



**Westcoast Connector
Gas Transmission**

Westcoast Connector Gas Transmission Project

Metal Leaching/Acid Rock Drainage Management Plan
Condition 11

Detailed Outline - Revision 1

January 2022

Prepared for:

Westcoast Connector Gas Transmission Ltd.

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FLUOR[®]



Westcoast Connector Gas Transmission Project

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Land Acknowledgement

We acknowledge that the Westcoast Connector Gas Transmission project (WCGT Project) area is in the Traditional and Ancestral Territory of many Indigenous Peoples, presently subject to the Nisga'a Treaty, Treaty 8, and vast areas of unceded Indigenous Traditional lands. These Indigenous groups include the Nisga'a Nation, Prophet River First Nation, Blueberry River First Nations, Doig River First Nation, Gitanyow Hereditary Chiefs, Gitxsan Hereditary Wilp, Halfway River First Nation, Kitselas First Nation, Kitsumkalum First Nation, Lake Babine Nation, Lax Kw'alaams First Nation, Wilp Luuxhon, Metlakatla First Nation, Saulteau First Nation, Takla Lake First Nation, Tsay Keh Dene First Nation, West Moberly First Nations, Nak'azdli First Nation, McLeod Lake Band, Gitxaala Nation, and the Métis Nation British Columbia

We acknowledge the many Indigenous Peoples who live on care for these lands and have for generations. We are grateful for the traditional Knowledge Keepers and Elders who are still with us today and those who have gone before us. We make this acknowledgement as an act of reconciliation and gratitude to those whose territory we reside on or are visiting.

Executive Summary

The British Columbia Environmental Assessment Office (BC EAO) issued an Environmental Assessment Certificate (Certificate) to Westcoast Connector Gas Transmission Ltd. (WCGT Ltd.) for the WCGT Project on November 25, 2014, and later granted a 5-year extension to the Certificate on April 25, 2019. The Certificate expires on November 25, 2024.

The WCGT Project approved in the Certificate includes the potential to build two 48-inch diameter natural gas pipelines within the same right-of-way along with accompanying compressor stations that could potentially service multiple liquefied natural gas (LNG) terminal sites starting at Cypress in northeast British Columbia (BC) and ending at Ridley Island on the north coast. The Certificate provided the flexibility to choose one of two routes to the Prince Rupert area—either through the Nass Valley (Nasoga Route) or north towards Kitsault (Kitsault Route).

WCGT Ltd. is actively developing the WCGT Project to build one express, single-purpose natural gas pipeline from a compressor station near Willow Flats in northeast BC to a delivery point at Wil Milit on the north coast to supply natural gas to potential LNG terminal sites (Project).

The Certificate granted for the WCGT Project is subject to 43 Conditions. The purpose of the Metal Leaching and Acid Rock Drainage Plan (MLARDMP or the Plan) is to address the requirements of Certificate Condition 11.

WCGT Ltd. is engaging with Indigenous groups and relevant regulatory authorities (RRAs) in the development of this detailed outline to support the full build-out of the Plan. Through engagement, WCGT Ltd. is seeking collaboration in the development of the Plan and any information that can be shared to strengthen the Plan and the commitment to fulfilling Condition 11.

WCGT Ltd. acknowledges the inherent connection Indigenous Peoples have with the land and that while the Plan will satisfy the regulatory requirement, the Plan is intended to minimize impacts of metal leaching and acid rock drainage by incorporating Indigenous Knowledge and ensuring concerns are addressed during mitigation development.

The scope of the Plan includes:

- The methodology, consultation, regulatory framework, mitigation, monitoring, and reporting that the Project will implement when metal leaching/acid rock drainage is encountered in the Project route.
- Project-related environmental mitigation and commitments to be addressed including pre-construction, during, and post-construction requirements, where they are set out in the Condition 11 of the Certificate.

Table of Concordance

Table 0-1 describes how this Plan addresses the applicable Certificate Conditions.

Table 0-1. Concordance with Certificate Condition 11: Metal Leaching/Acid Rock Drainage Management Plan

| Certificate Condition | Section |
|--|-----------|
| <i>Condition 11 – Metal Leaching/Acid Rock Drainage Management Plan</i> | |
| The Holder must develop, in consultation with OGC, and implement a Metal Leaching/Acid Rock Drainage Management Plan in accordance with Appendix 3-A of the Application. | Section 2 |
| The Holder must provide the plan to EAO and OGC no less than 60 days prior to the Holder’s planned date to commence Construction in high potential ARD/PAG areas identified in the Plan. | Section 4 |

Note:

BC OGC = British Columbia Oil and Gas Commission

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Acronyms and Abbreviations

| | |
|------------------------|--|
| AMP | Access Management Plan |
| ARD | acid rock drainage |
| BC | British Columbia |
| BC EAO | British Columbia Environmental Assessment Office |
| BC OGC | British Columbia Oil and Gas Commission |
| Certificate | Environmental Assessment Certificate |
| CPC | Certified Pipeline Corridor |
| EI | Environmental Inspector |
| FWQMP | Freshwater Water Quality Management Plan |
| LNG | liquified natural gas |
| LRMP | Land and Resource Management Plan |
| ML | metal leaching |
| ML/ARD | metal leaching/acid rock drainage |
| MLARDMP or the Plan | Metal Leaching/Acid Rock Drainage Management Plan |
| NPR | neutralization potential ratio |
| NWRP | Nisga'a Watercourse Restoration Plan |
| PAG | potentially acid-generating |
| Project | one express, single-purpose natural gas pipeline from a compressor station near Willow Flats in northeast British Columbia to a delivery point at Wil Milit on the north coast to supply natural gas to potential liquified natural gas terminal sites |
| QP | Qualified Professional |
| RP | Restoration Plan |
| RRA | Relevant Regulatory Authority |
| SRMP | Sustainable Resource Management Plan |
| TBD | to be determined |
| TCEMP | Terrestrial Construction Environmental Management Plan |
| WCGT Ltd. | Westcoast Connector Gas Transmission Ltd. |
| WCGT Project | Westcoast Connector Gas Transmission Project |
| WMP | Wetlands Management Plan |

1. Introduction

The British Columbia Environmental Assessment Office (BC EAO) issued an Environmental Assessment Certificate (Certificate) to Westcoast Connector Gas Transmission Ltd. (WCGT Ltd.) for the Westcoast Connector Gas Transmission Project (WCGT Project) on November 25, 2014, and later granted a 5-year extension to the Certificate on April 25, 2019. The Certificate expires on November 25, 2024. The Certificate granted for the WCGT Project is subject to 43 Conditions. The purpose of the Metal Leaching (ML)/Acid Rock Drainage (ARD) Management Plan (MLARDMP or the Plan) is to address the requirements of Certificate Condition 11.

WCGT Ltd. is engaging with Indigenous groups and Relevant Regulatory Authorities (RRAs) in the development of this detailed outline to support the full build out of the Plan. Through engagement, WCGT Ltd. is seeking collaboration in the development of the Plan and any information that can be shared to strengthen the Plan and the commitment to fulfilling Condition 11.

WCGT Ltd. acknowledges the inherent connection Indigenous Peoples have with the land and that while the MLARDMP will satisfy the regulatory requirement, the Plan is intended to minimize impacts to potentially acid-generating (PAG) rocks by incorporating Indigenous Knowledge and ensuring concerns are addressed during mitigation development.

This Plan outlines environmental protection measures to avoid, reduce, or mitigate impacts due to ML and ARD resulting from activities related to the Project. This Plan outlines the method for identifying the risk of ML/ARD, the handling and managing the material.

The MLARDMP provides Project-related environmental mitigation and commitments to be addressed for the Project, including pre-, during, and post-construction requirements, where they are set out in Condition 11. This MLARDMP should be read in conjunction with other Project documents including the Terrestrial Construction Environmental Management Plan (TCEMP), Environmental Alignment Sheets (EAS), Project commitments, and all applicable regulatory approvals and permits.

1.1 Project Description

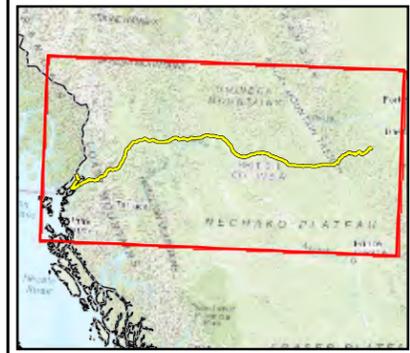
The WCGT Project approved in the Certificate includes the potential to build two 48-inch diameter natural gas pipelines within the same right-of-way along with accompanying compressor stations that could potentially service multiple liquefied natural gas (LNG) terminal sites starting at Cypress in northeast British Columbia (BC) and ending at Ridley Island on the north coast. The Certificate provided the flexibility to choose one of two routes to the Prince Rupert area—either through the Nass Valley (Nasoga Route) or north towards Kitsault (Kitsault Route).

WCGT Ltd. is actively developing the WCGT Project to build one express, single-purpose natural gas pipeline from a compressor station near Willow Flats in northeast BC to a delivery point at Wil Millit on the north coast to supply natural gas to potential LNG terminal sites (Project) (Figure 1).

The new compressor station at Willow Flats will have the potential to connect to Enbridge Inc.'s Westcoast Energy Inc. pipeline system near Compressor Station 2 or TC Energy's NGTL system, eliminating the need for the pipeline corridor from Cypress to Willow Flats and the compressor station at Cypress. WCGT Ltd. will apply to the BC EAO to amend its Certificate to:

- 1) remove approximately 100 kilometres of the Certified Pipeline Corridor from Cypress to Willow Flats;
and
- 2) change the location of the compressor station from Cypress to Willow Flats.

-
- 1 If WCGT Ltd. proceeds with construction of a second pipeline, it would also start near Willow Flats and
2 would not use the corridor from Cypress to Willow Flats.
- 3 The new delivery point for the pipeline will be near Wil Milit. WCGT Ltd. will apply to the BC EAO to amend
4 its Certificate to make routing changes along its approved Nasoga Route to end the first pipeline at Wil
5 Milit. WCGT Ltd. will retain the option to expand the WCGT Project to the currently approved delivery point
6 at Ridley Island at a later date.
- 7 WCGT Ltd. is developing condition plans for the Project with Indigenous groups and RRAs for submission
8 to the BC EAO in accordance with its Certificate. The condition plans will address potential impacts from
9 the Project, which includes the first pipeline from Willow Flats to Wil Milit, one compressor station at
10 Willow Flats and the necessary meter stations.
- 11 WCGT Ltd. does not have plans to build the second pipeline at this time; however, should it decide to
12 construct a second pipeline, increase capacity by adding compressor stations or extend the first pipeline to
13 Ridley Island, WCGT Ltd. will submit revised or new condition plans to the BC EAO in accordance with
14 Condition 1 of its Certificate.
- 15



- Town/Village/Service Area
- Kilometre Marker
- WCGT Pipeline Route
- Railway
- Highway
- - - International Border
- Watercourse
- Water Body

ENBRIDGE
Westcoast Connector
Gas Transmission

SCALE: 1:1,500,000

0 14,000 28,000 42,000 56,000 m
(All Locations Approximate)

FIGURE 1
REGIONAL OVERVIEW
WESTCOAST CONNECTOR GAS TRANSMISSION LTD.
WESTCOAST CONNECTOR GAS TRANSMISSION PROJECT

Jacobs

NAD 1983 BC Environment Albers
Hillshade Background: TERA Environmental 2008;
Highways/Roads: NRCAN 2015; Railways: NRCAN 2012; Hydrology: BC FLNRO 2008; Reserves: Government of Canada 2018; Legal Grid: TERA Environmental Consultants 2010; Watercourse Crossings: Jacobs 2021; Project Components: Enbridge 2021.

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Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

1 1.2 Project Interactions Resulting in Metal Leaching/Acid Rock Drainage

2 The construction of pipelines involves numerous activities including excavation, preparation of the right-of-
3 way using grading techniques, slope cutting, valley filling, and trench excavation and backfilling. These
4 activities may occur in bedrock terrain and expose fresh rocks. Depending on the location, the exposed rocks
5 may contain sulphide minerals (e.g., pyrite). If not prevented or contained, these react with atmospheric
6 oxygen, water, and weather and release acidic or neutral drainages containing metals and metalloids with
7 potentially negative effect on the environment. This MLARDMP is intended to include all Project
8 interactions resulting in potential ML/ARD during the pre-construction and construction phases, including
9 potential direct and indirect impacts.

10 The potential for ML/ARD occurring along the Project during pre-construction and construction have been
11 preliminarily investigated in two stages.

- 12 1) An initial desktop study was conducted using publicly available geologic and mineralogical
13 information and ranked the route into zones of high, moderate, and low ARD risk areas.
14 2) A field reconnaissance was then conducted to investigate the site and collect samples for laboratory
15 testing and confirmation.

16 The section of the pipeline route identified as having high and moderate risk for ML/ARD is shown in
17 Table 1-1 and the complete results of the assessment are outlined in the BC EAO WCGT Appendix 2J
18 ML/ARD Technical Data Report.

19 WCGT Ltd. will commission the required biophysical and geological studies along the proposed pipeline
20 route and associated infrastructure sites to further refine and optimize the Project footprint, refine the
21 understanding of the ML/ARD and further develop adequate prevention and control measures.

22 The Project will follow a planned hierarchy of avoid, minimize, and manage, with a proactive approach to
23 avoid Project interactions resulting in ML/ARD. In general, the primary objective is to locate the pipeline in
24 close proximity to existing disturbance(s) wherever possible. Where this is not possible, the hierarchy of
25 routing criteria in descending order of preference included the following: parallel other linear corridors;
26 identify new routing (greenfield) to balance several engineering, construction, environmental, cultural and
27 socio-economic factors; and, in the case of new routing, minimize the length away from existing linear
28 corridors.

29 Table 1-1 provides 2012/2013 assessment of moderate or high potential for ML/ARD along the current
30 centreline for this Project.

Table 1-1. Assessment of Moderate or High Potential for ML/ARD along WCGT Centreline
AMEC 2014 - Appendix 2J ML/ARD Technical Data Report (<https://projects.eao.gov.bc.ca>)

| Section | Approximate Kilometre Post | | ML/ARD Potential | Description |
|--------------|----------------------------|-----|------------------|--------------------------------|
| | From | To | | |
| Aiyansh | 522 | 539 | High | PAG samples Elevated Metals |
| Shedin Creek | 383 | 387 | High | PAG samples Elevated Metals |

Table 1-1. Assessment of Moderate or High Potential for ML/ARD along WCGT Centreline
AMEC 2014 - Appendix 2J ML/ARD Technical Data Report (<https://projects.eao.gov.bc.ca>)

| Section | Approximate Kilometre Post | | ML/ARD Potential | Description |
|--------------------|----------------------------|-----|------------------|---|
| | From | To | | |
| West Kwanika Creek | 215 | 224 | Moderate | Most samples non-PAG (one uncertain) Low NP |
| Besa | 34 | 40 | Moderate | All samples non-PAG, but known to contain pyrite in highly variable concentrations Potential for high S concentration Elevated metals Se, Cd, S, and Sb |

1

1 2. Metal Leaching/Acid Rock Drainage Management Plan
2 Overview

3 Condition 11 of the Certificate requires development and implementation of a MLARDMP, in accordance
4 with Appendix 3-A of the Application. This MLARDMP will be developed to meet the requirements of
5 Certificate Condition 11 in collaboration with the Indigenous groups and BC Oil and Gas Commission
6 (BC OGC).

7 The scope of the MLARDMP includes:

- 8 ▪ Purpose and objectives of the MLARDMP (Section 3)
- 9 ▪ Regulatory requirements that govern and/or guide the identification and mitigations of ML/ARD
10 (Section 4)
- 11 ▪ The pre-construction, construction, and post-construction (Operation phase) activities of the Project
12 that may impact the occurrence of ML/ARD and linkage to other plans, roles and responsibilities,
13 implementation schedule, and future updates (Section 5)
- 14 ▪ Engagement methods that identify parties, including Indigenous groups, RRAs and stakeholders, to be
15 engaged, a plan for how parties will be engaged and a description of how engagement outcomes help
16 shape the Plan (Section 6)
- 17 ▪ A description of the ML/ARD mitigation measures that may be implemented during pre-construction
18 and construction activities of the Project (Section 7)
- 19 ▪ A description of the monitoring program, during the construction period and in the first, third, and
20 fifth years following the first full growing season after completion of final cleanup (Section 8)
- 21 ▪ An outline of adaptive management program in relations to ML/ARD, including how the results of
22 monitoring will inform adaptive management (Section 9)
- 23 ▪ A plan for reporting on the implementation of the MLARDMP including the schedule, content, and
24 recipients of reports (Section 10)

1 **3. Purpose and Objectives of MLARDMP**

2 The objectives of the MLARDMP include the following:

- 3 ▪ Identification of Project activities that could expose pervasive rock related to ML/ARD.
- 4 ▪ Determination of suitable and effective mitigation measures to prevent, reduce or mitigate ML/ARD
- 5 related to the Project.
- 6 ▪ Identification of methods to confirm the previous ML/ARD ranking and determine potential areas with
- 7 elevated potential for ML/ARD that have not been sampled or tested prior that need to be
- 8 investigated Project construction.
- 9 ▪ Identification of measures to assess the effectiveness of implemented mitigations including
- 10 monitoring in order to identify potential deficiencies and implement corrective actions.
- 11 ▪ Reporting Requirements.

12 To determine whether the Plan meets the objectives, the Plan identifies goals that can be measured using

13 several performance indicators. The performance indicators and targets that will be monitored and

14 measured to evaluate the effectiveness of ML/ARD mitigation measures in achieving the goals of the

15 ML/ARD Plan will be described in Section 6.

16 Plans to address occurrences of inadequate mitigation or unanticipated Project effects are discussed

17 (Section 8).

1 4. Engagement

2 The Plan is being developed through engagement with Indigenous groups and the BC OGC. The Plan will
3 be provided to the BC EAO and BC OGC at least 60 days prior to construction in high potential ARD areas.

4 Throughout the development of the detailed outline, WCGT Ltd. is engaging to ensure the Plan is
5 reflective of Indigenous interests and concerns, meets the intent of the Certificate Condition, and aligns
6 with regulatory requirements as informed by RRA reviewers.

7 WCGT Ltd. is engaging on the content and approach provided in this detailed outline. Through this review,
8 WCGT Ltd. wants to ensure a collaborative approach at this early stage and that the outline captures, at a
9 high level, the intent and expectation of the Certificate Condition, as well as interests and concerns raised
10 by Indigenous groups and BC OGC.

11 The information that WCGT Ltd. receives will inform the drafting of the full Plan. WCGT Ltd. will document
12 and track all comments and recommendations received, and provide a description on how this information
13 has been considered and incorporated into the Plan.

1 5. Regulatory Framework

2 The legislation, regulatory guidelines, best management practices used to guide ML/ARD characterization
3 and develop mitigation measures proposed in this MLARDMP are summarized in this section.

4 Canada has been a global leader in ML/ARD characterization and mitigation. Policies and guidelines have
5 been developed since the 1980s and refined to provide a framework for the development of ML/ARD
6 characterization programs and identify suitable and feasible mitigation and control measures to prevent
7 and/or mitigate potential adverse effects on the environment. These guidelines and policies provide
8 guidance on the characterization and management practices for excavated, disturbed, or exposed rock
9 and contact water at mine sites, and infrastructure projects but are also equally applicable to pipeline
10 projects.

11 5.1 Indigenous Land Use Planning Documents

12 Indigenous Land Use planning documents provide strategic direction for resource management activities.
13 These plans provide direction for areas with general and specific resource values that are managed to
14 sustain environmental, social, economic, or cultural values. There are no Indigenous Land Use planning
15 documents that include specific ML/ARD objectives.

16 5.2 Regional and Municipal Land Management Plans

17 Land and Resource Management Plans (LRMPs) and Sustainable Resource Management Plans (SRMPs)
18 provide strategic direction for resource management activities. These documents provide guidance for
19 areas with general and specific resource values that are managed to sustain environmental, social, or
20 economic values.

21 Specific to this Plan, the following LRMPs have been identified at this time related to Condition 11:

- 22 ▪ Kalum LRMP
- 23 ▪ Kispiox LRMP
- 24 ▪ Morice LRMP

25 5.3 Provincial

26 Provincial legislation, regulatory guidelines, and policy documents that are applicable to the Plan include:

- 27 ▪ Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia
- 28 ▪ Policy for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia
- 29 ▪ Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage
30 at Minesites in British Columbia
- 31 ▪ Forest Road Engineering Guidebook. Second Edition
- 32 ▪ Evaluating the Potential for ARD/ML at Quarries, Rock cut sites and from Stockpiled Rock or Talus
33 Material used by the MOTI

34 Other references in pertaining to ML/ARD mitigations include:

- 35 ▪ Mined Rock and Overburden Piles – Investigation and Design Manual. Interim Guidelines
- 36 ▪ Operation and Monitoring of Mine Dumps.

1 5.4 Interim Guidelines

2 The guidelines and policies developed for ML/ARD at minesites were consulted and provide the overall
3 framework for the development of this Plan. However, since minesites differ in a number of ways from a
4 linear development such as a pipeline in terms of lateral extent, the extent of investigations and
5 confirmation methods that can be practically carried out prior to and during construction, accuracy in
6 determining the extent and distribution of material with elevated potential for ML/ARD prior to
7 construction and the practicability of proposed mitigation and monitoring measures also differ.

8 5.5 Federal

9 The federal guidelines and best practices pertaining to ML/ARD characterization and mitigation include
10 but are not limited to the following:

- 11 ▪ Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials - MEND Report 1.20.1
- 12 ▪ List of Potential Information Requirements in Metal Leaching/Acid Rock Drainage Assessment and
13 Mitigation Work
- 14 ▪ MEND Manual Volume 4, 5 and 6
- 15 ▪ Design, Construction and Performance Monitoring of Cover Systems for Waste Rock and Tailings.
16 Volume 1 – Summary. MEND Report 5.4.2d.
- 17 ▪ Design, Construction and Performance Monitoring of Cover Systems for Waste Rock and Tailings.
18 Volume 3 – Site Characterization and Numerical Analyses of Cover Performance. MEND Report
19 2.21.4c.

6. ML/ARD Identification During Project Activities

The ML/ARD assessment and mitigations activities as they relate to Project activities are outlined as follows.

6.1 Pre-Construction

- Undertake additional characterization of ML/ARD potential based on continued field sampling to identify areas permissive to the presence of sulphide minerals and where high ML/ARD potential may occur.
- Opportunistic assessment and sampling during geological studies and delineation of problematic areas.
- Revise and refine previous assessments based on results of further field sampling.
- Refine the list of potential mitigation methods, and plan preliminary target methods based on existing knowledge of type and extent of potential occurrence, location, topography relative to preliminary grading plans.
- Develop a list of preliminary locations for the disposal of material with high potential for ML/ARD and assess their locations, accessibility, and permitting requirements.

6.2 Construction Preparation

- Train Environmental Inspectors (EIs), staff and right-of-way grading inspectors to recognize and quantify sulphides and carbonates. The EIs will be responsible for identifying sulphide occurrences along the right-of-way as work progresses including areas not anticipated based on the pre-construction screening work.
- Train specialized EIs who will target inspections during work at areas identified as having a moderate or high potential for ML/ARD. A few of the EIs will be trained in sampling for ML/ARD testing conducting a paste pH test.
- Develop a preliminary delineation of the areas with high and moderate risk of ML/ARD and select the most suitable confirmation and mitigation methods.
- Liaise with other Project teams to set expectations, assign responsibilities, and establish communication with RRAs and stakeholders.
- Conduct a preliminary assessment (geotechnical stability, potential risk on receiving environment, etc.) of candidate disposal sites and select best options based on knowledge of ML/ARD locations.

6.3 During Construction

- During grading and construction, the EI and trained staff will visually identify the presence of sulphide and carbonates. Magnifying glasses and hydrochloric acid can aid in the assessment. If sulphides were identified at other locations with similar geology and lithology, the previous knowledge can be applied. If significant sulphides are identified, an attempt will be made to delineate the area of potential ML/ARD in the trench and along exposed rock, and samples will be collected for testing and analysis.
- Rock types and areas assessed as having low potential for ML/ARD are benign and will not require any mitigation or special handling. This is based on overburden or rocks with low or no sulphides or containing elevated neutralization capacity in the form of carbonates. Other areas will require mitigation including areas containing material with significant sulphides or low neutralization capacity and assessed as having a high risk to generate ML/ARD.

- 1 ▪ Areas assessed as containing material with uncertain or moderate ML/ARD will be further investigated.
2 Samples will be collected, their paste pH measured, and sulphur and carbon content determined by
3 based on LECO furnace (Laboratory Scientific Instrument). The neutralization potential ratio (NPR) will
4 be calculated, and the material classified as PAG or high ARD (NPR <2) or nonacid-generating (Non-
5 PAG) or low ARD (NPR>2). Non-PAG material suspected as having potential for generating ML
6 (especially material located upstream of environmentally sensitive areas) will be further tested to
7 assess ML potential. Rock with high ML/ARD will be mitigated to prevent the leaching of acidic metals
8 rich drainages, whereas rocks with low potential for ML/ARD will not be mitigated and can be used for
9 construction purposes where needed.
- 10 ▪ Select the best sites for the long-term disposal of excess high ML/ARD material.
- 11 ▪ Make final determination of the most adequate and practical mitigations, necessary and appropriate
12 monitoring, and develop a plan for implementation.
- 13 ▪ Implement the mitigations and determine the extent (duration and frequency) of monitoring
14 appropriate to the circumstances.

15 6.4 Post-Construction (Operation Phase)

- 16 ▪ Finalize the implementation of mitigation and construction of waste rock storage piles and implement
17 monitoring.
- 18 ▪ Implement corrective actions if early monitoring results indicate potential deficiencies in mitigations.

19 6.5 Linkages to Other Condition Plans

20 Information on other condition plans prepared for the Project will be considered in this MLARDMP. The
21 links between this MLARDMP and other condition plans will be provided in Table 6-1.

Table 6-1. Linkages to Other Condition Plans

| Plan | Description of the Plan | Linkages to this Plan |
|---|--|---|
| Condition 10 - Freshwater Water Quality Monitoring Plan (FWQMP) | The FWQMP outlines onsite water quality monitoring and reporting requirements to be implemented during construction. | To be determined (TBD) |
| Condition 12 - Wetlands Management Plan (WMP) | The WMP includes results of pre-construction surveys, recommends mitigation measures to be implemented during construction, and outlines the post-construction monitoring program for wetlands. The WMP also includes consideration for the objectives of the Sensitive Area Plan for Mugaha Marsh as per Condition 26. | TBD |
| Condition 22 - Access Management Plan (AMP) | The AMP provides the means by which access will be controlled, the types and locations of access requirements, rationale to demonstrate the necessity of any new temporary or permanent access, access control management measures that will be implemented during construction and operations, and post-construction monitoring requirements. | The AMP will include MLARDMP mitigation strategy requiring access and as described in this MLARDMP. |

Table 6-1. Linkages to Other Condition Plans

| Plan | Description of the Plan | Linkages to this Plan |
|--|--|-----------------------|
| Condition 25 - Restoration Plan (RP) | The RP provides recommendations for soil handling, construction cleanup, erosion control measures, revegetation plans, and life of Project vegetation management. | TBD |
| Condition 35 - TCEMP | <p>The TCEMP describes WCGT Ltd.'s environmental procedures and mitigation measures to field and construction personnel. These environmental procedures and mitigation measures will be implemented during construction of the Project to mitigate, avoid, or reduce potential adverse environmental effects. The TCEMP serves as reference information for construction and inspection personnel to support decision making and to provide direction to more detailed information (i.e., resource-specific mitigation, management, and contingency plans).</p> <p>The TCEMP also includes mitigation measures to address additional Conditions:</p> <ul style="list-style-type: none"> ▪ Condition 23 – integrated pest management ▪ Condition 24 – Red- and Blue-listed plants and ecological communities ▪ Condition 27 – mitigation for Red- and Blue-listed or culturally important lichen and plant species within the Nisga'a Lava Bed Memorial Park ▪ Condition 34 – hunting, trapping, and fishing policy | TBD |
| Condition 43 – Nisga'a Watercourse Restoration Plan (NWRP) | The NWRP outlines the objectives for achieving no net loss of environmental function for areas where the pipeline route intersects existing aquatic or riparian habitat restoration or compensation sites within Nisga'a Lands. | TBD |

1 6.6 Future Updates to the ML/ARD Plan

2 Revisions to the MLARDMP could occur as a result of:

- 3 ▪ Additional information becoming available
- 4 ▪ Changes to Project planning (e.g., engineering changes)
- 5 ▪ Engagement programs with Indigenous groups, RRAs and stakeholders
- 6 ▪ Commitments made during the regulatory review process
- 7 ▪ Regulatory permits and authorization conditions
- 8 ▪ Addressing unforeseen resource-specific conditions that may arise during construction

- 1 WCGT Ltd. will not inform Indigenous groups and BC OGC when minor revisions are made to the Plan (i.e.,
- 2 small changes that would not affect the scope and objectives of the Plan). Examples of small changes
- 3 include minor updates to text or references within the document.

- 4 Indigenous groups and BC OGC will be provided an opportunity to review and provide comment on
- 5 material revisions to the Plan (i.e., changes to the scope or mitigation and monitoring requirements). A
- 6 Document History table listing version, date, and distribution will be provided in this document

1 7. Mitigation Program

2 The purpose of mitigation measures is to prevent or reduce sulphide oxidation and the occurrence of
3 ML/ARD and to collect and treat drainages if ML/ARD cannot be prevented. ML/ARD mitigation can be
4 grouped into three major groups:

- 5 1) Source control (focusing on preventing ML/ARD)
- 6 2) Migration control (focus on containing ML/ARD)
- 7 3) Discharge control (treatment options for contact water and ML/ARD)

8 A suite of potential mitigation methods for this Project are described below. The mitigation method(s)
9 would be selected on a case-by-case basis taking into consideration local conditions, effectiveness,
10 feasibility, and practicability. The implementation of these mitigations would be supervised by a Qualified
11 Professional (QP).

12 7.1 Waste Rock Management

13 Avoidance: This is considered the best ML/ARD mitigation strategy (Price and Errington 1998) and will be
14 adopted for this Project in situations where excavation of PAG rocks can be avoided (e.g., quarry sites). It
15 aims at reducing the amount of excavation and exposure of PAG rock requiring possibly difficult ML/ARD
16 mitigation. However, this method may not be feasible along segments of the pipeline route due to
17 construction execution constraints and the nature and physiography of the terrain. Where avoidance is not
18 possible, efforts will be made to reduce the PAG rock excavation volume to the extent practicable, and an
19 alternative management option will be adopted for PAG rock excavated.

20 Waste Segregation: This method consists of the physical separation of PAG rock from unreactive material.
21 This method does not prevent ML/ARD; however, it allows for a reduced volume of material to be handled,
22 selection of a suitable mitigation method for the PAG rock, reduction of footprint of the area to be used for
23 stockpiling/storage and associated costs. Excavated PAG rock will be segregated, tagged, tracked, and
24 mitigated.

25 Dry Covers: Mitigation using dry covers consists of the storage of reactive PAG rock within and/or below
26 engineered waste piles constructed with low permeability material (e.g., till) designed to prevent
27 oxidation, minimize water infiltration into the stockpile, and seepage from the pile into the receiving
28 environment. There are several types of covers including natural covers made of earthen material and
29 synthetic covers constructed using high-density polyethylene liners or geosynthetics with clay layers.

- 30 ▪ The volume of PAG rock excavated along pipelines in BC is typically small and distributed along the
31 pipeline route in a few segments. Therefore, using dry covers as a mitigation measure may be a viable
32 option where volumes of PAG rock are small and potential for significant acidic drainage is low because
33 less space and costs will be required to build and maintain covers than for larger volumes. This same
34 concept may be used to cover PAG rock exposed in situ along the graded portion of the pipeline right-
35 of-way.
- 36 ▪ Where required, permanent covers over particularly high ML/ARD potential rock may be supplemented
37 with excess alkalinity and/or organic material to prevent the onset of ARD. Excavated rock identified as
38 requiring further ML/ARD testing based on field screening will be managed, as necessary.
- 39 ▪ Where mitigation of cut slopes is required, shotcrete may be sprayed on surfaces to protect exposed
40 PAG rock cut surfaces from contact with precipitation, seepage through the rock mass, and upslope
41 surface runoff. In addition, surface water diversion and collection structures may be implemented as
42 required to control water near cut slopes (Section 7).

1 Blending and layering: This process involves mixing and layering of reactive PAG rock with material with
2 high neutralizing potential such as limestone or lime so that acid generated from sulphide oxidation is
3 neutralized in situ in a constructed pile. In blending/layering methods, PAG rock is placed below the
4 neutralizing material. This method does not prevent ML/ARD and its effectiveness is highly dependent on
5 the availability of neutralizing material, geochemical properties of the rock, and efficiency of the mixing
6 process. This method is a viable option for excavated PAG rock from rock cuts, the pipeline ditch and right-
7 of-way grading, because of the expected low amount and distributed nature of PAG rock. The neutralizing
8 material can be produced from limestone-rich segments of the pipeline route or purchased.

9 Alkaline amendment: This is a common ML/ARD mitigation technique that consists of controlling pH by
10 adding natural or industrial solid neutralizing agent to the PAG material. Limestone (CaCO_3) and lime
11 (CaO , Ca(OH)_2) based pH control methods are widely used due to material availability, cost, safety, and
12 ease of handling. Limestone or lime may be added to dry covers, blending structures, drainage channels
13 and ditches, and applied to the pipe trench and right-of-way grade to create alkaline conditions and
14 increase buffering capacity.

15 7.2 Water Management

16 An important aspect of preventing and mitigating ML/ARD is water management because water is a
17 catalyst and the main pathway to the receiving environment. Drainage ditches berms and channels will be
18 constructed upstream of ML/ARD areas and waste rock stockpile to intercept and divert clean water away
19 from these sites. Perimeter channels will be constructed at the toe of cut slopes containing high ML/ARD
20 rock and waste rock stockpiles collect contact water into ponds constructed to contain drainages for
21 monitoring.

1 8. Monitoring Program

2 A monitoring program will be implemented to assess the effectiveness of mitigation measures
3 implemented by WCGT Ltd. as well as monitor for onset of ARD where PAG rock was used for construction
4 and implement corrective actions, where needed.

5 Reporting on mitigation effectiveness and compliance will be as per the final TCEMP. Should monitoring
6 programs indicate that the measures implemented were not adequate or were ineffective at avoiding or
7 reducing potential residual effects on MLARDMP, follow-up measures will be implemented.

8 8.1 Mitigation Compliance Monitoring

9 Inspections will be undertaken to assess compliance against the mitigation measures herein; with
10 inspections documenting potential environmental non-compliances. Corrective actions will be identified,
11 and follow-up conducted.

12 8.2 Mitigation Effectiveness Monitoring

13 Monitoring will be conducted in areas such as rock cut slopes, waste piles, and backfills where ML/ARD is
14 present. The pH and electrical conductivity of seepage and surface runoff from these areas will be
15 measured regularly, and contact water collected in collection ponds will be treated, if necessary, before
16 discharge into the environment.

17 Waterbodies in the vicinity of areas where ML/ARD rock is disturbed will be inspected for evidence of
18 ML/ARD and tested. If monitoring indicates unusual changes (i.e., decrease in pH, increase in conductivity,
19 accumulation of metals, etc.) samples will be collected and sent for detailed laboratory analysis. Results of
20 monitoring and supplemental laboratory testing will be used to decide if additional measures are
21 warranted for long-term mitigation at specific sites.

22 8.3 Monitoring Timeframe

23 ML/ARD mitigation sites will be monitored during the first, third, and fifth years following the first full
24 growing season post-construction as specified in the TCEMP. Monitoring will be primarily aerial
25 reconnaissance and ground reconnaissance will be used where warranted. Frequency and duration will be
26 as per site conditions, location of ML/ARD mitigation sites, and findings associated with the monitoring
27 data collected.

1 9. Adaptive Management

2 This section outlines how mitigation measures will be re-evaluated should monitoring programs indicate
3 that the measures implemented were not adequate or effective at avoiding or reducing potential residual
4 effects on the environment. Examples of the types of corrective measures that may be implemented are
5 provided as follows.

6 9.1 Adaptive Management Approach

7 Monitoring results will inform the need for corrective measures. Results of monitoring and supplemental
8 laboratory testing will be used to decide if additional measures are warranted for long-term mitigation at
9 specific sites. The need for and type of corrective measures will be developed.

10 9.2 Potential Corrective Measures

11 Corrective measures will be implemented as soon as practical.

12 Corrective measures will include but are not limited to:

- 13 ▪ Visual inspections related to potential misclassification of PAG rock and subsequent laboratory
14 testing.
- 15 ▪ Visual inspection for cracks, rebound, erosion and seepages related to shotcrete on cut slopes, till or
16 clay covers on the grade and ditch or backfilled ditches with subsequent corrective measure applied.

17 9.3 Construction Environmental Management Plan Contingency Plans

18 If mitigation methods are insufficient as determined during monitoring, water treatment may be
19 considered as a contingency measure. Water treatment methods can be active, involving the construction
20 of a treatment facility requiring long-term physical components and resource allocation, or passive using
21 constructed settling ponds or specially constructed wetlands. Unlike active treatment, passive treatments
22 do not require a long-term physical and financial commitment.

23 In this context, specifically constructed wetlands consist of water saturated soils and sediments supporting
24 vegetation and with the capacity to improve water quality and support the development of an ecosystem.
25 They are constructed downstream of ML/ARD sites and improve water quality through filtration, metal
26 adsorption and complexation, precipitation and uptake of metals, sedimentation of particles, release of
27 alkalinity, etc. Where contingency measures are unavoidable, a treatment method combining limestone or
28 lime-based pH control and passive water treatment is the preferred mitigation method.

1 10. Reporting Requirements

- 2 Monitoring and laboratory testing results during construction and, if necessary, post-construction
- 3 (operation phase) will be documented and used to determine if additional measures or corrective actions
- 4 are necessary, in consultation with RRAs, as required.