Qikiqtaaluk environmental
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WATER MANAGEMENT PLAN

Prepared for:

IQALUIT INTERNATIONAL AIRPORT IMPROVEMENT PROJECT "IIAIP"

BOUYGUES-SINTRA JOINT VENTURE

June 2015

Final – Rev 1.3

O/Ref.: QE14-214-11

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BOUYGUES-SINTRA JOINT VENTURE

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1. WATER MANAGEMENT OBJECTIVES

The purpose of this water management plan is to reduce and minimize, to the fullest extent possible, during the construction period, the impacts on groundwater quality and on the aquatic ecosystem of any fish bearing waters adjacent to the Airport. This will be done by:

- Minimizing the amount of surface water that is used by the IIAIP;
- Recycling surface runoff water at the Airport site; and,
- Collection, storage and treatment of any contaminated waters found at the Airport.

Water use at the Airport will be limited to the following activities:

- Use of water surface runoff for dust suppression and spraying aggregates for engineering specifications purposes;
- Dewatering of work areas where soils are highly saturated; and
- Management of storm and snowmelt waters.

Water is planned to be used by the workers camp where itinerant workers will be lodged. The water used for this purpose is to be provided by the City of Iqaluit including the collection of waste water. Quantities of provided fresh water and disposed waste water will be monitored. As such the management of this water will not be discussed further in this plan.

All water use will be tracked by the BBC-Sintra Joint Venture. The superintendent will be responsible for tracking the number of times the truck is filled in a day. The volume of the tank on each truck is known, and by multiplying the volume of the tank and the number of times it is filled, a total volume of water used per day will be determined. The responsible person for reviewing the monthly data will be the Joint Venture's Quality/Safety/Environmental (QSE) Manager.

The planned water extraction points are shown in the figures in Appendix A. The drainage ditch located in the inner field will be the primary location of water extraction. There is sufficient water that flows through this ditch during the season to be able to provide the necessary water. A backup extraction source is provided in case the ditch dries up and is not able to provide a sufficient amount of water.

The coordinates of the water extraction points (within 10 m) are as follows:

- Inner Field Ditch Point 1: 63°45'16"N, 68°32'54"W;
- Inner Field Ditch Point 2: 63°45'8"N, 68°32'24"W;
- Backup Water Extraction Point: 63°45'55"N, 68°32'37"W.

The water drawn from the extraction point will be tested once prior to the start of use, and once per month while in use during the season to show that the water meets acceptable guidelines. The tests will be for the following parameters:

- Total Petroleum Hydrocarbons;
- Benzene, Toluene, Ethylbenzene, Xylene;
- Ethylene Glycol;
- Propylene Glycol.

Analytical results from an accredited laboratory that shows that the water meets criteria are required before use of the water is initiated.

2. APPLICABLE REGULATIONS

The following is a list of applicable regulations related to water use:

- Federal Legislation;
  - Canadian Environmental Protection Act, [1999, c.33],
  - Nunavut Waters and Nunavut Surface Rights Tribunal Act, [2002, c.10],
  - Northwest Territories Waters Regulations, [SOR/93/303];
- Territorial Legislation;
  - Environmental Protection Act (Nunavut), [R.S.N.W.T. 1988, c. E-7];
- Guidelines and Policies;
  - CCME – Canadian Environmental Quality Guidelines (CEQG) and Canadian Water Quality Guidelines for the Protection of Aquatic Life,
  - DFO – Freshwater Intake End-of-Pipe Fish Screen Guideline (1995),
  - DFO – Policy for the Management of Fish Habitat (2001),
  - INAC - Quality Assurance (QA), Quality Control (QC) Guidelines for Use by Class "B" Licensees in Collecting Representative Water Samples in the Field and for Submission of a QA/QC Plan (1996),
  - INAC – A Policy Respecting the Prohibition of Bulk Water Removal from Major River Basins in Nunavut (2003).

3. WATER USAGES AND MITIGATION MEASURES

3.1 Use of water for dust suppression and materials conditioning at the work site

3.1.1 The water used for dust suppression and for soil conditioning will be collected from surface runoff waters that flows in the inner-field located within the work site. The water will be pumped mechanically at the designated water collection points; the pump's hose will be equipped with an inlet screen that respects the Freshwater Intake End-of-Pipe Fish Screen Guideline from Fisheries and Oceans Canada. The backup water source is the creek that flows to the northeast of Carney Creek and joins Carney Creek below Federal Road.

3.1.2 Water will only be collected from extraction points and tested for compliance with environmental quality guidelines.

3.1.3 Water will be either sprayed or allowed to trickle from the back of a water truck using a pipe that allows an even distribution of the water over the entire width of the truck and a sufficient amount of water to coat the exposed earthworks surfaces without provoking any surface run-off.

3.1.4 Should an area become saturated with water, then the spraying of water will be stopped immediately until dust begins to be generated again.

3.1.5 Dust suppression operations will be carried out by the vehicle operator, and will be supervised by the site superintendent or foreman.

3.1.6 The amount of water anticipated to be used for dust suppression is on average 100 m^3 per day in 2015, 50 m^3 in 2016, and 25 m^3 in 2017.

3.2 Dewatering of work areas where soils are highly saturated

3.2.1 Any saturated soils encountered during excavation will be stockpiled and allowed to drain prior to use. The stockpiles will be located in an area 31 m from the high water mark of any water body to prevent the introduction of silt or sediments into the water body.

3.2.2 During backfill operations, water will be directed towards the natural drainage feature.

3.2.2.1 Sedimentation ponds will be used when emptying backfill areas to prevent the introduction of additional sediment into drainage paths or watercourses.

3.2.3 Where necessary, dewatering will be done using pumps that will discharge water onto a rocky surface to reduce erosion of the land, at a point 31 m from the high water mark of any water body.

3.2.3.1 If there is a large amount of sediment in the water to be pumped, dewatering bags will be used to remove the sediment from the water.

3.2.4 All dewatering operations will be done as per the Project's Erosion and Sediment Control Plan, submitted as part of the application to the Nunavut Water Board.

3.2.5 Dewatering operations will be performed by both Sintra and Bouygues. Dewatering operations will be carried out under the supervision of their respective superintendents.

3.2.6 Should the soils to be dewatered be suspected, found, or known to be contaminated, then the materials will be placed on impermeable membranes and managed as per section 3.1.1.1 of the Soil and Groundwater Management Plan Addendum. Any contact water will be collected and tested. Should the water meet the discharge criteria in the permit, then the water will be discharged at the nearest approved discharge location. If the water does not respect the discharge criteria, then the water will be treated prior to its discharge.

3.2.7 For details on the management of contaminated soils please refer to section 3.1.1.1 of the Soil and Ground Water Management Plan Addendum.

3.2.8 Contaminated water will be managed as per section 5.4 of the Soil and Ground Water Management Plan submitted as part of the application to the Nunavut Water Board.

3.2.9 The amount of water to be generated from dewatering operations is expected to be limited

3.3 Management of storm and snowmelt waters

3.3.1 Where feasible, drainage will be redirected to prevent rain water and runoff to enter any of the excavation or backfill areas. Should a significant amount of water accumulate in an excavation that cannot be managed by isolation in one section of the excavation it will be pumped on to the land, in a rocky area, if possible to prevent erosion, at a point 31 m from the high water mark of any water body.

3.3.1.1 Should the excavated area be known to contain contaminated soil, then the water will be collected and tested. Should the water meet the discharge criteria in the permit, then the water will be discharged at the nearest approved discharge location. If the water does not respect the discharge criteria, then the water will be treated prior to its discharge. Discharge of treated water will be performed with the prior authorisation of AANDC, once approval of test results showing that the water respects the applicable regulations and discharge criteria from the water licence.

3.3.2 Stockpile areas will be left in a tidy, well drained condition, free of standing surface water. Any unused aggregates will be left in neat compact stockpiles.

3.3.3 A crowned surface will be maintained on all horizontal surfaces to allow for water runoff. Material will not be placed in free standing water. Low areas will be drained before placing materials.

3.3.4 All excavations will be kept free of water while work is in progress. Open excavations will be protected against flooding and damage due to surface run-off. Water will be discharged so as not to affect continuing, or completed work.

3.3.5 Flow of surface drainage or natural water courses will not be obstructed, unless required by the work.

3.3.5.1 When working within and/or in the vicinity of a drainage course or a body of water, silt fences, floating silt curtains and/or sedimentation ponds will be erected to prevent the release of sediments or deleterious materials into the water.

3.3.5.2 At the end of each work season the site will be left in a condition to prevent any erosion and/or ponding of water.

3.3.5.3 It is not anticipated that storm and snowmelt waters will generate a significant quantity of water to be managed.

3.3.5.4 The contaminated soil containment cell top surface is covered with a geomembrane and sloped to prevent any accumulation of water. Should water accumulate on the surface of the geomembrane, it will be treated as non-contaminated, as it has not come into contact with any contaminated materials.

4. MINIMIZATION OF WATER VOLUMES AND PREVENTION OF RUNOFF

4.1 **The following measures will be put into place to reduce the amount of water used at the Airport site during construction and to reduce the amount of waste water generated:**

4.1.1 Prevent surface water from entering excavated and backfill areas by erecting containment or diversion berms prior to starting excavation and or backfill operations.

4.1.2 Minimize the length of time open excavations are exposed to atmospheric conditions.

4.1.3 Promote the use of hand tools (brooms and shovels) and pressurized equipment (pressure washers) which need and generate less water during cleaning.

4.1.4 In any areas where contaminated soil is found, dewater excavations or backfill areas promptly to minimize the generation of contact water.

4.1.5 Any snow accumulated on top of work areas will be managed by removal of the snow prior to the start of work. The snow will be placed in an area where it will flow into natural drainage paths as it melts.

5. SURFACE WATER MONITORING PROGRAM

5.1 In order to ensure that the Project activities do not have a negative impact on the surface waters next to or in the Project area, a surface water monitoring program will be conducted over the entire span of the Project.

5.2 The following locations will be monitored at the start and end of every season. The coordinates of the monitoring points are included below and are good to within 10 m:

- Inflows:
  - Carney Creek Upstream Project Area
    - 63°45'45"N, 68°33'1"W
  - Start of Inner Field Drainage Ditch
    - 63°45'46"N, 68°33'59"W
- Outflows:
  - Carney Creek Downstream Project Area
    - 63°45'19"N, 68°32'23"W
  - Inner Field Ditch Downstream Project Area
    - 63°45'9"N, 68°32'11"W
  - Southern Inner Field Downstream Project Area
    - 63°44'56"N, 68°31'57"W

A figure showing the monitoring locations is presented in Appendix B.

5.3 In addition the following areas will be sampled, upstream and downstream of the works, prior to and immediately following the works:

- Installation of the Arch Culverts in Carney Creek;
- Construction of the new fish habitat in the drainage ditch to the northeast of Carney Creek.

5.4 The surface water monitoring program will measure the following parameters in the water:

- Total Petroleum Hydrocarbons;
- Benzene, Toluene, Ethylbenzene, Xylene;
- Biological Oxygen Demand;
- Total Suspended Solids;
- Ethylene Glycol;
- Propylene Glycol;
- Polycyclic Aromatic Hydrocarbons;
- Metals.

6. CONTAMINATED WATER

6.1 Water testing and management of contaminated water is planned to be carried out by Qikiqtaaluk Environmental Inc. (QE)

6.2 Contaminated water treatment to respect discharge criteria in of the Nunavut Water Board is planned to be done by QE. The treatment of this water will be done under QE's Water Licence (number 1BR-THI1419).

6.3 Any water generated in areas where there is known or suspected soil contamination will be tested, and, if necessary treated to respect the discharge criteria of the regulatory body, prior to discharge.

6.4 Contaminated water may be temporarily stored in existing tanks or lined berm areas while awaiting test results. The volume of contaminated water storage in any tank or berm area during winter months shall not exceed 50 % of the total capacity of the tank or berm area. Storage locations are presented in the drawing in Appendix A

6.5 Contaminated water will be managed as per section 5.4 of the Soil and Ground Water Management Plan submitted as part of the application to the Nunavut Water Board.

6.6 Authorisation will be obtained from an Aboriginal Affairs and Northern Development Canada Water Resource Officer prior to starting any discharge, when required**.**

6.6.1 All treated water will be discharged at an approved discharge location.

APPENDIX A

LOCATIONS OF WATER STORAGE BASINS, WITHDRAWAL POINTS AND DISCHARGE LOCATIONS

HAZARDOUS WASTE STORAGE

HOLDING BASSINS (width: HDPE Geomembrane Roll [est. 7 meters]; length: determine by desire volume

HOLDING BASSINS (width: HDPE Geomembrane Roll [est. 7 meters]; length: determine by desire volume

HOLDING BASSINS (width: HDPE Geomembrane Roll [est. 7 meters]; length: determine by desire volume

HOLDING BASSINS (width: HDPE Geomembrane Roll [est. 7 meters]; length: determine by desire volume

CONTAINMENT CELL

WATER EXTRACTION FOR DUST SUPPRESSION AND SOIL COMPACTION (less than 100m3/day between July and October 2014 to 2017)

WATER EXTRACTION FOR DUST SUPPRESSION AND SOIL COMPACTION (less than 100m3/day between July and October 2014 to 2017)

HOLDING BASSINS (width: HDPE Geomembrane Roll [est. 7 meters]; length: determine by desire volume

X WATER DISCHARGE POINTS

		1	2	3	4	5	6	7
HOLDING BASSINS	X	522106,1	522057,5	522467,01	522457,153	522375,59	522683,8	522815,778
	Y	7069974,8	7070037,8	7070222,94	7070232,87	7069802,73	7069546,6	7069198,41
WATER DISCHARGE POINTS	X	522113,6	522052,9	522449,797		522369,49	522694	522815,137
	Y	7069966,6	7070016,4	7070203,37		7069806,03	7069538	7069184,86
CONTAINMENT CELL	X	522117,732	522160,264	522231,52	522188,947			
	Y	7069908,38	7069950,71	7069880,49	7069838,21			
WATER EXTRACTION ZONE #1	X	522286,57						
	Y	7069742,04						
WATER EXTRACTION ZONE #2	X	522702,8						
	Y	7069407,5						

CLIENT

Nunavut

ARCTIC INFRASTRUCTURE PARTNERS

INFRARED CAPITAL PARTNERS
BOUYGUES BUILDING Canada
COLASCANADA
WINNIPEG AIRPORTS AUTHORITY

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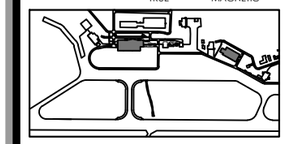
Keyplan

N TRUE N MAGNETIC



Legend

PROPERTY LINE
AIRPORT PROPERTY LINE
FENCE
CULVERT
OVERHEAD POWER LINE

Revision	By	Appd	YYYY.MM.DD
ISSUED FOR FINAL DESIGN	LM	KH	2014.05.13
Issued	By	Appd	YYYY.MM.DD

Permit-Seal

SEE ORIGINAL REVISIONS FOR PERMITS & SEALS

Project

IQALUIT INTERNATIONAL AIRPORT IMPROVEMENT PROJECT
IQALUIT - NUNAVUT - CANADA

Title

EXISTING SITE GRADING PLAN

Project No.
144313128

Scale	Date	Revision
1:4,500	2015-JUN-05	6

Drawing No.
IIAIP-CD-EXT-STA-PLN-CC-103-6

CC-103

Location of Backup Water Extraction Point

APPENDIX B

LOCATION OF WATER MONITORING POINTS

Location of Monitoring Points (Green pins = upstream points, red pins = downstream points)