

User Guide for Estimated Rehabilitation Cost Calculator for Petroleum and Gas



Prepared by: Regional and Regulation Support, Department of Environment and Science

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Version history

Version	Effective date	Description of changes
1.00	1 April 2019	This User guide has been prepared to support the use of the Petroleum and Gas Estimated Rehabilitation Cost Calculator.
2.00	1 October 2022	Updated to reflect changes made during 2021/22 ERC Calculator major review

Contents

Contents.....	iii
List of Tables.....	v
List of Figures	v
Acronyms, Initialisms and Abbreviations	vi
1 Introduction.....	1
1.1 Purpose of document.....	1
1.2 Purpose of Calculator	1
1.3 Key changes made during the 2021 review	1
2 Process of Estimated Rehabilitation Cost creation	3
3 General use principles.....	6
3.1 General concepts.....	6
3.2 Colour coding and notation.....	6
3.3 Quantity entry.....	7
3.4 Comment entries and text expansion	7
3.5 Default quantities	8
3.6 Alternate Rates and how to enter	8
3.7 Navigation, search, and information	9
3.8 Drop-down menus.....	10
3.9 Additional items (User Entered).....	11
3.10 Show/hide rows.....	11
3.11 Freeze panes	12
3.12 Security	12
3.13 Land type	12
4 Sheets and Domains	14
4.1 General	14
4.2 User sheets.....	15
4.3 Contents sheet.....	16
4.4 Registration sheet.....	16
4.5 Assumptions sheet.....	17
4.6 Subrates sheet.....	18
4.7 Lists sheet.....	19
4.8 Information sheet	19
4.9 Summary sheet (including Project Multipliers)	19
4.9.1 sheet Description	19
4.9.2 Project Management Multiplier	20
4.9.3 Environmental Maintenance and Monitoring Multiplier.....	21
4.10 Waste Levy Register.....	21
4.11 Main sheet	22
4.12 General Land Rehabilitation and User Input Sheet.....	23

User Guide for Estimated Rehabilitation Cost Calculator for Petroleum and Gas

4.12.1	Erosion and Sediment Control	24
4.12.2	Pest and Weed Management	24
4.12.3	General Land Rehabilitation User Input Sheet	24
4.13	Wells and User Input Sheet	25
4.14	Seismic and Infrastructure and User Input Sheet.....	27
4.15	Pipelines and User Input Sheet	28
4.16	Process Facilities, Water Treatment Plants and Transfer Stations, Water Treatment, User Input Sheet and User Build sheet.....	29
4.16.1	Process Facilities User Input Sheet.....	30
4.16.2	Processing Facilities User Build sheet.....	31
4.16.3	Water Facilities User Build sheet.....	32
4.16.4	Water and Salt Management	32
4.17	LNG Facilities and User Build Input sheet.....	33
4.18	Water Storage, Water Storage User Input Sheet and User Build sheet.....	34
4.18.1	Water Storage User Input Sheet.....	35
4.18.2	Water Storage User Build	35
4.19	Investigation and Contamination and User Input Sheet	38
4.19.1	Preliminary Site Investigation	38
4.19.2	Site Investigations.....	38
4.19.3	Investigation Contamination User Input Sheet	39
4.20	Mobilisation, Demobilisation and Fleet Size	40
5	Information on Rates	42
5.1	Bottom-up, First Principles Calculation Method.....	42
5.2	Labour Costs.....	42
5.3	Equipment Costs.....	43
5.4	Productivity	43
5.5	Scope and unit rates	43
5.6	Contractor Rate Inclusions	44
6	Worked examples.....	45
6.1	Seismic easements.....	45
6.2	Tracks and roads (Infrastructure Input sheet)	45
6.3	Pipelines	46
6.4	Gas processing facility in Main sheet	47
6.5	Gas processing facility in User Input Sheet.....	48
6.6	Water facilities User build	48
6.7	Camps in Main sheet	50
6.8	Camps in Infrastructure User Input Sheet	50
6.9	Wells in User Input Sheet	51
7	Glossary.....	53

List of Tables

- Table 1. Colour coding of cells
- Table 2. Sheets
- Table 3. Fleet sizes
- Table 4. Definitions

List of Figures

- Figure 1. Colour code key
- Figure 2. Quantity input example in the Main sheet
- Figure 3. Quantity input example in Wells User Input Sheet
- Figure 4. Text entries with space rows added at the beginning and end
- Figure 5. Examples of default quantities
- Figure 6. Alternate Rate cells
- Figure 7. Alternate Rate cell turn red upon entry
- Figure 8. Example of Contents hyperlink
- Figure 9. Example of hover text
- Figure 10. Finding the source of named cells
- Figure 11. Examples of drop-down menu (surface cover (left) and pond/dam details (right))
- Figure 12. Additional items (unused rows remove for clarity)
- Figure 13. Show/hide rows filter (left) and de-selected zero (right)
- Figure 14. Example of land type drop-down menu
- Figure 15. User Input Sheet header row
- Figure 16. Map ID
- Figure 17. Contents sheet
- Figure 18. Registration sheet
- Figure 19. Example of assumptions
- Figure 20. Example of subrates
- Figure 21. Example of determination and source of subrates
- Figure 22. Examples of Lists
- Figure 23. Information sheet
- Figure 24. Summary sheet
- Figure 25. Justification for User Entered multipliers
- Figure 26. Main sheet – Top showing header and beginning of exploration domain
- Figure 27. Main sheet - Subtotal for exploration domain
- Figure 28. Example of values coming from User Input Sheet
- Figure 29. Example of User Entered quantity in Main
- Figure 30. Example of additional rows for User defined entries
- Figure 31. Inputs for drainage and diversions
- Figure 32. General Land Rehabilitation section of Main showing reporting of User Input Sheet quantities
- Figure 33. Well type selection (left), quantity entry (middle), and area entry (right)
- Figure 34. Seismic by area table with default rehabilitation multiplier and land selection circled
- Figure 35. Process Facility – example of User defined capacity
- Figure 36. Example inputs for gas processing facilities
- Figure 37. Process facility type drop-down menu
- Figure 38. Water Facilities User Build sheet
- Figure 39. Water and salt treatment, disposal, and pumping
- Figure 40. LNG Facilities User Build sheet
- Figure 41. Water Storage User Input Sheet
- Figure 42. Mandatory inputs for Water Storage User Build
- Figure 43. Distance and fleet selections

Figure 44. Rates determined by fleet size and distance

Figure 45. 'Liner Warning' column

Figure 46. Site investigations user input table

Figure 47. Land investigation input cells showing options for defining the area

Figure 48. Disposal options

Figure 49. Mobilisation/Demobilisation Default Rates

Figure 50. Example of fleet and distance selection

Figure 51. Rate build-up

Acronyms, Initialisms and Abbreviations

DES	Department of Environment and Science
EA	Environmental Authority
ERC	Estimated Rehabilitation Cost
GPF	Gas Processing Facility
h	hour
ha	hectare
m	metre
m ²	square metre
m ³	cubic metre
P&A	Plugged and Abandoned
P&G	petroleum and gas
ROP	reverse osmosis plant
TOV	Table of Values
WTP	Water Treatment Plant
WTS	Water Transfer Station

1 Introduction

This document is a User Guide for the Estimated Rehabilitation Cost (ERC) Calculator (Calculator) for petroleum and gas (P&G) activities in Queensland. The Calculator commenced on 1 April 2019, replacing the former Financial Assurance Calculator. A major revision of the 2019 Calculator was undertaken in 2021.

1.1 Purpose of document

This document is the User Guide accompanying the major revision undertaken in 2021. The purpose is to:

- Discuss key changes made to the Calculator in the 2021 review.
- Explain how to use the revised Calculator.
- Describe the architecture of the Calculator including the various sheets.
- Explain how the cost rates are constructed.
- Improve User understanding through worked examples.

Definitions of specific words and phrases used throughout this User Guide are listed in the **Glossary** section.

1.2 Purpose of Calculator

The purpose of the Calculator is to provide a tool to calculate the ERC as required by the *Environmental Protection Act 1994*. The Calculator provides a consistent approach to estimating the cost to the Queensland Government to decommission, rehabilitate and close a petroleum and gas operation.

The ERC Calculator should be used to capture the maximum potential amount of liability to the State for the period the Environmental Authority (EA) holder has applied for. Therefore, EA holders should ensure the maximum potential liability is entered into the Calculator, including where minor infrastructure modifications may need to be made during construction.

1.3 Key changes made during the 2021 review

Changes made during the 2021 review include:

- Removal of macros to improve functionality and stability.
- Revision of the 'show/add rows' in the Main sheet, 'add rows' in several User Input Sheets, and search functions so that they do not require macros to operate.
- Addition of User Input Sheets for the following activities:
 - Wells
 - LNG Plants
 - Water Storage (defaults)
 - Process Facilities (defaults).
- Re-design of the following User Input Sheets to improve consistency between the spatial data supplied with ERC calculations and the ERC quantities:
 - General Land Rehabilitation (previously Miscellaneous Activities)
 - Infrastructure
 - Pipelines
 - Water Storage User Build (previously Dams)
 - Water Facilities User Build (previously Water Treatment Plants and Transfer Stations)
 - Process Facilities User Build (previously Gas Processing and Oil Storage Facilities)
 - Investigation, Contamination, Scrap, Waste Levy – split out from the former Miscellaneous Activities.

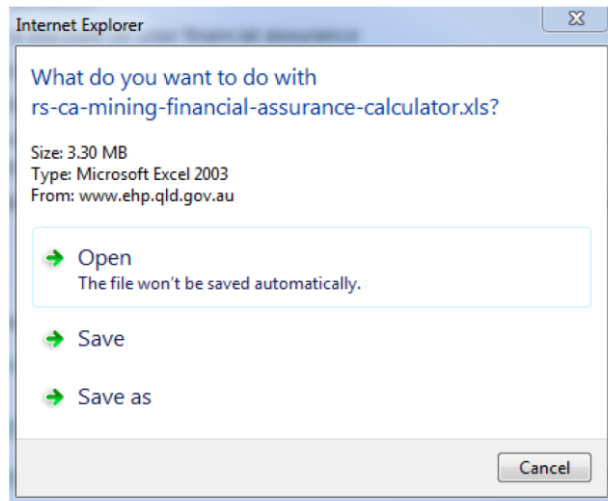
- Addition of user input tables added to Processing Facilities User Input Sheet (defaults) and Process Facilities User Build sheet for liquified petroleum facilities, conventional oil facilities, and conventional gas facilities.
- Addition of the following sheets (further detailed in the **Sheets** section) for reference and to provide greater transparency for rates, defaults and Calculator assumptions:
 - Assumptions
 - Information and User notes
 - Subrates.
- Addition of a Waste Register to itemise quantities multiplied by the Waste Levy.
- Expansion of the range of rates available for several groups including wells, tracks and roads, dams, and facilities.
- Expansion of area-based rates in addition to the per length basis or category (number of) methods.
- Addition of arid as a land option (in addition to pasture and native) primarily to account for facilities in the regions where the land is desert.
- Review and updated of rates and made consistent across the mining and petroleum and gas Calculators.
- Declutter and shortened headers for each sheet by removing the Use information, User comments space and legend. Use information and User comments are now collated into the Information sheet and the legend is on the Contents sheet.
- Table of Values removed and collated into the Main sheet.¹

¹ In the 2019 P&G Calculator, the Table of Values was replicated in Main creating unnecessary clutter.

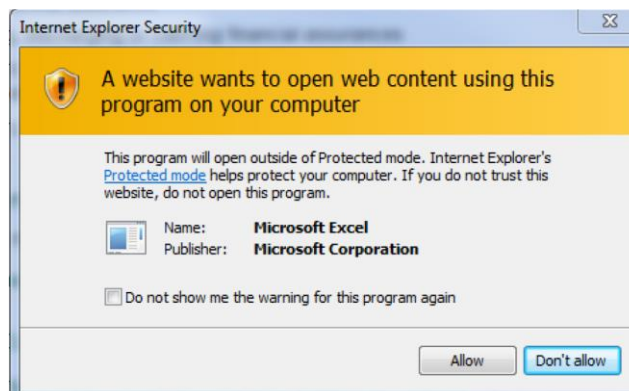
2 Process of Estimated Rehabilitation Cost creation

The User is recommended to follow these steps:

1. Download the Calculator. The Calculator is available on the Queensland Government's Business Queensland website at: [Financial assurance for resource activities | Business Queensland](#).
2. Click on the hyperlink to the Petroleum and Gas Calculator and a pop-up window like the one below will appear (this will look different depending on the internet browser used) and click 'Open' (or similar depending on the internet browser).



3. Another window like the one below may pop-up but is unlikely as all macros are removed from the new version of the Calculator. Click 'Allow' and the Calculator will open in Excel™.



4. Save the file as a new name preferably as *Company Site ERC Date* (e.g. *Gas International Surat Basin ERC 10Jan22*). By downloading the Calculator, the User agrees to the Terms and Conditions. The User can review the Terms and Conditions in the 'Terms-con' (furthest right of the sheets).
5. Either go direct or navigate via the CONTENTS sheet (see below) to the Registration sheet.

Petroleum and Gas Estimated Rehabilitation Cost Calculator

CONTENTS

Click on the links below

REGISTRATION
ASSUMPTIONS
SUBRATES
LISTS
INFORMATION
SUMMARY
MAIN
WASTE REGISTER
GENERAL LAND REHABILITATION
WELLS
SEISMIC AND INFRASTRUCTURE
PIPELINES (LAND)
PROCESS FACILITIES
PROCESS FACILITIES USER BUILD
LNG FACILITIES
WATER FACILITIES USER BUILD
WATER STORAGE
WATER STORAGE USER BUILD
INVESTIGATION CONTAMINATION
TERMS AND CONDITIONS OF USE

EA= Environmental Authority
 ERC = Estimated Rehabilitation Cost

6. Enter the required details to the Registration sheet (see below).

Petroleum and Gas Estimated Rehabilitation Cost Calculator

Contents		REGISTRATION	
Environmental Authority Ref:	<input type="text"/>	EA Holder:	<input type="text"/>
Tenure Numbers:	<input type="text"/> <input type="text"/>	Site Name:	<input type="text"/>
Last ERC Decision Date:	<input type="text"/>	Current ERC Amount:	\$ <input type="text"/> -
Site Contact:	<input type="text"/>	Position:	<input type="text"/>
Site Address:	<input type="text"/> <input type="text"/>	Phone:	<input type="text"/>
		Email:	<input type="text"/>
Waste Levy (select)	<input type="text"/> Waste levy does not apply because the site is not in a waste levy zone	Further user comment on waste levy application:	<input type="text"/> Enter a justification here if the site is in a waste levy zone but the waste levy is not applied. (Overwrite this text).
Name of Assessor (company):	<input type="text"/>	Name of Site Manager (company):	<input type="text"/>
Title:	<input type="text"/>	Title:	<input type="text"/>
Date:	<input type="text"/>	Date:	<input type="text"/>
<i>Below this line for the Department's use only</i>			
Name of Department Reviewer:	<input type="text"/>	Name of Department Manager:	<input type="text"/>
Title:	<input type="text"/>	Title:	<input type="text"/>
Date:	<input type="text"/>	Date:	<input type="text"/>

7. Either go direct or navigate via the CONTENTS sheet to the User Input Sheet you wish to populate.
8. In the User Input Sheets, enter quantities to Input cells and select options from the drop-down menus as required.
9. Continue populating the User Input Sheets applicable to the site.
10. Review the Summary sheet (see below) for the rolled-up totals.

Petroleum and Gas Estimated Rehabilitation Cost Calculator

SUMMARY		Contents	Total ERC \$		-
Item	Quantity	Unit	Rate	Total Cost	
1. Exploration				\$	-
2. Roads, Tracks, Laydown and Borrow Pits				\$	-
3. Camps, Buildings, Sewage Treatment Plant				\$	-
4. Power Generation and Distribution				\$	-

11. If site-specific Project Management and/or Environmental Maintenance and Monitoring values are justified, enter these to the cells in the Summary sheet and provide an explanation in the space provided in the Summary sheet.

Project Overheads and Contingency	User Entry	Default	Total Cost
Project Management		10%	\$ -
Environmental Maintenance and Monitoring		5%	\$ -
Contingency		10%	\$ -
Subtotal of Project Overheads and Contingency			\$ -

Total Estimated Rehabilitation Cost for the Site (excluding GST)	\$	-
---	----	---

Difference from last ERC amount	\$	-
--	----	---

Alternate Project Management Rate Justification:

Enter justification if alternate project management rate used (overwrite this text). Recommend adding a blank row at the beginning and end of the text so it displays correctly. (Alt Enter).

Alternate Monitoring and Maintenance Rate Justification:

Enter justification if alternate maintenance and monitoring rate used (overwrite this text). Recommend adding a blank row at the beginning and end of the text so it displays correctly. (Alt Enter).

3 General use principles

3.1 General concepts

The following general concepts apply to the Calculators:

- Quantities only need to be entered in one table. For example, when using rolled-up rates for roads, the same road quantities do not need to be entered to the User Quantities table. In a quantity-based table (e.g. number of dams) the area does not also need to be entered in the area-based table).
- The Default Rates in the Main sheet and User Input Sheets generally include activities reasonably anticipated to be required to rehabilitate items. Specifically, decommissioning, demolition, removal, disposal/storage, and rehabilitation of land (grade and seed) are included unless stated.
- In general, the intent is that the Default Rates will cover most scenarios and the User build-up should only be necessary if there is a clear requirement. For example, it is known that highly sodic soil will require amendment with a higher gypsum application rate or when growth media will require carting from more than 10 km.
- User Build Sheets used default cost rates but allow the User to assign quantities to specific items.
- Rates in arid environments do not include growth media and seeding because it is difficult to generate vegetation in these areas and the natural state in arid environments does not include vegetation (e.g. Channel Country in South West Queensland).

3.2 Colour coding and notation

Table 1 describes the colour coding and notation used throughout the Calculator. All cells except green and yellow are locked to the User. The colour code key is shown in **Figure 1**.

Table 1. Colour coding of cells

Colour	Use
Green	Cells to which the User can input values or text, select options from drop-down menus and click on hyperlinks to access other sheets or areas within a sheet.
Yellow	Reserved for User Entered Alternate Rates. If an Alternate Rate is entered, the yellow rate cell turns pink with red font to inform the department. If an Alternate Rate is entered, the User must provide an explanation in the Main sheet.
Purple cells	Reserved for Default Rates sourced from the Main sheet or Subrates.
Hatched cells	Structural block-out cells indicating no active part in the Calculator
White cells	Calculated quantities and fixed text that the User cannot change
Pink with red 'E'	Occurs in the User Input Sheets where dozers are used. The 'E' indicates a push length incompatible with the selected dozer. This will create an error in the cost calculation and the User must select a bigger dozer or shorter push length.
*	Used in the User Input Sheets to denote where a pop-up message is available






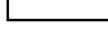
Colour Code Key	
User Input Cells	
User Input - Alternate Rates / justification	
Alternate Rates entered by User	
Locked cell - Default Rates or Sum from Input Sheets	
Locked cells - blanks	
Locked cell - calculations or text	

Figure 1. Colour code key

3.3 Quantity entry

The User enters quantities to the green cells, examples are shown in **Figure 2** and **Figure 3**.

4. Power Generation and Distribution			
	#4.01	Overhead powerlines (steel towers)	km

Figure 2. Quantity input example in the Main sheet

Map ID	Name	Type	Number	Total Area (all wells in row)
		Select from dropdown	Whole #	ha
		Conventional oil, Plugged and abandoned, Single well		
		Tight / shale gas, Corehole, Single well		

Figure 3. Quantity input example in Wells User Input Sheet

3.4 Comment entries and text expansion

The Calculator includes the following space for User comments:

- *Main sheet*—User comments and justification for Alternate Rates added to User Input Sheets to be added to column M and N respectively.
- *Summary*—Justification for use of alternate Project Management or Environmental Maintenance and Monitoring costs.
- *LNG Processing Facilities User Build*—Justification for use of Alternate Rates to be added into column L.
- *Registration*—User must explain why the Waste Levy does not apply to the sites if this is selected.
- *Information*—User can enter notes applicable to individual User Input Sheets in the spaces provided.

The User is encouraged to provide succinct and specific information to assist the department to understand the intent and assumptions underpinning the User's entries.

The 2022 version better manages User Entered text allowing automatic row expansion with added text. It is recommended to add a space row before and after the text to ensure clear viewing (**Figure 4**).

14. Additional Activities		
The MAP ID should also expand with the User entered text.	#14.01	Alt Enter on the first line to add a space row. The row should expand to cater for any amount of text. Alt Enter at the end of the text to add a space row.

Figure 4. Text entries with space rows added at the beginning and end

3.5 Default quantities

The Calculator has some cells which include default quantities used in the absence of a User entry. If a User enters a quantity where a default is present, the Calculator uses the User entry instead of the default.

Default Rates are summarised in the Assumptions sheet. Examples of default quantities are shown in **Figure 5**.

Tanks		Vertical, Steel, Open top, Earth, Lined, Single skin	Concrete Ring, Steel, Open top, Earth, Lined, Single skin	Horizontal, Steel, Closed top, Skid, Not lined, Single skin	Vertical, Steel, Closed top, Steel, Not lined, Single skin	Panel, Concrete, Open top, Earth, Lined, Single skin	Rainwater, Plastic, Closed top, Plastic, Not lined, Single skin
Geomembrane	t/m2	0.00075					
Liner	t/m2	0.0021					
Width of concrete ring	m		1.0		1.0		
Concrete foundation	mm		200		200		
Distance between tensioning poles	m					2.5	

Figure 5. Examples of default quantities

3.6 Alternate Rates and how to enter

Alternate Rates are entered to the yellow cells in the Main sheet and User Input Sheets (**Figure 6**). Alternate Rates must have the same unit as the Default Rates, otherwise they should be listed as an additional item in the rows provided (see **Additional items (User Entered)** section).

Petroleum and Gas Estimated Rehabilitation Cost Calculator

Contents LIQUIFIED NATURAL GAS PROCESSING FACILITIES

Total ERC \$ -

ID	Elements	Default Rate	Alternate Rate	Rate Used
LNG Tanks		\$ 1,428,860.18		\$ 1,428,860.18
LNG Flares		\$ 99,905.85		\$ 99,905.85

Figure 6. Alternate Rate cells

If an Alternate Rate is entered, the Calculator uses the Alternate Rate over the Default Rate, and the Alternate Rate cell turns red (**Figure 7**).

Petroleum and Gas Estimated Rehabilitation Cost Calculator

Contents LIQUIFIED NATURAL GAS PROCESSING FACILITIES

Total ERC \$ -

ID	Elements	Default Rate	Alternate Rate	Rate Used
LNG Tanks		\$ 1,428,860.18		\$ 1,428,860.18
LNG Flares		\$ 99,905.85	\$ 78,560.00	\$ 78,560.00

Figure 7. Alternate Rate cell turn red upon entry

If the User enters an Alternate Rate, the User must provide justification in the 'Rationale for Alternate Rate' column (column N in Main sheet and column L in LNG Processing Facilities User Build sheet). Alternate Rates, including third party quotes, entered to the ERC Calculator must meet the requirements in the *Estimated rehabilitation cost guideline* (ESR/2018/4425).

Users must review all Default Rates to which they apply quantities and ensure they are applicable to their site conditions.

3.7 Navigation, search, and information

Hyperlinks in the Contents sheet are used to access sheets within the Calculator, and the 'Contents' hyperlink in the sheets can be used to return to the Contents sheet (**Error! Reference source not found.**).

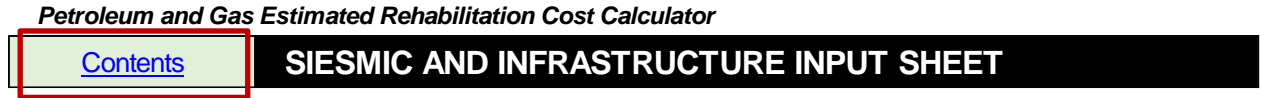


Figure 8. Example of Contents hyperlink

Information elements within the Calculator include hover text in specific cells. Hover text is generally in the heading of a column (**Figure 9**). The hover text is viewed by the User clicking in the target cell. Not all cells have hover text.

s	Land*	Full Reha Past
down	Select from	
	Past	0.1
	Native	
	Arid	
	Pasture	
	Native	

Enter length requiring rehab or leave blank and accept the % default.

Figure 9. Example of hover text

General information on the purpose and use of sheets can be found in the Information sheet.

Information on the source and make-up of formulas can be found by clicking in a cell with a formula and placing the cursor in the cell. Excel™ highlights the cells that make up the formula.

Named cells and ranges are used throughout the Calculator to aid in the development. The source of named ranges can be determined in most cases by clicking in cells or selecting a range of cells. For example, the rates for seeding in native and pasture land are named 'native' and 'pasture'. Clicking on the rate as shown on the left in **Figure 10** results in the name appearing in the cell name box in the formula ribbon (right). This means, wherever 'pasture' forms part of a formula, the rate shown on the left (\$1,655.50) is used. The formula bar in the example below shows 'Activities!F1094'. This is the source of the pasture rate. However, this is not available in the User version as the Activities sheet is deleted (and any connected values pasted as values) to protect the detailed calculations therein.

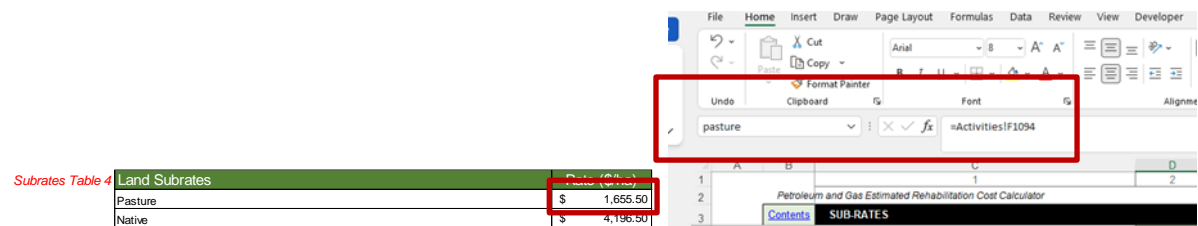
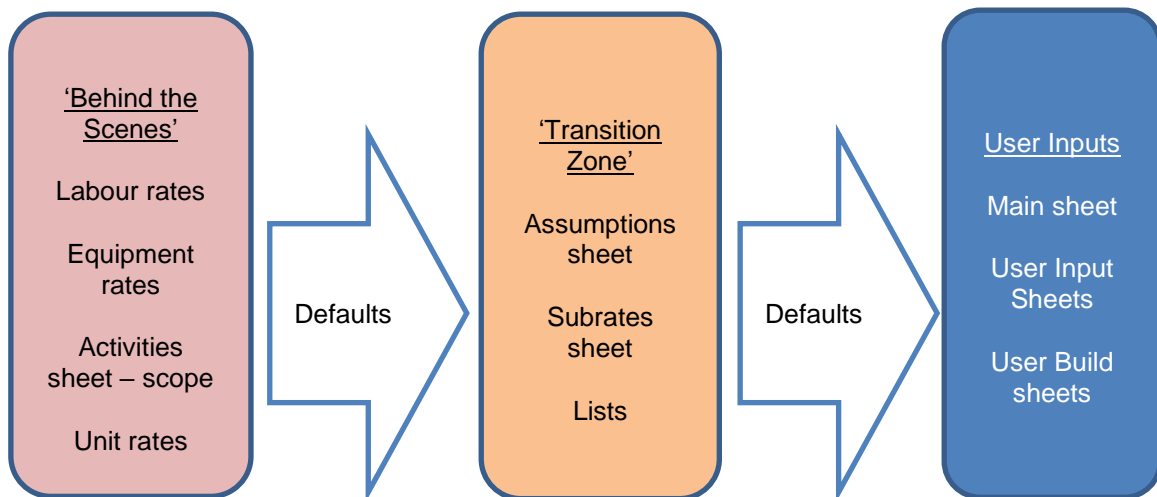


Figure 10. Finding the source of named cells

The 2022 version includes a 'Transition Zone' to improve transparency of the underlying calculations. It is called a transition zone as it reports information from the Detailed Calculations sheets (not available to the User) and in some cases the information in these sheets is used in the User sheets. The Transition Zone comprises the Assumptions sheet, Subrates sheet, and Lists sheet. The general concept is shown below and further information on the rate build-up is in the **Information on rates** section.



3.8 Drop-down menus

Drop-down menus are indicated by red text, are in green cells, and allow the User to select a range of items, for example:

1. Surface cover type (e.g. earthen, gravel, rock, bitumen)
2. Well type
3. Land type (pasture, native or arid)
4. Above ground or below ground pipelines.

Examples of drop-down menus are shown in **Figure 11** with selection of surface cover for tracks and road on the left and several selections to define a pond/dam on the right.

Tracks and Roads				
Area			Type	
			Select from dropdown	Select from dropdown
			Earthen	
			Earthen	
			Gravel	
			Rock	
			Bitumen	
Type	Size	Land	Liner	Regulated or Non-Regulated
Select from dropdown	Select from dropdown	Select from dropdown	Select from dropdown	Select from dropdown
Contaminated	0 to <= 50 ML	Pasture	Lined	Non-regulated
Clean	>50 ML to <=200 ML	Native	Unlined	Regulated
Contaminated	>1000 to <=5000 ML	Arid	Lined	Non-regulated
Contaminated	0 to <= 50 ML	Pasture	Unlined	Non-regulated

Figure 11. Examples of drop-down menu (surface cover (left) and pond/dam details (right))

3.9 Additional items (User Entered)

Additional rows are included in each section of the Main sheet and one dedicated section (14. Additional Activities) to allow miscellaneous User Entered items (Figure 12). These are items that are not included in the Calculator and that the User must define specifically. In this case the User must enter a description of the rate, the unit of the quantity (e.g. km), the rate (e.g. cost per kilometre) and explanation for the rate. An example is shown in Figure 12.

The User can use this section to add items that are defined by a Default Rate (or User Built rate) if they require additional rows (second row in example below). In the case of a Default Rate, the User must enter a reference to the Default Rate # as shown below.

14. Additional Activities									
AGGGG11, ED111	#14.01	Central office complex	1.00	facility	\$ 500,000.00	\$ 500,000.00	Major office facility combined with central centre and permanent camp.	See third party quote #EA0555_2022_01	This item includes see scope in third-party quote.
AGGGG11, ED113	#14.02	Panel, Concrete, Open top, Earth, Single skin, Lined, 7.6 ML	5.00	tanks	\$ 10,000.00	\$ 50,000.00	Tanks in Area X not covered under other sections	Default Rate #10.183	This item includes <<to be added by the Users>>

Figure 12. Additional items (unused rows remove for clarity)

3.10 Show/hide rows

The Main sheet includes a filter that allows hiding of rows that do not have entries. In the previous version of the Calculator this was achieved by a button powered by a macro. To filter out rows the User clicks in the arrow for the filter then de-selects the zero entry (Figure 13).

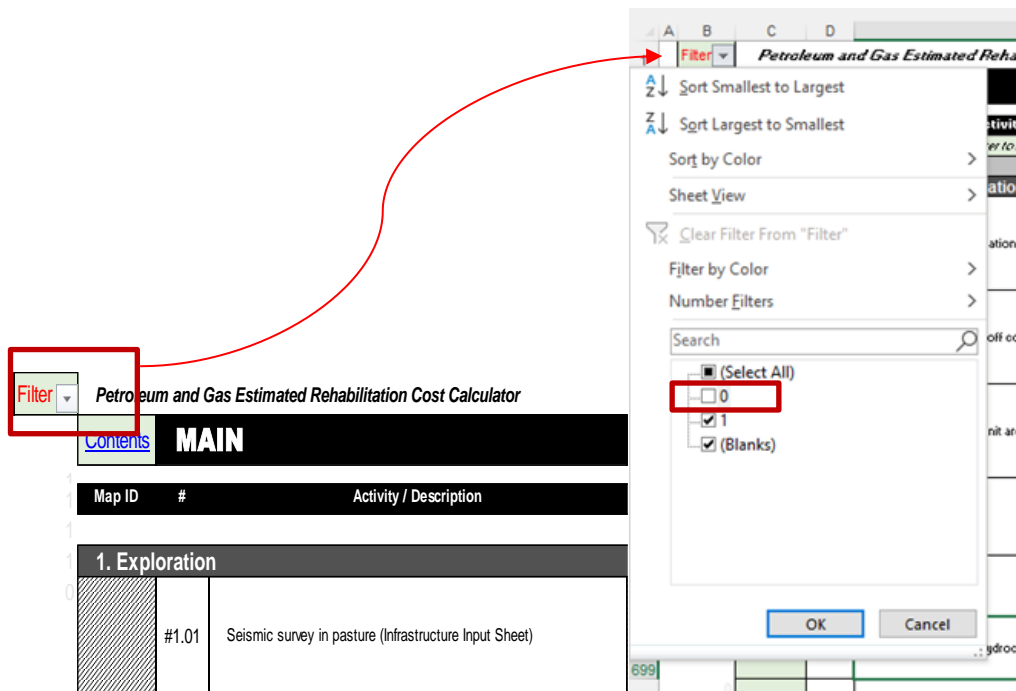


Figure 13. Show/hide rows filter (left) and de-selected zero (right)

3.11 Freeze Panes

The standard Freeze Panes function works in the Calculator so the User can freeze or unfreeze columns and rows to assist viewing and use. The standard set-up has freeze panes set to allow scrolling while maintaining the main header rows and name columns, but the User can re-set as required by using the Freeze Panes button in the Excel™ 'View' menu.

3.12 Security

To prevent inadvertent changing of formulas, text and processes, the Calculator is locked with only green and yellow cells available for User entry. The detailed calculations for the rates are removed from the published versions but the key assumptions are shown in the Assumptions and Subrates sheets.

3.13 Land type

Most activities require re-vegetation of the land surface and the Calculator allows the User to select between native, pasture and arid land types. Arid environments, such as that found in parts of South West Queensland, are desert environments where vegetation is absent. The Calculator typically includes either, drop-down menus, separate rows or separate columns to allow the selection of the appropriate land type. The Calculator applies the appropriate rate to area required to be seeded and if an area covers more than one land type, the User must input separate lines.

Petroleum and Gas Estimated Rehabilitation Cost Calculator						
Contents		INFRASTRUCTURE INPUT SHEET				
Total ERC		\$	4,160.59			
Seismic (by length)						
Map ID	Name	Rehab length	Land	Pasture	Native	Arid
		km				
		1.00	Pasture	1.00		
		1.00	Native		1.00	
		1.00	Arid			1.00
		0.00	Pasture	0.00		

Figure 14. Example of land type drop-down menu

4 Sheets and domains

4.1 General

Table 2 lists the sheets available in Calculator with a description of the intended use. Further detail on each User Input Sheet is provided in the next subsections.

Table 2. Sheets

Sheet	Type	Attributes, purpose and use
CONTENTS	Navigation	Lists the sheets available to the User with hyperlinks to allow quick access. Also includes the legend for the cell colours.
Registration	User input	For entry of details defining the site, regulatory reference, current ERC, key personnel, Waste Levy selection, and department review details.
Assumptions	User input	Shows the numerical defaults used in the background calculations such as machine productivity rates, density of materials to convert from volume to mass, thickness of surface layers, and soil amendment application rates.
Subrates	Reference	Contains subrates used to build the Default Rates in the Main sheet. The subrates cannot be altered by the User.
Lists	Reference	This is a functional sheet used to make other sheets work.
Information	Reference	Contains information about each User Input Sheet, the other sheets (e.g. Waste Register) and specific elements (e.g. tracks). The User can enter notes specific to their use of each User Input Sheet here.
Summary	Review	Shows the total ERC, the difference between the proposed and current amounts (if the User enter the current amount to the Registration sheet), rolled-up total cost for each domain and the multipliers for Maintenance and Monitoring, Project Management and Contingency.
Main	User input	The primary sheet in the Calculator for User Entered quantities. For many cases, the User will only enter quantities to this sheet and not use the other User Input Sheets.
Waste Levy Register	Reference	Reports the quantities of waste subject to a Waste Levy.
General Land Rehabilitation	User input	Allows User Entered quantities for rehabilitation that is not captured in other sheets.
Wells	User input	Allows User Entered quantities for well types, disturbance area, and land type.
Seismic and Infrastructure	User input	Allows User Entered quantities for seismic, tracks and roads, and camps.
Pipelines	User input	Allows User Entered quantities for pipelines and associated easements.
Process Facilities	User input	Allows User Entered quantities for gas processing facilities and oil storage facilities.
Process Facilities User Build	User input	Allows the User to build a cost for specific gas or oil processing facilities.
LNG Facilities User Build	User input	Allows the User to build a cost for specific LNG facilities.
Water Facilities User Build	User input	Allows User to build a cost for specific water treatment plants and/or water transfer stations.
Water Storage	User input	Allows User Entered quantities for dams and ponds.
Water Storage User Build	User input	Allows User to build a cost for specific water storages

Sheet	Type	Attributes, purpose and use
Investigation Contamination	User input	Allows User Entered quantities for a variety of activities associated with investigation and clean-up of sites (e.g. land investigations and treatment of hydrocarbon contaminated soils) that are not captured elsewhere in the Calculator.
Terms and Conditions (Terms-con)	Information	The terms and conditions under which the Calculator can be used. The User must review the terms and conditions prior to use. By using the Calculator, the User accepts the terms and conditions.

4.2 User sheets

The User Input Sheets are optional and can be used instead of / or in combination with the Main sheet. The User Input Sheets allow the User to list out the items more clearly (than in the Main sheet) in a domain and allow easier comparison with spatial data. If a specific item (e.g. a gas processing plant) is entered to the Main sheet, it should not also be added to the User Input Sheet and vice versa.

There are eleven User Input Sheets (see **Table 2**) allowing User inputs (not including Main sheet). The User Input Sheets comprise rolled-up rates in single lines and User input tables that build up the activity to calculate the total cost for the element.

The User Input Sheets are generally filled out from left to right (with Water Facilities User Build, Process Facilities User Build and LNG Facilities User Build sheets filled out from top to bottom) and only information relevant to the particular element needs to be entered. Generally, dimension or number inputs need to be entered to allow calculation. Where defaults are listed, and no information is entered by the User, a default value will be used in the calculation.

The structure of each User Input Sheet is similar with header rows providing the domain name, hyperlink Back to the Contents sheet, the total cost for the individual sheet, and the total ERC and for the site. An example is shown in **Figure 15**.

Petroleum and Gas Estimated Rehabilitation Cost Calculator

Contents	WELLS INPUT SHEET
Total Sheet	\$ -
Total ERC	\$ -

Figure 15. User Input Sheet header row

Each User Input Sheet includes a column on the left-hand side of the table for each activity to allow the entry of a map ID (Error! Reference source not found.). The map ID allows an entry which corresponds to a company-specific GIS (Geographic Information System) or other referencing system. A map ID must be entered where spatial data is provided which aligns with the line item of the Calculator. The DES form *Application for a decision on the estimated rehabilitation cost* (ESR/2018/4426) dictates where spatial information must or may be provided.

Petroleum and Gas Estimated Rehabilitation Cost Calculator

Contents	INFRASTRUCTURE INPUT SHEET
Total ERC	\$ -
Seismic (by length)	
Map ID	Name

Figure 16. Map ID

Some User Input Sheets (e.g. Water Facilities User Build) include spare rows to allow the User to enter items that are not included elsewhere.

The User Build Sheets allow the User more flexibility in the definition of the item than the standard User Input Sheets. For example in the Water Storage sheet, the User accepts the defaults such as sediment and growth media thickness for each category. In the Water Storage User Build sheet, the User can specify these quantities and these override the defaults.

4.3 Contents sheet

The Contents sheet is the primary navigation sheet for the Calculator and allows quick access to the Main sheet, User Input Sheets and Summary sheets. The mode of transport is hyperlinks which the User clicks on to access the target element (**Figure 17**).

Petroleum and Gas Estimated Rehabilitation Cost Calculator

CONTENTS
<i>Click on the links below</i>
REGISTRATION
ASSUMPTIONS
SUBRATES
LISTS
INFORMATION
SUMMARY
MAIN
WASTE REGISTER
GENERAL LAND REHABILITATION
WELLS
SEISMIC AND INFRASTRUCTURE
PIPELINES (LAND)
PROCESS FACILITIES
PROCESS FACILITIES USER BUILD
LNG FACILITIES
WATER FACILITIES USER BUILD
WATER STORAGE
WATER STORAGE USER BUILD
INVESTIGATION CONTAMINATION
TERMS AND CONDITIONS OF USE

EA= Environmental Authority
 ERC = Estimated Rehabilitation Cost

Figure 17. Contents sheet

4.4 Registration sheet

The Registration sheet (**Figure 18**) is where the User enters:

- EA and lease details.
- Name and location of the site.
- Personnel and contact details of the site contact.

- The date of the last (current prior to the submission in preparation) ERC decision and the amount of ERC last decided by the department (the current amount prior to the submission in preparation). The amount of ERC last decided is used in the Summary sheet to show the difference between that amount and the newly proposed ERC amount.
- Whether or not the Waste Levy applies.
- Explanation for any site-specific Project Management and/or Environmental Maintenance and Monitoring values entered to the Summary sheet, if relevant.
- Details of the people who prepared and approved the ERC, where relevant.

The space below the dotted line is for the department's use.

Petroleum and Gas Estimated Rehabilitation Cost Calculator

[Contents](#) **REGISTRATION**

Environmental Authority Ref:	<input type="text"/>	EA Holder:	<input type="text"/>
Tenure Numbers:	<input type="text"/>	Site Name:	<input type="text"/>
Last ERC Decision Date:	<input type="text"/>	Current ERC Amount:	\$ <input type="text" value="-"/>
Site Contact:	<input type="text"/>	Position:	<input type="text"/>
Site Address:	<input type="text"/>	Phone:	<input type="text"/>
	<input type="text"/>	Email:	<input type="text"/>
Waste Levy (select)	<input type="text" value="Waste levy does not apply because the site is not in a waste levy zone"/>	Further user comment on waste levy application:	<input type="text"/>
Name of Assessor (company):	<input type="text"/>	Name of Site Manager (company):	<input type="text"/>
Title:	<input type="text"/>	Title:	<input type="text"/>
Date:	<input type="text"/>	Date:	<input type="text"/>

Below this line for the Department's use only

Name of Department Reviewer:	<input type="text"/>	Name of Department Manager:	<input type="text"/>
Title:	<input type="text"/>	Title:	<input type="text"/>
Date:	<input type="text"/>	Date:	<input type="text"/>

Figure 18. Registration sheet

4.5 Assumptions sheet

The purpose of the Assumptions sheet is to provide transparency and serve as a User reference for the key parameters used in the detailed Calculators without providing all the calculations. The sheet shows the numerical defaults used in the background calculations such as machine productivity rates, density of materials to convert from volume to mass, thickness of surface layers, capping layers, and

soil amendment application rates. An example of assumptions for dozers is shown in **Figure 19**. The User cannot change the assumptions.

Dozer Specifications						
Description	D11R	D10R	D9R	D8R	D7R	D6R
Blade Width (SU) (m)	5.59	4.85	4.32	3.94	3.68	3.25
Dozing Speed - Average (kph)	4.00	3.50	3.00	3.00	3.00	3.00
Shank Gauge (3 shanks) (m)	3.00	2.64	2.34	2.16	1.98	1.98
Pocket Spacing (m)	1.45	1.32	1.18	1.09	0.99	0.99
Ripping Width (Ripper + 1 Pocket) (m)	4.44	3.96	3.52	3.25	2.97	2.97
Ripping Speed (kmph)	1.61	1.61	1.61	1.61	1.61	1.61
Ripping Maneuver (turn) Time (min)	0.25	0.25	0.25	0.25	0.25	0.25
Altitude Deration Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ripping Hourly Production (excluding maneuvering time) (m)	1609	1609	1609	1609	1609	1609

Figure 19. Example of assumptions

4.6 Subrates sheet

The purpose of the Subrates sheet is to provide transparency and serve as a User reference for the key rates (that are not in the Main sheet) used in the detailed Calculators without providing all the calculations.

Subrates is a reference sheet that contains the rates used to build the Main sheet default values, including the unit prices for earthmoving (e.g. cost per cubic metre to push soil 20 m using a D8 dozer), land amendments purchase price (e.g. gypsum) and gate fees and levy for waste. The User cannot change the Subrates. An example of the subrates for land amendments is shown in **Figure 20**.

Purchase Amendments (gate price)	Rate (\$/t)
Gypsum	\$ 100.00
Gypsum Recycled	\$ 70.00
Lime	\$ 60.00
Biosolids, MSW, Manure	\$ 40.00
Hay Mulch / Sugar Cane	\$ 180.00
Fertiliser pasture	\$ 1,000.00
Fertiliser trees	\$ 1,000.00

Figure 20. Example of subrates

The Subrates are either single values or determined in the User selection from drop-down menus. Hyperlinks in the User Input Sheets link to the source of the subrate in the Subrates sheet. In the example below (**Figure 21**) from the Water Storage User Build sheet, the selection of 'Small Fleet 2' and '<=200 m' haulage distance (left) determined a rate of \$3.00 per cubic metre (middle) which is sourced from 'Subrates Table 1' (right). The User can find the source of this subrate by clicking in the 'Subrates_Table_1' (middle) hyperlink.

Haul, Push, Fleet Selections		Subrates Table 1		
Remove Silt - Select Haulage Distance (m)	Sediment Fleet	1	2	3
Select from dropdown	Select from dropdown		Activity per LCM	Growth Media Bitumen etc
<=200 m	Small Fleet 2			Sediment
				Small Fleet 1
				Small Fleet 2
			<=200 m	\$ 3.1
			>200 m to <=500 m	\$ 3.1
				\$ 3.35

Unit Rates	
Sediment Haul Rate (\$/m3)	
Subrates Table 1	
\$	3.00

Figure 21. Example of determination and source of subrates

4.7 Lists sheet

This is a functional sheet used to make other sheets work and contains lists of all Default Rates included in the Calculator and the different options for each infrastructure type. The User cannot modify this sheet. Examples of lists are shown in **Figure 22**.

Fleet Size	Tanks List
Small Fleet 1	Vertical, Steel, Open top, Earth, Lined, Single skin
Small Fleet 2	Vertical, Steel, Closed top, Steel, Not lined, Single skin
Small Fleet 3	Concrete Ring, Steel, Open top, Earth, Lined, Single skin
Medium Fleet	Horizontal, Steel, Closed top, Skid, Not lined, Single skin
Large Fleet	Panel, Concrete, Open top, Earth, Lined, Single skin
Truck / shovel	Rainwater, Plastic, Closed top, Plastic, Not lined, Single skin
	Hopper, Steel, Closed top, Steel, Not lined, Single skin

Figure 22. Examples of Lists

4.8 Information sheet

This sheet contains information about each Input sheet and the other sheets (e.g. Waste Register). It provides a brief explanation of the purpose of each sheet and how it is intended to operate. This sheet is also where the User can enter explanations about their use of the Input sheets. In the example shown in **Figure 23**, the 'General' row is shown and contains general information about the use of the Calculator. The space for 'User Notes' is shown on the right.

CONTENTS		INFORMATION SHEET	
Sheet	Use	Notes	User Notes
General	Enter quantities in the green cells. If alternate rates are justified enter to the yellow cells and provide justification in the Table of Values. Quantities only need to be entered in one table (e.g. if using rolled-up rates for roads, the same road quantities do not need to be entered to the User Quantities table. If a quantity based table, e.g. number of dams is used, the user does not have to enter the area in the area-based table).	Numerical assumptions are shown in the Assumptions sheet. The rates generally include activities reasonably anticipated to be required to rehabilitate items. Specifically, decommissioning, demolition, removal, disposal / storage, rehabilitation of land ("grade and seed") and land investigations where required are included. User tables allow entry of site-specific quantities and adding on of non-standard items such as long distance haul of growth media and amendment to soil. In general, the intent is the default rates will cover most scenarios and the User build-up should only be necessary if there is a clear requirement. For example, it is known that highly sodic soil will require amendment with a higher gypsum application rate or growth media will require carting from more than 10 km. Rates in arid environments do not include growth media and seeding. Arid environments are desert whereby vegetation is absent (e.g. the Cooper Basin in South West Queensland). Click in title cells with asterisk for tips on specific use. When entering text (e.g. in User Notes to the right), it is recommended to add a blank row at the beginning and end of the text to ensure text displays correctly. Use Alt Enter to add blank rows.	
CONTENTS	The User can navigate through the calculator using the quick links. Includes the legend (repeated to the right) illustrating the colour coding used throughout the calculator.	Colour Code Key User Input Cells User Input - Alternate Rates / Justification Alternate Rates entered by User Locked cell - Default Rates or Sum from Input Sheets Locked cells - blanks Locked cell - calculations or text * denotes pop up message is available in cell	

Figure 23. Information sheet

4.9 Summary sheet (including project multipliers)

4.9.1 Sheet description

The Summary sheet reports total ERC cost and the difference between the current and proposed, the rolled-up total cost for each domain, and the multipliers for Environmental Maintenance and Monitoring, Project Management, and Contingency (**Figure 24**). The only User inputs available in this sheet are site-specific Project Management and Environmental Maintenance and Monitoring percentage multipliers.

Petroleum and Gas Estimated Rehabilitation Cost Calculator

SUMMARY				
Contents	Total ERC \$ -			
Item	Quantity	Unit	Rate	Total Cost
1. Exploration			\$	-
2. Roads, Tracks, Laydown and Borrow Pits			\$	-
3. Camps and Buildings			\$	-
4. Power Generation and Distribution			\$	-
5. Wells Pads and Associated Infrastructure			\$	-
6. Pipelines			\$	-
7. Gas Processing and Oil Storage Facilities			\$	-
8. LNG Plants			\$	-
9. Water Treatment Plants and Transfer Stations			\$	-
10. Water Storage Infrastructure (Dams / Ponds and Tanks)			\$	-
11. General Land Rehabilitation			\$	-
12. Investigation and Contamination			\$	-
13. Mobilisation and Demobilisation			\$	-
14. Additional Activities			\$	-
Total before Project Overheads and Contingency				\$ -
Project Overheads and Contingency		User Entry	Default	Total Cost
Project Management			10%	\$ -
Environmental Maintenance and Monitoring			5%	\$ -
Contingency			10%	\$ -
Subtotal of Project Overheads and Contingency				\$ -
Total Estimated Rehabilitation Cost for the Site (excluding GST)				\$ -
Difference from last ERC amount				\$ -

Figure 24. Summary sheet

If the User enters site-specific values for these items, justification must be added to the space provided in the Summary sheet **Figure 25**.

Alternate Project Management Rate Justification:

Alternate Maintenance and Monitoring Rate Justification:

Figure 25. Justification for User Entered multipliers

4.9.2 Project Management multiplier

The Calculator includes a default multiplier for Project Management costs, which amounts to 10% of the total ERC from the domains. The Project Management multiplier reflects the cost to government to execute a rehabilitation program for a P&G project and includes:

- Health and safety and overall work plans.
- Identifying and obtaining permits.
- Procurement of contractors and consultants and ongoing contract management.
- Ongoing management of the project including scheduling, expenditure tracking and forecasting, internal communication, and on-site supervision.

- Stakeholder (including landowner, community, municipal government and regulators, media) management.
- Consulting and legal costs associated with the above items.

The User can enter a site-specific Project Management multiplier on the Summary sheet. If the 10% default value is not used, quotes must be attached to the ERC application and the User must provide justification in the space provided in the Registration sheet. The Calculator only allows a percentage to be entered for an alternate Project Management multiplier. The User can show the build-up of the alternate Project Management cost in dollars but then must show the conversion to a percentage which will be the Project Management cost divided by the total ERC cost pre-multipliers. If a User enters a site-specific Project Management multiplier, the Calculator applies this value instead of the default.

4.9.3 Environmental Maintenance and Monitoring multiplier

The Calculator includes a default multiplier for Environmental Maintenance and Monitoring costs, which amounts to 5% of the total ERC from the domains. For the purposes of the Calculator, the allowance is assumed to cover five years of post-closure monitoring.

The Environmental Maintenance and Monitoring multiplier is separate to the other land rehabilitation rates in the Calculator and reflects the costs to government to undertake the following:

- Post-closure maintenance activities:
 - Minor repair of rehabilitated features eroded by surface water run-off and high intensity rainfall events.
 - Revegetation campaigns to rehabilitate areas where vegetation is damaged from drought, fire, animals and/or infertile seed.
 - Weed management, mapping and assessment surveys.
 - Repair of minor subsidence due to poor backfill operations.
 - Fence and signage repairs.
 - Security.
- Post-closure monitoring activities:
 - Environmental, revegetation and erosion monitoring and assessment.
 - Ground and surface water monitoring and drainage assessment.
 - Erosion and surface drainage assessments and inspections across all closure areas.
 - Feral animal assessment and control.
 - Independent contamination auditing and assessment (separate to the land investigation costs included in the Default Rates).
 - Satellite imagery for rehabilitation analysis and reporting purposes.
 - Preparation of annual environmental reporting and monitoring reporting requirements and data management and control.
 - Mobilisation and demobilisation of the monitoring and inspection teams.

The User can enter a site-specific Environmental Maintenance and Monitoring multiplier on the Summary sheet. If the 5% default value is not used, quotes must be attached to the ERC application and the User must provide justification in the space provided in the Registration sheet. The Calculator only allows a percentage to be entered for an alternate Environmental Maintenance and Monitoring multiplier. The User can show the build-up of the alternate Environmental Maintenance and Monitoring cost in dollars but then must show the conversion to a percentage which will be the Environmental Maintenance and Monitoring cost divided by the total ERC cost pre-multipliers. If a User enters a site-specific Environmental Maintenance and Monitoring multiplier, the Calculator applies this value instead of the default.

4.10 Waste Levy Register

This sheet reports the quantities of waste that may be subject to a Waste Levy. The User selects whether the Waste Levy applies in the Registration sheet and, if it does apply, whether the site is in

the Metro or Regional Waste Levy zone. The User should refer to the Waste Levy zone map available on the Queensland Government website to confirm if waste is likely to be disposed at a landfill in a Waste Levy zone and will attract the Waste Levy.

If the Waste Levy does not apply, the User should select 'Waste Levy does not apply' in the Registration sheet and no costs are allocated. If there is another reason why the Waste Levy does not apply, the User should select 'Waste Levy does not apply for another reason' in the Registration sheet and enter the reasoning in the comment box.

The Waste Register multiplies the User Entered quantities of each element (e.g. camp) by the specific mass of waste for that element. For example, 'X' tonnes of concrete per camp is multiplied by the number of camps to get the total concrete for that line to which the Waste Levy applies. The total waste (e.g. mass of concrete) is reported to the Main sheet where it is multiplied by the appropriate levy to get the total levy amount.

The Waste Levy rates (\$/tonne), leviable waste and levy zones is underpinned by the *Waste Reduction and Recycling Act 2011*, please refer to the Queensland Government's Waste Levy website for more information.

4.11 Main sheet

The Main sheet (**Figure 26**) is the primary sheet in the Calculator for User entries. For many cases, the User may only need to enter quantities to this sheet and will not need to use the other User Input Sheets. The key attributes of the Main sheet are discussed below.

Map ID	Activity/Description	User Select	Input Sheet	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	User Comments/Item Names	Rationale for Alternate Rate
1. Exploration										
#1.01	Seismic survey in pasture (Infrastructure Input Sheet)			0	km	\$ 1,006.18		\$ -		
#1.02	Seismic survey in native (Infrastructure Input Sheet)			0	km	\$ 1,895.53		\$ -		
#1.03	Seismic survey in acid (Infrastructure Input Sheet)			0	km	\$ 426.76		\$ -		

Figure 26. Main sheet – Top showing header and beginning of exploration domain

The Main sheet is grouped by domain (e.g. exploration, dams) and the total for each domain sums to a subtotal (**Figure 27**). The sum of all the domains plus the User defined additional items at the bottom of the sheet is displayed at the top of the Main sheet.

#1.47	Additional line item - user to name activity							\$ -		
								Subtotal	\$ -	

Figure 27. Main sheet - Subtotal for exploration domain

Where values are coming from the User Input Sheets, this is stated in the activity/description column and the quantity cell is hatched out (**Figure 28**). Except for the General Land Rehabilitation and Investigation and Contamination User Input Sheets where entries are reported to the Main sheet, the totals of the User Input Sheets are summed in those sheets and reported as a single line item to the Main sheet.

If entries are added to a User Input Sheet, they do not need to be re-added to the Main sheet. The information from the User Input Sheets automatically populates the relevant line of the Main sheet. If the User Input Sheets are not used, the User must enter all quantities to the Main sheet.

Map ID	#	Activity / Description	User Select	Input Sheet	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost
10. Water Storage Infrastructure (Dams / Ponds and Tanks)									
	#10.01	Water Storage User Defined				total			\$ -
	#10.02	Water Storage Input Sheet			0	dam			\$ -

Figure 28. Example of values coming from User Input Sheet

In the Main sheet there are instances where an additional User input is allowed in the User input column. For example, TJ/day in #7.01 (Figure 29). In general, these cases are to allow the User to enter a specific value between ranges. For example, with gas processing facilities there are several ranges, the User input allows the User to enter 220 TJ/day rather than enter to the 200 to 300 TJ/day line. In these cases, a calculation interpolates between the calculated rates.

7. Gas Processing and Oil Storage Facilities									
	#7.01	Gas processing facility of user entered TJ/day			220	TJ/day			

Figure 29. Example of User Entered quantity in Main

The 'Use of Default Rate' and 'Scope of Default Rate' columns provide information on the intended use and scope of each rate to assist the User in their selections. User comments and alternate rate rationale columns allow the User to enter information for the department to review. For example, a User might explain here why the default values for building areas are different to recorded footprint area in a relevant EA or Plan of Operations. A common use is to list the specific sites or equipment covered by the row entry. For example, if two water treatment plants are entered to a row, the User might assist the department in understanding by adding the names (and potentially the actual capacity) of those plants (e.g. Water Treatment Plant North 7 ML/day and Water Treatment Plant South 8 ML/day). If the User prefers, such listings can be entered to the User Input Sheets where itemisation is clearer.

If an Alternate Rate is entered, a justification must be provided and if the justification is external to the Calculator, the User can enter a reference (e.g. 'Refer to Document AAB').

The sub-totals for each domain (default values and User Input Sheet) report to the Summary sheet.

At the end of each domain, there are rows to allow the User to define specific activities not included elsewhere. There are also several rows for this purpose in section 14 of the Main sheet. The User must enter a description of the rate, the unit of the quantity (e.g. km), the rate (e.g. cost per kilometre) and explanation for the rate. An example is shown in Figure 30.

Map ID	#	Activity / Description	User Select	Input Sheet	Quantity	Unit	Default Unit Rate	Alternative Unit Rate
	#7.73	Additional line item - user to name activity						
	#7.74	Additional line item - user to name activity						

Figure 30. Example of additional rows for User defined entries

4.12 General Land Rehabilitation and User Input Sheet

This section provides information on specific land rehabilitation areas and the use of the General Land Rehabilitation User Input Sheet.

4.12.1 Erosion and sediment control

P&G activities include long linear clearances as part of pipeline construction. If not backfilled appropriately, these can act as barriers to, or channels for overland flow. Alteration of natural drainage patterns can increase concentration and/or velocity or run-off, which in-turn increases risk of erosion. Where surface cover has been reduced (e.g. by disturbance or clearing), overland flows will be less impeded, runoff will start to concentrate and may cause rill and gully erosion. This can trigger a downward spiral of degradation as runoff travelling at high speed is less likely to enter the soil and consequently less soil moisture will be available to plants, reducing growth and in turn exposing the soil to further erosion (*Soil conservation guidelines for Queensland*, DSITI 2015).

Erosion and sediment control, rehabilitation and revegetation measures are spread throughout the Calculator, with an allowance for recontouring of the site and a final grade and seed the norm. Where a site is known to have sub-par drainage or ongoing erosion issues, quantities can be added directly to section 11 of the Main sheet or the General Land Rehabilitation User Input Sheet which uses the same Default Rates.

4.12.2 Pest and weed management

Introduction and/or spread of weeds associated with resource activities are usually caused by either:

- Transportation of seeds / weed material into the area on vehicles and equipment, or in construction and landscaping material or footwear.
- Land disturbance due to project activities creating conditions favourable to weed growth.

While a range of pest animals occur in Queensland, feral pigs have the greatest ability to impact resource activities. Feral pigs cause extensive damage to natural habitats by turning over vast areas of soil when rooting for food. They also wallow and foul up water sources, trample and consume native vegetation and facilitate the spread of weeds. For resource sites, pigs can rapidly undo any rehabilitation or erosion and sediment control works through rooting and wallowing, and they act as a vector for weeds – with weed seeds germinating from fecal matter.

Pest and weed management usually involve a hierarchy of management measures from avoidance, through prevention to control. Commonly used prevention measures include weed washdowns / weed hygiene certificates for vehicles and equipment and weed / pest free certification for source material (e.g. topsoil). Control of weeds and pests involves more direct intervention and includes activities such as herbicide application for weeds and trapping and poisoning for pests.

Resource proponents generally manage pests and weeds as part of their routine operation and maintenance procedures. The Calculator includes two rates that can be used for pest and weed management:

- #11.07 Land management of undisturbed areas (e.g., weed management, feral animal control, erosion and sediment control works)
- #11.08 Pest management on buffer lands, non-disturbed, and rehabilitated areas

These rates can be used if there is a known pest and/or weed management issue and for which the proponent is responsible for costs. Quantities for these rates do not have to be applied if there is not a known pest and/or weed issue.

4.12.3 General Land Rehabilitation User Input Sheet

The Default Rates and user input tables in the other sheets include land rehabilitation so the General Land Rehabilitation sheet does not need to capture such activities for these items. For example, the Default Rates for camps and process facilities include grade and seed.

The General Land Rehabilitation User Input Sheet may be used to record areas that are in the total footprint of a facility and but not in the disturbance area such as buffer / fire safety areas. Discrepancies between areas reported in the Plan of Operations and the ERC submission can be

explained on this sheet. ERC costs should only be applied to areas the EA holder has a rehabilitation obligation or liability.

The General Land Rehabilitation sheet can be used for all areas requiring any of the following:

- Land rehabilitation and repair of subsidence and land management
- Natural drainage and diversions
- General doze and rip
- General grade and rip
- Miscellaneous soil amelioration and seeding
- Bores—with options for plugging, backfill with cuttings and full grouting with cement.

There are separate tables for each of the above categories and each require a variety of User inputs to allow the areas or volumes of material to be calculated.

For example, natural drainage and diversions requires the User to input the relevant dimensions (area or length) against applicable categories **Figure 31**.

Natural Drainage and Diversions						
Map ID	Name of Area	Engineered cut-through drain	Repairs and/or stabilisation of new or compromised water course diversion	Long term maintenance of water course diversion – Channel constructed through backfilled material	Long term maintenance of water course diversion – Channel constructed through competent material	Installation of rock armouring
		ha	m	m	m	m ²

Figure 31. Inputs for drainage and diversions

As the Default Rates are the same as those in the Main sheet, the Quantities are reported to the Main sheet as shown in **Figure 32**. The User can also add quantities to the Main sheet and the total for each line is multiplied by the Default Rate. Alternate Rates cannot be added to the User Input Sheet, but in most cases can be added against the relevant line item in the Main sheet together with the necessary justification.

11. General Land Rehabilitation							
	#11.01	Maintenance of rehabilitated areas		0.00		ha	\$ 644.19
	#11.02	Existing rehabilitation repair - minor		0.00		ha	\$ 1,233.06
	#11.03	Existing rehabilitation repair - moderate		0.00		ha	\$ 1,803.80

Figure 32. General Land Rehabilitation section of Main showing reporting of User Input Sheet quantities

4.13 Wells and User Input Sheet

The Main sheet includes Default Rates for an expanded (over the 2019 Calculator) range of well types for conventional gas, coal seam gas, conventional oil, and tight/shale gas. The categories of wells are further divided into status (stage of the well), and these are defined below in the context of the Calculator:

- Corehole—A bore drilled in the early stages of evaluating a resource. No liquids or gases are produced.
- Plugged and abandoned—Wells where aboveground (e.g. beam pump or ‘Christmas tree’) and in-well (e.g. pump) equipment is removed; the well void has been plugged (e.g. with

cement); and the well pad is either absent (grown over) or defined by a small (e.g. 4 m by 4 m) fenced area.

- Suspended—Wells that have been shut-in for an extended period (e.g. 2 to 5 years) and that are unlikely to return to production. A suspended well may have equipment removed and some down-well management to make it safe.
- Shut-in—Wells that have been isolated (e.g. by closing valves) and with a high likelihood of returning to production. Shut-in wells typically retain operation equipment and are in a ready to operate state.
- Appraisal/development—Wells where the resource is being evaluated. Such wells typically have additional (beyond an operation well) equipment and infrastructure on the well pad (i.e. liquids are managed locally as the well is yet to be connected to a production network) and consequently have larger well pads (than operation wells).
- Production/operation—Wells that are producing oil or gas. The well has operational equipment only and the well pad is typically reduced from an appraisal size.

The default cost rates for wells reflect the nature and extent of activities required to decommission and rehabilitate each specific well type. Further information on the specifics of each well category is included in the scope section for each rate in the Main sheet.

The Wells User Input Sheet allows the User to itemise the wells, (i.e. create a list of all the wells or groups of wells), enter the area of well pads, and decide the vegetation type. The User undertakes the following (

Figure 33):

- Selects the well type from the drop-down menu and enters the quantity of each. The total for all categories is shown at the top of the sheet.
- Enters the area of the well pad, or total area if wells are grouped into a line item.
- Selects the vegetation 'Land Type' (seed or no seed (arid)). The total for both categories is shown at the top of the sheet.

The total area entry is the total for all the wells in the category, the Calculator does not calculate this based on the number of wells. This is because well pads, even in the same category, may vary in size.

The rates in the Wells sheet are separated into decommission/dismantle and land rehabilitation. In the Main sheet, these two activities are rolled into one rate and therefore the rates in the Wells sheet and Main sheet are not the same.

The selection of 'Land Type' is only seed or no seed (arid). The User is advised to review the area entries for small pad sizes as the rate per hectare is high, reflecting the small pad size in relation to the per hectare rehabilitation rate. For example, the land rehabilitation rate for the category 'Conventional oil, Plugged and abandoned, Single well' is \$500,000 per hectare because the rate assumes a very small pad size (see Assumptions sheet). Consequently, the total cost for the land rehabilitation is low. If a site has corehole or plugged and abandoned well pads that are large compared to the Assumption in the Calculator, the User is recommended to use the Main sheet.

Contents		WELLS INPUT SHEET	
Total Sheet	\$	269,960.01	
Total ERC	\$	337,450.01	

14	4.50
----	------

Map ID	Name	Type	Number	Total Area (all wells in row)	Land type
		Select from dropdown	Whole #	ha	Select from dropdown
		Conventional oil, Plugged and abandoned, Single well	11	0.5000	sed
		Conventional oil, Appraisal / development, Single well	2	3.0000	sed
		Conventional oil, Operation / Production, Single well, No Beam Pump	1	1.0000	no ses (arid)
		Conventional oil, Operation / Production, Single well, Beam Pump			no ses (arid)

Figure 33. Well type selection (left), quantity entry (middle), and area entry (right)

The total costs for the decommission/dismantle and land rehabilitation components are summed for each category and the total for the sheet displayed at the top of this sheet and reported to the Main sheet as one line item.

Alternate Rates are not available in this sheet. The User should use the Main sheet if Alternate Rates are justified.

4.14 Seismic and Infrastructure and User Input Sheet

The Main sheet has a range of infrastructure rates for tracks, roads, laydown areas, borrow pits, buildings, and power distribution. Where appropriate, the rates have a by length (e.g. length of track of an assumed width) or by capacity (e.g. number of people for a camp) / size (volume of tank) category and a by area category. Where appropriate, groups of activities, such as tracks, include categories reflecting the activities required to rehabilitate different surfaces.

In most cases, the economies of scale are reflected in the cost rates. For example, decommissioning and demolishing a large warehouse building is likely to be lower per unit cost (but higher total cost) than a small ancillary building. Portable skid buildings are demountable buildings that can readily be lifted onto and transported by a truck as a whole.

The Seismic and Infrastructure User Input Sheet includes disturbances associated with seismic easements, tracks and roads and camps. The sheet can be used if the User wishes to list out the areas associated with these items. The cost rates applied to the quantities are the same as those in the Main sheet.

The sheet includes two options for seismic easements - by length and by area. In both cases the disturbance to be entered is only the length or area disturbed by the seismic equipment. Typically, such a disturbance is linear and contemporary techniques cause minimal disturbance to the environment. The Calculator applies a default (currently 5%) multiplier to the entered quantity to determine the amount that will be multiplied by the Default Rate acknowledging that rehabilitation requirements are likely to be minor. The User selects the land type and the Calculator assigns the appropriate Default Rate (Figure 34). Acknowledging that the actual disturbance is linear for both 2D and 3D seismic, the Calculator no longer makes the distinction between the two.

Seismic (by area)		5%		Land			
Map ID	Name	Total Area	Rehab area	Pasture	Native	Arid	
		ha	ha				
	Seismic area Yellowstone	100.00	5.00	Pasture	5.00		
	Seismic area Big Sur	100.00	5.00	Native	5.00		
	Seismic area Roma 1	100.00	5.00	Arid		5.00	
			0.00	Pasture	0.00		
		300.00	15.00				
				5.00	5.00	5.00	
				#1.04	#1.05	#1.06	
				TOV#			
				Rate	\$ 2,974.80	\$ 5,415.80	\$ 1,219.30
				Total	\$ 14,374.02	\$ 27,079.02	\$ 6,096.52

Figure 34. Seismic by area table with default rehabilitation multiplier and land selection circled

The sheet includes User build tables for roads and tracks and camps. The User can use this table if they wish to list out the specific elements, but the Default Rates are the same as those in the Main

sheet. Similar to the seismic tables, the User selects the land type, and the Calculator assigns the appropriate Default Rate.

The selection of the camp is determined by whether the structure is temporary or permanent and the capacity (number of people the camp can house) of the camp. A temporary camp is typically constructed for relatively short-term activities such as drilling campaigns or one-off activities such as construction of a process facility. Permanent camps are typically required for more than five years and include more hardstand (asphalt and concrete) and facilities (such as recreational modules, tennis and basketball courts) than a temporary camp. It is up to the User to determine the type of camp that is applicable in each case. The User may make a case that a camp that has been in use for more than five years is a temporary camp by demonstrating the absence of hardstand (i.e. the surface is predominantly compacted earth and gravel) and only has simple facilities (very basic recreational facilities).

The total costs for each table are summed and displayed at the top of the sheet and this total reported to the Main sheet as one line item.

Alternate Rates are not available in this sheet. The User should use the Main sheet if Alternate Rates are justified.

4.15 Pipelines and User Input Sheet

The Main sheet includes an extensive range of by length decommissioning and rehabilitation rates for flushing/purging, removing pipe if required (typically underground pipe is not required to be removed but is required to be flushed and capped) and rehabilitating of easements within pasture, native, and arid land. Rates for making safe and restoring road, rail, and water crossings are included and the User should demonstrate they have tallied up the number of such occurrences along the length of the pipeline and enter those quantities.

Rates for pipeline facilities are included:

- Pipeline hub (small) —Small facility comprising a combination of pig launching / receiving, metering, and manifolds. Typically will not include any buildings.
- Pipeline hub (large)—Larger facility (though still small compared to the process plants) comprising a combination of pig launching / receiving, metering, and manifolds. A large hub may include multiple launches and metering stations and potentially small buildings.
- Main-line valve—Equipment to isolate or change flow path of gas/oil in a pipe. The rate is intended to cover large diameter (in the order of 1 m diameter) valves typically installed on mainlines. The rate is not intended to be used for smaller isolation valves which may be installed on flowlines and gathering lines (these can be assumed to be covered under the pipeline rates).
- Metering station—Equipment to measure and report the flow and/or mass of gas flowing through a pipeline. Equipment typically comprises piping, valving, and instrumentation. Rate is per metering assembly which may comprise multiple instruments and valving arrangements. The rate is not intended to be used for small single flow instrumentation assemblies (these can be assumed to be covered in the pipe rates) or wellhead metering devices (which can be assumed to be covered in the well rates).
- Pig launcher / receiver—Equipment to introduce or receive pipe cleaning / inspection equipment (the 'pig') to/from pipelines. Equipment typically comprises barrel type at entry/exit to pipe and smaller pipes for utilities to propel the pig. Typically skid or simple steel structure mount with small bund. Rate is per launcher or receiver.

The Pipelines User Input Sheet allows the User to list out pipelines or groups of pipelines and enter the disturbance area improving consistency with the spatial data. The sheet allows selection for above

ground / below ground², oil, water and gas, a pipe diameter and rehabilitation status. Together these determine the Default Rates for purging and flushing. The default assumption is that gas pipes are purged, oil pipes are flushed, and water pipes are neither purged nor flushed as the water is beneficially re-used or evaporated in a pond.

For underground pipes, there are three selections for rehabilitation status of the easement:

- None—The easement is in the construction phase and the default easement width is the largest.
- Partially—The easement is in the operational phase with the easement width reduced from that during construction.
- Fully—The easement is rehabilitated or naturally overgrown but is yet to be progressively certified by the department. For this selection, the default easement width is to allow for ongoing inspection until the easement is signed off.

The rehabilitation of an above-ground pipeline easement is less involved than for an underground pipeline as a single rate is assumed with a narrow easement.

The calculation assumes the same treatment irrespective of pipe material (e.g. steel or high-density polyethylene).

The basic Default Rates in the input sheet do not include additional items such as low point drains, high point vents, road or rail crossings and/or creek/river crossings, but these can be added directly to the Main sheet (e.g. #6.135 and #6.136).

4.16 Process Facilities, Water Treatment Plants and Transfer Stations, Water Treatment, User Input Sheet and User Build sheet

The Main sheet includes Rates for a range of Process Facilities including:

- Gas processing facilities – associated with coal seam gas projects
- LPG facilities
- Conventional Gas Plants
- Conventional Oil Storage
- Water Treatment Plants
- Water Transfer Station.

The individual rates in the Main sheet are rolled-up and include decommissioning, dismantling, demolition, waste management (including disposal fees and Waste Levy if applicable) and land rehabilitation. The rates are by size/capacity (e.g. Terajoules per day for gas plant, megalitres per day for water treatment plants, kilolitres (storage) for conventional oil facilities).

For some of the facility types, the User can enter their specific capacity and the Calculator interpolates to obtain a cost (**Figure 35**). The User must enter the capacity of the plant (25 TJ/day in the example below) and the number of plants of that capacity (1 in the example below). There is a minimum and maximum capacity for which these rows can be used, and this is shown in the use of Default Rate.

² The primary difference between the calculations for underground and above-ground is the absence of road, rail and stream/creek crossings for above-ground pipes and a smaller default easement width for above-ground pipes (as no trench excavation is required).

The default cost rates reflect the nature and extent of activities required to decommission and rehabilitate each specific facility type. Further information on the specifics of each category is included in the scope section for each rate in the Main sheet.

#7.01	Gas processing facility of user entered Tj/day	25	Tj/day	1	facility		\$	328,094.57	\$	328,094.57
#7.02	Stand-alone gas compressor				facility		\$	6,127.77		\$ -
#7.03	Gas Processing Plant > 0 and <= 15 Tj/day				facility		\$	194,440.02		\$ -
#7.04	Gas Processing Plant > 15 and <= 25 Tj/day			1	facility		\$	328,094.57		\$ 328,094.57

Figure 35. Process Facility – example of User defined capacity

4.16.1 Process Facilities User Input Sheet

The Process Facilities User Input Sheet allows the User to itemise the facilities, enter the disturbance area for each facility (or group of facilities), and decide the vegetation type. The Process Facilities User Input Sheet includes tables for the same groups as in the Main sheet (listed above). The User (refer **Figure 36**):

- Selects the capacity / size range of the facility from the drop-down menu and enters the quantity of each. The total for all categories is shown at the bottom of each table.
- Enters the disturbance area of the facility, or total area if facilities are grouped into a line item, into the appropriate column (pasture, native, arid). The total disturbance area in each land type is shown at the bottom of each table.

The total area entry is the total for all the facilities in the category and the Calculator does not calculate this based on the number of facilities. This is because the disturbance area even in the same category may vary in size.

The rates in the Process Facilities sheet are separated into decommission/dismantle/demolish and land rehabilitation. In the Main sheet, these two activities are rolled into one rate and therefore the rates in the Process Facilities sheet and Main sheet are not the same.

The sums for each table are added together, the results displayed at the top of the sheet and reported to Main as a single line item.

User Guide for Estimated Rehabilitation Cost Calculator for Petroleum and Gas

Petroleum and Gas Estimated Rehabilitation Cost Calculator				Total ERC	Unc Gas	Con gas	Oil	LPG
PROCESS FACILITIES				\$ 881,235.87	\$ -	\$ -	\$ -	\$ -
Gas Processing Facilities								
#	Map ID	Name	Select	Number	Gas Process Plant - Pasture (Total for all facilities in row)	Gas Process Plant - Native (Total for all facilities in row)	Gas Process Plant - Arid (Total for all facilities in row)	
Select from dropdown				#	ha	ha	ha	ha
1			Stand-alone gas compressor					
2			Gas Processing Plant > 0 and <= 15 TJ/day					
3			Gas Processing Plant > 15 and <= 25 TJ/day					
4			Gas Processing Plant > 25 and <= 50 TJ/day					
5			Gas Processing Plant > 50 and <= 100 TJ/day					
6			Gas Processing Plant > 100 and <= 200 TJ/day					
7			Gas Processing Plant > 200 and <= 300 TJ/day					
8			Gas Processing Plant > 300 and <= 400 TJ/day					
9			Gas Processing Plant > 400 and <= 500 TJ/day					
10			Gas Processing Plant > 500 and <= 750 TJ/day					
11			Gas Processing Plant > 750 and <= 1000 TJ/day					
12			Gas Processing Plant > 50 and <= 100 TJ/day					
13			Gas Processing Plant > 50 and <= 100 TJ/day					
14			Gas Processing Plant > 50 and <= 100 TJ/day					
15			Gas Processing Plant > 50 and <= 100 TJ/day					
16			Gas Processing Plant > 50 and <= 100 TJ/day					
17			Gas Processing Plant > 50 and <= 100 TJ/day					
18			Gas Processing Plant > 50 and <= 100 TJ/day					
19			Gas Processing Plant > 50 and <= 100 TJ/day					
20			Gas Processing Plant > 50 and <= 100 TJ/day					

TOV#	Land Subrates	Land Subrates	Land Subrates
Rate	\$ 1,655.50	\$ 4,196.50	\$ -
Total	\$ -	\$ -	\$ -

Figure 36. Example inputs for gas processing facilities

4.16.2 Processing Facilities User Build sheet

The Process Facilities User Build sheet allows the User to construct a rate by selecting the items that are at the facility. The Process Facilities User Build sheet includes the same facility types as the Main sheet and User Input Sheet and requires the User only to enter quantities for:

- Type of facility (Select from the drop-down menu – **Figure 37**).
- Size (capacity, storage volume) of facility. This number is reference only and does not feature in the calculation.
- Construction type and capacity of tanks.
- Number of process modules. Process modules are larger than skids and typically require large cranes and trucks to transport whole. The Default Rates make assumptions on how large a module can be before it must be divided into sections for transport and the User must make these determinations if this sheet is used.
- Number of process skids.
- Number of on-site constructed buildings.
- Number of portable buildings.
- Length of steel piping (m). This is for piping not directly associated with modules and includes, for example, connections between modules.
- Number of pipe penetrations to ground.
- Length of site electrical cable and tray (m). This is for electrical not directly associated with modules and includes, for example, main feeds and connections between modules.
- Pumps and controls.
- Earth bund allowance.
- Liquid pump and dispose.
- Rip land.
- Growth media.
- Area for grade and seed (by land type).

Petroleum and Gas Estimated Rehabilitation Cost Calculator		Type (select from drop-down)		Conventional Gas	LPG Plant
PROCESS FACILITIES USER BUILD		Contents			
\$	-	Total ERC			
\$	-	This sheet			
Elements	Size	Unit	Unit Rate	\$	\$
1 Vertical, Steel, Open top, Earth, Single skin, Lined, 0.14 ML		tank	\$ 3,030.98		
2 Vertical, Steel, Open top, Earth, Single skin, Lined, 0.6 ML		tank	\$ 5,866.91		

Figure 37. Process facility type drop-down menu

The calculation uses the rates for the individual components (some of which are shown in Main sheet and other in Subrates) and the costs are summed in the bottom table. The overall total is displayed at the top of the sheet and reported to Main as a single line item.

4.16.3 Water Facilities User Build sheet

The Water Facilities User Build sheet allows the User to construct a rate by selecting the items that are at the facility. The Water Facilities User Build sheet includes the same facility types as the Main sheet and Process Facilities User Input Sheet and requires the User only to enter quantities for:

- Construction type and capacity of tanks.
- Number of major modules. Major modules are larger than skids and typically require large cranes and trucks to transport whole. The Default Rates make assumptions on how large a module can be before it must be divided into sections for transport and the User must make these determinations if this sheet is used. A typical water transfer plant would not include any major modules.
- Number of skids. For example, pump skids.
- Number of on-site constructed buildings.
- Number of portable buildings.
- Length of steel piping. This is for piping not directly associated with modules and skids and includes, for example, connections between modules.
- Number of pipe penetrations to ground.
- Length of site electrical cable and tray (m). This is for electrical not directly associated with modules and includes, for example, main feeds and connections between modules.
- Pumps and controls.
- Rip land.
- Growth media.
- Area for grade and seed (by land type).

It is anticipated that the Water Facilities User Build sheet would be used for water transfer type facilities.

Petroleum and Gas Estimated Rehabilitation Cost Calculator		Contents		Map ID	
WATER FACILITIES USER BUILD		Contents		Name	
\$	-	This sheet		Notes	
\$	881,235.87	Total ERC			
Elements		Unit Rate	\$	\$	
Vertical, Steel, Open top, Earth, Single skin, Lined, 0.14 ML	tank	\$ 3,030.98			
Vertical, Steel, Open top, Earth, Single skin, Lined, 0.6 ML	tank	\$ 5,866.91			

Figure 38. Water Facilities User Build sheet

4.16.4 Water and salt management

The Main sheet includes rates for management of residual water and salt. P&G projects typically manage liquids as part of their routine operation and management practice, consequently the inclusion of quantities for the following is not always expected. Oily water in process ponds is typically disposed off-site or processed.

For coal seam gas activities, large quantities of brine and salt can be generated and it is not typically transported off-site. Consequently, the inclusion of salt management is likely to be required for coal seam gas operations. The default method used in the Calculator is to load, haul, and dispose of at an off-site facility. If a different method will be used, the User must develop an Alternate Rate.

The following rates are included in the Main sheet for water and salt management (**Figure 39**):

- Water pH adjustment—Adjustment of low pH water using neutralisers. Typically not required on P&G projects. If a volume of low pH water can be expected to remain on-site during the ERC period, the User enters the volume in megalitres.
- Mobilisation of reverse osmosis (RO) plant—For many projects the water treatment plants would be retained to process any remaining water. However, for water systems not connected to a water treatment plant, an RO plant may need to be mobilised. The allowance is generous and can be assumed to cover up to three separate mobilisations.
- Water salt removal—The cost to operate and maintain an RO plant to process residual water. The Default Rate allows for electricity and electrical and mechanical labour to attend to plant. The rate can cover the operation and maintenance of an existing plant or rented unit.
- Salt disposal load and haul—For use where RO is used to separate salt and the salt is required to be transported off-site for disposal. The Default Rate includes machinery and transport costs. The haul distance is shown in the Assumptions sheet.
- Salt disposal gate fee—Automatically calculated based on entries to the salt disposal cell and uses the rate for disposal at an Ipswich facility.
- Water organics removal—For use where it is likely that hydrocarbon contaminated water would be residual. The Default Rate includes an oil water separator and activated carbon units including supply and dispose of carbon.

#9.12	Mobilisation of portable reverse osmosis unit to ponds (not connected to existing ROP)		area	\$	50,000.00		\$	-
#9.13	Water pH Adjustment		ML	\$	1,911.95		\$	-
#9.14	Water Salt Removal		ML	\$	2,715.91		\$	-
#9.15	Water Organics Removal		ML	\$	2,026.59		\$	-
#9.16	Salt Disposal - Loading and Haul		tonne	\$	5.19		\$	-
#9.17	Salt Disposal - Gate Fee	0.0	tonne	\$	100.43		\$	-
#9.18	Water Pumping		ML	\$	120.45		\$	-

Figure 39. Water and salt treatment, disposal, and pumping

4.17 LNG Facilities and User Build sheet

The Main sheet includes rates for 1, 2 and 3 train LNG Plants on Curtis Island. The individual rates in the Main sheet are rolled-up and include decommissioning, dismantling, demolition, waste management (including disposal fees and Waste Levy if applicable) and land rehabilitation. Rates for the LNG Plants include allowances for barging modules, skids, scrap, and waste to the mainland.

The LNG Facilities User Build sheet allows the User to construct a rate by selecting the items that are at the facility. As with the other User Build Sheets this one is populated from top to bottom.

The User is required to enter quantities (where relevant) for:

- LNG tanks.
- LNG flares.
- Process modules. Process modules are larger than skids and typically require large cranes and trucks to transport whole. The Default Rates make assumptions on how large a module can be before it must be divided into sections for transport and the User must make these determinations if this sheet is used.
- Skids.
- Tanks. There are several rows with drop-down menus (**Figure 40**) from which the User can select a type and size of tank, water tanks for example. (LNG tanks are selected separately).

- On-site constructed buildings / shelters.
- Portable buildings.
- Camps. The size and type are selected from drop-down menus and there is an option to select 'No Camp' if their site does not have one.
- Piping (between modules) and penetrations.
- Electrical cable tray (between modules).
- Mass of concrete that is assumed to be crushed and placed around the site.
- Area of surface hardstand that will be removed and transported off-site.
- Incidental waste.
- Security fencing.
- Area for grade and seed.
- Purgings.
- Land investigations.

The sheet contains Default Rates for each of the elements, and the User enters the quantities for a single LNG facility in the same column. The total cost per facility is totalled at the top of the column. The total cost for the sheet is displayed at the top sheet and reported to the Main sheet as a single line. Alternate Rates can be entered for each row and a justification must be supplied.

Petroleum and Gas Estimated Rehabilitation Cost Calculator		This Sheet		Total ERC
Contents	LIQUIFIED NATURAL GAS PROCESSING FACILITIES	\$	-	\$ 881,235.87
Green cells below allow User Selection from dropdown menu				
ID	Elements	Default Rate	Alternate Rate	Rate U
	LNG Tanks	\$ 1,428,860.18		\$ 1,428,860.18
	LNG Candle Flares	\$ 94,905.85		\$ 94,905.85
	LNG Ground flares	\$ 578,346.67		\$ 578,346.67
	Process Modules	\$ 37,198.42		\$ 37,198.42
	Skids	\$ 1,329.88		\$ 1,329.88
	Vertical, Steel, Open top, Earth, Single skin, Lined, 0.14 ML	3,030.88		\$ 3,030.88
	Vertical, Steel, Open top, Earth, Single skin, Lined, 0.14 ML	5,866.81		\$ 5,866.81
	Vertical, Steel, Open top, Earth, Single skin, Lined, 0.6 ML	23,522.88		\$ 23,522.88
	Vertical, Steel, Open top, Earth, Single skin, Lined, 1 ML	3,030.88		\$ 3,030.88
	Vertical, Steel, Open top, Earth, Single skin, Lined, 3.5 ML	21,027.15		\$ 21,027.15
	Vertical, Steel, Open top, Earth, Single skin, Lined, 7 ML	14,806.55		\$ 14,806.55
	Vertical, Steel, Open top, Earth, Single skin, Lined, 12 ML	84.86		\$ 84.86
	Vertical, Steel, Open top, Earth, Single skin, Lined, 17 ML			\$
	On-site constructed buildings (other/concrete work)	\$ 7,325		\$ 7,325
	Portable Buildings	\$ 6,193.24		\$ 6,193.24
	Temporary camp -> 50 and <= 100 persons	\$ 97,280		\$ 97,280
	Piping not associated with modules	\$ 24.49		\$ 24.49
	Pipe to ground penetrations	\$ 708.06		\$ 708.06

Figure 40. LNG Facilities User Build sheet

4.18 Water Storage, Water Storage User Input Sheet and User Build sheet

The Main sheet includes an extensive range of rates for decommissioning and rehabilitation of dams and ponds. The categories are determined by size (megalitres) or disturbance footprint (hectares), lined or unlined, contents (contaminated or clean), and the land type (pasture, native, arid).

In the Main sheet the User has two group options - by size or by disturbance footprint. For the by size option, the User enters the number of dams and ponds in that category. For the disturbance footprint option, the User enters the total disturbance footprint of the dam or pond or group of dams or ponds in that category. For the purposes of this Calculator, the disturbance footprint is assumed to be the crest area.

The selection of contaminated or clean contents is a decision for the User. Generally, dams and ponds such as interceptors receiving oily water should be considered contaminated. Brine dams do not necessarily need to be considered contaminated as the Calculator accounts for management of residual salt. The difference between contaminated and clean is the assumed sediment thickness which can be seen in the Assumptions sheet.

For the purposes of the Calculator, a lined dam has a plastic liner (e.g. polyethylene) and clay lined dams without a plastic liner are considered unlined.

For large dams where the land type may change, the User can apply the land type that covers the majority (>50%) of the footprint. Alternatively, the User can split the disturbance between two land categories although this will artificially inflate the cost.

The Main sheet has rates for aboveground panel tank type water storage.

4.18.1 Water Storage User Input Sheet

The Water Storage User Input Sheet uses the same by area rates as the Main sheet. The key utility of the sheet is that it allows a listing of all dams and ponds either individually or by group so the User and the Department can clearly see the disturbance footprint assigned to each.

The User is required to select the type (contaminated or clean), the size (megalitres), the land type (pasture, native, arid), liner (lined or unlined) and whether the dam is regulated or non-regulated (**Figure 41**). The selections except for regulated/non-regulated, determine the per area rate applied to the row. The User then enters the number of dams and ponds in that category (row) and the total disturbance area (crest area). The disturbance area is the total for all dams and ponds in that row. The per area rate is multiplied by the total disturbance area to get the total cost for each dam or pond in the category.

The number of dams and ponds in the category is for information only and does not feature in the calculation. It is not mandatory to enter the number but will assist the department to understand what is being costed.

The regulated/non-regulated selection does not feature in the calculation. Whether a dam is regulated or non-regulated is dependent upon the Consequence Category for the structure. Further information can be found in department’s guidance *Structures which are dams or levees constructed as part of environmentally relevant activities* (ESR/2016/1934). This regulated/non-regulated selection provides information needed by the Department to reconcile spatial data, assist in assessment and compliance, improve overall data and reporting of authorised water storages. The selection should be consistent with any regulated dam register required to be kept as part of the EA.

Petroleum and Gas Estimated Rehabilitation Cost Calculator										
WATER STORAGE INPUT SHEET										
Total Input Sheet		\$ -								
Total ERC		\$ 60,999.44								
#	Map ID	Name of Dam / Pond	Type	Size	Land	Liner	Regulated or Non-Regulated	Number	Information (only)	Total (of all dams in row) Land Area (crest area)
			Select from dropdown	Select from dropdown	Select from dropdown	Select from dropdown	Select from dropdown	Whole #		ha
1			Contaminated	0 to <= 50 ML	Pasture	Lined	Non-regulated			
2			Clean	>50 ML to <=200 ML	Native	Unlined	Regulated			
3			Contaminated	>200 ML to <=1000 ML	Arid	Lined	Non-regulated			

Figure 41. Water Storage User Input Sheet

The number of dam/ponds in each category (e.g. 0 to <= 50 ML Contaminated, Lined, Pasture) are summed on right hand side of the sheet and multiplied by the associated rate to get a total cost for the category. The cost for all categories is summed and displayed at the top of the sheet and reported to the Main sheet as a single line item.

4.18.2 Water Storage User Build

The Water Storage User Build sheet allows the User to construct a rate by defining items specific to dams or ponds. The sheet has similar selections to the Water Storage User Input Sheet but allows the User more flexibility on specific items such as sediment thickness and liner area. The sheet uses the same underlying Default Rates as the Main sheet and the Water Storage User Input Sheet.

The sheet requires the User to input/select the following:

- Dam/pond type (e.g. interceptor, oily/water, raw/produced water, brine, evaporation)
- Regulated/non-regulated—see discussion above
- Number of structures in each category
- Land type—pasture, native or arid
- Area—crest area of the pond/dam (single item only)
- Lined/non-lined—see discussion above
- Width, height and slope of walls (though see below)
- # Dams to Share Upfront Cost - This item is associated with land investigations and acknowledges that one-off type costs associated with the investigation (e.g. preparation of health and safety and work plans) is typically shared among items that can be reasonably assumed to be visited in one investigation campaign. Omitting this entry is a common cause of error in this calculation. Examples of use are:
 - A single dam/pond is entered to the row and it is the only dam/pond in the area that will be investigated. In this case the entry will be one indicating that the full one-off costs are applied to that dam/pond.
 - Five dams of similar characteristics and in the same local area are added to a row. In this case it is reasonable to enter five indicating that the one-off costs will be split between all the dams.
 - Four dams of similar characteristics are entered to the row but are separated by hundreds of kilometres. In this case it may be reasonable to enter 2.5 indicating that two separate investigation campaigns will be undertaken.

The User must enter these elements for the calculation to work correctly and for the department to have sufficient information for review. The elements required for the calculation are indicated by 'Key Input' in the row beneath the header and circled in **Figure 42**.

Petroleum and Gas Estimated Rehabilitation Cost Calculator

Contents		WATER STORAGE USER BUILD	
Total this sheet	\$		-
Total ERC	\$	60,999.44	

Top		Water Structures User				Details			Liner		
#	Map ID	Name	Type	Size (ML)	Regulated or Not Regulated	# of structures in this category (each row)	Land	Top (Crest) of Water Structure Area per pond (ha)	Liner (select Lined or Unlined)	User Entered Liner Area per pond (ha)	Liner area used in Calculations (ha)
					Select from dropdown	Whole #	Select from dropdown	Key Input	Select from dropdown		
1					Regulated		Pasture		Lined		0.00
2					Regulated		Native		Lined		0.00

Wall Push in		
Wall Height (above ground surface) (m)	Wall width at top (m)	Slope (1 in X)
Key Input	Key Input	Key Input

Figure 42. Mandatory inputs for Water Storage User Build

The User can select the haulage distance and fleet size for sediment removal, dozer push in walls, and growth media as shown in **Figure 43**. Further information on fleet size selection is included in the **Mobilisation, demobilisation and fleet size** section.

Haul, Push, Fleet Selections					
Remove Silt - Select Haulage Distance (m)	Sediment Fleet	Push Distance for Wall Push in (m)	Push Fleet for Wall Push in	Load, haul, dump growth media distance	Fleet
Select from dropdown	Select from dropdown	Select from dropdown	Select from dropdown	Select from dropdown	Select from dropdown
<=200 m	Small Fleet 2	> 20m to <= 30m push	D8R Dozer	>200 m to <=500 m	Small Fleet 1

Figure 43. Distance and fleet selections

The rate associated with each selection is sourced from the Subrates sheet which can be accessed by the hyperlinks as shown in **Figure 44**.

Unit Rates			
Sediment Haul Rate (\$/m3)	Wall Push in Rate (\$/m3)	Growth Media (\$/m3)	Seed (\$/ha)
Subrates Table 1	Subrates Table 2	Subrates Table 1	Subrates Table 4
\$ 3.00	\$ 0.37	\$ 3.12	\$ 1,656

Figure 44. Rates determined by fleet size and distance

The User has the option to override defaults and calculated values for:

- Liner area. If the User does not enter a liner area the calculation assumes a multiplier as shown within the formula cell. The calculation checks the liner selection and sets the liner area to zero if unlined is selected. If the User enters a liner area less than the crest area, the cell in the 'Liner Warning' column turns red and displays an 'E' (Figure 45). If this was not an error, the User must provide a justification.
- User Entered area of the wall. If the cross-sectional area is entered the User does not enter the width, height and slope. If the User does not enter a value, the default in the Assumptions sheet is used (accessed by a hyperlink above this column).
- Bund wall perimeter. If the User does not enter a perimeter, the calculation simply calculates the average length of a wall and multiplies it by four.
- Sediment thickness. If the User does not enter a sediment thickness, the calculation uses the default as shown in the Assumption sheet and linked to by a hyperlink in that column (see below).
- Growth media area. If the User does not enter a growth media area, the calculation assumes the entire crest area will receive growth media and be revegetated. If the User selects arid in the land type selection, the growth media area is automatically set to zero.
- Growth media thickness. If the User does not enter a growth media thickness, the calculation uses the default as shown in the Assumption sheet and linked by a hyperlink in that column (see below).
- Area to investigate. If the User does not enter an area to investigate area, the calculation assumes the entire crest area will be investigated. In some cases, the User may make a case that investigation is not required (e.g. if it can be demonstrated a dam or pond has only received clean water (e.g. for fire water) or rainwater). If a recent investigation has been undertaken (i.e. within the last year or within the last ten years but without any incoming potentially contaminating flow), the User may make the case that investigation is not required and set the area to zero.

	Liner			
Top of Water Structure Area per pond (ha)	Liner (select Lined or Unlined)	User Entered Liner Area per pond (ha)	Liner area used in Calculations (ha)	Liner Warning
	Select from dropdown			
20.00	Lined		24.00	ok
20.00	Lined	18.00	18.00	E

Figure 45. 'Liner Warning' column

The capacity of the pond/dam (volume in megalitres) serves to indicate the cost (\$) per megalitre on the right-hand side of the table and is not mandatory to enter.

The Calculator calculates the sum for each sub-activity (e.g. application of growth media) associated with the pond/dam and adds these together to reach a total cost. The total for the pond/dam is multiplied by the total number of structures in that category (mandatory entry by the User) to obtain the total for the row. It is important that the entries made in each row are by pond/dam, which is different to the Water Storage User Input Sheet where the total area for all the ponds/dams in that row are entered.

4.19 Investigation and Contamination User Input Sheet

The Main sheet has Default Rates for contaminated land investigations, including preliminary and detailed site (intrusive) investigations, treatment of hydrocarbon impacted soil and disposal off-site to a licensed facility. The Default Rates for activities in other domains including dams/ponds and process facilities (including gas, oil, water, and LNG) include land investigations. Similarly, waste management (including off-site disposal where required) is included in rates for those domains and activities such as wells. Activities that typically do not require land investigations are wells, pipelines, tracks and roads, laydown, and camps.

Consequently, the rates in this section and the Investigation Contamination User Input Sheet are unlikely to be commonly required. Examples of where they may be used are:

- A camp that has an associated and refuelling facility (of material size – for example greater than a 5 kilolitre tank and associated pump(s)).
- Contaminated soil piles being treated on-site. Contaminated soil management is not included in the Default Rates.
- A separate land treatment facility where material volumes (> 500 cubic metres) of soil are being treated on a one-off or routine bases.
- A stockpile of metals or asbestos contaminated soil either on or off-site. Contaminated soil management is not included in the Default Rates.
- Stockpiles of asbestos containing materials, e.g. from asbestos pipe.

The following tests are applicable when considering whether to apply the rates in this section:

- The activity produces one or more hazardous contaminants with the potential to cause serious or material environmental harm, and a person, animal or other part of the environment may become exposed to the hazardous contaminant(s).
- The site includes notifiable activities and/or has contaminated land on the Environmental Management Register (EMR) or Contaminated Land Register (CLR).

4.19.1 Preliminary site investigation

The preliminary site investigation unit rate is a one-off cost. A preliminary site investigation in the context of a facility or site closure is typically a part of planning activities and aims to identify areas of known, suspected or reasonably probable contamination resulting from P&G operations. The preliminary site investigation comprises a review of the site setting, site history, operational history (including any accidents and incidents), hazardous liquids, solids storage schedules and sources of potential impacts and the receptors.

If the User enters a preliminary site investigation but not subsequent intrusive site investigation quantities, the User should justify why in the User information column on the Main sheet or in the Information sheet for example

4.19.2 Site investigations

The approach to estimating costs for site investigations recognises that most investigations of this nature comprise a single campaign (one mobilisation) taking in multiple areas. The one-off cost allows for planning and preparation, ongoing project management, health and safety plans, work plans and reporting. A combination of the factors outlined above (risk, rehabilitation program, site history and grouping and relative proximity of infrastructure) must be considered in determining the number of one-off costs to apply. Examples of areas that may individually comprise one campaign are:

- Service facility area—fuel or chemical stores, workshop, vehicle washdown, sewage treatment.
- Processing plant—oil storage.

The Default Rates assume a number of soil bores per area and a specific suite of analytes. The area is applied only to the area to be investigated, a tank farm within a processing facility – in this case only the tank farm area is assumed for example

4.19.3 Investigation Contamination User Input Sheet

The Investigation Contamination User Input Sheet allows the User to list out investigation areas and quantities for disposal off-site. The Default Rates in the Main sheet include land investigations and waste management (e.g. for process facilities) and have a separate section for items not covered under the activity rates (as described above) therefore this sheet is not likely to be used often.

The site investigations table is shown in **Figure 46**. In general, an area will require one preliminary site investigation. The one-off costs acknowledges that several areas may be covered under one investigation campaign. As an example, if two discrete areas are entered to the table shown below and they are proximal, it is reasonable to enter 0.5 for each item indicating that the one-off costs will be shared between the two areas.

Petroleum and Gas Estimated Rehabilitation Cost Calculator

Contents	INVESTIGATION CONTAMINATION
Total ERC	\$ 60,999.44

Land Investigation									
Map ID	Name of Area	Preliminary Site Investigations	Proportion of One-off Costs (typ. 1)	Width (m)	Length (m)	Diameter (m)	User Area (ha)	Calculated Area (ha)	Area for calculations (ha)
		Whole #		m	m	m	ha		
								0.000	0.000
								0.000	0.000
								0.000	0.000
								0.000	0.000
								0.000	0.000
								0.000	0.000
								0.000	0.000
								0.000	0.000
								0.000	0.000
								0.000	0.000
								0.000	0.000
		0.0	0.0				0.000	0.000	0.000

Figure 46. Site investigations user input table

The User can describe the area for a land investigation by entering width and length, diameter or the area (**Figure 47**). This recognises that Users will have different quantity types. Some Users may use area outputs from GIS data and others may be a measure length and width off a plan. In this example, the hierarchy is User Entered area, width and length and then diameter. However, if length, width, and diameter are added, the Calculator uses length and width and ignores diameter (row 1 in **Figure 47**). The ‘Calculated Area (ha)’ column shows the calculation of area based on the User Entered dimensions and if a value is entered directly to the ‘User Area (ha)’ column, the ‘Area for calculations (ha)’ column will default to that entry.

The area is applied only to the area to be investigated. For example, a tank farm within a processing facility – in this case only the tank farm area is entered.

Petroleum and Gas Estimated Rehabilitation Cost Calculator

Contents	INVESTIGATION CONTAMINATION
Total ERC	\$ 28,844.16

Land Investigation							
Map ID	Name of Area	Width (m)	Length (m)	Diameter (m)	User Area (ha)	Calculated Area (ha)	Area for calculations (ha)
		m	m	m	ha		
		50.00	20.00	30.00		0.100	0.100
				100.00		0.785	0.785
					5.000	0.000	5.000

Figure 47. Land investigation input cells showing options for defining the area

The disposal to off-site facility table is shown in **Figure 48**. The User can select the contamination from the drop-down menu and enter the mass of that contaminant. Sludge can be used for tank bottoms or brine type material. Where applicable, the Calculator will add the quantities entered to the off-site disposal table to the Waste Register and apply the levy.

Top	Disposal to Off-site Facility		
Map ID	Name of Area	Mass to Dispose	Primary Contaminant
		t	Select from dropdown
			Asbestos (ACM)
			Asbestos in soil
			Asbestos in soil
			High Level Petroleum Hydrocarbons in soil
			Asbestos in soil
			Low Level Petroleum Hydrocarbons in soil
			Sludge

Figure 48. Disposal options

As the rates in the Investigation Contamination User Input Sheet are the same, they are reported individually to the input sheet column in the Main sheet.

4.20 Mobilisation, demobilisation and fleet size

Mobilisation and demobilisation is the process of transporting earthmoving machinery to the site for the rehabilitation work and transporting the machinery back to the supply centre. Typically, the supply centre for earthmoving equipment (e.g. excavator) is a major centre such as Brisbane or Rockhampton. Smaller equipment may be available in places such as Roma. The mobilisation/demobilisation costs reflect the effort required for safe transport earthmoving equipment which typically includes floats and convoys.

The Default Rates for mobilisation (**Figure 49**) are based on round trip (mobilisation and demobilisation) with the selection categories the one-way distance from the source of the majority of equipment to the site. The selection categories for distance are ≤ 150 km, >150 to ≤ 500 km, >500 to ≤ 1000 km and > 1000 km. In practice, equipment may come from several sources with lighter equipment easier to source close to the site. However, the User makes a judgement based on the average distance to which equipment will be sourced. As an example, if the source of equipment is deemed to be a major centre located 280 km from the site, the User selects the > 150 to 500 km category as this is the one-way distance from the source of equipment to the site.

For each distance category there are fleet size selections – small, medium, and large. The fleet size composition is dictated by the size and number of equipment. In practice, the fleet make-up may comprise equipment from various size categories. However, the User selects a fleet size based on an assessment of what will reasonably be required to rehabilitate the site. The appropriate fleet size will be informed by the activities covered under the ERC submission.

Table 3 provided guidance on fleet size selection.

Table 3. Fleet sizes

Fleet size	Activities
Small	Well pads, smaller track and road and laydown rehabilitation projects (≤ 5 km total length and ≤ 1 ha), single and/or small dams (≤ 1 ML and < 5 dams) and small facilities (e.g. temporary drilling camps).
Medium	Moderate size track and road and laydown rehabilitation projects (> 5 km and ≤ 50 km total length and ≤ 10 ha), moderate size dams (≤ 100 ML) and moderate size facilities (e.g. camps of ≤ 100 person capacity camp, ≤ 50 TJ/day gas processing plants and ≤ 6 ML/day water treatment plants).
Large	Large size track and road and laydown rehabilitation projects (> 50 km total length and > 10 ha), large size dams (> 100 ML) and large size facilities (e.g. camps of > 100 person capacity camp, > 50 TJ/day gas processing plants and > 6 ML/day water treatment plants).

The Default Rates includes costs for utility and service vehicles to support the earthmoving equipment.

The User has the option to include an Alternate Rate providing that appropriate justification is provided.

Contents		MAIN						Total ERC amount
Map ID	#	Activity / Description	User Select	Input Sheet	Quantity	Unit	Default Unit Rate	Alternative Unit Rate
13. Mobilisation and Demobilisation								
	#13.01	Mobilisation & Demobilisation (Distance to site <= 150 km) Small fleet for Well Pads, Roads, Pipeline Easements				mobe	\$ 33,300.00	
	#13.02	Mobilisation & Demobilisation (Distance to site > 150 to <= 500 km) Small fleet for Well Pads, Roads, Pipeline Easements				mobe	\$ 61,050.00	
	#13.03	Mobilisation & Demobilisation (Distance to site > 500 km to <= 1000 km) Small fleet for Well Pads, Roads, Pipeline Easements				mobe	\$ 115,440.00	
	#13.04	Mobilisation & Demobilisation (Distance to site > 1000 km) Small fleet for Well Pads, Roads, Pipeline Easements				mobe	\$ 142,080.00	
	#13.05	Mobilisation & Demobilisation (Distance to site <= 150 km) Large fleet for Facilities and Dams				mobe	\$ 99,450.00	
	#13.06	Mobilisation & Demobilisation (Distance to site > 150 to <= 500 km) Large fleet for Facilities and Dams				mobe	\$ 182,325.00	
	#13.07	Mobilisation & Demobilisation (Distance to site > 500 km to <= 1000 km) Large fleet for Facilities and Dams				mobe	\$ 344,760.00	
	#13.08	Mobilisation & Demobilisation (Distance to site > 1000 km) Large fleet for Facilities and Dams				mobe	\$ 424,320.00	
	#13.09	<i>Additional line item - user to name activity</i>						
	#13.10	<i>Additional line item - user to name activity</i>						
	#13.11	<i>Mobilisation & Demobilisation for total ERC amounts less than or equal to \$1,000,000 (total). Total is shown in column L.</i>	Pre-mobe and multipliers	\$ -		mobe		
Small Project Mobe		Small mobe applicable. Add 1 in Quantity above to use.						

Figure 49. Mobilisation/Demobilisation Default Rates

For some activities (e.g. water storage in the Water Storage User Build sheet), there is an option to select the fleet and distance from a drop-down menu (Figure 50). This allows for a specific load and haul fleet size or dozer size to be selected. The selection is the decision of the User and should be informed by the size of the activity. For example a large fleet is not appropriate for use on a small dam (<5 ML). The dozer selection may also be informed by what is reasonably available in the area with D10 and D11 dozers less likely to be available in remote areas unless a significantly large project is to be undertaken.

Petroleum and Gas Estimated Rehabilitation Cost Calculator					
Contents		WATER STORAGE INPUT SHEET			
Total this sheet		\$	-		
Total ERC		\$	-		
Top Water Structures User					
#	Map ID	Name	Push Distance (m)	Push Fleet	
			Select from dropdown	Select from dropdown	
1			> 20m to <= 30m push	D6R Dozer	
2			> 20m to <= 30m push	D7R Dozer	
3			> 20m to <= 30m push	D8R Dozer	
4			> 20m to <= 30m push	D9R Dozer	
5			> 20m to <= 30m push	D10T Dozer	
6			> 20m to <= 30m push	D11T Dozer	

Figure 50. Example of fleet and distance selection

5 Information on rates

5.1 Bottom-up, first principles calculation method

The unit rates for an activity are constructed using ‘bottom-up, first-principles’ whereby costs for relatively complex activities are built starting from basic singular values such as cost (\$) per hour for machinery and productivity of that machinery. The build of unit rates is illustrated in

Figure 51.

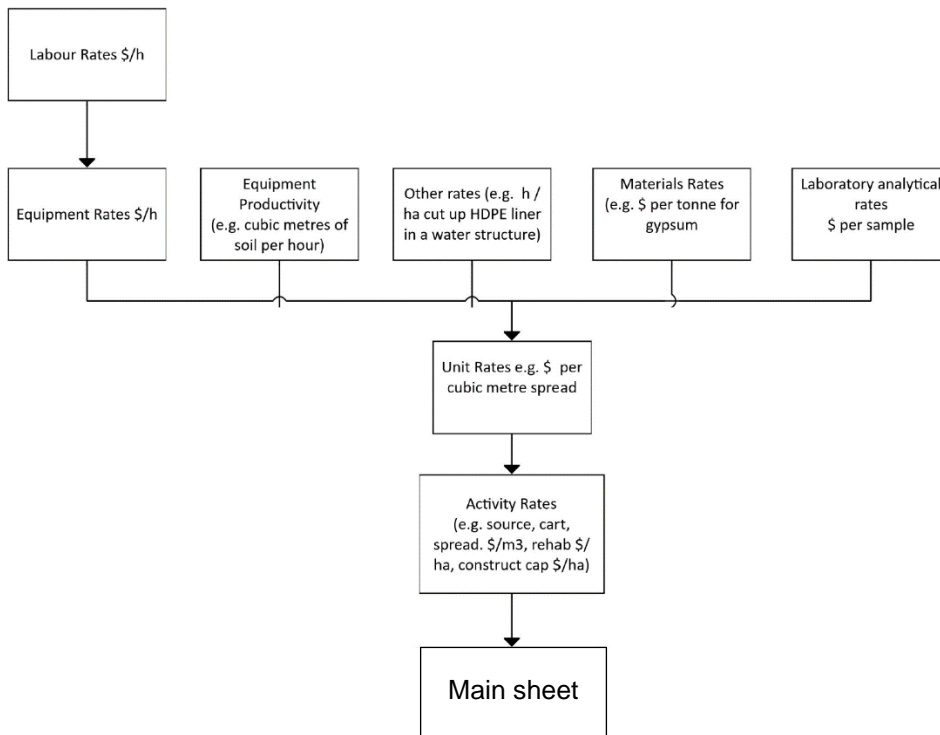


Figure 51. Rate build-up

The bottom-up, first principles method is generally:

- A scope for an activity is defined.
- Productivity values are used to estimate the time an activity may take.
- The time is multiplied by an hourly rate (encompassing labour and equipment rates) to obtain a cost for that activity.

Labour costs, equipment costs and productivity rates are the fundamental values (base rates) underpinning the unit rates and these are discussed further below.

5.2 Labour costs

The Labour costs (e.g. cost per hour for equipment operator) are calculated by adding the following allowance to a base rate:

- Annual leave
- Long service leave

- Paid notice
- Severance/retrenchment
- Payroll tax
- Workers' compensation
- Superannuation
- Profit
- Operating hour proportion.

5.3 Equipment costs

The Equipment costs (e.g. cost per hour for an excavator) are built assuming:

- The capital (ownership) cost of new equipment is depreciated over a much longer life within the Calculator than what it is likely for used equipment.
- The new equipment would be depreciated (and used) over several contracts by a typical earthmoving contractor unless they are long term contracts.
- Operating time of 3,723 hours per year for closure works.

The new equipment ownership (depreciation) rates per hour are anticipated to be similar to depreciation rates a contractor would apply to a standard earthmoving contract based on the typical age of used equipment proposed for the contract.

The following depreciation periods for new equipment are used in the Calculator rates:

- Dozers 35,000 hours
- Graders 55,000 hours
- Excavators 54,000 hours
- Front End Loaders 35,000 hours
- Haul Trucks 75,000 hours.

The Equipment costs are calculated by adding the following allowance to a base rate:

- Rolled-up labour cost as described above.
- Fuel is a set price per litre. The fuel cost per hour is calculated using fuel consumption rates from the Caterpillar™ manual.
- Preventative maintenance and wear.
- Contractor profit and administration of 16%.

5.4 Productivity

Productivity (e.g. cubic metres of soil a dozer can push over a specific length range) defines the performance capability of a machine or equipment, and is used to estimate the time an activity may take so that an hourly rate can be applied to obtain a cost for that activity. Productivity rates are generally sourced from the Caterpillar™ earthmoving manual.

5.5 Scope and unit rates

The scope for a unit rate is the sequence of events or activities (which could be thought of as sub-activities) required to be undertaken to complete an activity. For example, sourcing growth media comprises loading the material, transporting the material and placing the material. Each activity has a unit rate and these are summed to obtain the unit rate for the activity.

Depending on the complexity of the activity, unit rates either are a rate in the Main sheet (or Default Rate) directly or are combined with other unit rates to form a rate in the Main sheet. Instructions on appropriate application of each rate in the Main sheet are included in the 'Use of Default Rates' and 'Scope of Default Rates' columns in the Main sheet.

The scope for each activity was developed by a team of engineers with decommissioning and rehabilitation engineering cost estimation experience ranging from 20 to over 35 years. The base costs (e.g. cost per hour for an excavator) are based on contemporary third-party rates.

5.6 Contractor rate inclusions

The contractor rates (e.g. \$/h for an excavator) that form the basis of the unit rates include built-in allowances for:

- Health and safety plans and personnel protective equipment.
- Passenger vehicles/utilities for crew, support staff (e.g. fitters) and supervisors.
- Service vehicles for fuelling, oiling and greasing primary machinery.
- Ancillary equipment such as power generators, air compressors and hoses, lighting units.
- Signage and fencing.
- Consumables including fuel, oils and greases, other consumables.
- Maintenance personnel and tools.
- Temporary accommodation camps, workshops, offices and stores and equipment and consumables therein.

6 Worked examples

6.1 Seismic easements

To calculate the cost for rehabilitation of seismic easements via the Seismic and Infrastructure User Input Sheet, the User should follow the steps below.

By length

1. Enter the length of easement. In the example below, three groupings are entered of the same length (100 km).

Seismic (by length)		
Map ID	Name	Total Length
		km
	Seismic 1	100.00
	Seismic 2	100.00
	Seismic 3	100.00

2. The Calculator multiplies the User Entered length by a default (Assumptions sheet and currently 5%) to calculate the length of easement to be rehabilitated (first two lines in example below). The User can override this default by directly entering the easement length to be rehabilitated (third line in example below). The screen shot below shows the calculated 5.0 km length overridden by the User Entered 3.0 km.

Seismic (by length)				
Map ID	Name	Total Length	Rehab length	Land
		km	km	Select from dropdown
	Seismic 1	100.00	5.00	Pasture
	Seismic 2	100.00	5.00	Native
	Seismic 3	100.00	3.00	Arid

3. The User must select the land type from the drop-down menu in the 'Land' column (see above). Where different land types are impacted the User must use different line entries to capture the respective disturbances.
4. The length requiring rehab is multiplied by the Default Rate for the relevant land type to obtain the rehabilitation cost.

By area

5. The User follows a similar approach to that for length, but instead inputs the area of seismic easements in each land type.
6. The same assumption for rehabilitation area are used to calculate the area to be rehabilitated and the total area to be rehabilitated per land type summed at the top of the sheet.

6.2 Tracks and roads (Infrastructure User Input Sheet)

To calculate the cost for rehabilitation of a road using the User Input Sheet rather than the Main sheet, the User should follow the steps below.

1. Enter the name of the road (or group of roads) and the length of the road (or total length of the group of roads). Enter the width of the road or leave this cell blank. If the User leaves the

cell blank, the default quantity (6.0 m in this example) is used in the calculation. The area is calculated.

- The User may enter the area to be rehabilitated directly instead of length and width (third row below). If the User enters an area directly, the Calculator uses that area over the calculated area regardless of whether length and width are entered.

Tracks and Roads						
Map ID	Area	Length	Width	Area Calculated	Area User Entered	Area sent to Main
		km	m	ha	ha	ha
		10.00		6.00		6.00
		10.00	4.00	4.00		4.00
				0.00	7.00	7.00

- Select the surface covering of the road from the drop-down menu. A default surface covering thickness is used (see assumptions). The total area is picked up in the following columns multiplied by the rates and the total reported at the top of the sheet.

Type	Land	Earthen Pasture	Earthen Native	Earthen Arid	Rock, Gravel, Asphalt Pasture	Rock, Gravel, Asphalt Native	Rock, Gravel, Asphalt Arid
Select from dropdown	Select from dropdown	ha	ha	ha	ha	ha	ha
Earthen	Pasture	6.00					
Gravel	Native					4.00	
Bitumen	Arid						7.00

- The Default Rates include the distance to haul the surface cover material for disposal or reuse, volume of material to be removed and grade and seed. The Calculator multiplies the appropriate Default Rate for haulage by the volume to haul, to calculate the total cost for removal.
- The totals are reported to the Input sheet column of the Main sheet as shown below.

Map ID	#	Activity / Description	User Select	Input Sheet	Quantity	Unit	Default Unit Rate	Alternative Unit Rate
	#2.01	Tracks earthen in pasture (Infrastructure Sheet)		6.00		ha	\$ 2,055.66	
	#2.02	Track earthen in native (Infrastructure Sheet)		0.00		ha	\$ 4,536.66	
	#2.03	Tracks earthen in arid (Infrastructure Sheet)		0.00		ha	\$ 400.16	
	#2.04	Tracks rock, gravel, asphalt in pasture (Infrastructure Sheet)		0.00		ha	\$ 8,224.88	
	#2.05	Tracks rock, gravel, asphalt in native (Infrastructure Sheet)		4.00		ha	\$ 10,765.88	
	#2.06	Tracks rock, gravel, asphalt in arid (Infrastructure Input)		7.00		ha	\$ 6,569.38	

6.3 Pipelines

To calculate the cost for rehabilitation of a pipeline easement using the User Input Sheet rather than the Main sheet, the User should follow the steps below.

- Enter the name or identifying reference for the pipeline or group of pipelines (e.g. Surat East Gathering Lines or Roma to Emerald Water Line).
- From the drop-down menu select the type of pipeline (aboveground or belowground). This selection is for information only as this sheet only calculates costs associated with land rehabilitation. If the pipe is required to be removed, quantities must be added to the Main sheet.
- From the drop-down menu select the fluid being transported in the pipe. This selection is for information only as this sheet only calculates costs associated with land rehabilitation. If flushing or purging is required, quantities must be added to the Main sheet.

- Enter the length and width of the pipeline easement or enter the area directly as highlighted below.

Above or Below Ground	Fluid	Easement Length	Easement Width	Area Calculated	Area User Entered	Area sent to Main
Select from dropdown	Select from dropdown	km	m	ha	ha	ha
Aboveground	Oil	10.00	6.00	6.00		6.00
Aboveground	Water			0.00	6.00	6.00

- From the drop-down menus, the User selects status of rehabilitation for the easement. The options are:
 - None—Used for easements in the construction state and where a wider (than operational) area requires rehabilitation.
 - Partially—Used for easements in the operational state whereby the width required during construction is reduced for the operation stage.
 - Rehabilitated—Used for easements that are restored to the natural condition and requires inspection only.
- From the drop-down menu the User can enter the land type (pasture, native or arid).
- The sheet collates the area and type of rehabilitation required and totals are reported the Main sheet as a single line item.

Rehab Status*	Land*	Full Rehab needed Pasture	Full Rehab needed Native	Full Rehab needed Arid	Final Rehab needed Pasture	Final Rehab needed Native	Final Rehab needed Arid	Inspection only Pasture	Inspection only Native	Inspection only Arid
Select from dropdown	Select from dropdown									
Rehabilitated	Pasture							6.00		
Partially	Native				6.00					
None	Arid			0.00						

6. Pipelines										
		Pipelines Input Sheet				lump			\$	-

- If purging and flushing, removal are required and/or a pipeline has major crossings (e.g. river), vents and drains, and facilities (e.g. metering station), these quantities must be added to the Main sheet.
- Where necessary the User may enter Alternate Rates and the required justification or add User defined activities in the rows at the bottom of the section.
- Cutting and capping costs are included in the Default Rates for wells and process facilities and are not required as part of the pipeline.

6.4 Gas processing facility in Main sheet

The following steps should be followed for entering gas processing facilities to the Main sheet. This process is similar for water treatment plants.

- Add the plant capacity and number of plants of that capacity to the Default Rate line (#7.01). In the example below 30 TJ/day and 1 plant has been entered

7. Gas Processing and Oil Storage Facilities									
		Gas processing facilities from User Build	\$	-	0		total	\$	-
		Gas processing facilities from Input Sheet					lump	\$	-
	#7.01	Gas processing facility of user entered TJ/day	30	TJ/day	1	facility		\$	361,683.67
								\$	361,683.67

OR

2. Enter the quantity of facilities against the relevant Default Rate line for plants of varying capacities

#7.04	Gas Processing Plant > 15 and <= 25 T/day	facility	\$	328,094.57	\$	-
#7.05	Gas Processing Plant > 25 and <= 50 T/day	facility	\$	496,040.04	\$	-
#7.06	Gas Processing Plant > 50 and <= 100 T/day	facility	\$	815,355.73	\$	-
#7.07	Gas Processing Plant > 100 and <= 200 T/day	facility	\$	1,277,429.94	\$	-
#7.08	Gas Processing Plant > 200 and <= 300 T/day	facility	\$	1,756,583.14	\$	-
#7.09	Gas Processing Plant > 300 and <= 400 T/day	facility	\$	2,109,390.71	\$	-
#7.10	Gas Processing Plant > 400 and <= 500 T/day	facility	\$	2,431,742.46	\$	-
#7.11	Gas Processing Plant > 500 and <= 750 T/day	facility	\$	2,764,585.03	\$	-
#7.12	Gas Processing Plant > 750 and <= 1000 T/day	facility	\$	3,170,356.91	\$	-

3. The Default Rate includes the removal of major modules, skids, tanks buildings, pipelines and terminations, cable trays and fencing, removal of surface coverings e.g. concrete or asphalt, land investigation and grade and seed of the disturbed area
4. If the User requires more specificity or wants to align disturbance area with the spatial data, the Process Facilities User Input Sheet or Process Facilities User Build can be used.

6.5 Gas processing facility in User Input Sheet

The following steps should be followed for entering gas process facilities to the User Input Sheet. This process is similar for water treatment plants.

1. The User enters inputs vertically in this sheet. The Calculator uses basic entries such as number of modules to calculate cost. These quantities may come from design or as-built drawings or registers. If the User does not have this information, they should use the Default Rates in the Main sheet. The User enters:
 - a. The type of the facility
 - b. Name of the facility.
2. The User then enters the relevant quantities against the individual elements listed from top to bottom in the table (see non-exhaustive example below).

Petroleum and Gas Estimated Rehabilitation Cost Calculator				Type (select from dropdown)	
PROCESS FACILITIES USER BUILD				LPG Plant	
Contents				Map D	
\$ 1,382,632.96				Name	
\$ -					
Total ERC					
This sheet					
Elements	Size	Unit	Unit Rate	\$	\$
Panel, Concrete, Open top, Earth, Single skin, Lined, 25 ML		tank	\$ 126,227.7		
Panel, Concrete, Open top, Earth, Single skin, Lined, 40 ML		tank	\$ 179,442.3	4.0	
Panel, Concrete, Open top, Earth, Single skin, Lined, 50 ML		tank	\$ 211,255.5		
Major Module		module	\$ 25,154.9	1.0	
Skids (e.g. separator)		skid	\$ 4,832.5	1.0	
Pig launcher / receiver		item	\$ 9,635.3		
Pumps and Controls		#	\$ 431.1		
Terminations		#	\$ 1,013.5		
Piping (total length)		m	\$ 23.0	5	
Earthen bund allowance		bund	\$ 500.0		
Liquids pump and dispose		kL	\$ 271.6		
Portable buildings		bldg	\$ 2,255.9	2.00	

3. The User Entered quantities are multiplied by the Default Rates (which are not changeable) to obtain the cost for each activity (e.g. removal of process modules) and summed to obtain the total cost for the facility and domain. The Default Rates include decommissioning (e.g. electrical and mechanical disconnection), demolition, transport (e.g. of steel to scrap yard) and where applicable, gate fee (steel gate fee is set to zero, concrete is set to gate fee rate).

6.6 Water Facilities User Build sheet

The following steps should be followed for entering water facilities (water transfer stations) in the User Build sheet. This process is similar for Process Facilities.

User Guide for Estimated Rehabilitation Cost Calculator for Petroleum and Gas

1. The User enters inputs vertically in this sheet. The Calculator uses basic entries such as number of 0.6 ML vertical steel tanks to calculate cost. These quantities may come from design or as-built drawings or registers. If the User does not have this information, they should use the Default Rates in the Main sheet. The name of the facility and map ID (if relevant) are entered at the top as shown.

Petroleum and Gas Estimated Rehabilitation Cost Calculator

WATER FACILITIES USER BUILD		Contents	
\$	1,489,447.61	Total ERC	
\$	85,451.72	This sheet	
Elements		Unit Rate	
Vertical, Steel, Open top, Earth, Single skin, Lined, 0.14 ML	tank	\$ 3,030.98	
Vertical, Steel, Open top, Earth, Single skin, Lined, 0.6 ML	tank	\$ 5,866.91	
Vertical, Steel, Open top, Earth, Single skin, Lined, 1 ML	tank	\$ 6,483.39	1.0
Vertical, Steel, Open top, Earth, Single skin, Lined, 3.5 ML	tank	\$ 13,982.50	
Vertical, Steel, Open top, Earth, Single skin, Lined, 7 ML	tank	\$ 21,620.22	1.0
Vertical, Steel, Open top, Earth, Single skin, Lined, 8 ML	tank	\$ 24,752.50	
Vertical, Steel, Open top, Earth, Single skin, Lined, 12 ML	tank	\$ 28,674.06	2.0

Map ID		
Name	Water Facility 1	Water facility 2

2. Near the bottom of the column, the User enters the number of pumps, length of piping and number of portable buildings.

Elements		Unit Rate	\$ 140,305	\$ 55,973
Panel, Concrete, Open top, Earth, Single skin, Lined, 25 ML	tank	\$ 126,227.78		
Panel, Concrete, Open top, Earth, Single skin, Lined, 40 ML	tank	\$ 179,442.31		
Liquids pump and dispose	kL	\$ 271.68		
Major Module	module	\$ 27,512.91	3.0	1.0
Skids (e.g. separator)	skid	\$ 4,832.58		
Pumps and Controls	#	\$ 431.17		
Piping (total length)	m	\$ 23.09	15	5
Portable buildings	bldg	\$ 2,255.95		
Small, Brick wall, Steel roof, Concrete floor, 1 floors	m2	\$ 120.62		2
Large, Brick wall, Steel roof, Concrete floor, 1 floors	m2	\$ 72.05	1	

3. Finally, the User enters the total disturbance area for rip and/or grade and seed.
4. There are also rows available for User entry of elements not captured in the table. Where these rows are used, the User enters the rate (cost) in the quantity column rather than the unit rate column.

Elements		Unit Rate
Rip	ha	\$ 400.16
Growth Media - load, haul place	m3	\$ 3.60
Total disturbance area for grade and seed (pasture)	ha	\$ 1,655.50
Total disturbance area for grade and seed (native)	ha	\$ 4,196.50
Total disturbance area for rip (arid)	ha	\$ -
User entry		
User entry		

5. At the bottom of the column, the User Entered quantities are multiplied by the Default Rates (which are not changeable) to obtain the cost for each activity (e.g. decommission and remove tanks) and summed to obtain the total cost for the facility and domain. The Default

User Guide for Estimated Rehabilitation Cost Calculator for Petroleum and Gas

Rates include decommissioning (e.g. electrical and mechanical disconnection), demolition, transport (e.g. of steel to scrap yard) and where applicable, gate fees.

Petroleum and Gas Estimated Rehabilitation Cost Calculator

WATER FACILITIES USER BUILD										Small	Medium	Large	
\$	1,690,480.94	Water facility 2											
\$	246,278.39												
Elements	\$ 55,973	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 60,776	\$ 176,932	\$ 276,277
Summary													
Decommission and remove tanks	\$ 28,103.61	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 46,909.16	\$ 153,564.08	\$ 243,407.78
Decommission and remove pumps, skids and modules	\$ 27,512.91	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,724.67	\$ 3,449.34	\$ 5,174.01
Decommission and remove piping	\$ 115.44	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,154.36	\$ 2,308.72	\$ 3,463.08
Remove portable buildings	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,255.95	\$ 4,511.91	\$ 6,767.86
Demolish on-site constructed buildings	\$ 241.24	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Rip	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 400.16	\$ 600.24	\$ 800.32
Top soil	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,406.09	\$ 8,109.13	\$ 10,812.18
Seed	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,926.00	\$ 4,389.00	\$ 5,952.00
User entries	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	\$ 55,973.19	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 60,776.39	\$ 176,932.42	\$ 276,277.23
Arid	\$ -	\$ 52,444.30	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 164,434.28	\$ -	\$ 259,613.05

6. These costs reported to the Main sheet as a single line item.

CONTENTS MAIN										Total ERC amount	\$ 1,690,480.94
Map ID	#	Activity / Description	User Select	Input Sheet	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost		
	#9.27	Water transfer stations - user build	\$ 246,278.39	1		total			\$ 246,278.39		

6.7 Camps in Main sheet

The following steps should be followed for entering camps to the Main sheet.

1. The standard method is to simply add a quantity to the Default Rate line for the appropriate size (by person capacity) and type (temporary or permanent) camp.
2. The User should then enter words in the 'User Comments / Item Names' column to inform the department of the specific facility.

6.8 Camps in Infrastructure User Input Sheet

CONTENTS MAIN										Total ERC amount	\$ 2,624,556.12
Map ID	#	Activity / Description	User Select	Input Sheet	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	User Comments / Item Names	
	#3.39	Temporary camp - <= 20 persons				camp	\$ 48,560.61		\$		
	#3.40	Temporary camp - > 20 and <= 50 persons			1	camp	\$ 68,759.12		\$ 68,759.12	Camp 1	
	#3.41	Temporary camp - > 50 and <= 100 persons				camp	\$ 99,864.93		\$		
	#3.42	Temporary camp - > 100 and <= 150 persons				camp	\$ 145,275.99		\$		
	#3.43	Temporary camp - > 150 and <= 200 persons				camp	\$ 176,837.80		\$		
	#3.44	Temporary camp - > 200 and <= 250 persons				camp	\$ 244,340.91		\$		
	#3.45	Temporary camp - > 250 and <= 300 persons				camp	\$ 275,413.79		\$		
	#3.46	Temporary camp - > 300 and <= 400 persons			2	camp	\$ 339,250.51		\$ 678,501.02	Camp 2	

The following steps should be followed for entering camps to the Infrastructure User Input Sheet.

1. The Calculator uses basic entries such as capacity to calculate cost. These quantities may come from design, as-built drawings or registers or photographs. The User selects the size and type of camp from the drop-down menu, enters the name of the camp or group of camps and enters the number of camps in the category. The total disturbance area for the camp or group of camps is entered to the appropriate land type column.

Camps capacity and area						
Select Camp Size	Name(s)	Number	Pasture	Native	Arid	
Select from dropdown		#	ha	ha	ha	
Temporary camp - > 250 and <= 300 persons						
Temporary camp - > 250 and <= 300 persons						
Temporary camp - > 300 and <= 400 persons						
Temporary camp - > 400 and <= 500 persons						
Temporary camp - > 500 and <= 750 persons						
Temporary camp - > 750 and <= 1000 persons						
Temporary camp - > 1000 and <= 2000 persons						
Temporary camp - > 2000 and <= 3000 persons						
Temporary camp - > 3000 and <= 4000 persons						
Temporary camp - > 200 and <= 250 persons						
Temporary camp - <= 20 persons						
Temporary camp - <= 20 persons						

- The area for land type (grade and seed) is typically the area enclosed by the camp fence-line but maybe more if there are disturbed areas outside the fence line not captured elsewhere (e.g. a gravel parking area outside the fence). The grade and seed area may be smaller if areas within the fence line are rehabilitated.
- The User Entered quantities are collated in the table on the right-hand side of the sheet, the total displayed at the top of the sheet and reported to the Main sheet as a single item.
- The Default Rates (which are not changeable) applied to these quantities include decommissioning (e.g. electrical and mechanical disconnection), demolition, transport (e.g. of steel to scrap yard) and where applicable, gate fee.

6.9 Wells in User Input Sheet

The following steps should be followed for entering wells to the Wells User Input Sheet.

- Enter the map ID and name of the wells or group of wells.

Petroleum and Gas Estimated Rehabilitation Cost Calculator

Contents		WELLS INPUT SHEET	
Total Sheet	\$		0
Total ERC	\$	511,541.52	0.00

Map ID	Name	Type	Number	Total Area (all wells in row)	Land Type
		Select from dropdown	Whole #	ha	Select from dropdown
XXXX, CCCC 111	Bombay Sapphire 1	Conventional oil, Plugged and abandoned, Single well			seed
XXXX, CCCCC 112	Tanqueray 10	Conventional gas, Plugged and abandoned, Single well			seed
XXXX, CCCCC 113	Gordon's Folly	Conventional gas, Appraisal / development, Single well			no seed (arid)

- Select the type of well from the drop-down menu under the type column.

Petroleum and Gas Estimated Rehabilitation Cost Calculator

Contents		WELLS INPUT SHEET	
Total Sheet	\$		0
Total ERC	\$	511,541.52	0.00

Map ID	Name	Type	Number	Total Area (all wells in row)	Land Type
		Select from dropdown	Whole #	ha	Select from dropdown
XXXX, CCCCC 111	Bombay Sapphire 1	Conventional oil, Plugged and abandoned, Single well			seed
XXXX, CCCCC 112	Tanqueray 10	Conventional oil, Plugged and abandoned, Single well			seed
XXXX, CCCCC 113	Gordon's Folly	Conventional oil, Plugged and abandoned, Single well			no seed (arid)
		Conventional oil, Plugged and abandoned, Single well			no seed (arid)
		Conventional oil, Plugged and abandoned, Single well			seed
		Conventional oil, Plugged and abandoned, Single well			seed
		Conventional oil, Plugged and abandoned, Single well			seed

- Enter the quantity of wells in the selected category. In the example below one well is applied to each category.

User Guide for Estimated Rehabilitation Cost Calculator for Petroleum and Gas

Petroleum and Gas Estimated Rehabilitation Cost Calculator

Contents		WELLS INPUT SHEET	
Total Sheet	\$	6,081.46	
Total ERC	\$	519,143.34	

Map ID	Name	Type	Number
		Select from dropdown	Whole #
XXXX, CCCCC 111	Bombay Sapphire 1	Conventional oil, Plugged and abandoned, Single well	1
XXXX, CCCCC 112	Tanqueray 10	Conventional gas, Plugged and abandoned, Single well	1
XXXX, CCCCC 113	Gordon's Folly	Conventional gas, Appraisal / development, Single well	1

- Enter the total disturbance area for all the wells in the row and select whether the well requires seed (pasture or native land) or not (arid land).

Contents		WELLS INPUT SHEET	
Total Sheet	\$	6,366.46	
Total ERC	\$	519,499.59	

Map ID	Name	Type	Number	Total Area (all wells in row)	Land Type
		Select from dropdown	Whole #	ha	Select from dropdown
XXXX, CCCCC 111	Bombay Sapphire 1	Conventional oil, Plugged and abandoned, Single well	1	0.0002	seed
XXXX, CCCCC 112	Tanqueray 10	Conventional gas, Plugged and abandoned, Single well	1	0.0000	seed
XXXX, CCCCC 113	Gordon's Folly	Conventional gas, Appraisal / development, Single well	1	1.0000	no seed (arid)

- The totals for each well category are summed on the right-hand side of the sheet, multiplied by the appropriate rate and summed. The total sum for the sheet is displayed at the top of the sheet and reported to the Main sheet as one line item.

5. Wells Pads and Associated Infrastructure						
	Wells Input Sheet		lump		\$	6,366.46

7 Glossary

Table 4 shows the terms referenced throughout this document and their specific definition.

Table 4. Definitions

Word	Definition
Activity	A general term applied to simple and singular items such as excavating soil and more involved, multi-faceted items such as decommissioning a gas processing facility.
Alternate Rate	A site-specific rate entered by the User which overrides the Default Rate.
Bottom-up, first principles cost method	The process of building rolled-up costs for relatively complex, multi-faceted activities using basic singular values for plant, equipment and labour and productivity (e.g. cubic metres of soil excavated per hour) to estimate the time to complete an activity.
Calculator	The Excel™ workbook that calculates the ERC for the site.
Department	Refers to the Queensland Department of Environment and Science.
Default Rate	A standard (default) cost rate for an activity in the Calculator.
Domain	Discrete operational areas within a site, usually with unique function and purpose and therefore similar geophysical characteristics. Domains could include: <ul style="list-style-type: none"> • Infrastructure • Gas Processing facilities • Dams • Pits.
Estimated Rehabilitation Cost	The estimated cost of rehabilitating a site or project as specific to the ERC requirements of the <i>Environmental Protection Act 1994</i> .
Productivity	The performance capability of a machine or equipment. For example, the volume of soil an excavator can move per unit time.
Rolled-up	With respect to unit cost rates rolled-up means a single value generated from smaller activities and cost rates. Bottom-up, first principles are used to generate rolled-up rates.
Sheet	The individual worksheet (also termed a tab) within the Calculator.
User	The applicant or holder of an EA and the individual who prepares the ERC.