



Indian and Northern
Affairs Canada

Affaires indiennes
et du Nord Canada

Nunavut Regional Office
P.O. Box 2200
Iqaluit, NU, X0A 0H0

February 09, 2009

Attn: Mr. Thomas Kabloona, A/Chief Executive Officer
Nunavut Water Board
P.O. Box 119
Gjoa Haven, Nunavut
X0B 1J0

RE: Nunavut Water Board (NWB) Licence No. 1BR-ROB0813 (NWB's Required Submissions)

As per the table of required submissions on page iii of the Roberts Bay/ Ida Bay's NWB Licence # 1BR-ROB0813, please find the following documents enclosed:

1. NWB's Table of Required Submissions (with INAC's responses);
2. Modifications to final Remedial Action Plan (RAP) – highlighting some modifications made to the project since the submission of the final RAP to NWB. The modifications were effected in the Project Specifications;
3. Roberts and Ida Bay Project Specifications;
4. General Monitoring Plan (as per Part K of the Water Licence # 1BR-ROB0813);
5. Long Term Monitoring plan;
6. Abandonment and Restoration Plan;
7. Operations and Maintenance Plan for Sewage Disposal Facility;
8. Site Specific Health and Safety Plan; and
9. Tailings Freezeback Report.

Should you have any questions or require any clarifications, please contact the undersigned or the Project Manager, Dele Morakinyo at dele.morakinyo@inac-ainc.gc.ca, or by telephone at (819) 934-9224

Sincerely,

Natalie Plato, P. Eng.
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ISSUED FOR CONSTRUCTION

Roberts Bay/Ida Bay Mine
Site Remediation
Project No. 416829

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Roberts Bay and Ida Bay Location
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Estimated Volumes of Waste Rock at the Roberts Bay and Ida Bay Mine Sites
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TAILINGS POND
NON HAZARDOUS LANDFILL

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Part 1 General

1.1 SECTION INCLUDES

- .1 Methods and procedures for the preparation, filling, and closure of a dedicated, on-site landfill for the disposal of non hazardous waste (including ash, scrap metal and other non hazardous material) and soil from the remediation of Roberts Bay and Ida Bay.
- .2 Work under this section includes but is not limited to the following:
 - .1 Stabilization of the existing Tailings Pond berms.
 - .2 Consolidate tailings spilled over existing berm area, estimated quantity of 10 m³.
 - .3 Consolidate tailings spilled over existing berm area, estimated quantity of 10 m³.
 - .4 Installation of woven geotextile over existing tailings.
 - .5 Placement of 500 mm thick protective cover of granular material over woven geotextile.
 - .6 Construction of perimeter containment berm.
 - .7 Spreading and compaction of non hazardous waste and soil within the Tailings Pond landfill.
 - .8 Placement of Intermediate cover material over waste layers.
 - .9 Placement of final cover material.
- .3 Details and design of landfill are provided on the design drawings.
 - .1 Estimated quantity of Type 1 (Waste Rock) - 1300 m3 (in place)
 - .2 Estimated quantity of Type 2 (Sand and Gravel) - 1700 m3 (in place)
 - .3 Estimated quantity of Intermediate Cover (Type 2) 250m3 (in place)

1.2 DEFINITIONS

- .1 Non hazardous Waste: Waste materials derived from the decommissioning of the respective mine sites and which are destined for disposal in the dedicated, on-site landfill.
- .2 Hazardous Materials: Dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos, PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, or other material that can endanger human health or well being or environment if handled improperly.
- .3 Granular Fill: Site derived waste rock, sand or sand and gravel materials used in the various elements of the landfill construction.

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- .4 Woven Geotextile: Synthetic material used to provide stabilization of the tailings during the construction of the tailings pond landfill.
- .5 Type 1 Granular Fill: Waste rock, obtained from the Robert's Bay and Ida Bay stockpiles.
- .6 Type 2 Granular Fill: Sand / Sand and Gravel with a maximum particle size of 250mm, obtained from the Robert's Bay borrow areas.
- .7 Berm: Granular fill berm type as indicated on the Drawings, placed above the original ground up to the design elevation.
- .8 Intermediate Cover: Type 2 Granular Fill, as designated by the Engineer, used to cover each waste layer and fill void spaces within the landfilled waste.
- .9 Surficial Boulders: Visible rocks with a nominal diameter of 300 mm or greater.
- .10 Waste Material: Excavated material unsuitable for use in work or surplus to requirements.
- .11 Borrow Material: Material obtained from approved areas and required for regrading requirements.
- .12 Maximum Dry Density is determined in accordance with ASTM D698. It is applicable if less than 30% of the material is retained on the ASTM 19 mm sieve.
- .13 Corrected maximum dry density is applicable if more than 30% of the material is retained on the ASTM 19 mm sieve. It is defined as:
- .1
$$D = \frac{D1 \times D2}{(F1)(D2) + (F2)(D1)}$$
- .2 Where:
- D = Corrected maximum dry density kg/m³
- F1 = Fraction (decimal) of total field sample passing ASTM 19.0 mm sieve
- F2 = Fraction (decimal) of total field sample retained on ASTM 19.0 mm sieve (equal to 1.00 - F1)
- D1 = Maximum dry density, kg/m³ of material passing ASTM 19.0 mm sieve determined in accordance with Method C of ASTM D698 or latest edition thereof.

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D2 = Bulk density, kg/m³ of material retained on ASTM 19.0 mm sieve, equal to 1000 G where G is bulk specific gravity (dry basis) of material when tested to ASTM C127-84, or latest edition thereof.

1.3 QUALITY ASSURANCE

- .1 Regulatory Requirements: Ensure work is performed in compliance with CEPA, CEAA, TDGA, MVSA and applicable Nunavut regulations.
- .2 Health and Safety.
 - .1 Do construction occupational health and safety in accordance with Section 01 35 32 – Site Specific Health and Safety Plan.

1.4 SITE CONDITIONS

- .1 Site Environmental Requirements.
 - .1 Perform work in accordance with Section 01 35 43 - Environmental Procedures.
 - .2 Suspend operations whenever climatic conditions are unsatisfactory for work to conform with this Specification.
 - .3 Do not operate equipment in work areas until the material has dried sufficiently to prevent excessive rutting.
 - .4 Contractor is advised that soft ground conditions may be prevalent at the site during periods of maximum thaw of the permafrost. Schedule and carry out work to minimize disturbance to permafrost soils.
 - .5 Heavy construction equipment can only travel on the road between the Ida Bay mine site and the Roberts Bay Mine site during the winter months.

1.5 SUBMITTALS

- .1 All submittals will be in accordance with Sections 01 33 00 - Submittal Procedures and 01 78 00 - Closeout Submittals as well as with these specifications.
- .2 Landfill Construction Plan-submittals to include:
 - .1 Topographic survey.
 - .2 Written landfill construction plan including:
 - .1 The haulage route proposed for movement of waste from the demolition or excavation sites to the landfill.
 - .2 The equipment to be used to haul, place, grade, and compact the waste.
 - .3 Provide total station topographic survey results in NAD83 coordinates, and landfill volume calculation to the Engineer following completion of waste placement and construction of interim soil cover.

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- .3 Final As-built topographic survey as per Section 01 71 01 – Survey Requirements

1.6 MEASUREMENT OF PAYMENT

- .1 Preparation of the landfill area, landfilling of non hazardous waste and if necessary contaminated soils, and placement of the final cover system will be paid on a lump sum basis, under Item 31 23 11-1 on the Basis of Payment form.
- .2 Except as otherwise indicated herein, work under this section will not be measured. Include all costs in Item BOPC-1, Balance of Project Costs in the Basis of Payment Schedule. Indicate the cost of this work as a separate line item in the cost breakdown specified in Section 01 32 19 – Project Management and Construction Schedule.

Part 2 Products

2.1 MATERIALS

2.2 WASTE ROCK (TYPE 1 GRANULAR FILL)

- .1 Obtained from Roberts Bay and Ida Bay waste rock stockpiles. Waste Rock will be unfrozen, and free from deleterious materials.

2.3 SAND / SAND AND GRAVEL (TYPE 2 GRANULAR FILL)

- .1 Granular Fill material obtained from on-site borrow areas.
- .2 Granular Fill materials require the approval of the Engineer.
- .3 Granular Fill material is to be pit-run or screened stone, gravel or sand consisting of hard durable particles free from clay lumps, cementation, organic material, snow, ice and other deleterious materials.

2.4 GEOSYNTHETIC MATERIALS

- .1 Geotextile material in accordance with Section 31 23 12 - Geotextiles.

Part 3 Execution

3.1 SITE PREPARATION

- .1 Tailings material from spills outside the tailings pond containment area are to be excavated and placed into the Tailings Pond prior to start of landfill construction.
- .2 Unless specifically indicated on the Drawings, do not remove existing topsoil or organic materials from embankment construction areas. Remove exposed surface boulders over 300 mm in diameter that are located in areas to receive Type 2 Granular Fill. Dispose of boulders by placing on embankment side slopes.

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.3 Borrow Excavation:

- .1 Obtain from potential borrow areas located within the Site Boundaries as shown on Drawings, or provide from own sources, all required fill material.
- .2 Advise Engineer of selected borrow areas seven (7) days in advance of excavation operations.
- .3 Notify Engineer whenever unsuitable materials are encountered in borrow areas.
- .4 Borrow material cannot be obtained from existing granular pads beneath facilities to be demolished, unless authorized in writing by the Engineer.
- .5 Stripping, stockpiling and replacement or placement to a new location of organic material and stripping and disposal of waste material found when excavating existing granular fills to be as directed by the Engineer.
- .6 Final grading of borrow area upon completion to be tidy, in a well drained condition, free of standing water to the satisfaction of the Engineer.
- .7 Upon completion of final grading, leave all slopes in a stable condition and spread all stripped organics.
- .8 Transport aggregate from borrow areas to the work areas via existing access routes where available. Maintain and provide for dust control on the access route between the borrow area and the work areas.

3.2 GRANULAR FILL PLACEMENT – GENERAL

- .1 Set grades and lay out work in detail from control points in areas of granular fill placement. Advise Engineer sufficiently in advance of granular fill placement operations to enable original ground cross-sections to be surveyed and verified.
- .2 Haul granular fill material from borrow sites to designated areas.
- .3 Place granular fill material to the lines, grades, elevations and dimensions indicated on the Drawings, or agreed to with the Engineer.
- .4 Do not place granular fill on snow or surface ice.
- .5 Maintain natural drainage patterns, unless otherwise directed, and fill depressions to avoid any ponding of water adjacent to embankments.
- .6 All fill material is to be placed in an unfrozen state. Fill material to be free from debris, snow and ice. Do not place granular fill if the outside air temperature is below 0°C, unless otherwise directed by the Engineer.
- .7 Maintain a crowned surface during construction to ensure ready runoff of surface water. Do not place material in free standing water. Drain low areas, before placing

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- material. Follow all requirements specified in the Water Use License and Land Use Permit.
- .8 Do not dump waste or intermediate fill material over the side slopes of berms.
 - .9 Place and compact fill material in horizontal lifts.
 - .10 Cease construction at any sign of movement or bulging in the embankments to allow assessment by the Engineer.
 - .11 For fill depths greater than 500 mm, place granular material in lifts not exceeding 250 mm in loose thickness. For fill depths greater than 200 mm and less than 500 mm, place material in two lifts of equal depth. For fill depths less than 200 mm, place material in one lift. Place intermediate fill as described in Clause 3.7 of this Section.
 - .12 Moisture condition granular fill as required to meet compaction requirements. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.
 - .13 If granular fill has dried out prematurely due to weather conditions, scarify surface, adjust moisture condition and recompact at the Engineer's discretion. No extra payment will be made for extra costs incurred as a result of any extra work.
 - .14 Compaction equipment must be capable of obtaining required densities uniformly in materials on project. Hand equipment must be available for compaction in areas where large equipment can not access and around instrumentation.
 - .15 Apply water as necessary during compaction to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.
 - .16 Shape finished surface to required cross-section and grade, or as directed by the Engineer.
 - .17 Type 1 and Type 2 Granular Fill to be compacted to a minimum of 95% of maximum dry density in accordance with ASTM 698 or as determined from a control strip density. The method for determining the maximum dry density will be established by the Engineer. Provide all equipment and resources necessary to carry out a control density test upon request.

3.3

TAILINGS POND LANDFILL – BERM STABILIZATION

- .1 The existing Tailings Pond perimeter berms are to be stabilized prior to commencing with landfilling operations. Type 1 Granular Fill material is to be placed on the outer slopes of the existing perimeter berms in accordance with the following specifications and the requirements of Clause 3.2 of this Section, and as shown on the Drawings.

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- .2 Supply place, blade and trim Waste Rock (Type 1 Granular Fill material) to elevation, grades, and cross-section dimensions indicated or directed by the Engineer.
- .3 Supply and install witness grade stakes in areas to be reconstructed to monitor the depth of granular fill material. The grade stakes are to be placed on a grid spacing approved by the Engineer for each specific regrading area. Immediately replace all grade stakes that are damaged or displaced by Contractor operations.
- .4 Compact Waste Rock (Type 1 Granular Fill material) to obtain specified density.
- .5 Place specified backfill material in uniform horizontal layers in depths as indicated in Clause 3.2 of this Section up to lines and grades indicated. Compact each layer before placing succeeding layer.
- .7 Dry out material or apply water as necessary during compaction to obtain specified density.

3.4

PREPARATION FOR GEOSYNTHETICS INSTALLATION

- .1 Any standing water contained within the tailings pond area is to be removed prior to the initial site survey and geosynthetic material installation. Water to be removed in accordance with the requirements of Section 01 35 43 - Environmental Procedures and as approved by the Engineer.
- .3 Geosynthetic Materials
 - .1 Smooth the tailings surface prior to the installation of the geotextile material.
 - .2 Notify Engineer when the tailings surface preparations are complete. Engineer's approval required prior to installation of the geosynthetic material.
 - .3 Install geosynthetic material as indicated on the Drawings and in accordance with Section 31 23 12 - Geotextiles.
 - .4 Notify Engineer when geosynthetic material installation is complete. Engineer's approval required prior to placement of granular fill over the geosynthetic material.
 - .5 Place Type 1 or Type 2 Granular Fill material over the geotextile as indicated on the Drawings.
 - .6 The first lift of granular fill immediately over the geotextile is to be a minimum of 300 mm in thickness. A greater lift thickness to be used if excessive rutting occurs. Carry out granular fill placement using low ground pressure equipment capable of placing / spreading the granular fill without disturbing the underlying geotextile.

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- .7 Notify Engineer when the installation of the full lift of granular material has been completed. Engineer's approval required prior to completion of the perimeter containment berm.

3.5 PERIMETER CONTAINMENT BERM

- .1 Supply, place, blade and trim Type 2 Granular Fill material to the elevation, grades, and cross-section dimensions indicated on the drawings or as directed by the Engineer.
- .2 Existing berm inner slopes are to be free of debris, snow, ice and water prior to the placement of additional granular materials.
- .3 Supply and install witness grade stakes in areas to be reconstructed to monitor the depth of granular fill material. The grade stakes are to be placed on a grid spacing approved by the Engineer for each specific regrading area. Immediately replace all grade stakes that are damaged or displaced by Contractor operations.
- .4 Type 2 Granular Fill to be compacted to a minimum of 95% of maximum dry density in accordance with ASTM 698 or as determined from a control strip density. The method for determining the maximum dry density will be established by the Engineer. Provide all equipment and resources necessary to carry out a control density test upon request.
- .5 Place specified backfill material in uniform horizontal layers in depths as indicated in Clause 3.2 of this Section up to lines and grades indicated. Compact each layer before placing succeeding layer.
- .6 Dry out material or apply water as necessary during compaction to obtain specified density.

3.6 DISPOSAL OF NON HAZARDOUS WASTE MATERIALS

- .1 Place non hazardous material from the designated area(s) in uniform, horizontal lifts between and against the perimeter containment berm as shown on the Drawings. The thickness of each waste lift is to be such that voids within the waste can be filled with intermediate cover. The maximum thickness of each waste lift is to not exceed 500 mm.
- .2 Compact waste during placement with a compactor or approved alternative during placing and spreading of the waste material. The equipment must be capable of crushing demolition debris.
- .3 For placement in landfill, cut all demolition material and debris as required:
 - .1 To minimize displacement and lifting of landfilled materials.
 - .2 So that the maximum depth of any one material component within the landfill does not exceed 0.5 metres.
 - .3 To satisfy the overall landfill dimension requirements as indicated on the Drawings.

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- .4 Cut structural steel materials into separate members prior to placement in landfills. Place large materials including structural steel members, timbers, communication dishes, etc. on the base of the landfill or on the base of an intermediate cover layer so that the materials lay on a compacted, flat surface. Cut hollow components or objects, such as tanks, as required, to allow for nesting of materials. As a minimum, hollow components are to be cut in half parallel to the lengthwise axis, and are not to exceed 0.5 metres in height when placed in the landfill. Within the landfill, support the underside of nested materials with intermediate cover or other debris material to minimize displacement and lifting of materials.
- .6 Segregate all metal demolition material and debris from other material when placed in the landfill. The proposed location of the metal waste area within the landfill is to be reviewed by the Engineer. Record the specific location and depth of this material on the project Record Drawings.
- .7 Crush, cut or shred barrels to be landfilled on site to reduce the total original barrel volume by a minimum of 75 percent.

3.7 PLACEMENT OF INTERMEDIATE COVER

- .1 Place 150 mm lift of intermediate cover material over each 500 mm thick lift of waste material. Two (2) lifts of waste expected for this project.
- .2 Type 2 Granular Fill to be used as the intermediate cover material.
- .3 Spread and compact the granular fill material in order to fill in any voids remaining in the compacted waste material.
- .4 Place sufficient granular fill to provide a minimum of 150 mm of cover over the waste at all locations.
- .5 Final lift of intermediate cover to be levelled and compacted prior to placement of subsequent granular material layers.

3.8 PLACEMENT OF GRANULAR FILL COVER

- .1 Supply, place, blade and trim Type 2 Granular Fill cover material to the elevation, grades, and cross-section dimensions indicated on the drawings or as directed by the Engineer.
- .2 Supply and install witness grade stakes in areas to be reconstructed to monitor the depth of granular fill material. The grade stakes are to be placed on a grid spacing approved by the Engineer for each specific regrading area. Immediately replace all grade stakes that are damaged or displaced by Contractor operations.
- .3 Type 2 Granular Fill to be compacted to a minimum of 95% of maximum dry density in accordance with ASTM 698 or as determined from a control strip density. The method for determining the maximum dry density will be established by the Engineer. The contractor is to provide all equipment and resources necessary to carry out a control density test upon request.

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- .4 Place specified backfill material in uniform horizontal layers in depths as indicated in Clause 3.2 of this Section up to lines and grades indicated. Compact each layer before placing succeeding layer.
- .5 Dry out material or apply water as necessary during compaction to obtain specified density.

3.9 PLACEMENT OF WASTE ROCK COVER

- .1 Supply, place, blade and trim Type 1 Granular Fill cover material to the elevation, grades, and cross-section dimensions indicated on the drawings or as directed by the Engineer.
- .2 Supply and install witness grade stakes in areas to be reconstructed to monitor the depth of granular fill material. The grade stakes are to be placed on a grid spacing approved by the Engineer for each specific regrading area. Immediately replace all grade stakes that are damaged or displaced by Contractor operations.
- .3 Compact Type 1 Granular Fill material to obtain specified density.
- .4 Place specified backfill material in uniform horizontal layers in depths as indicated in Clause 3.2 of this Section up to lines and grades indicated. Compact each layer before placing succeeding layer.
- .5 Dry out material or apply water as necessary during compaction to obtain specified density.
- .6 Complete the placement of the waste rock on the outer berm slope to the lines and grades indicated on the design drawings and in accordance with the requirements of the specifications.

3.10 AS-BUILT SURVEY

- .6 Complete as-built survey in accordance with the requirements of Section 01 71 01 – Survey Requirements.

END OF SECTION



REAL PROPERTY SERVICES
Western Region

Project No. 416629
Date: E4100914

Project Name
Roberts Bay
Nunavut

Project Location
Roberts Bay/Ida Bay Mine
Site Remediation

Prepared By
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Designed By
WTH - EBA Engineering Consultants Ltd.

Drawn By
WTH - EBA Engineering Consultants Ltd.

Checked By
JAMES BUCHHE

Project Manager
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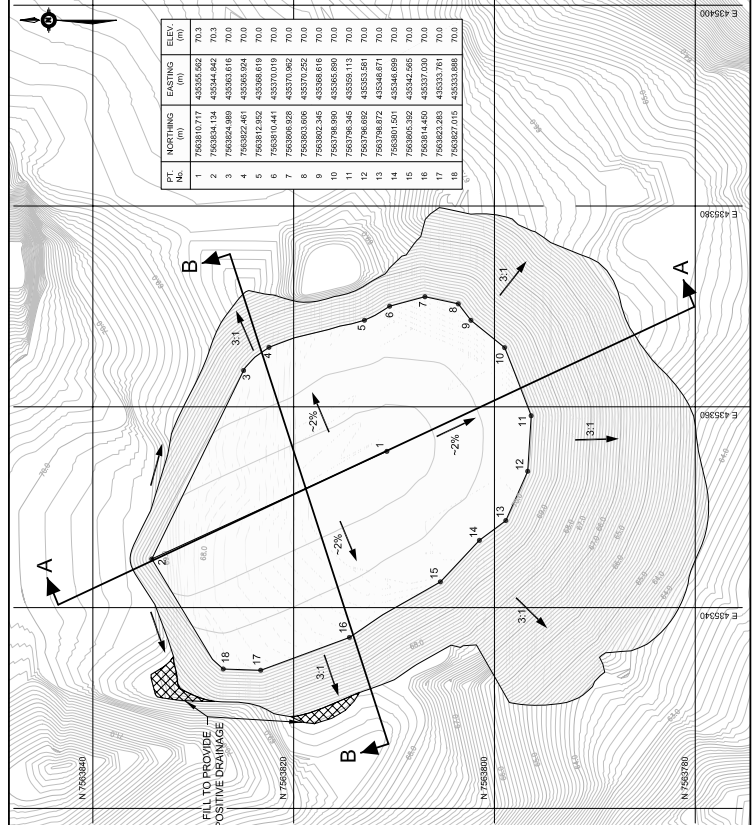
Project Engineer
JAMES BUCHHE

Project Engineer
JAMES BUCHHE

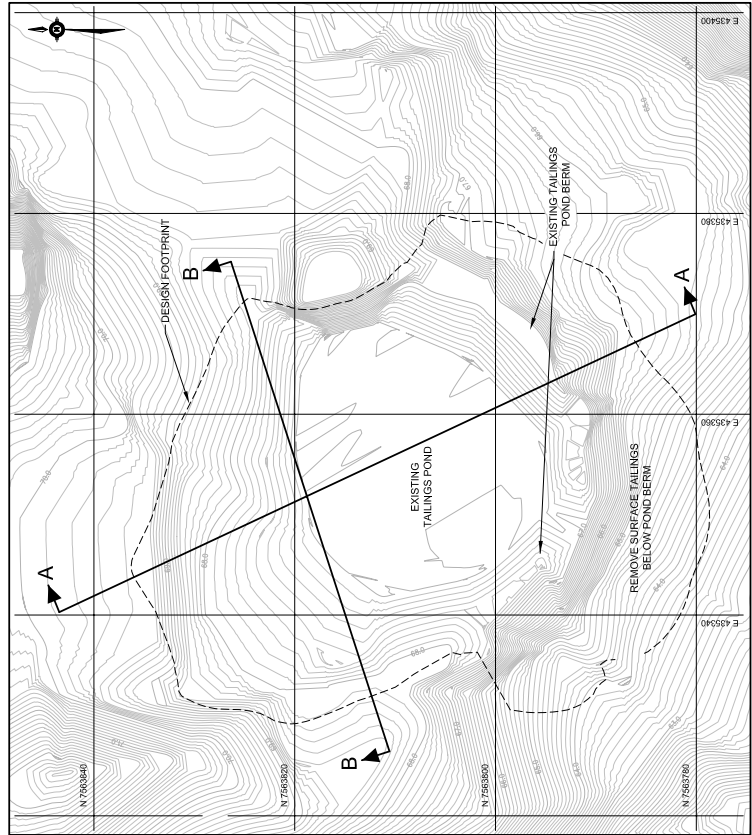
Project Engineer
JAMES BUCHHE

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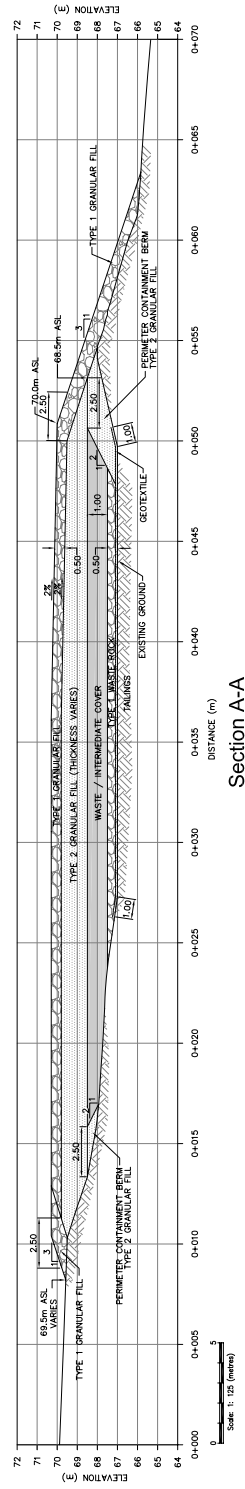
Project Engineer
JAMES BUCHHE



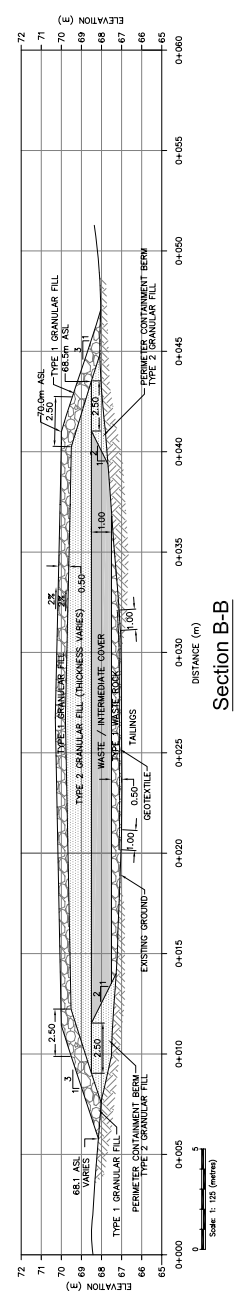
PLAN - EXISTING
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PLAN - DESIGN
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Section A-A



Section B-B

Waste Placement Detail
N.T.S.

