Terms of Reference

Project Information		
.1	Project Title:	Consulting Services – Water Reservoir.
.2	Project Location:	Eureka Station, Eureka, Nunavut
.3	PWGSC Project Number:	R.055428.001
.4	User Department:	Environment Canada

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

Canada

TERMS OF REFRENCE

Architectural and Engineering Resources

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1.0 PROJECT INFORMATION

1.1 SERVICES

1.1.1 Environment Canada has identified a priority to upgrade the capacity of fresh water storage at Eureka High Arctic Weather Station in Eureka, Nunavut.

1.1.2 Public Works and Government Services Canada (PWGSC) intends to retain a Professional Civil/Municipal Engineering Company for the following services.

.1 To conduct an investigative study, based on Option #3 (Worley Parsons Report) – Construct New Reservoir North of Existing Reservoir (c/w multiple bore hole investigation a new recommended water reservoir site north of the fuel storage tank farm, investigate desalinization feasibility and investigate/quantify granular material sources. There are some contaminated plume areas around Water Reservoir as shown on drawing C1. Provide an engineering solution, feasible to the site conditions, to prevent the plumes from contaminating the water reservoir.

1.1.3 The PWGSC General Procedures and Standards Document (GP&S)

.1 The Terms of Reference (TOR) document must be used in conjunction with the GP&S, as the two documents are complimentary.

.2 The TOR describes project specific requirements, services and deliverables while the GP&S document outlines minimum standards and procedures common to all projects.

.3 In the case of conflict between the two documents, the requirements of the TOR override the GP&S Document.

2.0 PROJECT INTRODUCTION AND BACKGROUND

2.1 WATER RESERVOIR UPGRADE

2.1.1 The existing Water Reservoir has reached its capacity. In recent years the population using this water has increased significantly. The concern is that we may have a shortage of water in the near future. Currently the water usage is restricted during high population seasons. The current reservoir has never been dredged to remove accumulated silt since its construction. We expect that the capacity of the reservoir has decreased significantly due to silting.

2.1.2 Currently the reservoir is filled each summer by pumping water from Station Creek when it starts running clear. The volume of available water from the creek depends upon the previous winter snowfall. Some years, it is possible to top up the reservoir again before freeze-up; however, during a dry year there is only one opportunity. If sufficient water is not captured during this window of opportunity there will be a water shortage until the next runoff occurs.

2.1.3 The objective of this study is to confirm the water volume requirements for design period of next 30 years; Complete additional geotechnical investigation for the location of Option #3 in the Worley Parsons Report 2010 (Drawings attached); Investigate and provide a suitable solution to mitigate the spread on the contamination plume at the reservoir site; investigate the possibility of a new reservoir location north of fuel tank farm; Investigate and quantify the quality and quantity of granular material available along Station Creek, Blacktop Creek, Remus Creek, and along ridge south of PEARL Lab (site map attached), and investigate the feasibility of desalinization as a year round source of potable water.

2.2 ENVIRONMENTAL STRATEGIES

2.2.1 Development of the Infrastructures is broadly guided by the Department of Environment (EC) Sustainable Development Strategy, which recognizes the EC commitment to the progressive integration of environmental, social and economic considerations into decisions concerning the organization's focus, priorities and management strategies. The EC has made a commitment to sustainable development in relation to facilities management and design, incorporating sustainable design principles in the construction of new facilities.

2.3 USER DEPARTMENT

2.3.1 The User Department, referred to throughout the Terms of Reference, is EC – Environment Canada.

2.4 CONSTRAINTS AND CHALLENGES

2.4.1 Site constraints and challenges:

.1 Eureka consists of a Meteorological Service of Canada weather station, an airstrip and a military facility. There are no civilian operated facilities at Eureka.

.2 The weather station at Eureka is in an isolated location in the high Arctic. Due to the northern location of the site, the construction season is very short. In a normal year, outdoor construction is feasible from mid June to early September. Snow and below freezing temperatures can occur at any time during this period. The short season is somewhat compensated for by the long hours of daylight.

.3 Normal access to site is by air charter from Resolute Bay, Nunavut. Once a year, normally in early September, freight is brought to the station by sealift. For the purpose of this contract it is anticipated that all equipment and materials will be airlifted to the site during the early part of the summer of 2012.

.4 Booking arrangements and preparations for shipping and delivering all materials, construction tools and other equipment, including payment for all costs unless otherwise specified, regardless of shipping methods, to the site will be the direct responsibility of the Contractor.

.5 There are no medical facilities at Eureka and it is the Contractor's responsibility to become familiar with the location of the nearest facilities and to have a contingency plan available in the event that the evacuation of the Contractor's workers is required for medical reasons.

.6 There is no source available on site for purchasing prescription or over-the-counter medical or pharmaceutical supplies and there are no facilities for purchasing personal sundry materials. Make all workers aware of the need to take such items with them to Eureka.

.7 Accommodation facilities and messing (food) for contractor’s workforce will be provided at no cost to the Contractor.

.8 Contractor is responsible to make all travel arrangements for the construction crew. Commercial transportation is available as far as Resolute Bay, Nunavut, while chartered aircraft will be required from Resolute Bay to Eureka.

.9 All drilling and site investigation shall take place during the summer months.

.10 During the summer months, the runway has weight restrictions limiting the size and weight of landing aircraft. This shall be considered when identifying what size and type of drilling/coring rig to be used on site.

3.0 SCOPE OF WORK

3.1 GENERAL

3.1.1 The consultant shall provide the following services.

.1 Assist the Departmental Representative in carrying out his duties and responsibilities to ensure that the contracted work is completed according to Department of Public Works and Government Services Canada’s, and

EC Standards, Policies, and Procedures or other directives.

.2 Review the terms of reference and other documents and become familiar with all of the requirements of the contract.

3.1.2 All site work is to be coordinated through the Site Program Manager, Rai Lacotte or Al Gaudet, Eureka High Arctic Weather Station, Eureka, Nunavut.

3.2 WATER RESERVOIR AND RELATED WATER TREATMENT FACILITIES.

3.2.1 Identify feasible water conserving practices at the Station to reduce water demand and storage requirements.

3.2.2 Refine the water reservoir option analysis for Option #3 including:

.1 Additional geotechnical assessment to confirm the subsurface materials;

.2 Assessment of conflicts with existing and potential Station infrastructure;

.3 Study defining how to manage the contamination located immediately east;

.4 Investigate provision of a new pump house and pipeline routes or providing a pipeline to convey water from the reservoir to the treatment plant;

.5 Investigate potential of intentional accumulating snow above reservoir to limit ice formation and increase active storage depths.

3.2.3 Provide a plan and carry out drilling/coring c/w sample analysis.

.1 Quantity and depth of core samples sufficient to determine subsurface materials required for new reservoir construction in location and size identified for Option #3 (Worley Parsons).

.2 Quantity and depth of core samples sufficient to assess capacity and quality of granular materials located at: Station Creek, Blacktop Creek, Remus Creek and PEARL.

.3 Quantity and depth of core samples sufficient to determine subsurface materials required for new reservoir construction in location and similar size of Option #3 located north of Fuel Storage Tank Farm if determined as a feasible location..

.4 Quantity and depth of core samples sufficient to determine subsurface materials and extent/depth of contaminated plume to identify solutions to mitigate the spread to the existing and new reservoir (Option #3).

3.2.4 Based on the annual potable water demands of the Station, determine if desalination or distillation or ground source water (wells) are a feasible alternative as a sole source of potable water or if a smaller, portable type desalination/distillation systems could be utilized for water shortage emergencies. Identify what would be required to implement this year round or temporary emergency solution given the current infrastructure and resource limitations in Eureka as well as any and all relative regulatory regulations concerning the use of seawater as potable water source. Provide cost estimates for capital and operating/maintenance over a 30 year life cycle. Identify the design

requirements for year round pipeline operation and logistics of the supply intake for sea water. Explore the possibility of ground water wells for potable water sources and identify design requirements for the wells and pumping system to provide a year round operational system.

3.2.5 All work prepared by the Consultant shall bear the professional stamp and signature of a qualified engineer representing the firm – licensed to practice in Nunavut.

3.2.6 Assess available quantities and quality of granular materials at four locations: Station Creek, Blacktop Creek, Remus Creek and Top of hill at PEARL.

.1 Additional geotechnical assessment to confirm the subsurface materials, quality, quantity and depth of excavation required to recover granular materials required for the 3 large infrastructure recapitalization projects in Eureka & for maintenance of the Runway thereafter;

3.2.7 Assess feasibility of an optional location for new water reservoir north of fuel storage tank farm on upper section of hill. Complete all surveying required, including geotechnical survey, in order to proceed to design, if location is determined to be a suitable option.

3.2.8 Discuss preliminary findings with PWGSC and EC Reps before leaving Eureka site in order to ensure completeness of the information gathered.

3.3 GEOTECHNICAL INVESTIGATION AND MATERIAL TESTING

3.3.1 Analyze the project requirements including any amendments. Review all available information; inquire from site staff, client, local or other contractors and consultants familiar with site regarding the aggregate resources and their quality.

3.3.2 Conduct the investigation and material testing as follows. Assess available quantities and quality of granular materials at four locations: Station Creek, Blacktop Creek, Remus Creek and top of hill at PEARL.

.1 Additional geotechnical assessment to confirm the subsurface materials, quality, quantity and depth of excavation required to recover granular materials;

.2 Quantity and depth of core samples sufficient to assess capacity and quality of granular materials located at: Station Creek, Blacktop Creek, Remus Creek and PEARL

3.3.3 Conduct all investigation and testing in accordance with American Society for Testing and Materials ASTM Standards.

3.3.4 Classify and identify depth and type of existing natural soils or rock material in proposed recommended Water reservoir site based on Option 3 of Worley Parsons report and location identified north of Fuel Storage tank farm.

3.3.5 There are some contaminated plume areas around Water Reservoir as shown on drawing C1. Provide engineering solution options that are feasible and cost effective based on existing site conditions to prevent plumes contaminating the water reservoir. For example one of the option can be a French Drainage barrier with a collection reservoir.

3.3.6 Determine and plot material gradation.

3.3.7 Plot material log indicating depth versus material type, properties of materials e.g. California Bearing ratio CBR, Standard Penetration Test SPT, Moisture content, sample methods, and temperature, etc

3.3.8 Determine permafrost active and non-active depths.

3.3.9 Use the Canadian Geotechnical Manual Guidelines for visual classification for ice in soil samples.

3.3.10 Provide a plan for excavating in permafrost and rock blasting during the construction year. Plan is to include necessary procedures for contaminated soil removal, relocation, and disposal should this be necessary.

3.3.11 List any applicable codes, best practices, regulations for excavating and constructing in permafrost zone. And for rock blasting and for contaminated soil removal, relocation, and disposal should this be necessary

3.3.12 Prepare a report including executive summary and all data as appendices.

3.3.13 All work prepared by the Consultant shall bear the professional stamp and signature of a qualified engineer representing the firm.

3.4 DIGITAL TOPOGRAPHIC SURVEY

3.4.1 Conduct digital topographical control survey as for the optional water reservoir location north of fuel storage tank farm as follows. Area to be surveyed must be equal to footprint of Option #3 plus 20% all four directions.

3.4.2 Control to be produced using the 6-degree UTM grid system and geodetic mean sea level datum for all survey positioning. The horizontal datum is to be NAD 83. Tie in total station survey with a minimum of three (3) geodetic monuments and clearly indicate them on survey drawings. Provide ASCII format file containing information in the following order for each survey point: Point number, Northing, Easting, Elevation, and description (as required to identify specific items, abbreviations are acceptable if code table for abbreviations is provided).

3.4.3 Indicate and define Grid North UTM, and True North relative angles.

3.4.4 Process horizontal control data using rigorous least squares adjustment program.

3.4.5 Follow surveying convention to clearly indicate all topographical features.

3.4.6 Each instrument set up is to pick up minimum of two spot elevations in the previous instrument set up.

3.4.7 Survey all surfaces using a maximum 20 m stations spacing including all edges and corners. No point further than 20 meters from its nearest neighbouring point.

3.4.8 Where necessary, use tighter grid spacing to ensure all important features, including survey boundaries, feature break lines such as edge of ditch, edge of water reservoir, edge of water, edge of silting, are obtained. Take additional survey points wherever there is change in horizontal alignment of features and wherever there is change in slope.

3.4.9 In addition to the above noted survey points, locate and provide details of:

- .1 Minimum three reference points that correspond to site survey – topo mapping done by Worley Parsons Report 2010..
- .2 Any other object within the survey area

3.4.10 Prepare a 1:1000 scale AutoCAD drawing of all survey points. Each point to have appropriate survey data attached (i.e. northing, easting, elevation, description).

- .1 Join like features (e.g. water reservoir edge, reservoir water edge, silt limit edge, ditch or swale edge, ditch or swale centreline, etc.) with lines and Indicating break lines for features.
- .2 Logically assemble and label like features/object data Annotate by colour, and group by layer in the CAD file. Ensure each data point has its associated Point number annotated. Topographical data points and benchmarks are to be placed on exclusive drawing layers. Provide legend describing each point type Description code.
- .3 Provide contour lines at maximum 0.20 m intervals to indicate topographical features on the 1:1000 scale drawings based on the grid elevation data.
- .4 Surveyed area is to be mapped into a single CAD file only. The CAD file is not to be broken down into separate sub-files joined by match lines. Use ‘ground’ coordinates to create the file.
- .5 Provide drawing in UTM Ground Coordinates; indicate Bench Marks and scale factor used to calculate Ground Coordinates.
- .6 Do not use drawing level 0 (zero).
- .7 Clearly indicate geodetic monuments on the drawing

3.4.11 Provide ASCII format files containing information in the following order for each survey point: Point number, Northing, Easting, Elevation, and Description (as required to identify specific items, abbreviations are acceptable provided a legend of the abbreviations is also submitted). Files are to be comma delimited.

3.4.12 Submittals – The following is to be submitted:

- .1 One ASCII survey point file in each of the following formats:
  - .1 UTM ‘ground’ coordinates

.2 ·UTM ‘grid’ coordinates

3.4.13 Survey Precision

.1 Vertical Precision- the vertical precision is to be 15mm for gravel and grass surfaces.

.2 Horizontal Precision- the Horizontal control points to be 1 in 25000.

3.5 CHANGES IN SCOPE OF SERVICES OR ROLE OF PERSONS

3.5.1 Make changes in the Services to be provided for the Project, including changes which may increase or decrease the original scope of Services, when requested in writing by the Project Manager; and

3.5.2 Prior to commencing such changes, advise the Project Manager of any known and anticipated effects of the changes on contract fees, Schedule, and other matters concerning the Project.

3.5.3 For proposed changes to the roles of any and all persons, submit in writing, to the Project Manager for approval, the names, addresses, qualifications and experience of the proposed individual(s).

4.0 SCHEDULE

4.1 GENERAL

4.1.1 The following milestone dates are to be incorporated into the project schedule:

.1 Award contract – August 27, 2012

.2 Start Site Investigation Work – September 17, 2012

.3 Site Work completed by – October 17, 2012

.4 Draft report – November 30, 2012

.5 Final report and documentation completed – January 15, 2013

5.0 CONSULTANT TEAM

5.1 GENERAL

5.1.1 The Consultant and his/her personnel identified in the submission, including Sub-Consultant and Specialists comprise the integrated consultant team (Consultant Team). The Consultant Team will be required to maintain its expertise for the duration of the project.

5.1.2 The Consultant shall be responsible to co-ordinate and direct all Consultant Team activities. The Consultant shall be responsible for the performance of his staff and ensure that they comply with all Airport Safety, Security, and Operational Procedures and Regulations.

5.1.3 The Consultant Team shall be comprised of qualified professional and technical expertise with extensive relevant experience, and shall be capable of providing the required services. All members of the

Consultant team shall be eligible to work in Nunavut.

5.1.4 Personnel, identified by the Consultant in his proposal and approved by the PWGSC, may not be changed without written approval.

5.1.5 Expertise and relevant experience requirements for this project are as follows:

.1 It is anticipated that the following personnel will be involved in the execution of this project.

.1 Senior Professional Civil/Municipal Engineer
.2 Professional Geotechnical Engineer
.3 Senior Technologist
.4 Technician
.5 Survey Party Chief
.6 Chain person/Rod Person/ Support Staff

.2 Senior Professional Civil/Municipal Engineer

.1 Registered Professional Engineer with a civil engineering degree and with a minimum of Seven years experience in municipal works such as water supply and waste water treatment and systems. Work experience related to heavy civil engineering and construction in permafrost areas is required.

.2 Senior Professional Engineer will be responsible for overall quality of the project. Senior Professional Engineer will direct Senior technologist and technicians' work and will ensure that the work is done in accordance with ASTM and other applicable standards.

.3 Professional Geotechnical Engineer

.1 Registered Professional Engineer with a civil engineering degree and with a minimum of seven years experience in heavy civil construction, geotechnical investigations, materials testing, analysis, and solving construction material related problems. Experience dealing with project in permafrost areas is desirable.

.4 Senior Technologist

.1 A graduate in Civil Technology from a recognised technical school/college and C.S.A. certified.

.2 Minimum seven (7) years experience in Civil and Municipal works such as water supply and waste water treatment and systems, heavy civil construction involving material testing (soil, concrete and asphalt), grading and paving operation Experience related to heavy civil engineering and construction in permafrost areas is desirable.

.5 Technician

.1 Preferably a graduate in civil Technology from a recognised technical school/college and have some experience in municipal and civil engineering and material sampling and testing.

.6 Survey Party Chief

.1 A graduate in Land Surveying Technology from a recognised technical school/college and. and minimum 5 years experience in surveying with Total Station including hydro graphic survey.

.7 Chain Person/Rod Person/ Support Staff

.1 Preferably a graduate in Land Surveying Technology from a recognised technical school/college and have some experience in land surveying.

6.0 EXISTING DOCUMENTATION

6.1 EXISTING DOCUMENTATION

6.1.1 The following documents will be made available upon request:

.1 Drawing C1. Site plan indicating Water Reservoir Area to be investigated and Surveyed, and Bore hole locations.

.2 Drawing C2-1 and C2-2 Site plan indicating Proposed Sewage Location and Force Main Alignment and Areas to be investigated and surveyed, and core hole locations.

.3 Worley Parsons Report

7.0 LINES OF COMMUNICATION

7.1 GENERAL

7.1.1 Unless otherwise directed by the Departmental Representative, conduct all project communication through the Departmental Representative only.

7.2 MEDIA

7.2.1 The Consultant shall not respond to requests for project related information or questions from the media. Such inquires are to be directed to the Departmental Representative.

7.3 GENERAL PROJECT DELIVERABLES

7.3.1 All work will be undertaken and reported in metric units. Where deliverables and submissions include summaries, reports, network diagrams, drawings, plans, or schedules submit deliverables as follows:

.1 Hard copies and electronic submissions on CD: two (2) copies of each.

.2 Electronic format shall mean:

.1 Written reports and studies:	Microsoft Word
.2 Spreadsheets and budgets:	Microsoft Excel
.3 Presentations:	Microsoft Power Point
.4 Schedules	Primavera
.5 Drawings:	Auto Cad
.6 Web	Adobe PDF
.7 Internet	HTML, Macromedia Flash

7.4 ACCEPTANCE OF PROJECT DELIVERABLES

7.4.1 While PWGSC acknowledges the Consultant's obligations to meet project requirements, the project delivery process entitles PWGSC to review work. PWGSC reserves the right to reject undesirable or unsatisfactory work.

.1 The acceptance does not relieve the Consultant of professional responsibility for the work and compliance with the contract.

7.5 PROJECT RESPONSE TIME

7.5.1 It is a requirement of this project that the key personnel of the Prime Consultant and Sub-Consultants or specialist firms are personally available to attend meetings or respond to inquiries within two working days.

7.6 MEETINGS

7.6.1 The Departmental Representative shall arrange a meeting before the start of work to review and confirm the scope of work and to reconfirm the security and other operational procedures. Other meetings will be on as required basis.

7.6.2 Meetings will be conducted either by teleconference or in person in Winnipeg and Eureka, Nunavut.

7.6.3 The consultant shall:

.1 Attend the meetings,

.2 Record the issues and decisions and

.3 Prepare and distribute minutes within two (2) working days of the meeting.

8.0 AUTHORITIES, SUBMISSIONS, REVIEW AND APPROVAL PROCESSES

8.1 PROVINCIAL AND MUNICIPAL AUTHORITIES/JURISDICTION

8.1.1 The Federal Government does defer to provincial and municipal authorities for specific regulations, standards and inspections. In areas of conflict, the Federal Authority prevails.

.1 Nunavut Ministry of Labour

- .1 Employment Standards
- .2 Construction Safety
- .3 Designated Substance Management
- .4 Workers Compensation

.2 Nunavut Ministry of the Environment

- .1 Building Discharges into the air, water and ground
- .2 Disposal of Designated Substances including Asbestos

8.2 REVIEW SUBMISSIONS

8.2.1 The consultant shall make regular submissions of the project progress for review by the PWGSC. The Consultant's response to review comments shall be in writing to the Departmental Representative.

8.2.2 Project Delivery Team (including RPS Technical Resources Team and the User Department Reviews)

- .1 Purpose of review and approval:
  - .1 Scope Of work and technical quality assurance
- .2 Submissions:
  - .1 Reports.
    - .1 The Consultant will outline the results of the findings obtained during the assessment in a detailed report. The report shall include, but not limited to the following:
      - .1 Executive Summary
      - .2 Introduction
      - .3 Methodology
      - .4 Observations
      - .5 Sample results
      - .6 Conclusions
      - .7 Recommendations
    - .2 The report shall include a detailed description of the methods employed, results obtained and interpretation of the findings. The report shall provide documentation, including references and photographs, to support the findings and conclusions. Laboratory data shall be summarized in a table with the applicable criteria and/or standards that are used for the numerical comparisons.
    - .3 All site plans must be in AutoCad format.
- .3 Submission schedule - submissions are reviewed at;
  - .1 Completion of site work, 90% draft report and final report..
  - .2 When site work is complete, consultant will call project manager from site to debrief and go over the check list to ensure that all of the information is captured before leaving the site.
- .4 Expected turnaround time:
  - .1 Approx. 2 week