Tahera Diamond Corporation

JERICHO PROJECT
LANDFARM AND CONTAMINATED SNOW CONTAINMENT FACILITY
CONSTRUCTION SPECIFICATIONS

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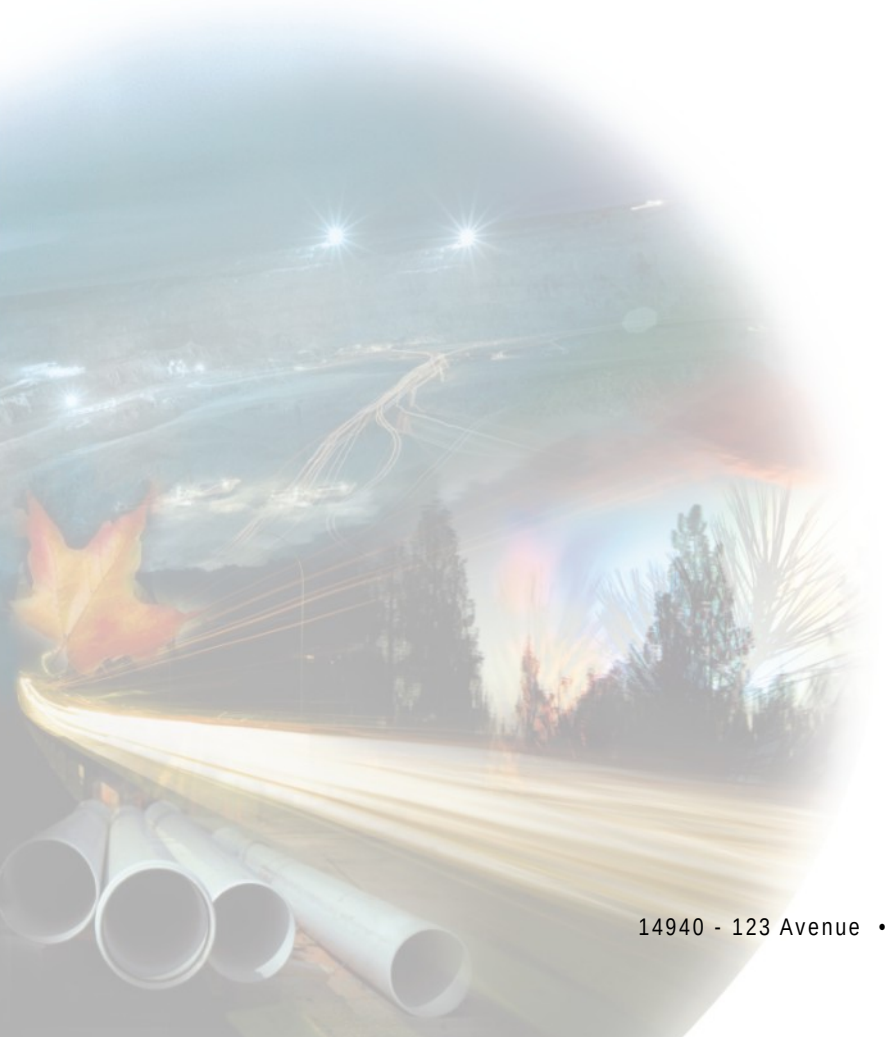

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APPENDICES

1.0 GENERAL

.1 Definitions of terms used throughout the Construction Specifications are presented in this section.

2.0 DEFINITIONS OF TERMS USED

.1	Construction Drawings:	the design drawings as issued for construction of the Landfarm and Contaminated Snow Containment Facility.
.2	Construction Specifications:	this document.
.3	Contractor:	the general contractor responsible for construction of the work.
.4	Engineer:	the EBA Engineering Consultants Ltd. (EBA) representative on site during construction or related activities.
.5	Owner:	Tahera Diamond Corporation
.6	Site:	the area in which construction of the Landfarm and Contaminated Snow Containment Facility or related activity is occurring.
.7	Unsuitable:	not meeting the requirements stated herein or not receiving the Engineer's approval.
.8	LCSCF:	Landfarm and Contaminated Snow Containment Facility

1.0 GENERAL

A Landfarm and Contaminated Snow Containment Facility (LCSCF) is being constructed at the Jericho Mine site for Tahera Diamond Corporation (Tahera). The purpose of the Facility is two-fold:

.1 to treat hydrocarbon contaminated soils resulting from accidental spills during site activities (landfarming). Landfarming consists of aeration and biological breakdown of hydrocarbons present in the soil after it has been spread in a layer approximately 30 cm thick; and

.2. to store hydrocarbon contaminated snow resulting from spills over winter. Upon freshet meltwater will be pumped out of the Facility and treated as required.

The Facility will be lined with a high density polyethylene (HDPE) geomembrane. One end of the facility comprises a depressed sump area, capable of accommodating melt water from the LCSCF surface area and from contaminated snow placed over winter. The sump is graded to direct runoff to one corner where it can readily be accessed and pumped out.

The LCSCF is designed to be constructed on a waste rock fill pad to reduce impact to the permafrost.

A geotechnical investigation for the LCSCF has not been completed and foundation conditions are therefore unknown. Provision has been made in these specifications for completion of a geotechnical investigation. Results from the investigation may be used to reduce the waste rock pad thickness.

The precise location of the LCSCF was not known at the time of tender. The LCSCF is therefore designed as a generic structure, using relative elevations and layout points.

2.0 SCOPE OF WORK

The scope of work for construction of the Landfarm and Contaminated Snow Containment Facility is as follows:

a. Supply, delivery and placement of waste rock material to construct the foundation pad and berms, as directed by engineer.

b. Supply, delivery and placement of 200 mm minus material (Zone B Material) to construct the berms and liner subgrade, as directed by the engineer.

c. Supply, delivery and placement of 20 mm minus material (Zone A Material) for bedding material above and below the liner system.

d. Supply and install a liner system consisting of a layer of 60 mil HDPE between two layers of non-woven geotextile (542 g/m^2 for both the bottom and top layers).

3.0 MATERIALS

.1 The material types referenced in the Construction drawings and Specifications and the estimated quantities required to complete the Civil Component of the work are shown in Table 1002.1.

TABLE 1002.1: LCSCF MATERIAL QUANTITIES

Geomembrane (m^2)	Geotextile (m^2)	Fill Material Type		
		Waste Rock Material (m^3)	Zone A (m^3)	Zone B (m^3)
3,250	6,500	2,000	2,100	4,700

Notes:
1. Quantities are "in-place". Seaming allowance and contingencies must be added to geomembrane and geotextile quantities. It is recommended that 20% extra quantities be available on site. Bulking factors and contingencies must be added to fill quantities; 20% should be added to reported quantities for stockpile volumes.
2. Waste rock quantity does not include material required to construct the waste rock foundation pad.

.2 The Contractor is advised that the above quantities are based on excavation and construction to the neat lines shown on the Construction drawings and represent in-place quantities. The Contractor shall satisfy himself as to the accuracy of the quantities and shall bring any discrepancies to the attention of the Engineer prior to undertaking any work.

4.0 SITE CLEANUP

.1 The Contractor shall remove all temporary structures and shall clean up the construction area, borrow areas, and stockpile areas after completion of the Contract Work.

.2 Surplus material generated during construction shall be hauled and disposed of as directed by the Engineer.

1.0 GENERAL

.1 This section describes foundation preparation for the Landfarm and Contaminated Snow Containment Facility.

.2 The foundation for the LCSCF shall comprise a waste rock pad, as shown on the Construction Drawings.

2.0 EXECUTION

.1 Open graded boulders and deleterious materials shall be removed from the LCSCF foundation area as determined by the Engineer.

.2 Ice rich or other soils beneath the LCSCF deemed to be unsuitable by the Engineer shall be removed.

.3 Site grading or excavation shall be carried out if and where existing ground surfaces do not allow for minimum fill thicknesses as shown on the Construction Drawings.

.4 The waste rock pad shall be constructed a minimum 3.0 m above original ground unless results of the geotechnical investigation indicated a reduced thickness is permissible. Fill shall be placed in accordance with Section 1005.

.5 Reduction of the waste rock pad thickness shall be authorized by the Engineer.

3.0 DRAINAGE

.1 Provide temporary drainage and pumping as necessary to keep the site free from water.

4.0 DRILLING AND BLASTING

.1 The Contractor is responsible for ensuring that blasting procedures used are within guidelines set by all regulatory bodies and authorities having jurisdiction in the area.

.2 The Contractor shall use such excavation methods that minimize fracturing beyond the excavation limits.

.3 Care must be taken in locating the drill holes, orienting the drills and during drilling so that accurate positioning and alignment of the drill holes is achieved.

.4 The method of excavation used for all excavations shall be such as to produce an excavation base that is free from abrupt changes in elevation.

.5 Controlled blasting techniques shall be used, which will satisfy the excavation requirements specified herein. The initial explosive type and quantity, blasting sequence, and delay pattern shall be modified to achieve the requirements specified herein.

.6 The Contractor shall submit complete details of the proposed blast to the Owner twenty-four (24) hours prior to commencement of drilling for each blast. Data shall include the following:

a. the location, depth and area of each blast;

b. the type, strength, quantity, column load and distribution of explosives to be used per hole, per day and per blast;

c. the sequence and pattern of delay; and

.7 If, in a specific area, a plan that has been previously adopted does not produce conditions in accordance with the requirements of these Specifications, the Contractor shall submit a revised plan to the Engineer before continuing drilling and blasting in adjacent areas.

5.0 FOUNDATION APPROVAL

.1 Foundations must be inspected and approved by the Engineer prior to berm construction. The Contractor shall give not less than twenty-four (24) hours notice to the Engineer.

1.0 GENERAL

.1 This section describes the fill material requirements for the Landfarm and Contaminated Snow Containment Facility.

.2 Material quantities are presented in Section 1002 – General.

2.0 REFERENCE STANDARDS

.1 The most recent copy of American Society for Testing Materials, ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregate.

3.0 MATERIAL SOURCES

.1 No material of any type shall be borrowed or excavated without the Owner's prior approval.

.2 Pits and quarries shall be maintained and managed in accordance with the requirements set out in the Owner's Land Use and Quarry Permits.

.3 Waste rock material, 700 mm maximum, shall be obtained from Jericho pit or other sources approved by the Owner, provided the final product meets the requirements stated herein. Specific quarrying and/or processing procedures may be required to achieve the specified maximum top size.

.4 Zone B Material shall be processed from material obtained from the Jericho pit or other sources approved by the Owner, provided the final product meets the requirements specified herein. Processing will be required to achieve the specified gradation.

.5 Zone A Material shall be processed from material obtained from the Jericho pit or other sources approved by the Owner, provided the final product meets the requirements specified herein. Processing will be required to achieve the specified gradation.

.6 The parent rock from which all fill materials are derived shall consist of sound, hard, durable material free from soft, thin, elongated or laminated particles and shall contain no unsuitable substances. The potential quarry source shall be approved by the Engineer. The Engineer may require trial crushing and durability testing prior to approving a quarry site.

.7 The quarry source for fill materials shall be inspected by the Engineer throughout material processing to ensure the product meets the requirements stated herein.

4.0 MATERIAL SPECIFICATIONS

.1 Zone A Material (20 mm minus)

a. The Zone A Material shall consist of hard, durable particles, shall be free of roots, topsoil, and deleterious material and shall have a particle size distribution, as measured by ASTM C136, as presented in Table 1004.1.

b. The Zone A Material can be crush granite or esker material, provided it meets the particle size distribution in Table 1004.1.

TABLE 1004.1: ZONE A MATERIAL (20 MM MINUS) PARTICLE SIZE DISTRIBUTION LIMITS

Sieve Size (mm)	% Passing
20.0	100
12.5	65 – 100
5.0	45 – 70
0.63	15 – 35
0.08	4 – 10

.2 Zone B Material (200 mm Minus)

a. The Zone B Material shall be free of roots, topsoil and other deleterious material and have a particle size distribution falling within the limits presented in Table 1004.2.

TABLE 1004.2: ZONE B MATERIAL PARTICLE SIZE DISTRIBUTION LIMITS

Sieve Size (mm)	% Passing
200	100
100	50 – 100
50	25 – 65
25	10 - 40
5	0 – 15

.3 Waste Rock Material

a. The waste rock material can have a wide variation in gradation with a maximum particle size of 700 mm. Rockfill particles must be hard, durable and angular.

b. The depth and spacing of drill holes as well as the weight and delay of charges shall be selected to produce waste rock material meeting the specification.

c. Any significant concentration of unsuitable materials must be removed and directed to a waste disposal area, other location approved by the Owner or, with the Engineer's approval, mixed with other materials to produce a material meeting specifications.

1.0 GENERAL

.1 This section describes the fill placement methods for the Landfarm and Contaminated Snow Containment Facility.

.2 Construction shall be performed in accordance with the best modern practice and with equipment best adapted to the work being performed. Material shall be placed so that each zone is homogenous, free of stratifications, ice chunks, lenses, pockets, ruts and layers of material of different texture and grading not conforming to the requirements specified herein.

.3 No fill material shall be placed on any part of the foundation until it has been prepared as specified herein and approved by the Engineer. Placement of material shall conform to the lines; grades and elevations shown on the Construction Drawings or as specified herein and shall be performed in such a manner as to avoid mixing of materials in adjacent zones.

.4 Fill placement shall not proceed when the work cannot be performed in accordance with the requirements of the Specifications. Any part of the LCSCF which has been damaged by the action of rain and snow, or any other cause, shall be removed and replaced with material conforming to the requirements specified herein before succeeding layers are placed.

.5 Stockpiling, loading, transporting, dumping and spreading of all materials must be carried out in such a manner to avoid segregation or any other condition that does not meet the requirements stated herein. Segregated materials shall be removed and replaced with the materials meeting the requirements stated herein and receiving the Engineer's approval.

.6 The Contractor shall remove all snow, debris, vegetation or any other material not conforming to the requirements stated herein prior to placing fill. The Contractor shall dispose of these materials in an area approved by the Owner.

.7 The Engineer may, at his discretion, adjust the berm top width to account for site-specific foundation conditions and construction equipment. The minimum top of berm width shall be 1.5 m.

2.0 REFERENCE STANDARDS

.1 The most recent copy of American Society for Testing Materials, ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3).

3.0 WASTE ROCK

.1 The waste rock shall be placed in lifts not exceeding 700 mm thickness. The placement method must ensure that segregation and nesting of coarse particles is avoided.

. 2 The waste rock shall be compacted to the satisfaction of the Engineer. Particles greater than 700 mm diameter shall be moved to the outside face of the fill material.

4.0 ZONE A MATERIAL PLACEMENT

.1 Place Zone A Material for the HDPE liner bedding (minimum 150 mm thick) to the specified design grade.

.2 Subsequent to the liner installation, the Zone A Material shall be placed as cover material. The cover material layer shall be a minimum of 600 mm thick in areas that will be accessed by haul trucks and 300 mm thick in all other areas.

.3 Zone A Material shall be placed in lifts not exceeding 300 mm in uncompacted thickness.

.4 Compact all placed lifts to a minimum of 95% of maximum dry density (ASTM D698).

.5 Wheeled vehicles with tire pressures of 200 kPa or less can operate on a minimum thickness of approximately 300 mm; however, all vehicles with tire pressures of 500 kPa or higher should not operate on less than 900 mm of compacted fill. A generalized guideline regarding minimum fill thickness versus placement equipment is presented in Table 1005.1

TABLE 1005.1: MINIMUM LIFT THICKNESS

Backfill Thickness	Placement Equipment
No backfill	Foot traffic or 4 tire ATV vehicle only
150 mm or less	Hand placement
200 - 300 mm	D3 - D4 LGP Cat
300 mm	Bobcat (Skid-Steer)
300 mm	D4 - D6 Style Cat
600 mm	D300 haul truck with 350 kPa tire pressure

.6 Equipment with ground pressures higher than 350 kPa should not be permitted inside the facility once the HDPE liner has been placed. Care is required to provide the appropriate thickness of fill beneath a vehicle when placing material above the composite liner system to ensure it is not damaged. Traffic in the area should be restricted to low ground pressure equipment.

5.0 ZONE B MATERIAL PLACEMENT

.1 The Zone B Material shall be placed in lifts not exceeding 500 mm. The placement method used shall ensure that segregation and nesting of coarse particles is avoided.

.2 The Zone B Material shall be compacted with a smooth drum vibratory compactor weighing not less than 10 tonnes. Moisture conditioning may be required prior to compaction. The Zone B Material shall be compacted with at least four passes of the compactor (back and forth being two passes). Rolling patterns must be used throughout construction to optimize the number of passes, amount of water added and vibration frequency for compacting the Zone B Material.

.3 Zone B Material shall be placed and compacted to the satisfaction of the Engineer. Subsequent lifts of Zone B Material shall not be placed without approval of the Engineer.

1.0 GENERAL

.1 This sections details the product and installation specifications for the nonwoven geotextile and geomembrane liner system for the Landfarm and Contaminated Snow Containment Facility.

.2 The liner system will be provided and installed by the Contractor.

.3 Quality control testing of the geomembrane liner shall be completed by the Contractor.

.4 Estimated liner quantities are presented in Section 1002 – General.

2.0 REFERENCE STANDARDS

.1 The most recent copy of the following American Society for Testing Materials standards:

a. ASTM D638 Standard Methods for Tensile Properties of Plastics.

b. ASTM D792 Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.

c. ASTM D1004 Standard Test Methods for Initial Tear Resistance of Plastic Film and Sheeting.

d. ASTM D1603 Standard Test Methods for Carbon Black in Olefin Plastics.

e. ASTM D1777 Standard Test Methods for Thickness of Textile Materials.

f. ASTM D4533 Standard Test Methods for Trapezoidal Tearing Strength of Geotextiles.

g. ASTM D4632 Standard Test Methods for Grab Breaking Load and Elongation of Geotextile.

h. ASTM D4751 Standard Test Methods for Determining Apparent Opening Size of a Geotextile.

i. ASTM D4833 Standard Test Methods for Index Puncture Resistance for Geotextile, Geomembranes, and Related Products.

j. ASTM D5199 Standard Test Methods for Measuring the Nominal Thickness of Geosynthetics.

k. ASTM D5261 Standard Test Methods for Measuring Mass per Unit Area of Geotextiles.

l. ASTM D5994 Standard Test Methods for Measuring Core Thickness of textured Geomembranes.

.2 Federal Test Method

a. FTM Standard 101.

3.0 MATERIALS

.1 Geotextile

a. The non-woven geotextile on both sides of the HDPE liner shall have a weight of 542 g/m^2.

b. The manufacturer shall, prior to shipment of materials, provide to the Engineer a signed manufacturing certification that materials to be shipped to site have test values that meet or exceed the requirements listed in Table 1006.1.

TABLE 1006.1: RECOMMENDED MINIMUM GEOTEXTILE PROPERTIES

Physical Property	Minimum Average Roll Value (Weakest Principal Direction)
Thickness – Typical (ASTM D5199)	3.6 mm
Grab Tensile Strength (ASTM D4632)	1690 N
Elongation at Failure (ASTM D4632)	50 %
Trapezoidal Tear Strength (ASTM D4533)	645 N
Puncture (ASTM D4833)	1070 N
Apparent Opening Size (ASTM D4751)	150 microns
Weight – Typical (ASTM D5261)	542 g/m^2

.2 Geomembrane

a. The HDPE geomembrane shall be a textured, 1.5 mm (60 mil) thick geomembrane or equivalent.

b. The manufacturer shall, prior to shipment of materials, provide to the Engineer a signed manufacturing certification that materials to be shipped to site have test values that meet or exceed the requirements listed in Table 1006.2.

TABLE 1006.2: RECOMMENDED MINIMUM GEOMEMBRANE PROPERTIES	
Property	Textured HDPE 60
Minimum Average Thickness (ASTM D5994)	1.5 mm
Relative Density (ASTM D792)	0.94
Tensile Strength at Yield (ASTM D638)	23.1 kN/m
Elongation at Yield (ASTM D638)	13 %
Tear Resistance (ASTM D1004)	200 N
Puncture Resistance (FTMS 101)	347 N
Carbon Black Content (ASTM D1603)	2.0 %

c. The liner material supplied under the specifications shall be new and shall not have any blisters, holes, undispersed raw materials or any signs of contamination or inclusions of foreign matter. Such defects shall be repaired using welding techniques in accordance with manufacturer's recommendations. Excessive defects may be grounds for rejecting the entire roll of liner. Such a decision shall be made by the Engineer or his representative.

d. Extrusion resin used for extrusion joining of sheets and for repairs shall be HDPE from the same resin batch as the sheet resin. Physical properties must be the same as the liner sheets.

4.0 SHIPPING AND STORAGE

.1 Geotextile

a. Any visible damage to the shipment of geotextile must be noted on the freight receipt and project records.

b. Storage of geotextile rolls on site must be in a secure location that will minimize exposure to the elements and physical damage.

.2 Geomembrane

a. The geomembrane liner shall be shipped in accordance with the manufacturer's requirements and shall be conducted in a manner that avoids damage to the liner. Any visible damage to the shipment shall be noted on the freight receipt and project records.

b. The geomembrane liner shall remain packaged in dry storage until ready for use.

5.0 GENERAL INSTALLATION

.1 The liner system consists of the following layers (starting from the bottom layer):

- Non-woven geotextile (542 g/m^2)
- HDPE 60 mil geomembrane
- Non-woven geotextile (542 g/m^2)

.2 The three layers of geosynthetics shall line the entire surface of the containment, which includes the crest of the berms, inside slopes, and containment floor.

.3 The Contractor shall ensure that the integrity of the liner system and its components are not compromised during construction. Precautions the Contractor may take to avoid damaging the liner system may include, but will not be limited to, providing light plants in the work area to improve visibility or using pylons to mark the lift/liner system interface.

.4 Any damage to the liner system and/or its components shall be immediately reported to the Engineer. Repair work shall commence as soon as possible. Fill placement shall cease immediately in an area where the integrity of the liner system has been compromised. Fill surrounding the damaged liner system may have to be excavated, without further damaging the integrity of the liner, to permit repairs to be made. Hand excavation shall be used to expose damaged portions of the liner for repair.

.5 The liner system shall be anchored at the top of the berm so that movement downslope does not occur during backfilling at any stage of construction.

.6 The Contractor shall take the necessary steps to ensure that backfilling does not induce tensile stress in the liner system. Care shall be taken to avoid making sharp turns, sudden stops or sudden starts adjacent to the liner system. Non-essential heavy equipment traffic in the immediate vicinity of the liner system shall not be permitted.

6.0 GEOTEXTILE INSTALLATION

.1 The area to be covered by the geotextile shall be smooth and free of sharp objects that could puncture the geotextile and damage the overlying geomembrane liner. Placement of the geotextile shall be conducted in a manner that will prevent damage to the geotextile. The installation of the geotextile shall not begin until the base has been approved by the Engineer.

.2 Geotextile placement shall not be conducted during periods of high wind.

.3 The geotextile shall be placed with a minimum overlap of 150 mm and connected at the seam by heat bonding. Horizontal seams should be kept to a minimum on the side slopes. If a horizontal seam is unavoidable, the overlap shall be capped with a 300 mm wide strip of the same geotextile and heat bonded to the underlying material.

.4 Sufficient temporary anchorage shall be used to hold the geotextile in place during placement of the other elements of the liner system.

.5 Any tears or holes made in the geotextile should be repaired by placing a patch of geotextile on the defect and held in place by heat bonding. The patch should extend at least 300 mm beyond the damage, in all directions.

7.0 HDPE LINER INSTALLATION

.1 The HDPE liner shall be deployed subsequent to the placement of geotextile. The liner shall be placed with no horizontal seams on the slopes. Tie-in seams shall be located on the floor at a minimum of 1.5 m from the toe of the slopes.

.2 The area to be lined shall be smooth and free of sharp objects that could puncture the geomembrane. Placement of the geomembrane shall be conducted in a manner that will prevent damage to the underlying geotextile. The installation of the geomembrane shall not begin until the base has been approved by the Engineer.

.3 The liner panels shall be welded together along the full length of the seam to the top of the berm.

.4 Both the wedge and the extrusion welding equipment shall be qualified by conducting trial seam tests prior to start-up each day and at approximately 4-hour intervals during seaming operations. During the trial seam, the minimum peel and shear strength criteria set by the manufacturer for the 60 mil HDPE geomembrane shall be met. The industry-accepted peel and shear strengths for 60 mil HDPE geomembrane are 78 ppi (pounds/inch) and 120 ppi, respectively.

.5 The Engineer or site inspector should walk the liner to observe for any defects caused by on-site equipment and tools. Any liner area showing injury due to excessive scuffing, puncture, or distress from any cause shall be replaced or repaired with an additional piece of HDPE liner extrusion welded over the defective area. All patches should have rounded edges and extend a minimum of 150 mm beyond the affected area.

.6 Low ground pressure equipment shall be used to deploy the liner material. No track-wheel equipment shall be allowed on the liner. Equipment travel on the liner material should be kept to a minimum.

.7 Care shall be taken when deploying the geomembrane. Sharp objects, vehicles and equipment shall not come in contact with the material.

.8 The geomembrane liner shall be placed in a relaxed condition, free of stress or tension.

.9 Geomembrane liner placement shall not be done in periods of high wind.

8.0 BACKFILLING

.1 The Contractor must take the necessary steps to ensure that the integrity of the liner system is not compromised during backfilling.

.2 The Contractor must take the necessary steps to ensure that backfilling does not induce tensile stress in the liner system during backfilling. Care must be taken to avoid any damage to the liner system by making sharp turns, sudden stops or sudden starts adjacent to the liner system. Non-essential heavy equipment traffic in the immediate vicinity of the liner system must be minimized.

.3 Stresses in the liner imposed by placing backfill on the sloping liner must be released at the top of the slope during cover soil placement.

.4 The Contractor shall discuss with the Engineer the schedule for liner system and backfill placement. The Engineer must approve all plans and schedules for backfilling the liner system.

1.0 GENERAL

.1 The quality assurance testing required by the Engineer is described in this section.

.2 The quality testing will be conducted by the Engineer, with the exception of HDPE geomembrane testing, which shall be completed by the Contractor.

2.0 REFERENCE STANDARDS

.1 The most recent edition of the following American Society for Testing Materials standards:

a. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

b. ASTM D2216 – Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by mass.

c. ASTM D698 – Standard -Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))

d. ASTM D4437 – Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes.

e. Geosynthetic Research Institute

f. GRI Test Method GM6 – Pressurized Air Channel Test for Dual Seamed Geomembranes.

3.0 FILL TESTING REQUIREMENTS

.1 Bedding Materal (20 mm minus)

a. Quality Assurance testing shall be performed when the Zone A Material is being produced. The tests and testing frequency required while producing the Zone A Material are presented in Table 1007.1. Additional testing may be required at the discretion of the Engineer.

TABLE 1007.1: TESTING AND FREQUENCY DURING PRODUCTION OF ZONE A MATERIAL

Test	**Test Frequency**
Particle Size Analysis	1000 m^3 (2000 tonnes) or every 6 hours of crusher production, whichever is most frequent
Maximum Dry Density	One per 10,000 m^3 (20,000 tonnes)

b. The compacted density of the Zone A Material in the LCSCF shall be evaluated by using in situ measurements of density. In situ density measurements of the compacted Zone A Material will be conducted with a nuclear densometer. Samples of the Zone A Material may be taken from the lift surface for additional testing at the discretion of the Engineer. The required tests and testing frequency for the Zone A Material placed are presented in Table 1007.2.

TABLE 1007.2: ZONE A MATERIAL FILL TESTING AND FREQUENCY

Test	**Test Frequency for Placed Material**
Moisture Content	5 per lift or 5 per day
Compacted Dry Density	5 per lift or 5 per day
Particle Size Analysis	One every two days

.2 Zone B Material

a. Samples of the Zone B Material will be evaluated from time to time during production and placement to ensure that the produced and placed gradation meets the specification stated herein. The required tests and testing frequency for the Zone B Material are presented in Table 1007.3. Additional testing may be conducted at the discretion of the Engineer.

TABLE 1007.3: TESTING AND FREQUENCY DURING PROCESSING OF ZONE B MATERIAL

Test	**Test Frequency**
Particle Size Analysis	One per 2000 m^3 (4000 tonnes) or every 12 hours of crusher production, whichever is most frequent.

4.0 HDPE GEOMEMBRANE TESTING REQUIREMENTS

.1 General

a. The Contractor is responsible for obtaining mill certificates from the manufacturer and forwarding them to the Engineer.

b. The Contractor shall record all seam parameters (i.e. time, date, operator, welding speed and temperature) on the liner.

c. The Contractor shall be responsible for completing the vacuum box testing and pressure testing for the appropriate seams. The Contractor shall mark the test number and parameters on the liner.

d. The Contractor shall supply and use a field tensiometer for testing liner seams for shear and peel strength.

e. Qualifying seams will be tested by the contractor with results being provided to the Engineer prior to welding.

f. The Contractor is responsible for maintaining testing records.

g. All coupons and test specimens remain the property of the Owner.

.2 Qualifying Seams

a. Qualifying seams shall be conducted on fragmented pieces of material at the following times:

- At the start of each shift of production seaming, and at 4 hour intervals during production seaming;
- When a new operator or new machine starts welding;
- When a machine is restarted after repairs;
- When welding is stopped for sixty (60) minutes or more;
- When there is a change in the ambient conditions; and
- At the discretion of the Engineer.

b. Qualifying seams shall be 1 m long, and shall be subject to shear and peel testing. The test seam shall meet the minimum requirements stated herein for seam strength, when tested on a field tensiometer. If a qualifying seam fails, the seaming procedure shall be reviewed and the test shall be repeated.

.3 Seam Acceptance Criteria for Qualifying Welds

a. Seam and adhesion tests will be performed according to ASTM D4437.

b. Seam and adhesion strength acceptance will be based on five (5) samples in each coupon, which shall meet or exceed the minimum value specified. No individual sample may have a seam shear strength less than the minimum value specified in Section 3.0 of Section 1006.

c. If a coupon does not meet the acceptance criteria, two (2) additional coupons shall be cut and tested from the seam within three (3) metres of each side of the failed coupon. If coupon samples continued to show failing results, the welding equipment shall be adjusted and another strip of trial seam shall be conducted and retested.

.4 Non-Destructive Testing

a. Test all wedge-welded seams over their full length using a vacuum unit or air pressure test.

- Seam intersections will also be subject to vacuum box testing, regardless of seaming method employed.
- The Contractor shall supply all apparatus and personnel for this type of test.
- The tests shall be witnessed and documented by the Engineer.

b. Clean all seams to permit proper inspection.

c. Repair any seams which fail non-destructive testing in accordance with this Specification. Repairs shall be fully documented by the Contractor.

.5 Vacuum Box Testing

a. Extrusion welded seams should be tested using either vacuum box testing or pick-testing. Vacuum box testing involves placing the extrusion weld under a vacuum. The weld is first coated with a soapy water solution and any holes in a weld would be indicated by a stream of bubbles when vacuum is applied.

b. No leaks shall be permitted while conducting vacuum box testing.

c. Pick-testing is conducted on uneven surfaces where a vacuum cannot be maintained. During pick testing, attention should be paid to the following specific items:

- The width of the weld;
- Weld bond to the underlying geomembrane;
- Joints between three panels ("T" joints);
- Defects such as bubbles created within the weld due to moisture; and
- Textured weld surfaces due to temperature fluctuation in the extrusion welder.

.6 Air Pressure Testing

a. Wedge welded seams should be air-pressure tested over their full lengths using an air pressure test. Air pressure testing involves pressurizing the air channel located between the dual tracks of the seams to a minimum pressure of 40 psi for a period of five minutes.

b. During the test, the air pressure is not allowed to drop more than 4 psi (10% allowance). Any leaks and bubbling in the seams found during the non-destructive tests must be repaired by extruding a patch of HDPE material over the defect.

c. Air pressure testing shall be carried out according to GRI Test Method GM6, Pressurized Air Channel Test for Dual Seamed Geomembranes.

.7 Destructive Testing for Production Seams

a. Cut-out coupons shall be taken at a minimum frequency of one (1) per 150 m of seam, or once per seam. Coupons shall be cut by the contractor at the location directed by the Engineer. Coupons shall generally be taken from a location that does not affect the performance of the liner. All cut-outs shall have rounded corners. Care shall be taken to ensure that no slits penetrate the parent liner.

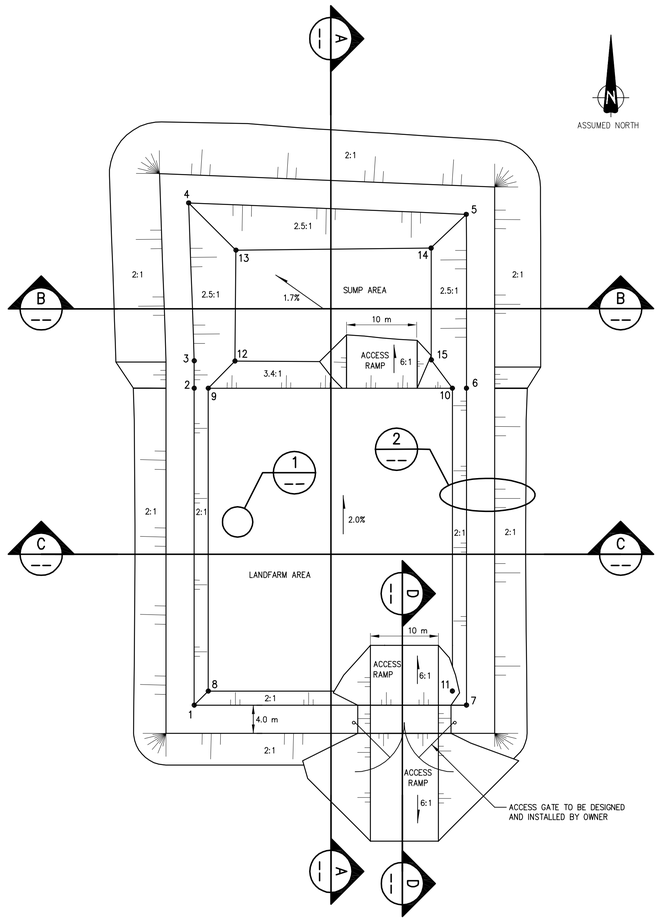
b. All holes left by cut outs shall be patched immediately.

.8 Testing of Repairs

a. All repairs shall be tested using the Vacuum Box in accordance with test method ASTM 4437.

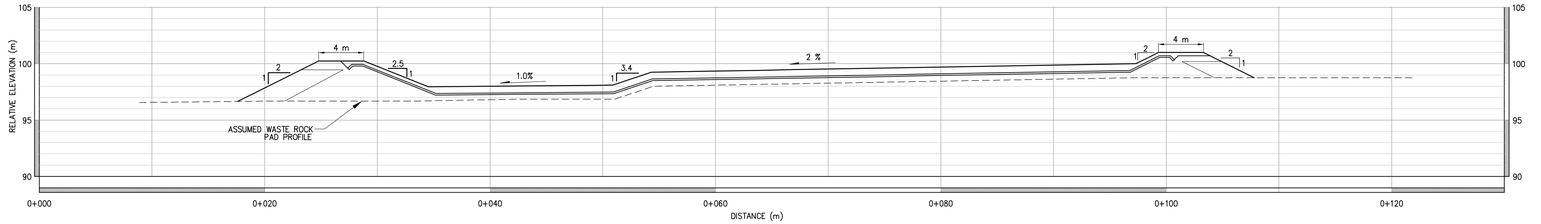
APPENDIX

APPENDIX A DRAWING 1100060-01



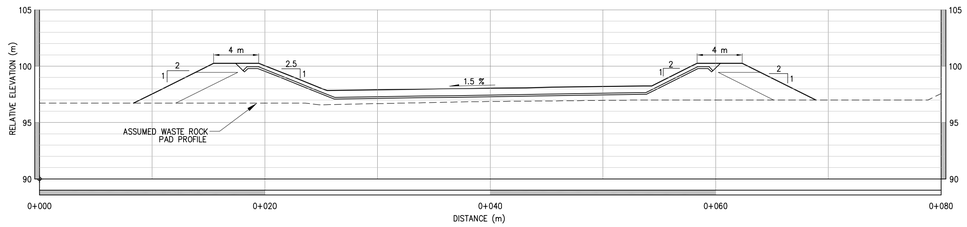
0 20 metres

PLAN
SCALE: 1: 400

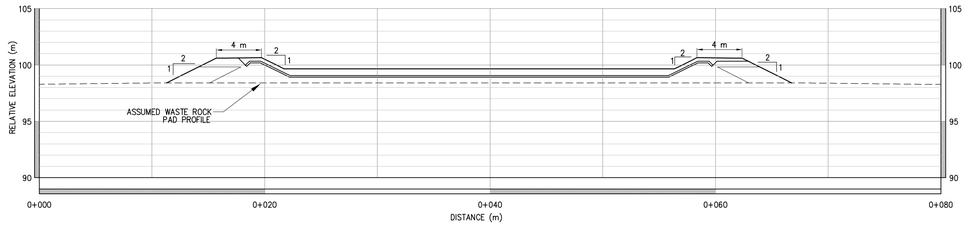


SECTION A
SCALE: 1: 250

RELATIVE LAYOUT COORDINATES			
POINT	X (m)	Y (m)	ELEVATION (m)
1	0	0	101.00
2	0	45.00	100.25
3	0	48.90	100.25
4	−0.879	71.31	100.25
5	38.65	69.74	100.25
6	38.65	45.00	100.25
7	38.65	0.00	101.00
8	2.00	2.00	100.00
9	2.00	45.00	99.25
10	36.65	45.00	99.25
11	36.65	2.00	100.00
12	5.79	48.87	97.95
13	5.93	64.60	97.65
14	33.63	64.90	98.25
15	33.66	49.03	98.25



SECTION B
SCALE: 1: 250



SECTION C
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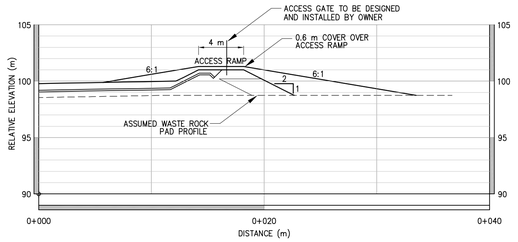
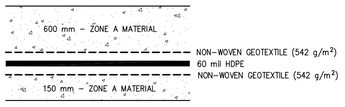
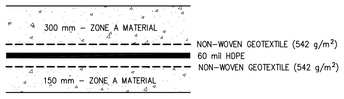


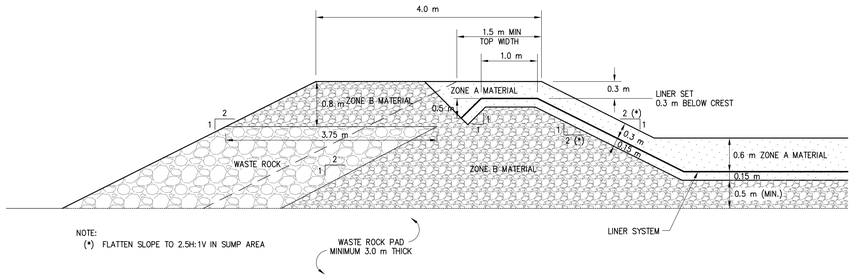
SECTION D
SCALE: 1: 250



DETAIL – LINER SYSTEM (BASE) 1
N.T.S.



DETAIL – LINER SYSTEM (BERMS) 2
N.T.S.



SECTION – (TYPICAL)
N.T.S.

NOTES:

1. FOUNDATION CONDITIONS TO BE INSPECTED BY ENGINEER PRIOR TO STARTING CONSTRUCTION.
2. LANDFARM AND CONTAMINATED SNOW CONTAINMENT FACILITY TO BE CONSTRUCTED ON WASTE ROCK PAD, MINIMUM 3.0 m THICK, UNLESS SITE INVESTIGATION INDICATES A THINNER PAD THICKNESS MAY BE USED. REDUCTION IN PAD THICKNESS SHALL BE DETERMINED BY THE ENGINEER.
3. MAINTAIN THE FOLLOWING MINIMUM COVER THICKNESS OVER LINER TO SUPPORT LISTED EQUIPMENT. CONSULT ENGINEER IF DESIRED EQUIPMENT IS NOT LISTED.

COVER OVER LINER (mm)	ALLOWABLE EQUIPMENT
0	FOOT TRAFFIC, 4 TIRE ATV
300	D4–D6 STYLE CAT, BOBCAT
600	D300 HAUL TRUCK WITH 350 kPa TIRE PRESSURE

4. COVER THICKNESS OVER ACCESS RAMP TO BE INCREASED TO 0.6 m.
5. FACILITY LAYOUT BASED ON ASSUMED BENCHMARK LOCATION AND ELEVATION. CONSTRUCTION ELEVATIONS TO BE ADJUSTED TO MATCH EXISTING TOPOGRAPHY.
6. LAYOUT POINTS 11 AND 15 LOCATED UNDER ACCESS RAMPS.
7. BERM TOP WIDTH MAY BE ADJUSTED BY ENGINEER IN ACCORDANCE WITH SITE SPECIFIC CONDITIONS. MINIMUM BERM TOP WIDTH MEASURED FROM THE INSIDE CREST SHALL BE 1.5 m.

REFERENCE DRAWINGS				REVISION				
DRAWING No.	DRAWING TITLE	DATE	REV	No.	DESCRIPTION	DATE	APPROVED
–	–	DD/MM/YY		A	ISSUED FOR CLIENT REVIEW	DEC/05	KJ

EBA ENGINEERING CONSULTANTS LTD.

DESIGNED BY:	GK
DRAWN BY:	GK/DRG
DATE:	09/11/05
SCALE:	AS SHOWN
PROJECT No.:	1100060.008
ACAD FILENAME:	1100060008D01e.dwg

ORIGINAL
SIGNED AND SEALED
Seal: G.D. Koop, P.Eng. Date: December 9, 2005
Permit: Kevin W. Jones, P.Eng. Date: December 9, 2005
The signed Professional Seal and Permit to Practice stamps reside on the executed drawing which is held and controlled by EBA Engineering Consultants Ltd.

Tahera Diamond Corporation

TAHERA DIAMOND CORPORATION

LANDFARM AND CONTAMINATED SNOW CONTAINMENT FACILITY

LANDFARM AND CONTAMINATED SNOW CONTAINMENT FACILITY DESIGN PLAN, SECTIONS AND DETAILS

REVISION ISSUE: A

DRAWING No.: 1100060–01