

Land and Water Boards of the Mackenzie Valley



DRAFT

Mackenzie Valley Land Use Security Estimate Tool User Manual

September 30, 2020

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1 Introduction

In the Mackenzie Valley, the Gwich'in, Sahtu, Wek'èezhìi, and Mackenzie Valley Land and Water Boards have the authority to set a security deposit for activities that require a land use permit.¹ The security deposit is intended to cover the costs to close and reclaim the site if the site were abandoned. The Mackenzie Valley Land Use Regulations (MVLUR) state that the Board may require security to be posted in an amount not exceeding the aggregate of the costs of:

- (a) Abandonment of the land use operation;
- (b) Restoration of the site of the land use operation; and
- (c) Any measures that may be necessary after abandonment of the land use operation.

The Board's authority to set security for land use permits applies throughout the Mackenzie Valley. Depending on the location within the Mackenzie Valley, Indigenous Governments, CIRNAC and the GNWT share the authority for establishing the form of security, holding security, and where necessary for paying for the closure and reclamation of sites. Indigenous Governments, CIRNAC, and the GNWT also have the authority to set security under other instruments within their respective jurisdictions.

The Mackenzie Valley Land Use Security Estimate Tool (the Tool) was developed to assist applicants, landowners, and authorities in calculating the security amount for activities that require only a land use permit (and not a water licence). The Tool is intended to be generic in its applicability to a range of land use operations but may be modified to account for site-specific circumstances.

This User Manual provides context for the costs included in the Tool and user instructions for the Inputs required.

1.1 Applicability

The Tool is for land use operations that are typically small operations predominantly in the mineral or oil and gas exploration field, but also in forestry, quarrying, transportation, communication, research, tourism and more. It is for land use operations that require a land use permit but not a water licence.² For operations that require a water licence, or both a land use permit and a water licence, the RECLAIM 7.0 Model (GNWT, 2017) is the preferred cost estimating model.

1.2 Objectives

The Tool was developed to achieve the following key objectives:

¹ The Boards' authority to require proponents to post and maintain security is granted under the *Mackenzie Valley Resource Management Act (MVRMA)* and subsection 32(1) of the *Mackenzie Valley Land Use Regulations (MVLUR)*.

² See www.mvlwb.ca for [Guide to Completing a Water Licence Application \(2020\)](#), which outlines when water licences are required.

- a) The Tool is user friendly.
- b) The Tool captures all reasonable and expected closure and reclamation costs.
- c) The Tool provides a transparent and consistent cost estimating approach.

To meet these objectives; the user entry categories align with the information provided by the applicant in the MVLWB Land Use Permit Application.³ Guidance for the application process is provided in the *Guide to the Land Use Permitting Process*.⁴ The closure and reclamation categories and activities are also consistent with RECLAIM and other Canadian security cost models (e.g., British Columbia Ministry of Energy and Mines and Petroleum Resources (MEMPR) Regional Reclamation Bond Calculator),⁵ and accepted industry cost estimating methods are applied.

1.3 Basis and Assumptions

The security associated with an applicant's Land Use Permit is intended to cover the costs to fulfill the obligations for closure and reclamation should the applicant be unable to. The underlying basis and assumption of the tool are:

- Unit costs are based on third-party contractors conducting all of the work.
- Mobilization costs are included for every piece of equipment or machine required for the work to be completed (i.e. assumes equipment that was being used for the land use operation will not be available or in good working condition).
- There is no credit for salvage or sale of equipment.
- The security reflects the activities, scope and scale detailed in the Land Use Permit Application.

The Tool is generic and intended to be applicable to a range of types and sizes of land use operations. Projects that require a land use permit only and not a water licence typically have limited footprints and, therefore, limited impacts to land and water. For such operations, the removal of buildings and equipment are expected to be the most significant costs. In a northern environment, clean-up of a site, consolidating waste, and preparing items for demobilization typically would occur in a non-frozen field season. If removal of large quantities of waste and/or heavy equipment is necessary, demobilization during a winter season would typically be required.

In addition to the above, for land use operations that require land restoration or large building demolition requiring the use of heavy equipment, an initial winter season mobilization would be required to bring the heavy equipment to the site. This is consistent with the underlying assumption that mobilization costs are included for every piece of equipment or machinery required for the work to be completed. The

³ See <https://mvlwb.com/mvlwb/apply-permit-licence> for the application form and supporting materials.

⁴ See mvlwb.ca for [MVLWB Guide to the Land Use Permitting Process](#).

⁵ See British Columbia's provincial website under Mineral Exploration & Mining – Mine Permitting – Reclamation and Closure <https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/permitting/reclamation-closure>.

sequence is then assumed to consist of a winter mobilization, closure and reclamation activities carried out in the summer (non-frozen season), and all items demobilized in a second winter season.

With the exception of a limited amount of soil remediation resulting from fuel spills, costs associated with remediation of contamination are not considered in the security estimate (e.g., significant water spills, significant land spills). It is expected that permittees will report spills in accordance the NWT *Spill Contingency Planning and Reporting Regulations* and address them at the time they occur. Projects with known contamination requiring significant remediation will need to estimate those costs and enter them as “Other Project Specific Costs” in the Project Specific Questions worksheet. Similarly, land use operations with unique activities or more complicated logistics (e.g., use of helicopters or barges) may also require site specific costs to be added in the same worksheet. More information is in Section 4.4.

It is recognized that the completed Land Use Permit Application may describe the maximum extent of the proposed operations. This would therefore mean the security estimate would represent the maximum costs, even though the full extent of the project may never be realized. In these cases, land use permit applicants can propose phasing of security, so that the security increases as the project size and/or scope increases. Applicants who wish to propose phasing should propose milestones that would trigger security increases, with rationale, and propose security amounts for each milestone, as part of their application. Staff can assist applicants who have questions about proposing phased security.

1.4 Structure of the Tool

The Tool is in MS Excel file format and consists of two (2) user entry worksheets:

- 1) Costing Questions
- 2) Project Specific Questions (most projects will not need this sheet)

and three (3) calculations sheets, which are displayed for transparency:

- 1) Security Estimate Calcs
- 2) Cost Quantity Calculations
- 3) Unit Rate Calculations

User-provided inputs (data entry) is only required for the Costing Questions worksheet. Input for Project-Specific Costs is optional. The Security Estimate Calcs worksheet is a summary and breakout of the total security estimate by reclamation activities. The two other calculation worksheets (Quantities and Unit Rates) show details of the costing methodology.

2 User Instructions

2.1 Costing Questions Worksheet

This is the key Input worksheet. It is important to note that the sections of the Costing Questions worksheet align with the Land Use Application Form; meaning the same order and numbering system are used. Users should be aware that not all sections of the LUP Application Form are included in the Tool, because some of the sections have no bearing on the security estimate.

The column headings in the Costing Questions worksheet include the following:

- Question No. Questions 1 to 19;
- Application Section Section number from the Land Use Permit Application Form;
- Input Description Describes what information should be entered;
- Where are the costs calculated from this input? This column shows which cost items are affected by the Input;
- Input There are 19 inputs (data entry) for the user to fill out. Ten (10) are 'quantities' and nine (9) are 'yes or no' entry boxes. These inputs are used in the calculation worksheets to calculate the security estimate; and
- Applicant's Rationale Justification input section where the user provides the rationale for their entry.

NOTE: Under the Total Security Estimate box at the top of the sheet, text shows the number of questions (out of 19) completed. All questions must be completed to properly calculate the security.

The questions that require the user to input a quantity (e.g., number of kilometres) and the "yes or no" questions are discussed separately below.

2.1.1 Costing Questions: Quantity Inputs

The answers to the Costing Questions are used for estimating the effort required for the expected reclamation and closure work. The 10 quantity inputs consist of the following:

1. Distance of site from closest hub city (i.e., city with airbase and land access for transport of waste for disposal),
Yellowknife has been selected as the default hub city for costing purposes in the Tool, but other road access communities are assumed to be equivalent cost-wise based on the detail level of the cost estimate.

- The distance is used to calculate air and land mobilization, and demobilization costs. A straight-line distance is appropriate for this level of estimation.
2. Total area of disturbed land

The Land Use Permit Application Form requires the total number of hectares to be disturbed in each phase of the project, as well as through the life of the project.

The disturbed land area is used to calculate the costs associated with restoration of land (if required) and cleanup of debris.
 3. Total footprint area of all buildings

The Guide to the Land Use Permitting Process (2020) requires a description of the dimensions of the of the buildings.

The total area of the buildings is the sum of each individual building and is used to calculate the costs associated with dismantling the buildings for demobilization.
 4. Total camp weight

The camp weight is also used to calculate the costs associated with demobilization. It is expected that the camp weight will be known by the applicant as it would have been required to develop and budget for their mobilization plan. If not known, a general rule of thumb would be:

 - A 14'x 16' canvased metal frame tent weighs approximately 680 kg (1,500 lbs) (including furniture and appliances but not lumber for floors).
 5. Length of winter road construction

The length of new winter road construction to access the site is used to calculate the costs of winter mobilization and demobilization.
 6. Total number of heavy machinery/equipment to be used

The number of pieces of equipment is used to estimate the amount of time required to prepare the equipment for removal from the site. This includes draining hazardous fluids and breaking down the equipment to meet demobilization load restrictions.
 7. Total weight of heavy machinery/equipment to be used

The total weight must be calculated by the user from the list provided in Section 12 of the Land Use Permit Application Form. The total weight is used in the estimate of demobilization costs and disposal fees. It is recognized that it may be that not all of the equipment that is listed in the Land Use Permit Application Form will necessarily be on site throughout the life of the operation. However, the total number of individual pieces of equipment represents the highest potential total liability.
 8. Total number of fuel barrels

The Guide to the Land Use Permitting Process (2020) outlines the requirement for an applicant to provide the number, capacity, and type of containers for all types of fuels.

The total number of drums is used in the Tool to calculate costs to drain residual fuel, consolidate and decontaminate the drums, and

- demobilize and dispose of drums off-site (based on calculated total weight of empty drums).
9. Total weight of non-barrel fuel storage containers (e.g., fuel tanks) The total weight of all other fuel storage tanks is used in the Tool to calculate demobilization and disposal costs for the tanks.
 10. Total volume of fuel For the purposes of quantities, the total fuel volume is the maximum amount stored at site at any time during the life of the project.

The total volume is used to calculate a provision for a residual amount of fuel that may require removal and disposal. It is also used to calculate a provision for quantity of material to be removed and disposed of around the fuel transfer areas (i.e., minor spills).

Note: The total fuel volume is not used to calculate the security estimate. Only a residual amount, calculated as a percentage of the total, is included in the estimate.
 11. Existing Securities The Tool subtracts securities already held under other instruments (e.g., land access agreements, land leases, etc.).

2.1.2 Yes or No Inputs

An input of 'Yes' for a 'Yes or No' questions trigger a specific cost item to be included in the calculation of the security estimate. The nine (9) yes or no inputs consist of the following:

1. Is the Project fixed-wing aircraft access only? If a site is fixed-wing aircraft accessible only, this triggers the 'winter' demobilization unit rate (the actual season does not materially affect this unit rate since the costs are based on flights and cargo weights). If the input is 'Yes', then it is assumed the land use operation was originally mobilized by fixed-wing aircraft and would similarly be demobilized by fixed-wing aircraft.

Helicopter-access only operations are not considered suitable for the Tool since specific helicopter staging, fuel caching and sling load management would need to be considered at a project specific level.
2. Will there be construction of a building with a footprint of more than 100 m² and a height of more than 5 metre If the Input is 'Yes', then it is assumed that large building demolition is required, which would in turn require the use of heavy equipment. This triggers costs to be included for the mobilization and demobilization of heavy equipment.
3. Does land restoration require the use of heavy equipment? If the Input is 'Yes' this triggers the same requirement as above for costs to be included for mobilization and demobilization of heavy equipment. Examples of restoration requiring heavy equipment are

- ripping of compacted surfaces, removal of bridges and culverts, re-contouring, replacing stripped organic soils, etc.
4. Is winter road construction required for mobilization of the operation?

If the Input is 'Yes', then this triggers the costs to construct a winter road.
 5. Is the winter road construction over land-only?

If a winter road construction is over land-only, this triggers the winter road construction unit rate (over land-only).
 6. Is there a potential impact of the proposed project on groundwater and surface water?

For most small and limited footprint land use operations, it is not expected that environmental risks to ground and surface water would be present. However, the potential impact would be described in the Potential Environmental Impacts section of the LUP Application Form and if the Input is 'Yes', this triggers a cost for water monitoring as part of the interim (or standby) care and maintenance phase (i.e., the period of time after the site has been abandoned and before closure and reclamation activities have been initiated).
 7. Is there a potential for instability of reclaimed areas?

For most small and limited footprint land use operations, it is not expected that the potential for instability of reclaimed areas would be present. The impact would be described in the applicant's LUP Application Form in the Potential Environmental Impacts section. Examples of instability of reclaimed areas include a landfill or erosion of reclaimed disturbed areas. An Input of 'Yes' triggers a cost for geotechnical monitoring as part of the interim (or standby) care and maintenance phase (i.e., the period of time after the site has been abandoned and before closure and reclamation activities have been initiated).
 8. Will a detailed Closure and Reclamation Plan be required?

An Input of 'Yes' triggers a cost for development of a detailed Closure and Reclamation Plan following abandonment of a site. Applicants are required to provide a reclamation and closure plan during the Land Use Permit Application process, or for small-scale projects, a description of the proposed activities. This information is reviewed by the Board. If there is reasonable certainty in the Closure and Reclamation Plan and no additional technical or further design requirements are expected, significant costs for a detailed Closure and Reclamation Plan would not be expected.
 9. Is Post-Closure Monitoring and Inspection required?

Similar to iv) and v) above, Post-Closure Monitoring and Inspection would only be expected for sites with likely environmental impacts and/or potential instability of reclaimed areas. In that scenario, a

monitoring and inspection plan should be developed as part of the application process.

3 How are Individual Costs Calculated?

The Tool uses the user entries from the Costing Questions worksheet to calculate Quantities (in the Quantity Calcs worksheet) and Unit Rates (in the Unit Rate Calcs worksheet). The results from these two worksheets are fed into the Security Estimate Calcs worksheet, which estimates the total security for the project. Because these three worksheets are closely linked, the cost categories (for example 1 - Restoration of Disturbed Lands) are the same in all three. One exception is that the Unit Rate worksheet contains additional rows at the top for Labour and Equipment Rates.

The Quantity Calcs worksheet and Unit Rate Calcs worksheets have a 'Costing Detail' column (Column "H"), which provides some information breakdowns for each row. The next set of columns (Columns "K" to "M"), labeled Variable1, Variable2 and Variable3, are used to calculate the appropriate Quantity or Unit Rate for a given row (each row being equivalent to a reclamation activity). These cells contain different variables so calculation formulas can be tracked and followed in the worksheet. The variables include:

- Specific trigger responses from the Costing Questions worksheet
- Input dimensions
- Formulas for converting quantities to match the final costing quantities
- Results from other calculation rows
- Assigned values
- Derived production rates (daily production rates)
- Daily unit rates
- Formulas for quantity unit rates

Columns "O" and "P" of the Quantity Calcs and Unit Rate Calcs worksheets have the calculated quantities and unit rates.

The Quantity Calcs worksheet also has an additional set of columns, "S" to "U", which break out the work production formulas and calculated production rates.

Descriptions of the calculations for the different reclamation activities (grouped by Cost Categories) are provided in the sections below.

3.1 Restoration of Disturbed Lands

The Tool uses the area of disturbed lands (entered by the user), including gravel pads, sumps, site access roads, areas where topsoil has been removed, etc., to calculate land restoration costs. The tool includes

the costs of restoring these areas (as described in the next paragraph), and assumes that 25% of the area would be revegetated. This assumption accounts for practical and fiscal constraints on revegetation and the fact that some areas of disturbed land may have been naturally unvegetated before the disturbance. The Board or landowner may require additional restoration of disturbed lands, in which case the user will need to enter additional land restoration costs in the Project Specific Questions worksheet.

Common restoration activities may include the following:

- Re-contouring disturbed areas
- De-compacting surfaces (e.g., ripping or rough and loose surface preparation)
- Re-placement of stockpiled organics
- Removal of gravel pads
- In-filling sumps
- Stabilization of landforms, including erosion control measures
- Reclamation of site access roads

At minimum, the work is expected to require a fleet of heavy equipment that would include:

- 1x- 20T excavator
- 2x- 30T haul trucks
- 1x – D6 bulldozer

- Quantities: The Tool uses the total area in hectares (ha) of disturbed land to assess the total work effort required.

A default of 25% of the total area is assumed in the calculation for the quantity of material for placement of organics (e.g., stripped and stockpiled soil) to restore specific areas and promote revegetation. 25% is considered a reasonable coverage of disturbed lands and assuming available and salvageable topsoil to be limited.

The application of fertilizer and seed is also based on the same 25% of the total disturbed land.
- Production: The overall production rate (duration) of the work is dictated by the productivity of the bulldozing;
 - At a rate of 300 loose m³/hr (Caterpillar Performance Handbook⁶),
 - Or 1.9 ha/day.

⁶ A publication by Caterpillar, Peoria, Illinois, U.S.A. Performance information in the booklet is intended for estimating purposes only.

It was determined that the bulldozer would be at full production for the duration of the reclamation work and excavator and two haul trucks at one third production for the same duration.

Assuming a 200 m haul, the production for the placement of salvaged topsoil was calculated to be 880 m³/day.

Based on a 4-person crew application of fertilizer and then seeding could each be done at 2 ha/day (based on the BC Bond Calculator).⁷

- Unit Rates: The unit rates for this work are based on the calculated daily productions and the daily rates for the equipment fleet and labour crew.

3.2 Removal of Abandoned Equipment and Buildings (Demobilization Costed Separately)

The basis of the security estimate is that all Buildings and Equipment will be removed from the site, as opposed to considering these to be an asset that will remain.

- Quantities: The security estimate includes costs for labour to prepare the abandoned equipment and demolish the buildings for winter demobilization, including clean-up of and consolidation of all scrap and debris.

The calculations are based on the total number of permitted equipment, area of disturbed land (for scrap cleanup) and the total area of buildings (for manual dismantling and demolition).
- Production: Production rates for the labourers to prepare equipment, pickup scrap and dismantle buildings has been based on site experience with similar work.
- Unit Rates: The unit rates for this work were derived from the calculated daily productions and the daily rates for the equipment fleet and labour crew.

Tipping unit rates are based on a reputable vendor quote.

3.3 Management of Hazardous Materials and Contaminated Soil (Demobilization Costed Separately)

Costs in this category are for residual fuel and fuel container management, and the removal and disposal of a limited quantity of contaminated soil as has typically been observed at abandoned sites. A small

⁷ See British Columbia's provincial website under Mineral Exploration & Mining – Mine Permitting – Reclamation and Closure <https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/permitting/reclamation-closure>.

amount of hazardous camp building materials would also be collected, consolidated, and disposed of, including:

- Waste petrol products (oils and lubricants, filters absorbent pads)
- Used chemicals – cleaners and other solvents
- Batteries
- Fluorescent lights

As stated in Section 1.3, more extensive contamination of soil or water is not considered in the Tool and if present would require a calculation outside of the Tool.

- Quantities: The total volume capacity of all fuel storage containers is used to determine the work effort for a crew to clean and consolidate the empty fuel containers.

The soil remediation volume is based a percentage of the total fuel volume that may be absorbed into the soil.

Disposal of hazardous materials includes the weights of drums and fuel tanks, contaminated soil, waste fuel and waste petrol products. The waste fuel represents a 10% estimated residual of the total permitted fuel volume.
- Production: Production rates for the labourers to drain residual fuel and consolidate the fuel containers, as well as manually dig out contaminated soil, are based on reasonable industry estimates.
- Unit Rates: The unit rates for this work are based on the calculated daily production and the daily rates for the equipment fleet and labour crew.

Tipping unit rates are based on a vendor quote.

3.4 Interim Care and Maintenance

Interim care and maintenance occurs during the period of time after the site has been abandoned and before closure and reclamation activities have been initiated. It is expected that most land-use-permit-only operations will require little interim care and maintenance. However, the Tool includes a default cost for a site inspection by an Inspector accompanied by a qualified professional to assess and, if necessary, secure the site and evaluate reclamation requirements. These costs are included for all projects, regardless of scope and size. However, if potential environmental impacts for either land or water are triggered by an Input of 'Yes', then costs are also included for geotechnical inspections and water monitoring to be conducted in the Project-Specific Costs worksheet.

3.5 Mobilization, Camp, and Demobilization Costs

The Tool includes the Cost Category – Mobilization, Camp and Demobilization Costs. Within this Cost Category are the following subcategories:

- a) Mobilization of Heavy Equipment for the Reclamation Work, if required
- b) Mobilization and Demobilization of Workers and Supplies for the Reclamation Work
- c) Camp for the Reclamation Work
- d) Demobilization of abandoned equipment and reclamation equipment, if required

These are further described as follows:

- a) If heavy equipment is required for building demolition and/or land restoration, then costs for an initial winter mobilization are triggered. The four pieces of heavy equipment outlined in Section 1.4, supplies, and calculated fuel would be mobilized to site; if winter road construction is required, associated costs are also included.
- b) Its expected that the majority of closure and reclamation activities would be carried out during a non-frozen field season. Such activities would include land restoration (if required), site cleanup, waste consolidation and preparation from demobilization, building dismantling, etc. By default, the Tool includes costs for a summer air mobilization of crew and supplies, a summer work program, and air demobilization.
- c) The summer work program is based on the quantity of work and calculated work production rates that calculate the number of total workdays. For a program less than one week, it was determined daily fly-ins to site would be more cost effective than using a camp. A formula assigns either additional daily mobilization and demobilization for this scenario, or for total number of workdays in excess of one week, then camp costs are triggered.
- d) The final demobilization is assumed to be during a winter season and includes demobilization of all reclamation equipment, abandoned equipment, consolidated building wastes, and consolidated hazardous wastes.

- o Quantities: If required, the initial mobilization would be the equipment, supplies and fuel based on weights of the determined reclamation equipment fleet. Fuel is calculated based on the quantity of work, activity production rate of the equipment and calculated fuel consumption of the equipment.

The summer air mobilization assumes a six-person crew (one supervisor, four labourers and one camp/support person). A provision for four operators is added for when heavy equipment work required. Costs include mobilization of a 6 or 10-person camp and then full demobilization of crew and camp.

Camp quantities are based on calculated person-days.

The final demobilization quantities are drawn from the other quantity fields:

- Reclamation equipment weight
- Abandoned equipment weight (equivalent to total of equipment to be used)
- Abandoned buildings weight
- Hazardous material weights

- Unit Rates: The Tool calculates a winter land mobilization/demobilization unit rate per tonne based on haul truck and driver hourly rate, return distance of site to Yellowknife and speed of travel.

It calculates an air (fixed-wing) mobilization/demobilization unit rate per tonne based on the aircraft charter hourly rate, return distance of site to Yellowknife and speed of travel.

- Contingency Because mobilization and demobilization are not categorized in the Tool as a Direct Cost, it is not included in the project contingency costs (Section 3.11 below). In order to include a contingency for mobilization and demobilization, a cost of 10% of mob/demob costs has been added.

3.6 Development of a Detailed Closure and Reclamation Plan

As described in Section 2.1.2, the Land Use Permit Application requires a description of the plan for closure and reclamation. Applicants are to develop a plan to address the cleanup at the site and any impacts to the land. If there is reasonable certainty in the Closure and Reclamation Plan, and no additional technical or further design requirements are expected, significant costs for a Closure and Reclamation Plan would therefore not be expected.

For land use operations for which a more detailed Closure and Reclamation Plan is likely to be required, the user would input 'Yes' and costs to prepare the plan, carry out consultation and engagement, and meet regulatory compliance (e.g., permitting, reporting, legal, etc.) would be triggered.

3.7 Post-Closure Monitoring and Inspection

Post-closure monitoring and inspection costs should reflect the monitoring and inspections identified in the Closure and Reclamation Plan. For most land use only operations, post-closure monitoring and inspection are not expected. However, a cost can be developed in the Project Specific Costs worksheet should there be reasonable expectations for post-closure monitoring and inspection.

Common monitoring programs include surface and groundwater quality, geotechnical, and vegetation. Other monitoring programs may be included to reflect the approved closure objectives for a particular

operation. Commonly, post-closure monitoring is conducted on a declining frequency at progressively fewer sampling points.

3.8 Project Management

Project management covers general project coordination, accounting and project control, quality assurance/quality control (QA/QC) and oversight, change orders and as-built reports. Project management is assumed to be at least 5% of direct project costs.

3.9 Health and Safety Plans/Monitoring and Quality Assurance/Quality Control

The inclusion of costs for workers health and safety, monitoring and QA/QC are common in government contracting processes and as such are relevant to the estimate of security cost. A provision of 1% of direct costs provides for preparation and administration of safety protocols, and relevant worker training.

3.10 Bonding/Insurance

Section 85.1 of the Construction Act and section 12 of the accompanying General regulation, all “public contracts” with a contract price of \$500,000 or more require the contractor to furnish both a performance bond and a labour and materials bond. A formula was set up in the Quantity Calcs worksheet to trigger 1% of the direct costs for bonding if the direct costs were > \$500,000.

3.11 Contingency

A contingency is added to cover both the uncertainty in the costing estimate (i.e., variability in quantity of work, Unit Costs and required scope of activities) and the possibility that some aspects of the closure and reclamation activities may be more difficult to perform.

A default contingency of 15% is used in the Tool to reflect a relatively low risk of higher costs due to the low technical requirements for most of the reclamation work described in this User Manual.

4 Supporting Information

A group of additional rows are included in the Unit Rate worksheet that list Labour rates, Equipment rates, Sub-Contractor rates and Cost items. The rows provide the source of specific unit rates and also include some reference rates for context.

4.1 Labour Rates

The labour rates selected for the Tool are from the Yukon Fair Wage Schedule (2020) with a loading of 200% to overhead, payroll, overtime, and profit.⁸ The fair wage schedule was developed as a right to fair

⁸ See <https://yukon.ca/en/fair-wage-schedule-2020> to download the Yukon Fair Wage Schedule.

wages and working conditions on construction projects under Federal Contract, was guaranteed under the Fair Wages and Hours of Labour Act and Regulations. Although the Act and Regulations were repealed in 2014, the Yukon continues to publish yearly wage schedules.

The Yukon Fair Wage Schedule was used since the information represents a published and current database of rates for work in Canadian northern communities.

4.2 Equipment Rates

Three (3) sets of equipment rates are shown in the Unit Rate worksheet, sourced from:

- The RECLAIM cost model (2014 unit-costs inflated to 2020 real dollars);
- Yukon Third Party Rental Rates for government contracts (2019 rates inflated to 2020 real dollars); and
- The Alberta Roadbuilders & Heavy Construction Association (ARHCA) (2020).

All three equipment rates are provided in the Tool for context and comparison. No such database is known to exist for the Northwest Territories. For the purposes of this Tool, the Yukon Third Party Rental Rates were selected to represent work in Canadian northern communities.

4.3 Sub-contractor Rates

- Mobilization haul: The Yukon Third Party Rental Rate has rates for tractor haul trucks and was equivalent to a vendor quote sourced in the development of this tool. Average travel speeds on winter roads (winter mobilization) and a typical payload are included in the Variable columns to allow calculation of per unit winter road mobilization rates.
- Twin Otter: A vendor quoted rate for a Twin Otter charter, travel speed and payload are in the Variable columns to provide data for calculating per unit air mobilization rates.
- Camp rental rate: A vendor quote is listed in the variable column.
- Operation of camp: An estimate based on known camp costs is listed in the variable column.
- Waste disposal tipping fee - Yellowknife: An industrial waste disposal tipping fee to Yellowknife's waste transfer facility (final southern disposal) is used for the Tool.
- Hazardous waste disposal tipping fee; contaminated soil - Yellowknife: A hazardous waste disposal tipping fee to Yellowknife's waste transfer facility (final southern disposal) is used for the Tool.

- Hazardous waste disposal tipping fee; liquid - Yellowknife: A hazardous waste disposal tipping fee to Yellowknife's waste transfer facility (final southern disposal) is used for the Tool.

4.4 Project Specific Costs

The optional Project Specific Costs worksheet allows the user to include atypical costs such as geotechnical and water quality monitoring during interim care and maintenance, engagement, regulatory compliance and more.

Known project costs were used to develop a default rate for the construction of winter ice roads. The per unit cost represents a significant cost for any security estimate and is recognized to be highly variable. A simple per distance unit rate is likely oversimplistic to accurately assess the costs; however, a more sophisticated estimate is beyond the scope of the Tool. Therefore, a project-specific unit rate can be entered in the Project Specific Costs worksheet. Where possible, actual costs from the applicant's planning or implement operations should be used.

Cost for monitoring and inspection were used as defaults in the tool. The costs were estimated based on experience with small-scale monitoring and inspection projects. However, it is recognized that the scope of the work will highly influence costs, and a large database for the types of land use operations intended to be represented in this Tool is not available.

For monitoring and inspection costs, the user can enter the following:

- Number of inspections per year
- Cost of contractors for each inspection
- Laboratory costs
- Reporting costs
- Other costs
- Number of years

Engagement Costs, Regulatory Compliance Costs and Detailed Closure and Reclamation Plan Costs can also be entered as project-specific costs. Costs that are unique to the project can also be added in the "Other Project-Specific Costs" section at the bottom of the worksheet. These are costs not anticipated by the tool, and they must be calculated by the user before they are entered. The applicant should submit any relevant evidence to support any "Other Project-Specific Costs".