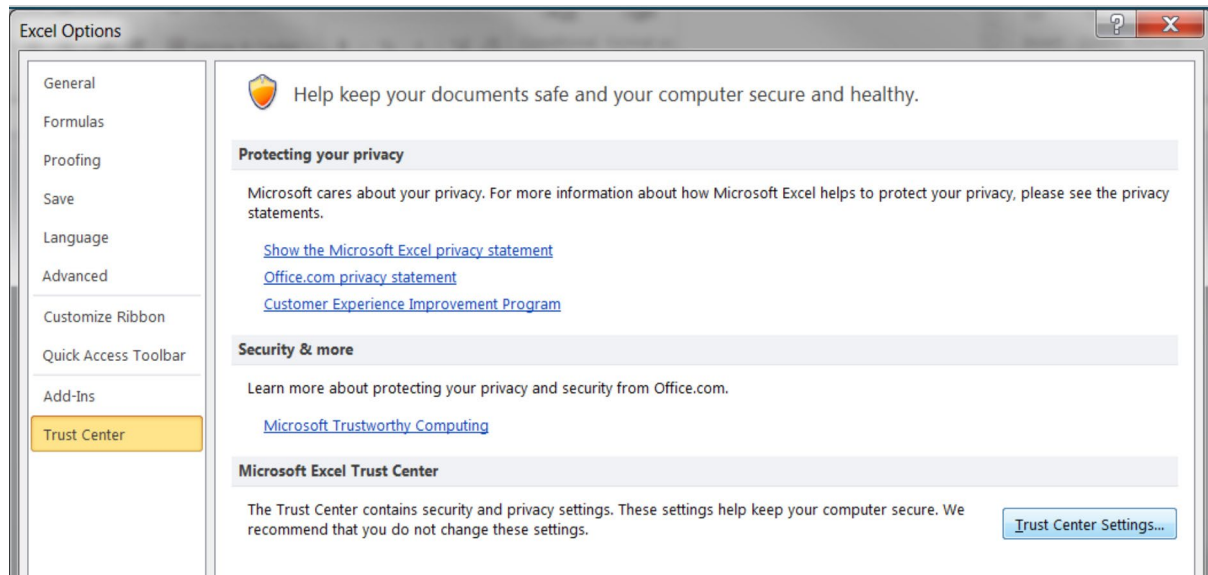
- **Excel 2000 and 2003** — Navigate to the 'Tools' tab in the top tool bar, hover over the 'Macro' option and then select 'Security'. In the security window, choose the level of security desired ('Medium Security' asks permission before running a macro.)
- **Excel 2007** — Open a Microsoft Excel file and select the 'Office' button, then select 'Excel Options' at the bottom of the menu. Select 'Trust Center' followed by 'Trust Center Settings'; click on the 'Macro Settings' and then choose the level of security desired to run macros.

Figure 3. Excel 2007 – Trust Center › Macro Settings



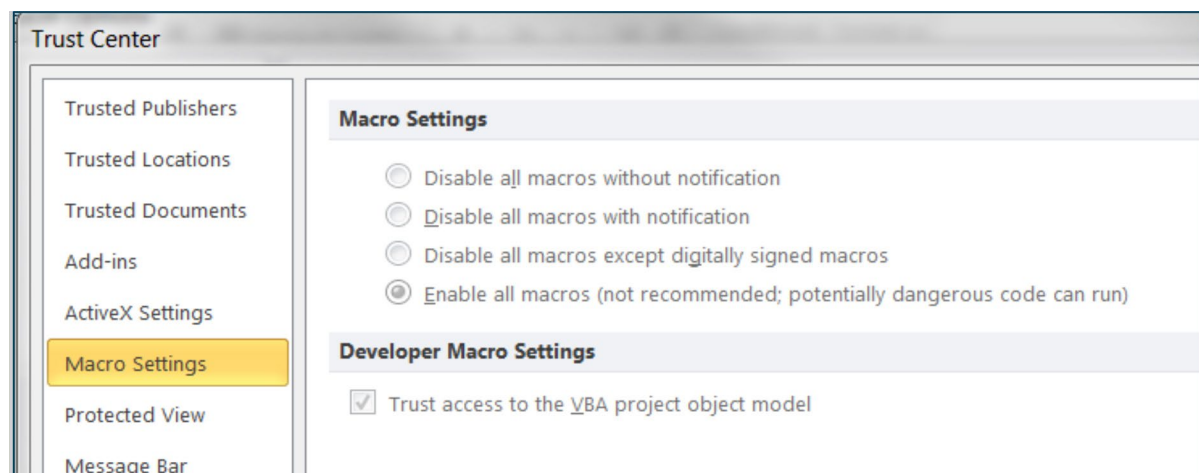
- **Excel 2010 and 2013** — Open a Microsoft Excel file and in the first tab 'File' select the 'Options' button in the menu followed by 'Trust Center' and Trust Center Settings'.

Figure 4. Excel 2010 and 2013 – Trust Center › Trust Center Settings



In the 'Trust Center' window click on the option 'Macro Settings' and then choose the level of security desired to run macros (see an example in Figure 5).

Figure 5. Excel 2010 and 2013 – Macro Settings



To save the file under a different name, under the 'File' tab or dropdown menu, select 'Save As' and nominate a relevant file name and location where the file can be accessed and stored for use and / or retained as a record.

Most images provided in this handbook are sourced from Microsoft Excel 2010. Screen views may differ slightly in other Excel versions; but the functionality of the RCE Tool is the same.

2.3.2 Data collection

Data collection should include the use of:

- site survey, spatial and topographic data
- aerial photos
- detailed design drawings
- mine planning/sequencing software, where available.

The choice of data sources should consider the user's requirements, existing and readily available data, and the resolution and scale required. A number of these sources may provide easily obtainable data (for example, pit bench widths and heights, topsoil volumes and disturbance areas) in order to develop a representative RCE.

Where relevant, the ability to keep records of measurements used to calculate quantities should be considered for future reference and validation purposes.

Free GIS software that can be utilised from the internet include: Google Earth or Google Earth Pro – for registered users (www.google.com/earth), QGIS Essen (qgis.org/en/site) and SIX Maps (maps.six.nsw.gov.au/) – see opening window in Figure 6.

Each software package has its own specific terms and conditions for use.

Some operations may have licenced GIS software, such as MapInfo or ArcGIS which they can use to acquire data needed for this process. 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 areas.

Figure 6. SIX Maps welcome and help page



2.4 Developing a Rehabilitation Cost Estimate

2.4.1 Introduction

To select the type of operation at your site(s), click on the button on the introduction page that aligns with the operation (see Figure 7). This will take you straight to the registration page.

Figure 7. The RCE introduction page

Calculating a RCE

The framework of the RCE 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 authority holder has the opportunity to nominate unit rates* which are not the same as those in the RCE Tool, any other unit rate proposed by the authority holder must be based on a third party cost as it is assumed that if the authority holder defaults on their responsibility to rehabilitate the mine or exploration operation(s), a contractor will be engaged by the Government to carry out the required rehabilitation works.

Select Type of Mining/Exploration Operations from Buttons Below

By selecting the relevant type of mining/petroleum/exploration 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 exploration, petroleum operations and/or mining operation.

Open Cut

Underground

Open Cut & Underground

Exploration

*Note: DRG may regularly make changes and updates to the spreadsheet as necessary. All authorisation holders are encouraged to use the most recent version of the spreadsheet, available on the DRG website.

Reset

At the bottom right of the introduction worksheet is a 'Reset' button. At any time you can use this button to completely reset the workbook and change the type of operation being reported.

Registration details, assumptions and rate change justification information will be retained. If a different operation type is selected following activation of the reset function, inputs to the operation type worksheets will not be retained (for example, notes, calculations and selections from dropdown boxes). If the same operation type is selected, the data will be retained.

2.4.2 Site registration

2.4.2.1 Mining operations

To fill the 'Site Registration' sheet, start by entering the Date using the dropdown box (see Figure 8). Then fill in the other details such as the name of your site, lease numbers and authorisation holder.

Figure 8. Site registration page – mining operation

	A	B	C	D	E	F	G	H	I	J	K	L
1												
2		Site Registration								Date		
3										Month		Year
4										Month		
5		Complete the following fields prior to calculating the Security Deposit.								January		
6										February		
7		Mine Name:								March		
8										April		
9		Lease(s):								May		
10										June		
11		Title Holder:								July		
12												
13		Mine Operator:										
14												
15		Expiry of MOP:										
16												
17		Current Security:					Current Security held by Department of Industry		Security Deposit review			
18												
19		Mine Contact:										
20												
21		Position:										
22												
23		Address:										
24												
25												
26												
27		Phone:			e-mail							
28												

Below the 'Site Registration' page is a 'Site Description' page. In the 'Site Description' page, for mining operations input the Summary of Mine Activities information (for example, mine lease area and area of extraction) for the Mining Operations Plan period (see Figure 9).

Figure 9. Summary of mine activities

Summary of Mine Activities	
Total annual production (tonnes):	
Mine lease area (ha):	
Area of extraction (ha):	
Area of disturbance (ha):	
Rehabilitation in progress (ha):	
Rehabilitation complete (ha):	
Achieved ecosystem sustainability	
MOP Utilised:	
Reference MOP no. version and date	
MOP Plan(s) utilised:	1
Reference Plan no. version and date	2
	3
<input type="checkbox"/> Plan(s) attached	

On the 'Site Description' page, also identify Environmental Sensitivities relevant to your site (see Figure 10).

Figure 10. Environmental sensitivities

Environmental Sensitivities

Surrounding land use (tick all that apply):

- ☒ Cropping
- ☒ Pasture
- ☐ Forest
- ☐ Undisturbed habitat
- ☒ Urban

Environmental Issues affecting site (tick all that apply)

- ☒ Threatened flora
- ☐ Threatened fauna
- ☒ Cultural heritage items
- ☐ Natural heritage features
- ☒ Mine subsidence
- ☒ Surface water pollution
- ☐ Ground water pollution
- ☒ Hydrocarbon contamination
- ☒ Methane drainage/venting
- ☐ Spontaneous combustion
- ☐ Acid Mine Drainage
- ☒ Within drinking water catchment
- ☒ Other (describe below)


Geotechnical considerations for
Co-disposal

Add any other relevant issues to
your site (example)

Key registration information is automatically transferred into the 'Summary' page (see Figure 11).

Any edits to the Summary page must be done via the Site Registration tab. The summary report cells are locked.

Figure 11. Summary page



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Environment**

Create
Underground
RCE Report

Underground Summary Rehabilitation Cost Estimation

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

Mine Name:	<input type="text" value="Coal and Mineral Mine"/>		
Lease(s):	<input type="text" value="ML1000, CML54545"/>		
Mine Owner:	<input type="text" value="Underground Extraction Pty Ltd"/>		
Mine Operator:	<input type="text" value="Underground Extraction Pty Ltd"/>		
Expiry of MOP:	<input type="text" value="31/1/2017"/>		
Current Security:	<input type="text" value="\$8,000,000"/>	Date of Last Security Deposit Review:	<input type="text" value="14/12/2014"/>
Mine Contact:	<input type="text" value="Jonathon Higgins"/>		
Position:	<input type="text" value="Environmental Manager/Quantity Surveyor"/>		
Address:	<input type="text" value="123 Mine Road"/>		
	<input type="text" value="Mine Town"/>		
	<input type="text" value="NSW 2312"/>		
Phone:	<input type="text" value="123456789"/>	email:	<input type="text" value="jon.higgins@undergroundextraction.com.au"/>

2.4.2.2 Exploration authorisations

The 'Site Registration' page is completed in a similar way to the 'Mining Operations' page. Begin by entering the date using the dropdown box, then complete all other details such as the authorisation number, holder of the authorisation, authorisation expiry date and current security (see Figure 12).

Figure 12. Site registration – exploration authorisations

Site Registration	Date	Month	Year
Complete the following fields prior to calculating the security deposit.			
Exploration Authorisation No.:	<input type="text" value="EL12345"/>		
Exploration Authorisation Holder Name:	<input type="text" value="Explore for Resources Ltd"/>		
Expiry of Authorisation:	<input type="text" value="1-1-2016"/>		
Current Security	<input type="text" value="\$33,000"/>	Current Security held by the Department	Date of last Security Deposit review <input type="text" value="01-01-2015"/>
RCE Contact	<input type="text" value="John Citizen"/>		
Position	<input type="text" value="Exploration Manager"/>		
Address	<input type="text" value="123 Explore Street"/> <input type="text" value="Resources, NSW 2244"/>		
Phone	<input type="text" value="0412 345 678"/>	e-mail	<input type="text" value="j.r.citizen@EFR.com"/>

In the 'Site Description' page for exploration authorisations, enter the Summary of Exploration Activities information, which includes authorisation area and approval references (see Figure 13).

Figure 13. Site description – exploration authorisations

Site Description

The following site specific information is requested to provide background information in the context of calculating the security deposit.

Summary of Exploration Activities

Authorisation area (ha):	Hectares	
Exploration Activity (Assessable Prospecting Operations) Approval references for activities which have not been rehabilitated to the satisfaction* of the Department.	1	
	2	
	3	
	4	

*Rehabilitation of prospecting operations is deemed 'satisfactory' when:

- a Form ESF2 – Rehabilitation Completion and/or Review of Rehabilitation Cost Estimate is submitted to the department by the authority holder, and
- the department has formally notified the authority holder that the rehabilitation is satisfactory.

Key registration information is automatically transferred into the 'Exploration Summary Report' (see Figure 14).

Any edits to the Summary page must be done via the Site Registration tab. The summary report cells are locked.

Figure 14. Exploration summary page



Planning & Environment

Exploration Summary Rehabilitation Cost Estimation

Create Exploration RCE Report

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

Exploration Authorisation Number	EL12345		
Exploration Authorisation Holder Name	Explorer for Resources Ltd		
Expiry of Authorisation	1/01/2016		
Current Security	\$33,000	Date of Last Security Deposit Review	1/01/2015
RCE Contact	John Citizen		
Position	Exploration Manager		
Address	123 Explore Street Resources, NSW, 2244		
Phone	0412 345 678	email	j.r.citizen@Efr.com

2.4.3 Worksheets

The worksheets presented in the RCE Tool are summarised in Table 1.

Table 1. RCE Tool worksheets and their functions

Worksheet Title	Use/Function
Introduction	Introduction to the tool – use buttons to select type of operations for which a RCE is being developed.
Registration	<p>Input Site Information (operation name, lease/authorisation, current security, contact, etc.) and Site Description:</p> <p>For mining: mine activities – disturbance, rehabilitation, MOPs; environmental sensitivities – surrounding land use, issues affecting site.</p> <p>For exploration only: authorisation area and exploration authorisation approval references.</p>
Summary Report	Auto-populated with a summary of operations registration information and domain rehabilitation costs. Contingency, post closure environmental monitoring, project management and surveying calculations for the RCE can be manually adjusted.
Operations	<p>Input information to the domains as relevant:</p> <ul style="list-style-type: none">• Open Cut• Underground• Open Cut & Underground• Exploration <p>Open Cut (infrastructure, tailings & rejects, overburden & waste, active mine & voids and management activities).</p> <p>Underground (infrastructure, tailings & rejects, overburden & waste, subsidence & management).</p> <p>Open Cut & Underground (infrastructure, tailings & rejects, overburden & waste, active mine & voids and subsidence & management).</p> <p>Exploration (all rehabilitation activities).</p> <p>Inputs to each domain will include: domain-specific assumptions, quantities, dropdown box inputs (if any), alternative unit rates (if any), and 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>

Worksheet Title	Use/Function
Assumptions	Available to enter/describe project specific assumptions such as life-of-mine period, liabilities excluded by contract (e.g. easement and switchyard rehabilitation, rail loop, contractor infrastructure, etc.), post mining land use, infrastructure to be retained (by documented agreement), rehabilitation strategies (e.g. number of voids to remain at closure, depth of growth media, ratio of revegetation types, etc.).
Rate Change Justification	Identifies and provides the basis for any alternative third party rates provided for rehabilitation activities. The relevant domain, activity, DRG unit/rate, adopted rate and justification must be identified in this worksheet. The company representative must also provide relevant information to certify that the rate change is justified based on third party rates and that only the listed rates were adjusted in the RCE Tool.
Definitions	Key definitions are provided in this worksheet for the terms used within the RCE Tool. This is to assist in determining applicability of activities to operations for which a cost estimate is being developed.
Cost Schedule	This worksheet lists all the rehabilitation activities in the RCE Tool. It presents the activity description, unit, unit rate/price and justification and assumptions for proposed rates. The justifications and assumptions are only provided as indicative methodologies to indicate how an activity may be undertaken. This is intended only as guidance and to assist the user with information on how to apply the rate. It is accepted that in some instances different plant and equipment may be used, and the 'Default Unit Rate' endeavours to accommodate variation resulting from this.

2.4.4 Formulas and functionality of the workbook

The RCE Tool includes formulas and functionality for ease of calculation. The key aspects include:

- When the column 'Applicable (Y or N)' is changed to 'N', nil Total Cost is assigned to that line item – the number in the 'Total Cost' column disappears. When 'Y' is retained, the number in the 'Total Cost' column remains at \$0 awaiting the input of quantities and associated information for that line item (see Figure 15).

Figure 15. The application of the Y or N function

Open Cut and Underground Operations										
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
No Acid Sulfate Soils (ASS) located on-site					Total Landform Establishment:					17 ha
					Total Growth Media Development:					12 ha
					Total Ecosystem Establishment:					12 ha

Number in column disappears when
Applicable (Y or N) = N

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 Acid Sulfate Soils	N		ha	\$2,580				Assumes ASS is treatable via neutralisation and does not require capping and isolation.
	Removal and disposal of plastic liner (i.e., dam, leach pad, sump etc.)	Y		m2	\$1.00		\$0		Provisional sum for cutting using ripping tyres and on-site disposal of the liner.

- Quantities entered by the user are calculated into a total cost for each line item based on 'Quantity' x 'Default Unit Rate' (see Figure 16).

Figure 16. Entering quantities

Open Cut Operations

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			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:
Termination of Services and Demolition Works	Disconnect and terminate all services (Water, electricity, gas etc at point of attachment to site)	Y	2	allow	\$35,000		\$70,000	1 disconnection fee for Administration and workshop 1 disconnection fee for 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.

Where relevant, information should be provided in the column 'Basis for Costs Estimation and Additional Relevant Information'. This may include details describing aspects including infrastructure, areas and landforms where the activity/description will take place and for which the quantities are representative. Where helpful, basic equations can be inserted in the 'Quantity' column to assist in calculations to determine quantities (see Figure 17).

Figure 17. Basis for cost estimation and relevant information

Earthworks / Structural Works (Landform Establishment)	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:
	Major bulk pushing to achieve grades nominated in the approval/permit – 50 m push length	Y	=2*10000*2	m3	\$0.80		\$31,925	< 50m push 2 ha of short push at ~2m average depth	D11 push at \$350 and 400 bcm/hr
	Minor reshaping and pushing	Y		ha	\$3,900		\$0		D10 Dozer @ \$332 per hour and 16H Grader @ \$212 per hour (50% utilisation).
	Structural works, banks, waterways - contour banks, drainage channels and other soil conservation measures	N		ha	\$1,600				Combination of dozer and excavator work. Small dozer (D6 or similar) @ ~\$200 per hour plus grader @ \$212 per hour for ~4 hours each per ha.

- A number of 'Activity/Description' line items have dropdown boxes to input rates reflective of site-specific parameters for:
 - Haul distance (carbonaceous/metalliferous spillage, stabilised material, topsoil, filling dams/voids, draining and removing contaminated sediments from dam/sump floors)

- Volumes of hydrocarbon contaminated material (for onsite remediation of hydrocarbons via manual land farming)
- Push length (major bulk pushing to achieve grades nominated in the project approval conditions)
- Development of an unplanned project closure plan (State significant development or non-state significant development).

The dropdown box option selected determines the 'Default Unit Rate' (that is,. the unit rates differ for different haul distances, push lengths, etc.).

After providing a 'Quantity' for the activity, the applicable option must be selected from the dropdown box (see Figures 18 and 19).

Figure 18. Using dropdown boxes – contaminated material

Load, cart and dispose of High Level contaminated material off site to a licensed landfill. Assumes cartage to a licensed landfill	N		m3	\$700.00			specialists to treat.
Load, cart and disposal of Low Level contaminated material off site to a licensed landfill. Add \$50/m3 for cartage to regional landfill	N		m3	\$200.00			Includes load, haul and dump fees to a licensed facility.
Onsite remediation of hydrocarbon contaminated soils manual land farming (Select Volume from List)	Y	20	m3	Select from List			<div> <div>Select Volume Here</div> <div> <div><50m3</div> <div>> 50m3 but <100m3</div> <div>>100m3 but < 500m3</div> <div>> 500m3</div> </div> </div> <div> <div>reading of contaminated soils on prepared surface and stimulation</div> <div>perobic microbial activity within</div> <div>soils through aeration and/or the</div> <div>addition of minerals, nutrients and</div> <div>moisture to promote the aerobic</div> <div>degradation of organic chemicals -</div> <div>time frame of up to 24 months.</div> </div>

The volume of hydrocarbons to be treated as part of the rehabilitation program will be determined from the land contamination investigations and/or estimations based on observations.

The determination of whether the project is a State Significant Development or non-State Significant Development would be based on the classification provided in the planning/approval stages.

Figure 19. Using dropdown boxes – development significance

Sundry Items					Subtotal	\$25,000		
Development of an 'Unplanned' Project Closure Plan - State Significant Development	Y	1	@	\$100,000		\$100,000	SSD	Provisional sum to be used to refine the conceptual closure plan into a detailed closure plan with execution strategies for rehabilitation activities;

Measurements/calculations of haul distance and push length are outlined in Section 2.4.6. Once determined, these require input via dropdown boxes as well (see Figure 20).

Figure 20. Using dropdown boxes – dozer push

Earthworks / Structural Works (Landform Establishment)	Major bulk pushing to achieve grades nominated in the approval/permit – 50 m push length	Y	40000	m3	\$0.80	\$31,925	< 50m push	push at \$350 and 400 bcm/hr
	Minor reshaping and pushing	Y		ha	\$3,900	\$0	Select Push Length Here	Dozer @ \$332 per hour and 16H
	Structural works, banks, waterways - contour banks, drainage channels and other soil conservation measures	N		ha	\$1,600		< 50m push > 50m - 100m < push > 100m - 150m < push > 150m push	der @ \$212 per hour (50% utilisation).
	Fill dams, voids etc. - Source local material, cart and spread to cap or backfill, cap thickness determined by approval / permit (Select Haul Distance from List)	Y		m3	Select from List		Select Haul Distance Here	Combination of dozer and excavator work. Small dozer (D6 or similar) @ ~\$200 per hour plus grader @ \$212 per hour for ~4 hours each per ha. This item includes the volume of material requiring backfill using an excavator and scraper to fill the void and enable the establishment of rehabilitation.

- The 'Alternative Unit Rate' based on third-party costs (as per Section 2.4.7) is entered and utilised to calculate 'Total Cost' for the line item instead of the 'Default Unit Rate' where present (see Figure 21).

Figure 21. Using an alternative unit rate

Exploration boreholes – rehabilitate boreholes and drill pads as required	Y		depth (m)	\$40.00		\$0		Assumes a per metre drilling rate of ~\$150 / m of which ~25 - 30% is for rehabilitation 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, reshaping / ripping the drill pad, amelioration / seeding etc.)
Exploration boreholes – backfill open bore holes with cuttings	Y	3	allow	\$300.00	\$260.00	\$780	insert additional information here	May include cutting of casing, installation of a casing cap, and/or backfilling the hole with drill cuttings.
Exploration boreholes – grout and cap open bore holes	Y		allow	\$7,950		\$0		Includes grouting and capping 100 - 200 m exploration boreholes to meet the

When an alternative rate is used, the 'Basis for Costs Estimation and Additional Relevant Information' is coloured red and provides a reminder to provide information to support the alternative rate (see Figure 22).

Figure 22. Alternate rates – supporting information

Exploration boreholes – rehabilitate boreholes and drill pads as required	Y		depth (m)	\$40.00		\$0		Assumes a per metre drilling rate of ~\$150 / m of which ~25 - 30% is for rehabilitation 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, reshaping / ripping the drill pad, amelioration / seeding etc.)
Exploration boreholes – backfill open bore holes with cuttings	Y	3	allow	\$300.00	\$260.00	\$780	Based on Drillmaster contractor quote 01/02/2016	May include cutting of casing, installation of a casing cap, and/or backfilling the hole with drill cuttings.
Exploration boreholes – grout and cap open bore holes	Y		allow	\$7,950		\$0		Includes grouting and capping 100 - 200 m exploration boreholes to meet the

- If required, additional activities not listed within the Activity/Description can be included in the 'Additional Items' section. This can be done by changing 'Applicable (Y or N)' column to 'Y', entering the 'Quantity', 'Unit', and 'Alternative Unit Rate', and insert supporting information in the column 'Basis for Costs Estimation and Additional Relevant Information' (see Figure 23).

Figure 23. Including additional items

Additional Items	Removal of lightening poles from magazine	Y	1	allow	This is	\$6,000.00	\$6,000	Provisional quote from LMD Demolitions
	Other 2 <insert>	N			deliberately			
	Other 3 <insert>	N			left blank			
Additional Items Subtotal							\$6,000	

- For each line item after applicability is selected as 'Y' and 'Quantity', 'Alternative Unit Rate' and dropdown box inputs are applied; the 'Total Cost' for all the individual line items of that management precinct are summed to the greyed 'Subtotal' line (see Figure 24).

Figure 24. Management precinct subtotal

Roads and Tracks	Unsealed roads / vehicle park-up areas – minor works including deep rip and trim	Y	15	ha	\$960.00		\$14,400	Light vehicle monitoring tracks.	Assumes ~6 m road width - 16H Grader @ \$212 per hour.
	Unsealed roads / access tracks / vehicle park-up areas with windrows and/or small earthen bunds – minor earthworks and deep rip and trim	N		ha	\$1,500				Assumes ~20 m road width - D10 Dozer @ \$332 per hour.
	Unsealed roads / vehicle park-up areas – Minor earthworks, final trim and deep rip and seed (pasture grass)	Y	9	ha	\$3,698		\$33,282	Exploration tracks through pasture areas	D10 Dozer @ \$332 per hour and 16H Grader @ \$212 per hour (50% utilisation) - pasture grass
	Unsealed roads / vehicle park-up areas – Minor earthworks, final trim and deep rip, ameliorate and seed (native tree/shrub/grass)	Y	3	ha	\$4,485		\$13,455	Exploration tracks through bushland	D10 Dozer @ \$332 per hour and 16H Grader @ \$212 per hour (50% utilisation) - tree/shrub seed.
	Unsealed roads / haul roads / vehicle park-up areas with windrows and/or small earthen bunds – Minor earthworks, final trim and deep rip, ameliorate and seed (pasture grass)	N		ha	\$3,820				D10 Dozer @ \$332 per hour and 16H Grader @ \$212 per hour (50% utilisation) - pasture grass seed.
	Unsealed roads / haul roads / vehicle park-up areas with windrows and/or small earthen bunds – Minor earthworks, final trim and deep rip, ameliorate and seed (native tree/shrub/grass)	N		ha	\$4,595				D10 Dozer @ \$332 per hour and 16H Grader @ \$212 per hour (50% utilisation) - tree/shrub seed.
	Remove stabilised material (blue metal, aggregate etc.) from roadways and disposal on-site/locally (haul distance >1 km but <2 km)	Y	1250	m3	\$5.64		\$7,051	> 1km but <= 2km Decommission a build pad 50 x 50 m and ~0.5 m 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, Ancillary watercart and grader at \$0.75cm3
	Roads and Tracks Subtotal						\$68,188		

- All the management precinct 'Subtotal' lines in a domain are summed to the final line at the end of that table titled 'Total Cost for [XXX] Domain' (see Figure 25).

Figure 25. Domain total costs

	Site security during closure	Y	2	yr.	\$75,000		\$150,000	Decommissioning and rehabilitation estimated to take 1.5 - 2 years	Provisional sum for site security measures required during closure. This includes nightly patrols and first response in the event of an out of hours incident.
	HAZMAT Clean-up - cleaning and decontaminating plant and equipment, chemical storage locations, oil and grease traps, tanks, vessels, and pipe work etc	N		allow	\$100,000				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		\$25,000	Only 1 radiation device for manual analysis	Provisional sum for removal and disposal of monitoring devices on conveyors using a radiation source (i.e., Americium - 241, Plutonium - 238, Caesium - 137 etc).
	Additional fees for accessing State, Crown or other public lands for rehabilitation/remediation activities	N		allow	Use alternate rate cell				Provisional sum.
Sundry Items Subtotal							\$175,000		
Mobilisation and Demobilisation	Mobilisation & Demobilisation for small mine or quarry	Y	1	item	\$40,000		\$40,000	Small mine produces only 900 kt of product per year with small disturbance footprint	May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation (Distance to site <150 km)	N		item	\$100,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation (Distance to site >150 km but <500 km)	N		item	\$150,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation (Distance to site >500 km but <1000 km)	N		item	\$300,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation (Distance to site >1000 km)	N		item	\$500,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
Mobilisation and Demobilisation Subtotal							\$40,000		
Additional Items	Removal of cattle grid to allow access to post closure 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			deliberately				This item includes <<to be added by the operator>>
	Other 3 <insert>	N			left blank				This item includes <<to be added by the operator>>
Additional Items Subtotal							\$14,000		
Total Cost for Subsidence and Management Activities							\$329,000		

- The total cost for each domain is auto-populated in the Summary Report worksheet (e.g. 'Open Cut Summary Report', 'Underground Summary Report', 'Open Cut and Underground Summary Report' or 'Exploration Summary Report') and summed (see Figure 26).

Figure 26. Summary report – domain totals

Domain	Security Deposit
Domain 1: Infrastructure	4,323,101.63
Domain 2: Tailings & Rejects	5,428,576.42
Domain 3: Overburden & Waste	2,342,887.69
Domain 4: Subsidence and Management	1,208,569.75
Sub-Total (Domains and Sundry Items)	\$13,303,135.49

- Based on the characteristics of the operations for which a RCE is being completed, the contingent items including project management and environmental monitoring in the '[Operations] Summary Report' worksheet should be modified where relevant. Changes should consider the relevant NSW Department of Planning and Environment, Division of Resources and Geoscience *Rehabilitation Cost Estimate Guidelines (ESG1)*, and consultation with the Department where clarity is required. To change the percentage of any contingency or other provisions, edit the percentage in the table – these percentages are set at recommended default rates of 10%.

In the example below, a 15% contingency is applied to an operation due to inadequate knowledge about 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. These percentages are automatically calculated based on the 'Sub-Total (Domains and Sundry Items)' (see Figure 27).

Any amendments to this contingency amount are to be made in the 'Summary Report' worksheet and also justified in the 'Rate Change Justification' worksheet.

Figure 27. Summary report – contingent items

Sub-Total (Domains and Sundry Items)		\$13,303,135.49
Contingency	15%	\$1,995,470.32
Post Closure Environmental Monitoring	5%	\$665,156.77
Project Management and Surveying	10%	\$1,330,313.55

- The total security deposit required for the mining or exploration operations is then automatically calculated based on the 'Sub-Total (Domains and Sundry Items)' and contingent items, excluding Goods and Services Tax (GST).

The company representative must check the boxes beneath the estimate to indicate if unit prices have been altered in the estimate (that is, if alternative rates have been used) and the proposed rehabilitation design is consistent with the project approval conditions. They must also provide their name, role/responsibility, date and signature citing the rehabilitation security estimate as a true and accurate reflection of the total rehabilitation liability held for the operations using the best available information at that time (see Figure 28).

Figure 28. Finalising the Rehabilitation Cost Estimate

Domain		Security Deposit
Domain 1: Infrastructure		1,528,607.80
Domain 2: Tailings & Rejects		2,239,673.33
Domain 3: Overburden & Waste		1,799,062.15
Domain 4: Subsidence & Management		987,000.00
Sub-Total (Domains and Sundry Items)		\$6,554,343.28
Contingency	10%	\$655,434.33
Post Closure Environmental Monitoring	5%	\$327,717.16
Project Management and Surveying	10%	\$655,434.33
Total Security Deposit for the Mining Project (excl. of GST)		\$8,192,929.09

Note: GST is not included in the above calculation or as part of rehabilitation security deposits required by the Department

☒ 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 the AEMR.

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 held by this mine.

Jack Citizen _____
Company Representative's Name

02/02/2016 _____
Date

Managing Director _____
Company Representative's Role / Responsibility

Signature

2.4.5 Selecting activities

2.4.5.1 Considerations

To determine and select the appropriate activities in the RCE Tool required to rehabilitate all disturbance generated for the purposes of mining and/or exploration, the following aspects should be considered:

General

- Post mining land use (i.e. grazing, cropping, bushland, industrial, etc.)
- Revegetation strategies – direct seeding, hydro-seeding, tube stock, addition of fertiliser/biosolids, amelioration, fencing to protect vegetation

- Availability and application of topsoil/growth media
- Availability of other suitable rehabilitation materials (e.g. competent rock, low permeability materials, organic amendments, Virgin Excavated Natural Materials (VENM), etc).
- Groundwater contamination
- Post mining landform profiles
- Steep slope stabilisation
- 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 maximise soil conservation and minimise the potential for erosion (i.e. contour banks, drainage channels, sediment dams, rock drains, etc.)
- Repatriation of heritage items and management requirements
- Cost/requirement to access public/State/Crown land to complete rehabilitation
- Mobilisation/demobilisation distance (round trip) to closest regional centre for demolition and earthworks equipment
- Exploration operations

Infrastructure

- Points of attachment of site services (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 – substations, demountables (on stumps), small (single storey/level), light industrial (single storey/level with raised roof to height of another level), industrial (multi storey/level with gantry crane, or other heavy infrastructure requiring removal), comminution, processing/preparation plant, hoppers, etc.
- Positioning of conveyors ('on ground', 'elevated' and '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 to be removed and disposed
- Stacker/reclaimer type (radial, luffing, bucket wheel) and presence of rails and ballast – in the case of a small mine or quarry, the stacker may be better classified as conveyor due to the scale and absence of hydraulics for raising/lowering or rotating
- Presence of silos, rail loading bins, reclaim tunnels, tanks (above ground and underground), pipes, pumps and pontoons, bitumen, evaporation fans and/or other water transfer and management infrastructure, radiation devices
- Rail loop and loading facilities

- Number and size of portals, adits and ventilation fan shafts requiring sealing and whether bat gates are required
- Presence and type of un-rehabilitated boreholes
- Dams to be retained (landowner agreements)
- Dam sediments requiring removal, decommissioning of turkey's nest structures unless a land owner agreement is in place
- Requirements to backfill sumps and voids

Contamination and remedial works

- Contamination requirements – assessment (Phase 1), water disposal, high and low level contaminated material requiring removal / treatment off-site, material requiring remediation on site, asbestos requiring removal, acid sulfate soils requiring management
- Requirement to remove blue metal/aggregate from stabilised areas and the depth of removal (typically 0.5 m)
- Presence and types of roads, access tracks, haul roads, vehicle park-up 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 re-design and re-construction of landform areas – see Section 2.4.6 for assistance to determine this)
- Any ongoing management requirements for successfully rehabilitated areas
- Buffer lands and successfully rehabilitated areas requiring pest management
- Undisturbed areas and land management requirements

Landforms

- Final pit/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 (considering public safety, coal seams and acid rock drainage potential areas, geotechnical stability, public infrastructure, etc.)
- Warning signs, safety barriers and/or trenching requirements (near voids, etc.)
- Creek diversion stabilisation, armouring and maintenance requirements

2.4.5.2 Examples of activities

The 'Cost Schedule' provides a list of rehabilitation activities that may be required for the decommissioning and rehabilitation of operations on a Mining Lease or an exploration authorisation. Examples of the decommissioning and rehabilitation activities that may be required for certain disturbance areas are provided below.

Dams

- Clean water dams to be retained after closure
- Drain and remove contaminated sediments
- On-site treatment of contaminated water due to high salt or low pH
- Remove pump and pontoon
- Remove and disposal of liner
- Load and haul material to fill dams/voids/sumps to achieve a free draining landform
- Major earthworks to decommission turkey's nest style dams

Underground-specific infrastructure

- Demolish and remove vent raise fans, electrical substation and winch
- Seal portals/adits or small adits
- Seal and rehabilitate ventilation fan shafts
- Install gate/grill over adit
- Security fence around steep section of highwall (use for shafts as required)
- Purchase and erect warning signs
- Maintenance and monitoring of sealed adits/portals
- Boreholes – cap and seal service boreholes for underground operations, goaf drainage, surface-to-in-seam gas drainage and/or vertical gas drainage

Exploration areas

- Boreholes – backfill open boreholes or grout with concrete and cap and seal boreholes (depending on sealing requirements)
- Remove and dispose of drill cores, pegs, tags, sample bags, flagging tape, drill chips and other wastes
- Contamination management as required
- Unsealed roads/access tracks/vehicle park-up areas/sumps and areas of bulk sampling – minor earthworks, final trim and deep rip
- Substrate preparation and revegetation of disturbed areas
- Erosion, sediment and drainage control and ongoing management
- Weed and pest animal control
- Monitoring and maintenance as required

2.4.6 Calculations

2.4.6.1 Measurements/estimations — examples

Area

To calculate an area (for example, a building to be demolished or a dam liner to be removed), measure around the item with your cursor (see Figure 29 and 30).

Figure 29. Estimating the area of a building

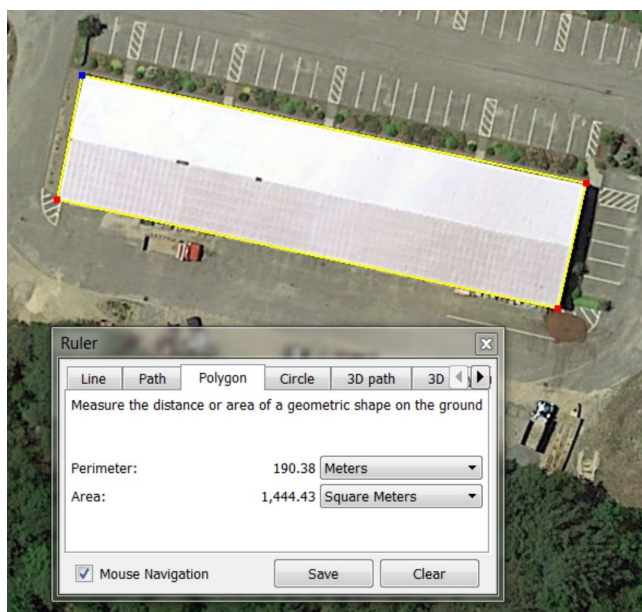
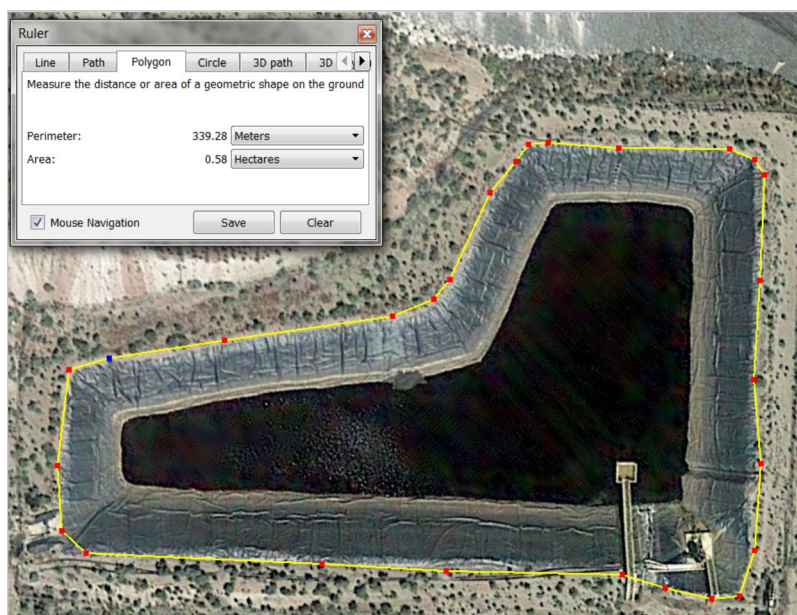


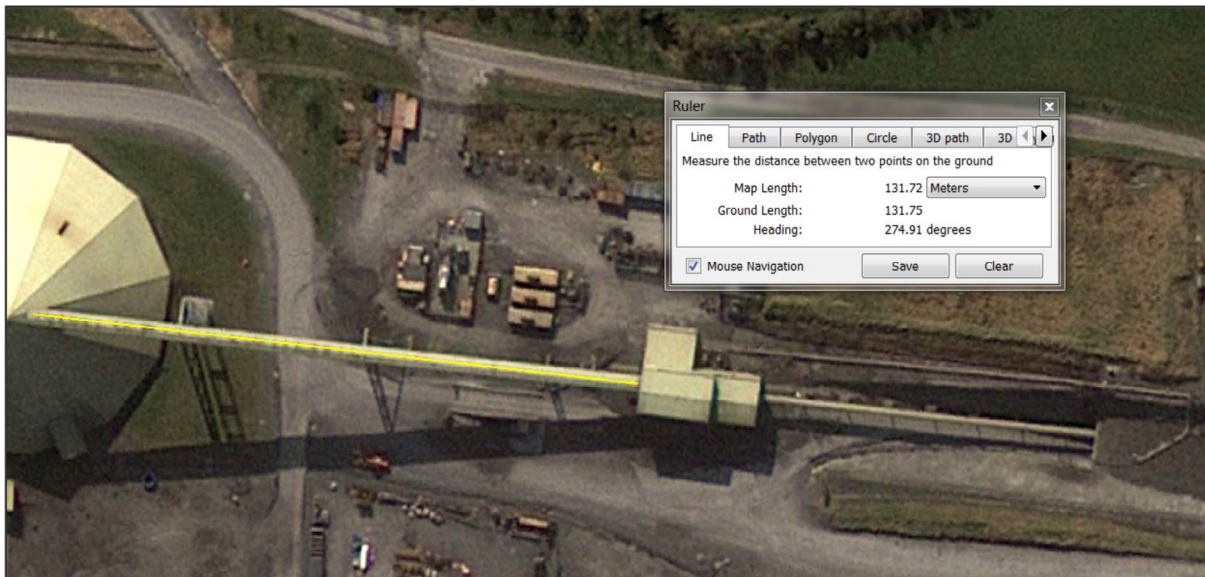
Figure 30. Estimating the area of a dam



Length/Width

To calculate the length or width of items such as conveyors, roadways and pipelines measure between the start and end points as required (see Figure 31).

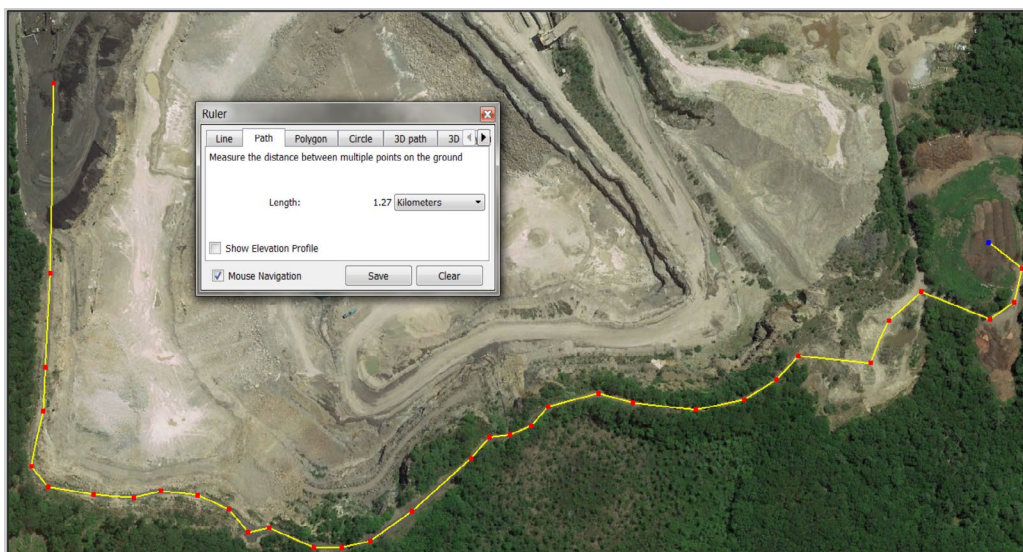
Figure 31. Estimating lengths



Haul distance

To calculate haul distance, measure the path within existing roadways between the approximate mid-points of the two locations considering other landforms and accessibility (see Figure 32), then double this length to identify the haul distance. In the example that follows, the growth media for the landform will require haulage >2 km but <5 km (i.e. $1.27 \text{ km} \times 2 = 2.54 \text{ km}$).

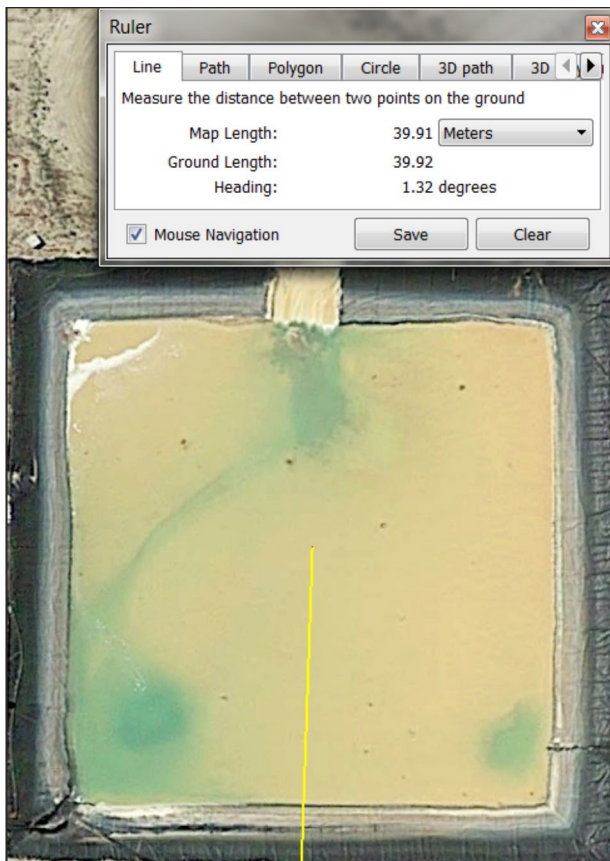
Figure 32. Estimating haul distance



Push length and volume

To calculate the dozer push length, measure the length between the material to be pushed and the approximate centre of the landform where the material is to be spread (see Figure 33). A push length of <50 m has been measured for pushing/levelling the dam wall (i.e. 39.91 m).

Figure 33. Estimating the maximum dozer push



Push volume is calculated based on length for example, the total bund length/perimeter), width and height/depth. This is required in addition to push length within the RCE Tool. To calculate push volumes on a dump, the area of the low wall, toe or other area to be pushed should be multiplied by the push depth (estimate based on current operations).

To calculate push volumes for a bund, the estimation can be calculated by:

$\frac{1}{2} \times \text{width (base)} \times \text{height} \times \text{length (of bund)}$

Example: for a bund of 560 m length around a dam, 3 m height and 10 m base width, the push volume would be:

$\frac{1}{2} \times 10 \text{ m} \times 3 \text{ m} \times 560 \text{ m} = 8,400 \text{ m}^3$

Height/depth

To determine the height and depth of buildings, sumps, bunds, dam walls etc., use contour data, reported measurements (from drawings and reports) or estimates by operations personnel.

2.4.6.2 Quantities

Calculations to determine quantities for the RCE Tool will consider the following:

- Areas are measured in square metres (m²) or hectares (ha) (in the column titled 'Unit'). Where conversion is required, note that 10,000 m² = 1 ha. A conversion of m² to ha is shown in Figure 34.

Figure 34. Calculating area

Mine Waste	Reshaping, capping / sealing of a structure unlikely to present difficulties due to chemistry – reactive materials (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.	Y	=170000/ 10000	ha	\$81,000	\$1,377,000
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- Volumes are measured in m³, L or ML (see the column titled 'Unit'). Where conversion is required, note that 1 m³ = 1,000 L and 1,000,000 L = 1 ML (Megalitre).

For calculations: generally volume = length x width x depth (see Figure 35).

Alternatively, volume = mass / density.

Figure 35. Calculating volume

Land Preparation and Revegetation (Growth Media Development and Ecosystem Establishment)	Source, cart and spread growth media - haul distance >2 km but <5 km	Y	37500	m ³	\$6.97	\$223,827	> 2km but <= 5km
	Planting mature trees (>15 cm)	Y		allow	\$20.00	\$0	25 ha area being topsoiled at 0.15 m average depth

- Mass is measured in tonnes. Note that 1,000 kg = 1 tonne.
- Length is measured in metres (m), kilometres (km) or lineal metres (Lm). Note 1,000 m = 1 km.
- m² / 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 36):

Figure 36. Calculating Building Demolition Area

Demolish and remove CHPP/process plant (include the area of each floor of the structure) - and disposal on-site/locally	Y	22050	m ² /floor	\$265.00	\$5,843,250	Processing plant has a 105 x 70 m footprint and is ~9 m high	Needs to be calculated per floor/level (Assume 1 floor/level = 3-4 m) - does not include transport to regional disposal facility or equivalent.
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- Item/@ are measures of the number of objects referenced in the description (such as overpasses, small tanks, Phase 1 contamination assessments, mobile treatment units, boreholes, trees, signs, dams and mobilisations / demobilisations). Calculation is not typically needed for these, but rather a basic count.

2.4.6.3 Unknown/undetermined values and contingencies

Some values may be unknown due to an absence of predictable rates or inability to predict how soils, geology, geotechnics, rock mechanics, nutrients, ecology and populations, legacy contamination, process changes, etc. will influence rehabilitation methodologies. Some examples of quantities required in the RCE Tool where the values may be as yet unknown/undetermined are:

- **Existing rehabilitation repair** – minor/moderate/major/total failure of landform – unknown extent, magnitude required in recently rehabilitated areas
- **Minor earthworks and maintenance of subsidence areas or create cut through to re-establish natural water courses/drainage channels following subsidence** – applicability unknown due to changing geology, uncertainty regarding extent of workings currently being mined (interaction with historic workings), or mining methods
- **Pest management on buffer lands, non-disturbed and rehabilitated areas or land management of undisturbed areas (rehabilitation, weeds, ferals, erosion and sediment control works)** – unknown due to ongoing changing ecology and populations, programs usually only conducted as required (infrequent and not scheduled)
- **Long-term maintenance of water course diversion – channel constructed through backfilled/competent material** – unknown due to absence of soils dispersion characterisation 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 the site conditions, any predictions in technical reports, monitoring results to date, etc.

Example 1: A mine has recently completed the rehabilitation of a 25 ha waste dump. Previously the mine rehabilitated a 10 ha waste rock dump of the same waste rock type, and using similar rehabilitation materials and methods. No monitoring has been conducted on the 10 ha waste rock dump to date, but the mine has found that 10 large gullies of approximately 10 m length, 2 m width and 3 m depth have opened up at the surface and will 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 and using a snapshot for this point in time, the mine can calculate that for the 10 ha waste rock dump that:

- Rehabilitation requiring repair:
 - Total failure of landform for the previous rehabilitation is
 $10 \times 10 \text{ m} \times 2 \text{ m} / 10,000 \text{ m}^2 / \text{ha} = 0.02 \text{ ha} (\sim 0.2\%)$
 - Moderate damage to previous rehabilitation is ~4 ha (~40%)

Based on this experience, the mine can also extrapolate a rate of repair for the 25 ha waste rock dump which was recently completed:

- Existing rehabilitation repair:
 - Total failure of landform for the current rehabilitation will be:
 $0.5\% \times 25 \text{ ha} = 0.125 \text{ ha}$
 - Moderate damage to current rehabilitation is $40\% \times 25 \text{ ha} = 10 \text{ ha}$

Example 2: A diversion of 1,560 m has been constructed recently at a mine. The diversion is designed in accordance with relevant best practice guidelines, taking into account regional geomorphology and material characterisation testing results. The design was constructed 70% in competent natural material, and 30% in backfilled material. The section constructed in backfill material is scheduled to be rock armoured next year. Only three rain events have occurred to date with very minor erosion on ~10% of the section of channel constructed through competent material, and ~50% of the section of channel constructed through backfill material. Based on this, the mine can extrapolate that long-term maintenance of water course diversion using a snapshot for this point in time will be through:

- competent material 70% x 1560 m = 1092 m (competent). 10% eroded = 109.2 m
- backfilled material 30% x 1560 m = 468 m (backfill). 50% eroded = 234 m.

2.4.7 Alternative rates

2.4.7.1 Inputs

An 'Alternative Unit Rate' should reflect independent third-party contract rates to undertake the rehabilitation activities in accordance with the project approval conditions. If only partial rehabilitation is captured by the alternative unit rate provided, this must be supplemented by rehabilitation activities within the RCE Tool or 'Additional Items' to address the remaining works required. The rates should be an accurate reflection of current market pricing, and adequately account for the works required to achieve the final landform, land-use and rehabilitation objectives.

The basis and relevant information for these rates must be supplied with the submission. Within the RCE Tool, methods of capturing alternative rates include the following:

- In the 'Alternative Unit Rate' column for the rehabilitation activity, insert the alternative rate as provided by or calculated based on the third-party information, and in the column 'Basis for Costs Estimation and Additional Relevant Information', insert the name of the company and date of quote as reference.
- In the 'Additional Items' management precinct for the relevant domain, insert the description of the works for which a quotation has been received; in the 'Applicable (Y or N)' column change the 'N' to 'Y'; insert the number of works required in the 'Quantity' column; an '@' in the 'Unit column'; and, the estimate in the 'Alternative Unit Rate' column. Then in the column 'Basis for Costs Estimation and Additional Relevant Information', insert the relevant landform/area, name of the company and date of quote as reference (see Figure 37).

Figure 37. Including alternate rates for rehabilitation work

Additional Items	Cap/cover for quarry waste as per design based on recent study	Y	1	@	This is	\$345,000.00	\$345,000	For Waste Cell A based on We Cover You study dated 10 February 2016. Monitoring and project management fees removed.
	Other 2 <insert>	N			deliberately			
	Other 3 <insert>	N			left blank			
Subtotal							\$345,000	

IMPORTANT NOTE: the 'Description/Notes' column describes how the rates in the RCE Tool were derived. The review of the applicability of each 'Default Unit Rate' and activity 'Description/Note' is a fundamental step in using the RCE Tool.

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 'on the ground' differ to those presented in the RCE Tool.

It is the holder's responsibility to review and adjust the rates accordingly, to make the rates for each rehabilitation activity suitable for the specific site, and the nature and scale of the operations.

2.4.7.2 Rate change justification

When a rate change has been made, this information must be entered in to the 'Rate Change Justification' worksheet as follows:

- (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 utilise that activity/description).
- (3) Enter the relevant 'DRG unit/rate' from the relevant line item or worksheet titled 'Cost Schedule' and then in the column titled 'Adopted Rates', add the rate sourced from the third-party.
- (4) In the 'Justification' column, describe why a third-party rate is being utilised. For example, 'Quarry tailings typically dry out quickly with high shear strength and trafficability and costs less to rehabilitate than \$108,000 / ha'.
- (5) Read the conditions of the form 'In completing the DRG Rehabilitation Cost Estimation, we are seeking an adjustment to the rates currently utilised in the DRG Rehabilitation Cost Estimation Tool. 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 Rehabilitation Cost Estimation Tool.' and ensure the inputs comply. Then complete the information of the company representative, sign and date.
- (6) Depending on the complexities associated with the alternative rates and the impact this has on the total estimate, DRG may also require a detailed quote or report to be attached to the RCE to ensure that sufficient information is provided to justify the rate. These could include amine sealing design report, a high wall geotechnical report or similar document (refer to Section 2.4.9).

2.4.8 Assumptions

2.4.8.1 Project specific assumptions

As described in Section 2.4.3 Table 1, project specific assumptions such as life-of-mine, liabilities excluded by contract, post mining land use, infrastructure to be retained (by documented agreement), rehabilitation strategies, number of voids at closure, etc. should be recorded. This information should be entered in the 'Assumptions' worksheet (see Figure 38).

Figure 38. Entering project specific assumptions

Assumptions and Rehabilitation Requirements	
List or record any assumptions made when completing this tool:	
Life of Mine is 2037.	
The switchyard near the explosives area is owned by Ausgrid and is not a liability of the mine.	
The demountables and structures in the Contractor Yard will be removed by the contractors at the end of service.	
Post-mining land use will be bushland in all areas except the flat/plateau surfaces of Waste Rock Dumps 1 and 2	
Pit A requires backfill as per project approval; stockpiled material within 1 km is currently adequate for backfill.	
There will be 1 void at closure. The walls will be blasted and battered back to 14 degrees from competent rock.	

2.4.8.2 Domain-specific assumptions

Assumptions specific to a domain may be entered in the column 'Basis for Costs Estimation and Additional Relevant Information' for the associated line item or at the top of that domain (see Figure 39).

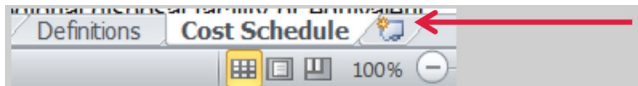
Figure 39. Domain specific assumptions

Underground Operations											
Domain 1a: Infrastructure					Total Cost for Infrastructure Domain			\$7,441,858			
Additional Assumptions: Record any relevant assumptions to this domain below:											
All infrastructure built for the purposes of mining will be demolished and removed - no agreements in place for infrastructure.					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:
Termination of Services and Demolition Works		Disconnect and terminate all services (Water, electricity, gas etc at point of attachment to site)		Y	2	allow	\$35,000		\$70,000	Administration and workshops are separate to 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

2.4.9 Adding supporting documentation

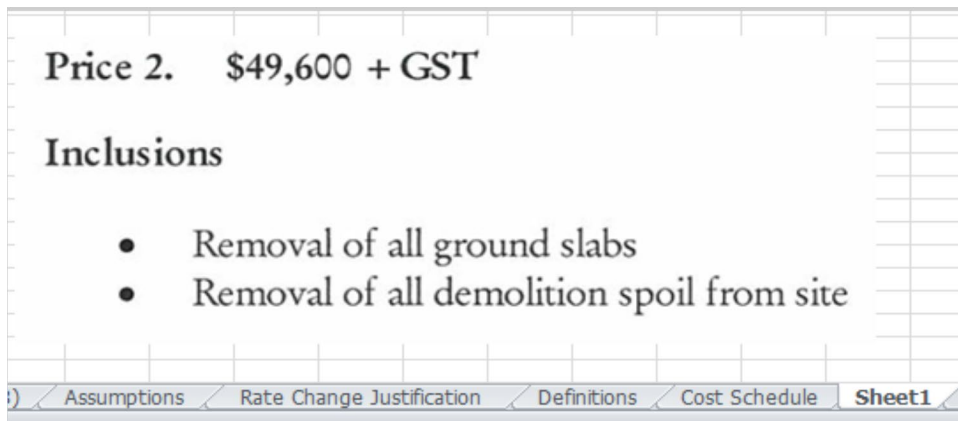
Supporting documentation can be included on a separate tab in the Microsoft Excel Workbook by clicking on the 'Insert Worksheet' tab to the right of the Cost Schedule tab (see Figure 40).

Figure 40. Inserting an additional worksheet



Information and pictures can be copied and pasted into the new worksheet (e.g. Sheet 1) (see Figure 41).

Figure 41. Example of copy and paste



The new worksheet can be renamed by right clicking on the 'Sheet 1' tab, and selecting the rename option. Save the file after attaching the supporting documentation.

3 Finalising and reviewing a Rehabilitation Cost Estimate

The following checklist provides guidance to reviewing the RCE for accuracy and completeness, and highlights important information that should be checked. As shown in Figure 42, if a drop down box isn't activated, the costs will not be calculated.

Table 2. RCE Tool review checklist

Subject	Checks	Complete?
Totality of operations reflected	<ul style="list-style-type: none"> (1) All infrastructure included <ul style="list-style-type: none"> (a) Buildings (b) Tanks (c) Bins/hoppers (d) Reclaim tunnels (e) Conveyors (f) Explosive magazines (g) Water/sewage treatment areas (2) All landforms included <ul style="list-style-type: none"> (a) Tailings dams (b) Rejects emplacements and co-disposals (c) Waste rock dumps – in pit and out of pit (d) Open cuts/pits (e) Stockpiles (3) All underground infrastructure included <ul style="list-style-type: none"> (a) Portals and adits (including historic/legacy) (b) Ventilation shafts (c) Vent fans and winders (d) Service and gas boreholes (4) Roads and hardstands/laydowns <ul style="list-style-type: none"> (a) Haul roads (b) Access roads (where required) (5) Dams (6) Exploration operations (7) Other lands (undisturbed areas) 	

Subject	Checks	Complete?
Activities chosen	For each area of disturbance, the rehabilitation activities chosen will achieve project approval conditions. Consider Section 2.4.5 of this Handbook.	
Rates used and justifications	For each alternative rate use, ensure it complies with Section 2.4.7 of this Handbook and the 'Rate Change Justification' worksheet has been completed as required.	
Assumptions	Consider Section 2.4.8 of this Handbook and ensure any assumptions related to rehabilitation outside of liability and other key information on strategies, completed rehabilitation, and extrapolations (see Section 2.4.6) are captured.	
All applicable items costed	Ensure that after selecting appropriate rehabilitation activities for the totality of the operations, each domain is reviewed to ensure that all items where 'Y' has been retained in the 'Applicable (Y or N)' column, also has an amount detailed in the 'Total Cost' column (see Figure 42).	

Figure 42. Reviewing an RCE

<div> No 'Total Cost' for this line item though relevant and calculated. Dropbox for 'Select Haul Distance Here' needs to be addressed. </div>							
Remove stabilised material (blue metal, 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 stabilised material from the road, laydown or other surface using an excavator, dozer and grader to enable the establishment of rehabilitation.
Roads and Tracks Subtotal					\$61,137		

4 Printing the Rehabilitation Cost Estimate

- Printing normally – Use the Microsoft functionality as you traditionally would for printing an Excel workbook.
- Printing only completed rows – A button is positioned at the top of the 'Summary Report' tab for each type of mining/exploration operation (See Figure 43). This facilitates the generation of a .pdf file that includes only the line that were completed – the items where 'Y' is selected. Using this function will expedite the review process as only the activities with costs associated with them will be presented.

Figure 43. Reviewing an RCE

The screenshot shows an Excel spreadsheet with columns A through M. The form content is as follows:

- Logos:** NSW GOVERNMENT logo and Planning & Environment logo.
- Title:** Open Cut and Underground Summary Rehabilitation Cost Estimation
- Note:** Sections of this page are automatically filled in from the registration page
- Form Field:** Mine Name: [text input box]
- Buttons:** A button labeled "Create Open Cut and Underground RCE Report" is located in cell K1. A yellow tooltip box points to it with the text: "Click button to create pdf report once RCE is complete".

5 Submitting the Rehabilitation Cost Estimate

- **If you are applying for a new exploration activity** — complete the Rehabilitation Cost Estimate questions within form *ESF4: Application to Conduct Exploration Activities* and attach the Rehabilitation Cost Estimate prepared using the RCE Tool. Submit the Rehabilitation Cost Estimate with Form *ESF4: Application to Conduct Exploration Activities*. Submit the information:

By email: Send an electronic copy of the form to minres.environment@industry.nsw.gov.au

By mail: Mail your form to Division of Resources and Geoscience, Environmental Sustainability Unit, PO Box 344, Hunter Region Mail Centre NSW 2310

- **If you are applying for renewal/part renewal or transfer of an authorisation** — complete the Rehabilitation Cost Estimate questions within the relevant form and attach the Rehabilitation Cost Estimate prepared using the RCE Tool. Submit the Rehabilitation Cost Estimate with the application for renewal/part renewal, transfer, cancellation or part cancellation of an authorisation. Submit the information:

By email: Send an electronic copy of the form including any attachments to titles.services@industry.nsw.gov.au

By mail: Mail your form and any attachments to Division of Resources and Geoscience, Titles Services, PO Box 344, Hunter Region Mail Centre NSW 2310

In person: Submit your application in person at the Division of Resources and Geoscience's Titles Services office, 516 High Street, Maitland, New South Wales 2320. Office hours are 9.30 am to 4.30 pm.

- **If you are applying for a review of the security deposit at any other time** — complete form *ESF2 Rehabilitation cost estimate submission* and attach the Rehabilitation Cost Estimate prepared using the RCE Tool. Submit the information:

By email: Send an electronic copy of the form to minres.environment@industry.nsw.gov.au

By mail: Mail your form to Division of Resources and Geoscience, Environmental Sustainability Unit, PO Box 344, Hunter Region Mail Centre NSW 2310

Appendix 1: Definitions

Term	Meaning
adit	Entrance to an underground mine which is horizontal or nearly horizontal, by which the mine can be entered, drained of water and ventilated.
amelioration	Addition of materials to change physical or chemical properties or soil, tailings, or other materials.
aquifer	Has the same meaning as it has in the <i>Water Management Act 2000</i> .
armouring	Application of a self-sustaining mechanism for erosion control typically utilising rock.
authority	Means an exploration licence, an assessment lease or a mining lease granted under the <i>Mining Act 1992</i> .
authorisation	Means an authority, a small-scale title or an environmental assessment permit granted under section 252 of the <i>Mining Act 1992</i> .
backfill	The act of placing material to refill an excavation or void (such as an open cut or dam).
ballast (rail)	A free draining coarse aggregate or metallurgical slag used to support railway tracks and allow for drainage.
batters	Slopes manufactured during mining and/or excavation activities.
borehole	A hole made by drilling or boring, but excludes sampling and coring using hand held equipment; and petroleum wells.
capillary break	A layer of coarse material placed 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 function to limit root penetration into the underlying seal and more than one capillary break can be present within a cover design.

Term	Meaning
capping/sealing	The act of applying material (such as clay) in a usually engineered design to seal off underlying material (such as waste, contaminated soil or spoil) in order to prevent exposure of this material to the environment and outside conditions.
CHPP	Coal Handling and Processing Plant - a plant used to upgrade the quality of coal including crushing, sizing washing and drying.
clearing of vegetation	Any one or more of the following: <ul style="list-style-type: none"> • cutting down, felling, thinning, lopping, logging or removing vegetation • killing, destroying, poisoning, ringbarking, uprooting or burning vegetation.
contaminated	Condition or state where there is/are potentially hazardous substance(s) 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.
contour banks	Earthen structures constructed across cultivated slopes.
crusher/crushing plant	Equipment that crushes ore or rock - also referred to as a mill
demountable	A transportable prefabricated structure/building produced off site and transported to site, designed to be movable rather than permanently located.
The department	The Division of Resources and Geoscience within the Department of Planning and Environment.
desiccation	Process of removing moisture or extreme drying.
de-water	The removal or draining of groundwater or surface water from a structure by pumping or evaporation.
diversion	A drain or channel that diverts stormwater runoff around a site or landform.

Term	Meaning
earthworks	Equipment activity involving the placement and working of large amounts of earth to engineering or other design specification (such as cut and fill operations for roads, dams and landforms).
evaporation fans	Fans used to evaporate water as an alternative to discharging water off-site.
excavation	The removal of the surface layer of land to a depth greater than 500 mm from the natural surface level of that land.
exploration	Has the same meaning as it has in the <i>State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007</i> .
gas drainage	A method of reducing the in-situ gas content of the seam to within acceptable limits by drilling holes into the seam or surrounding strata ahead of mining.
goaf	The space remaining following extraction of the mineral.
groundwater	Water that occurs beneath the ground surface in the saturated zone.
hardstand	A hard-surfaced area on which heavy vehicles can be parked and equipment can be stored.
haul road	Roads used to transport mine materials (product and waste).
HAZMAT	Anything that, when produced, stored, moved, used or otherwise dealt with without adequate safeguards to prevent it from escaping, may cause injury or death or damage to life, property or the environment.

Term	Meaning
Item of heritage significance	<p>Any heritage items listed in one or more of the following:</p> <ul style="list-style-type: none"> • the Commonwealth Heritage List • the World Heritage List • the National Heritage List • the State Heritage Register • an Environmental Planning Instrument <p>Any relic (being any deposit, object or material evidence which relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and which is 50 or more years old).</p> <p>Within State Conservation Areas:</p> <ul style="list-style-type: none"> • items listed on the OEH Historic Heritage Information Management System • in all other circumstances, any deposit, object or material evidence relating to the settlement or occupation of New South Wales or a part of New South Wales (not being Aboriginal settlement or occupation) if the deposit, object or material evidence is more than 25 years old at the date of the interference or removal.
leach	Dissolution and removal of a soluble substance from a substrate.
mine subsidence	Movement of strata resulting from the extraction of coal, metals or minerals and incorporates vertical ground movement (strain) and differential vertical movement (tilt).
open cut	Open-cut 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 referred to as open-pit, or open-cast mining.
overburden	Top soil/strata overlying a coal seam.
petroleum title	An exploration licence, assessment lease, production lease or special prospecting authority in force under the <i>Petroleum (Onshore) Act 1991</i> .

Term	Meaning
petroleum well	<p>A hole made by drilling or boring in connection with prospecting for petroleum or operations for the recovery of petroleum, but excludes:</p> <ul style="list-style-type: none"> • sampling and coring using hand held equipment • a hole constructed and operated for the following purposes where the operation of that hole does not involve fracture stimulation or the recovery of petroleum: <ul style="list-style-type: none"> – stratigraphic definition – seismic (for example shot holes, geophone, tilt meters bores) – water monitoring – environmental assessment.
portal	The surface entry to an adit including the structure surrounding the immediate entrance.
process plant	A facility where metals are extracted from a mined ore.
rehabilitation	Has the same meaning as it has in the <i>Mining Act 1992</i> .
rehabilitation repair	After damage or failure, to restore to a good or sound condition disturbed land already returned to a safe, stable, productive and self-sustaining condition, such as eroded areas.
remediation	Measures to repair, clean up or mitigate pollution, contamination (such as soil or water) or adverse effects on the environment.
reshaping	The process of raising and/or lowering the levels of land to achieve a final land-form design.
revegetation	The act or process of re-establishing and redeveloping vegetation on disturbed areas with appropriate species.
scalp	To plane down the surface and/or remove surface material.

Term	Meaning
security deposit	Financial assurance provided to the NSW Government to secure funding for the fulfilment of obligations under the authorisation, including obligations under the authorisation that may arise in the future.
shaft	A vertical or inclined excavation in rock for the purpose of providing access to an ore body. Usually equipped with a hoist at the top, which lowers and raises a conveyance for handling workers and materials, and/or used to move air through a mine for ventilation purposes.
State significant development	Has the same meaning given by Division 4.1 of Part 4 of the <i>Environmental Planning and Assessment Act 1979</i> .
subsidence	Movement of strata resulting from the underground extraction of reserves and incorporates vertical ground movement (strain) and differential vertical movement (tilt).
tailings	Material comprising of dirty water with chemicals and other minerals rejected from a mill after most of the recoverable valuable minerals have been extracted.
turkey nest	A small earth dam adjacent to, and higher than, a larger earth dam, to feed water by gravity.
underground	Underground mining involves creating tunnels from the surface into the mineral seam used to transport machinery that extracts the mineral. The main types of underground mining in NSW are bord-and-pillar, longwall and stope mining.
void	The remaining hole following excavation - final mine pit at end of mine life.
waste	Has the same meaning as in the <i>Protection of the Environment Operations Act 1997</i> .

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Disclaimer

The information contained in this publication is based on knowledge and understanding at the time of writing (June 2017). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the NSW Department of Planning and Environment or the user's independent advisor.



*For more information about the Rehabilitation Cost Estimation Handbook
visit www.resourcesandenergy.nsw.gov.au*