Services Partagés Canada
Shared Services Canada

RETURN RESPONSES TO:

RETOURNER LES RÉPONSES À:

Philip de Leon (Contracting Authority / Autorité contractante)
Bid Receiving Shared Services Canada | Réception des soumissions de SPC
Services partagés Canada
700 Montreal Road
Ottawa, Ontario
K1A 0P7

INVITATION TO QUALIFY

INVITATION À SE QUALIFIER

Title – Sujet	
High Performance Computing ITQ Calculateur haute performance ISQ	

Solicitation No. – N° de l'invitation 2B0KB-123816/B	**Date** October 04, 2013

Client Reference No. – N° référence du client 2B0KB-123816/B

GETS Reference No. – N° de reference de SEAG

File No. – N° de dossier C74.**2B0KB-123816/B**	**CCC No. / N° CCC - FMS No. / N° VME**

Solicitation Closes – L'invitation prend fin at – à 02 :00 PM on – le October 18, 2013 – 18 octobre 2013	**Time Zone Fuseau horaire** Eastern Standard Time (EST) Heure Normale de l'Est (HNE)

F.O.B. - F.A.B.
Plant-Usine: ☐   **Destination:** ☐   **Other-Autre:** ☐

Address Inquiries to : - Adresser toutes questions à: Philip de Leon	**Buyer Id – Id de l'acheteur**

Telephone No. – N° de téléphone : 819-956-1544	**Email - Courriel** philip.deleon@spc-ssc.gc.ca

Destination – of Goods, Services, and Construction:
Destination – des biens, services et construction :
See Herein
Voir aux présentes

Delivery required - Livraison exigée See Herein Voir aux présentes	**Delivery Offered – Livraison proposée**

Comments - Commentaires
This document contains a Security Requirement / Ce document comprend des exigences relatives à la sécurité

Vendor/Firm Name and address
Raison sociale et adresse du
fournisseur/de l'entrepreneur

Issuing Office – Bureau de distribution
Shared Services Canada / Services partagés Canada
Procurement And Vendor Relationships / Approvisionnement et relations avec les fournisseurs
11 Laurier Street
Gatineau, Quebec
K1A 0S5

SHARED SERVICES CANADA

High Performance Computing

INVITATION TO QUALIFY

TABLE OF CONTENTS

1 Part 1: General Information

The Government of Canada (GC / Canada) established Shared Service Canada (SSC) on August 4, 2011. Part of its mandate is to operate and transform Canada's Information Technology (IT) infrastructure. Certain departments and crown corporations are required by the *Shared Services Canada Act* to obtain their network services from SSC. All entities that obtain such services from SSC are referred to in this Invitation to Qualify as SSC's Clients.

1.1 Introduction

This Invitation to Qualify (ITQ) is neither a Request for Proposal (RFP) nor a solicitation of bids or tenders and is intended only to pre-qualify suppliers. Together this ITQ and the subsequent Review and Refine Requirements Phase (RRR) and bid solicitation are the three parts of the solicitation process. These phases are described in detail within Part 3. No contract will result from this ITQ. The objective of this pre-qualification phase is to qualify suppliers who have demonstrated and proven skills and experience in providing high performance computing (HPC) solutions and is described in Part 6.

Suppliers who do not successfully qualify at the ITQ Phase will not be able to participate in subsequent phases of the solicitation process.

Given that this ITQ or the subsequent phases may be cancelled by Canada at any time in accordance with the applicable terms, it may not result in the subsequent procurement process described in this document. Because the ITQ is not a request for a proposal, suppliers who submit a response can choose not to bid on the subsequent phases.

The ITQ is divided into the following parts:

Part 1: General Information: provides an overview of the requirement.

Part 2: Respondent Instructions: provides instructions, clauses and conditions of the ITQ.

Part 3: Procurement Process: provides suppliers with an overview of the phases of the procurement process.

Part 4: Response Preparation Instructions: provides suppliers with instructions on how to prepare and submit their response.

Part 5: Security and Financial Requirements: includes information on the security clearances that will be required by Canada at various stages.

Part 6: Evaluation Procedures and Basis of Qualification: indicates how the evaluation of the responses will be conducted, and the basis for selecting the Qualified Respondents.

The following annexes are part of this ITQ:

Annex A: Overview of the Existing NCF Cyberinfrastructure & Expected Future Requirements

Annex B: ITQ Submission Form

Annex C: ITQ Mandatory Criteria Form

Annex D: Information and Instructions for Canada Supplied ITQ Gate Test

1.2 Overview of the Requirement

This ITQ is being issued by SSC. It is intended that the contract resulting from any subsequent bid solicitation will be used by SSC to provide shared services to its clients, which include SSC itself, those government institutions for whom SSC's services are mandatory at any point during the Contract Period, and those other organizations for whom SSC's services are optional at any point during the Contract Period and that choose to use those services from time to time. This solicitation process does not preclude SSC from using another method of supply for these or other entities of the Government of Canada with the same or similar needs.

Canada has a requirement for the lease of a 24/7 government-wide mission critical HPC solution consisting of the following components: a supercomputer, global storage cloud, high-speed local/storage area networks, batch scheduling environment, pre- and post-processing clusters, vendor supported solution (Hardware, Operating System and Software Development Environment), associated training and conversion assistance services and maintenance and support services for the solution. Canada is also considering at this time the capacity for the provision of a fully hosted facility and additional capacity for the HPC solution. The contract period for any resulting contract would be 8 ½ years, with Canada retaining the option to extend for an additional 2 ½ year. This contract period does include the initial implementation and conversion period.

1.3 Volumetric Data and Scope of Future RFP

The scope of the requirement is described in Annex A: Overview of the Existing NCF Cyberinfrastructure & Expected Future Requirements. It is provided for information purposes only and may be used by Canada for discussion in the subsequent Review and Refine Requirements Phase of the HPC solution solicitation process. The inclusion of this information in the ITQ does not represent a commitment that future requirements for HPC services in any subsequent RFP will be consistent with this information.

1.4 National Security Exception, Data Sovereignty and Security, Industrial and Regional Benefits Policy

Canada has invoked the National Security Exception in respect of this requirement and as a result, the trade agreements do not apply to this requirement.

The protection of Canada's data which will be processed by the HPC is critical to the integrity of government programs and to national security and is also required pursuant to a number of laws, including privacy laws. While all data stored by Canada must be protected against unauthorized access, personal, confidential and sensitive data require even stronger levels of control. Canada's specifications for the HPC will be designed considering these parameters and the Request for Proposal and Resulting Contract clauses will incorporate various security measures.

The Canadian Industrial and Regional Benefits (IRB) policy may apply to this procurement. For further information on the IRB policy, please refer to the IRB policy website at www.ic.gc.ca/irb.

2 Part 2: Respondent Instructions

2.1 Standard Instructions, Clauses and Conditions

All instructions, clauses and conditions identified in this ITQ by number, date and title are set out in the Standard Acquisition Clauses and Conditions (SACC) Manual issued by PWGSC. The Manual is available on the PWGSC Website: https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual.

Respondents who submit a Response agree to be bound by the instructions, clauses and conditions of the ITQ.

Standard Instructions - Goods or Services - Competitive Requirements 2003 (2013-06-01) are incorporated by reference into, and form part of, the ITQ, except that:

a) Wherever the term "bid solicitation" is used, substitute "Invitation to Qualify"

b) Wherever the term "bid" is used, substitute "Response"

c) Wherever the term "Bidder(s)" is used, substitute "Respondent(s)"

d) Section 3 is amended by deleting "Pursuant to the Department of Public Works and Government Services Act, S.C. 1996, c.16"

e) subsection 4 and 5 of Section 1 are deleted.

f) Subsection 5(4), which discusses a validity period, does not apply, given that this ITQ invites suppliers simply to qualify.

g) Section 7 is replaced by the following:

 i. A response delivered to the specified address after the closing date and time but before all responses have been assessed may be considered, provided the Respondent can prove the delay is due solely to a delay in delivery that can be attributed to the Delivery Company. Delivery Company means an incorporated courier company, Canada Post Corporation, or a national equivalent of a foreign country. The only pieces of evidence relating to a delay that are acceptable are:

    1. a cancellation date stamp; or

    2. a courier bill of lading; or

    3. a date stamped label

    that clearly indicates that the response was received by the Delivery Company before the closing date.

 ii. Postage meter imprints, whether imprinted by the Respondent or the Delivery Company, are not acceptable as proof of timely mailing.

h) For the purposes of this ITQ, the PWGSC policies referenced within the Standard Instructions are adopted as SSC policies.

If there is a conflict between the provisions of Standard Instructions - Goods or Services - Competitive Requirements 2003 and this document, this document prevails. All references to PWGSC contained within the Standard Instructions will be interpreted as a reference to SSC.

2.2   Submission of Responses

Responses must be submitted only to the Contracting Authority identified on page 1 of this ITQ by the date and time indicated on page 1 of this ITQ.

Due to the nature of the ITQ, transmission of responses by facsimile or electronic mail to SSC will not be accepted.

Suppliers are requested to send an e-mail notification to philip.deleon@ssc-spc.gc.ca prior to the closing date indicating their intention to submit a response.

2.3   Enquiries

All enquiries must be submitted in writing to the Contracting Authority identified on the cover page of the ITQ no later than 7 calendar days before the ITQ closing date. Enquiries received after the date and time specified may not be answered.

Respondents should make enquiries as early as possible and should not make assumptions about the nature of the requirements of this ITQ. Respondents who do not raise issues and questions they may have prior to the enquiry deadline do so at their own risk.

Respondents should reference, as accurately as possible, the numbered item of the ITQ to which the enquiry relates. Care should be taken by Respondents to explain each question in sufficient detail in order to enable Canada to provide an accurate answer.

Technical enquiries that are of a proprietary nature must be clearly marked "proprietary" at each relevant item. Items identified as "proprietary" will be treated as such except where Canada determines that the enquiry is not of a proprietary nature. Canada may edit the questions or may request that Respondents do so, so that the proprietary nature of the question is eliminated, and the enquiry can be answered with copies to all Respondents. Enquiries not submitted in a form that can be distributed to all Respondents may not be answered by Canada.

2.4   Applicable Laws

The relations between the parties will be governed by the laws in force in the Province of Ontario.

A Respondent may, at its discretion, substitute the applicable laws of a Canadian province or territory of its choice without affecting the validity of its Response, by inserting the name of the Canadian province or territory of its choice in Annex B: ITQ Submission Form. If no other province or territory is specified, the Respondent acknowledges that the laws of Ontario are acceptable to the Respondent.

2.5   Language

Respondents are requested to identify in the ITQ Submission Form (Annex B: ITQ Submission Form), which one of Canada's two official languages will be exclusively used for all future communications with Canada and, if successful in the ITQ evaluation, for all subsequent phases of the solicitation process.

2.6 Respondents' Conference

A respondents' conference will be held via WebEx on October 16, 2013. The conference will begin at 1:00 pm Eastern Daylight Saving Time. The Supply Chain Integrity process, to which this requirement will be subject, will be reviewed during the conference and questions on that process will be answered. It is recommended that respondents who intend to submit a response participate.

Respondents are requested to communicate with the Contracting Authority before the conference to confirm participation and obtain details for connecting to the WebEx. Respondents should provide, in writing, to the Contracting Authority, the names of the person(s) who will be participating at least 3 working days before the scheduled conference.

Respondents who do not participate will not be precluded from submitting a response.

3 Part 3: Procurement Process

3.1 Overview

The solicitation process is shown in Figure 3-1 and summarized in Table 1. This process will be used until the final RFP is issued to the Qualified Respondents in the Bid Solicitation Phase. This will allow Canada to conduct due diligence with respect to the HPC requirements with Qualified Respondents before issuing bid solicitation.
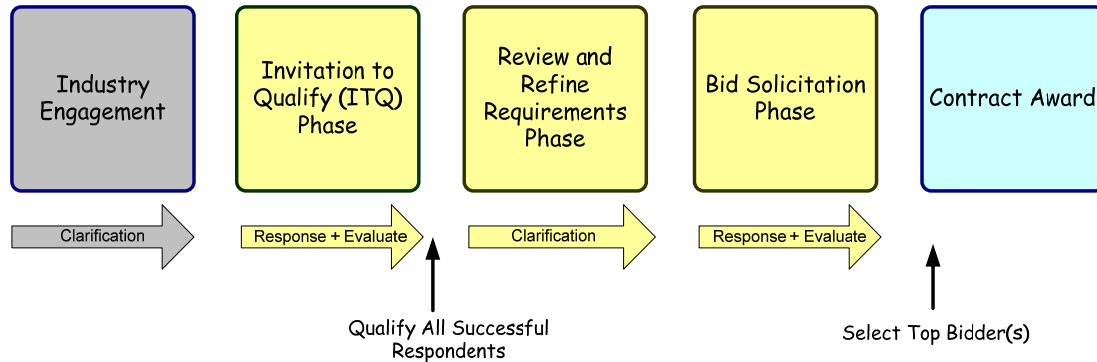

Figure 3-1 HPC Procurement Approach

Table 1: Summary of HPC Solicitation Process Phases

Phase	Objectives
Industry Engagement	•Identify organizations interested in delivering a HPC Solution for Canada •Solicit feedback from industry on HPC technology trends for the next decade ***This phase has been completed***
Invitation to Qualify (ITQ)	•Issue ITQ on the Government Electronic Tendering Service BuyandSell.gc.ca •Obtain ITQ responses from Respondents •Evaluate ITQ responses •Select the Qualified Respondents to continue to the Review and Refine Requirements Phase
Review and Refine Requirements	•Qualified Respondents have an opportunity to enhance their understanding of the HPC requirements and provide feedback on the requirements
Bid Solicitation	•Issue RFP to all Successful Respondents •Obtain bid from the Bidders •Evaluate the bid proposals •Validate benchmark results •Select the successful bid
Contract Award	•Award the HPC contract

3.2 Invitation to Qualify Phase

The purpose of the Invitation to Qualify (ITQ) is to identify the Respondents who have experience in supercomputing technologies and services to implement and operate an HPC Solution.

The ITQ evaluation criteria focus on the Respondent's capabilities to deliver HPC services. Please refer to Part 4: Response Preparation for the detailed evaluation criteria.

Respondents who meet all of the mandatory criteria will be notified that they are Qualified Respondents and will proceed to the "Review and Refine Requirements Phase", described below.

Once the Qualified Respondents have been selected and have been notified that they have qualified for the next phase of the procurement process, Canada intends to proceed with the Review and Refine Requirements Phase. Qualified Respondents may withdraw from the process at any time by providing written notification to the Contracting Authority.

3.3 Review and Refine Requirements Phase

Canada will start the Review and Refine Requirements (RRR) Phase by providing Qualified Respondents with the detailed process that will be followed for the RRR Phase.

In this phase, Canada will provide Qualified Respondents with its preliminary requirements and request that the Qualified Respondents provide comments, suggestions, and/or identify areas that require additional clarification from Canada.

Specific scope elements and supporting requirements (e.g., alignment to vision and strategy, use of standards, and integration with existing SSC services) may be refined and will be documented in more detail during the RRR Phase.

Canada will consider the feedback provided by Qualified Respondents when finalizing its technical and solicitation requirements for use in the Bid Solicitation Phase. Canada may request input for topics, such as, but not limited to business, functional, architectural, security, service delivery and technical requirements of the HPC solution.

3.4 Bid Solicitation Phase

In the Bid Solicitation Phase, Canada may issue an RFP to the Qualified Respondents who have participated in the RRR Phase.

3.5 Contract Award Phase

Any contract(s) will only be awarded after completion of the Bid Solicitation Phase and any necessary internal approvals have been obtained.

4 Part 4: Response Preparation Instructions

4.1 Response Preparation Instructions

Canada requests that:

a) Respondents provide their responses in separately bound sections as follows:

i) Qualification Response (2 hard copies and 2 soft copies on USB and CD)

If there is a discrepancy between the wording of the soft copy and the hard copy, the wording of the hard copy will have priority over the wording of the soft copy.

b) The soft copies be in a format that is compatible with either Microsoft docx format (e.g., readable with Microsoft Office Suite 2007 or 2010), OASIS Open Document format ISO/IEC 26300:2006 (e.g., readable with LibreOffice.org), or Portable Document Format ISO/32000-1 (e.g., readable and searchable with Adobe Acrobat.).

c) Respondents follow the format instructions described below in the preparation of their responses:

i) Use 8.5 x 11 inch (216 mm x 279 mm) or ISO 216 A4 (210 mm x 297 mm) paper

ii) Use a numbering system that corresponds to that of the ITQ

iii) Include a title page at the front of each volume of the response that includes the title, date, solicitation number, Respondent's name, and address and contact information of its representative

iv) Include a table of contents

d) In accordance with a policy that Canada issued in April 2006, directing federal departments and agencies to take the necessary steps to incorporate environmental considerations into the procurement process Policy on Green Procurement (http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html) and to assist Canada in reaching its objectives pertaining to this policy, Respondents should use where practical:

i) Paper containing fibre certified as originating from a sustainably-managed forest and/or containing minimum 30% recycled content; and

ii) An environmentally-preferable format including: black and white printing instead of colour printing; printing double sided/duplex; using staples or clips instead of cerlox, duotangs or binders.

e) Respondents not include any pricing, brochures and promotional materials in their responses.

4.2 Qualification Response

A complete qualification response consists of the following:

a) **Element I: Qualification Response**

i) **ITQ Submission Form (requested at ITQ closing)**: Respondents are requested to include the completed Annex B: ITQ Submission Form with their responses. It includes a common form in which Respondents can provide information required for evaluation.

ii) **ITQ Mandatory Criteria Form (requested at ITQ closing)**: Respondents are requested to include the completed Annex C: ITQ Mandatory Criteria Form with their responses. It includes a common form in which Respondents can provide information required for evaluation.

iii) **ITQ Gate Test, detailed description within Annex D (mandatory at ITQ closing):** Respondents must provide the information outlined in Annex D: Information and Instructions for Canada Supplied ITQ Gate Test.

If Canada determines that any of the requested information is incomplete or requires correction, Canada will provide the Respondent with an opportunity to do so.

4.2.1 Types of Respondents

A Respondent can be a corporation, a partnership or a joint venture.

Each Respondent (including related entities) will only be permitted to qualify once. If a Respondent or any related entities participate in more than one response, Canada will provide those Respondents with 2 working days to identify one response to be considered by Canada. Failure to meet this deadline may result in all responses being disqualified or in Canada choosing, in its discretion, which response to evaluate.

For the purposes of this article, regardless of the jurisdiction where any of the entities concerned is incorporated or otherwise formed as a matter of law (whether that entity is a natural person, corporation, partnership, etc.) an entity will be considered to be "**related**" to a Respondent if:

a) they are the same legal entity (i.e., the same natural person, corporation, partnership, limited liability partnership, etc.);

b) they are "related persons" or "affiliated persons" according to the Canada *Income Tax Act;*

c) the entities have now or in the two years before the ITQ closing had a fiduciary relationship with one another (either as a result of an agency arrangement or any other form of fiduciary relationship); or

d) the entities otherwise do not deal with one another at arm's length, or each of them does not deal at arm's length with the same third party.

Despite the above, a Respondent may act as a subcontractor to another Respondent. However, subcontractors will not participate in the Review and Refine Requirements Phase.

5 Part 5: Security and Financial Requirements

Security clearance is an important corporate requirement. No unauthorised access will be permitted. SSC expects that the contract(s) may require some or all of the following non-exhaustive list of contractual obligations and restrictions.

5.1 Security Instructions for Respondents

Respondents and subcontractors that currently do not meet any of the anticipated security requirements identified in the ITQ should initiate the security screening process immediately, as outlined below:

1. Respondents (including any subcontractors, if applicable) that are not registered in the Industrial Security Program (ISP) of PWGSC's Canadian Industrial Security Directorate (CISD)[1] must ask to be registered in the ISP. Respondents should submit the request by email to the individual identified on the title page of this ITQ. The request must include the following information:

   a. Solicitation Number for which the registration is requested
   b. Name of the Respondent
   c. Address of the Respondent's Office in Canada
   d. Telephone, fax numbers and e-mail address, as applicable
   e. Name of President, CEO or contact, as applicable
   f. Language preference (English or French), and;
   g. The Respondent's Procurement Business Number (PBN)

2. Respondents that are registered in the ISP can initiate registration for a subcontractor. The Respondent must also initiate the registration through a written request to CISD. The Respondent must specify the security requirements contained in the solicitation and must include the information listed above.

3. If a Respondent that is registered in the ISP has employees who were screened through another company, the Respondent must ask for their reliability status or security clearances to be duplicated. The Respondent must complete and submit CISD Form 330-23[2] to CISD and must indicate on the Form the reason for the request (in this case, a duplication).

4. If a Respondent that is registered in the ISP requires personnel security screening information of an individual who is not an employee of its own organization, the Respondent must first ensure that the individual's consent has been received by CISD, before CISD will release third party information to the Respondent. The Respondent must follow the instructions on how to obtain third party information from CISD.

5. If the Respondent wishes to propose the services of an individual who has been screened by a government department or agency other than CISD, the Respondent must contact CISD and request either a transfer or a duplicate of the

---

1   http://ssi-iss.tpsgc-pwgsc.gc.ca/index-eng.html
2   http://ssi-iss.tpsgc-pwgsc.gc.ca/form-eng.html

reliability status or the security clearance of the individual. CISD will then explain to the Respondent which steps need to be followed.

Screening timelines may vary depending on the security level requested. The Respondent is advised that all security requirements will be expected to be met before RFP closing, including any required transfer or duplicate of an existing reliability status or security clearance.

For more information on personnel and organization security screening please visit PWGSC's CISD web site. Respondents can also contact CISD by telephone at 1-866-368-4646, or (613) 948-4176 in the National Capital Region.

5.2 Security Requirements at ITQ Closing

Canada will require the following at ITQ closing: Respondent to have initiated the registration process for, or obtained, Facility Security Clearance (FSC) CISD, PWGSC at the level of SECRET with approved Document Safeguarding at the level of PROTECTED B;

Canada reserves the right to enhance the level of security clearance required following the ITQ stage. Respondents can expect that at the RFP stage, bidders must satisfy all security requirements. Respondents are advised that works and services to be carried out for the HPC solution shall be accompanied by special security measures and be subject to national security constraints. Consequently, Successful Respondents must accept the conditions set out in the ITQ and RFP(s) relating to national security and national interest, which requires vetting and security checks for designated individuals involved in the HPC solution. Respondents should anticipate that there will be stringent requirements and the absolute need to comply with them, including requirements applying to the processing of Secret information.

5.3 Anticipated Security Requirements at RFP Closing

Although Canada reserves the right to revise the security requirements following the ITQ stage, Canada currently anticipates the following security requirements will form part of the RFP:

a) The Contractor must not utilize its Information Technology systems to electronically process, produce or store any sensitive PROTECTED information until CISD of PWGSC has issued written approval. After approval has been granted, these tasks may be performed at the level of PROTECTED B and an IT Link at the level of PROTECTED B can be used by the Contractor.

b) Subcontracts which contain security requirements are not to be awarded without the prior written permission of CISD of PWGSC.

c) Supply Threats to the Government of Canada:

In addition to the threat of cyber attack, there is a growing awareness of the risks posed by potentially vulnerable or shaped technologies that may be entering Canada's communications networks and IT infrastructure through the supply chain.

At the Bid Solicitation Phase, Bidders may be required to provide Canada with a list of all hardware and software manufacturers and vendors proposed to be used in the Cyberinfrastructure and Services of the HPC Solution in advance of sub-contracting to them. Canada reserves the right to reject a hardware or software manufacturer and/or vendor for security and/or business stability reasons.

d) The Contractor must comply with the provisions of the following:
   i) *Security Requirements Check List*
   ii) *Industrial Security Manual* (Latest Edition)

5.4 Financial Capability

It is anticipated that SACC Manual clause A9033T (2012-07-16), Financial Capability, will apply to the resulting bid solicitation(s); EXCEPT that Subsection 3 is deleted and replaced with the following: "If the Bidder is a subsidiary of another company, then any financial information required by the Contracting Authority in 1(a) to (f) must be provided by each level of parent company, up to and including the ultimate parent company. The financial information of a parent company does not satisfy the requirement for the provision of the financial information of the Bidder; however, if the Bidder is a subsidiary of a company and, in the normal course of business, the required financial information is not generated separately for the subsidiary; the financial information of the parent company must be provided. If Canada determines that the Bidder is not financially capable but the parent company is, or if Canada is unable to perform a separate assessment of the Bidder's financial capability because its financial information has been combined with its parent's, Canada may, in its sole discretion, award the Contract to the Bidder on the condition that the parent company grant a performance guarantee to Canada."

It is intended that the financial capability will be evaluated during the Bid Solicitation Phase.

6 Part 6: Evaluation Procedures and Basis of Qualification

6.1 Evaluation Procedures

Responses will be assessed in accordance with the entire requirement of the ITQ including the evaluation criteria.

An evaluation team composed of GC representatives will evaluate the ITQ responses on behalf of Canada. Canada may hire any independent consultant, consulting firm or use any Government resources, to evaluate any ITQ Response. Not all members of the evaluation team will necessarily participate in all aspects of the evaluation.

In addition to any other time periods established in the ITQ, if Canada seeks clarification or verification from the Respondent about its response, the Respondent will have four (4) working days (or a longer period if specified in writing by the Contracting Authority) to provide the necessary information to Canada. Failure to meet this deadline will result in the response being declared non-responsive. If additional time is required by the Respondent, the Contracting Authority may, following receipt of a written request from the Respondent, grant an extension in his or her sole discretion.

6.2 Mandatory Technical Requirements

Each response will be reviewed to determine whether it meets the mandatory requirements of the ITQ. Any element of the ITQ identified with the words "must", "required" or "mandatory" is a mandatory requirement. Mandatory Technical Requirements will be evaluated on a simple pass/fail basis. Responses that do not comply with each and every mandatory requirement will be declared non-responsive and be disqualified.

Respondents are required to indicate their compliance with the two Mandatory Technical Requirements listed below.

Mandatory Technical Requirement M01
Respondent must have at least 1 supercomputer listed on the November 2012 TOP500 list of the top 500 supercomputers in the world. Respondent must indicate the rank (between 1 and 500) of one of their supercomputers on the November 2012 TOP500 list.
Mandatory Technical Requirement M02
Respondent must execute the Canada Supplied ITQ Gate Test in accordance with, and provide the information outlined in, Annex D.

6.3 Basis of Qualification

A response must comply with the requirements of the ITQ and meet all mandatory evaluation criteria to be declared responsive. A Respondent whose response has been declared responsive is a Qualified Respondent for the next stage of the solicitation process. However, Canada reserves the right to re-evaluate the qualification of any Qualified Respondent at any time during the solicitation process.

Annex A: Overview of the Existing NCF Cyberinfrastructure & Expected Future Requirements

Canada hosts scientific computing resources for numerous federal government departments and agencies. Environment Canada is one of the biggest users of government supercomputing capacity. This annex provides an overview of what is available to them and how it is used.

For more than 40 years, Environment Canada's Canadian Meteorological Centre (CMC) in Dorval, QC has seen continuous investment in its High Performance Computing facility. The CMC operates a supercomputer that forms the core of Canada's GWMC Numerical Weather Prediction (NWP) system, processing an average of more than 4 million observations received daily from radiosondes, satellites, radar, aircraft, buoys and surface stations around the world to produce forecasts and severe weather warnings. The CMC thus promotes the health and safety of Canadian citizens, as well as the economic competitiveness of the government and the commercial interests of Canada.

The Government of Canada's weather service Numerical Computational Facility (NCF) is an essential piece of infrastructure for the Meteorological Service of Canada (MSC) and supports many government-wide mission-critical functions that, in its absence, could not be provided; these include:

- Weather forecasts and warnings of high impact events provided to Canadians on a 24x7 basis;

- Support to the Department of National Defence and Canadian Coast Guard operations in support of sovereignty at home and abroad;

- Essential weather services to NAV CANADA in support of safe aviation operations (including the provision of warnings to aviation operations when volcanic ash is released into the atmosphere);

- Support to the Department of Foreign Affairs and International Trade for nuclear test ban treaty enforcement;

- Alerts of poor air quality, information on the spread of nuclear radiation, and air borne disease vectors for Health Canada; and

- Forecasts to Public Safety Canada to support responses to environmental emergencies (spread of chemical, biological, radiological and nuclear material).

The NCF in Dorval, QC has been the home of High Performance Computing within the Meteorological Service of Canada for over 40 years. During that time, the HPC infrastructure has grown from a Cyber 7600 computer (with a processing speed of the order of 2 MFlops) to the current setup involving 512 compute nodes of IBM POWER7 processors (laid out in 2 clusters totaling 16,384 compute cores) providing a combined peak processing capability of 503 TFlops with 33 TB of main memory and 900 TB of usable Storage Area Network (SAN). This represents an increase in computing power by 6 orders of magnitude during this 40-year period. An IBM proprietary high-performance fabric provides the high speed communication links between the nodes.

The Dorval Numerical Computational Facility includes:

I. Scientific Computational Facility (SCF): A leased array of integrated HPC hardware consisting of several hundred large-scale IBM UNIX nodes linked together with a high performance interconnect, attached disk and network subsystems.

II. Global Storage Cloud providing storage capacity for the NCF, including a High Performance Near Line Storage system (HP-NLS): over 30 petabytes of near-line storage based on robotized tape libraries and enterprise grade magnetic tape drives.

III. Pre/post-processing: large Intel-based computational clusters on which operational and R&D users can pre-process environmental data prior to submission to the supercomputer, run small models, and post-process NWP data into different products and formats.

IV. Hundreds of computer systems and complex high performance networks required for: data acquisition and data collection, quality control, visualization, verification, and dissemination of weather information.

V. A reliable, government-owned facility: 1 megawatt (MW) computer-grade guaranteed electricity supply with a backup; commensurate power and computer cooling capacity, and; other requisite building infrastructure to support a 1 MW IT load.

VI. With the exception of the SCF, which is now housed at a vendor-provided facility, the above are housed in a purpose-built subterranean data centre.
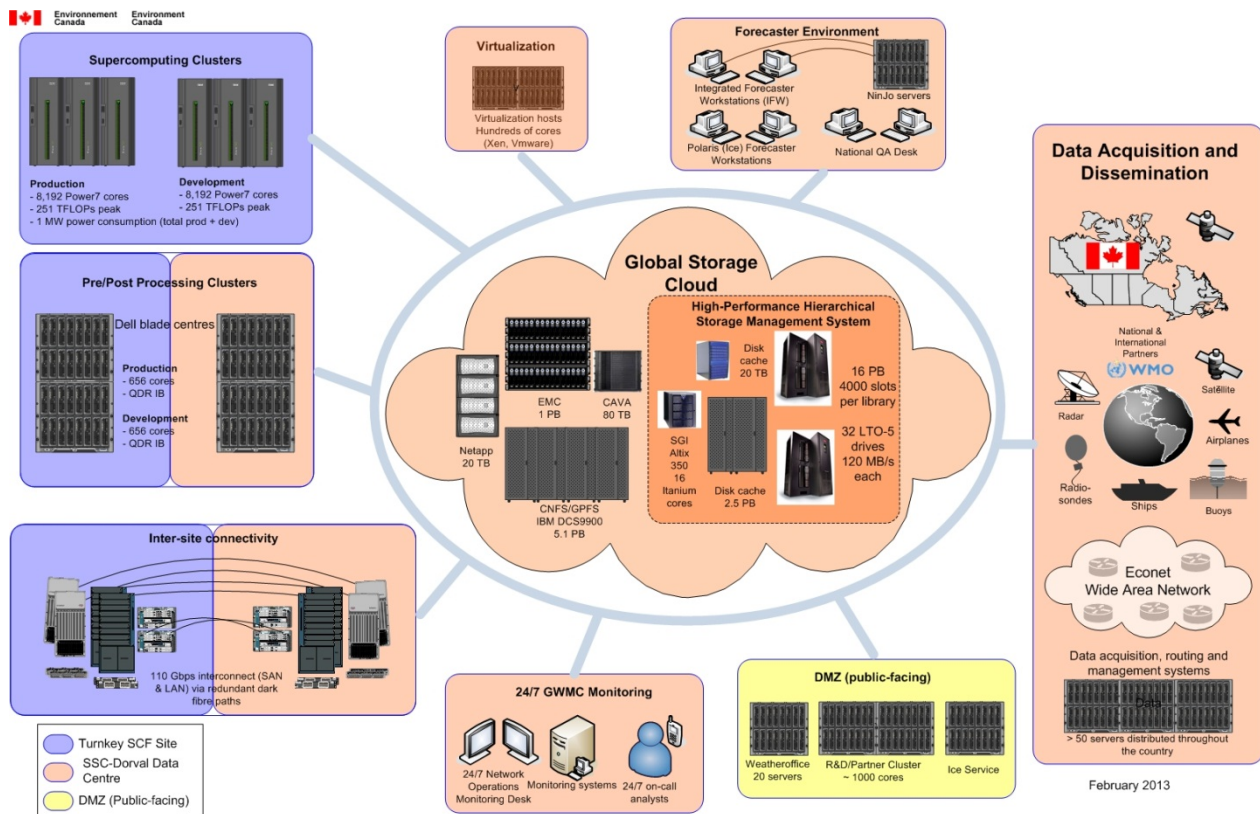

Figure A-1 Schematic representation of the National Weather Cyberinfrastructure. Only the 24x7 GWMC real-time components are depicted.

As shown in Figure A-1, the supercomputer is connected to other vital systems via high speed interconnect (10 GigE technology). Central to operations is the Global Storage Cloud, which is a

high performance (high bandwidth, low latency) high capacity data pool including the High Performance Near Line Storage system for long term storage and retrieval. This is also where data and backups are stored (from 6 months to infinity). The HP-NLS drive engine consists of SGI Altix 350 processors; special software manages the disk space and the 16 PB (Petabyte) storage capacity automated tape library. Two clusters are also connected to the supercomputer through a high speed interconnect. These Intel-based clusters provide both operational and R&D users with interactive and batch platforms which serve in pre- and post-processing of data, job preparation, databasing, small model development, etc.

Scientific computing goes far beyond the reliable operations of a supercomputer. In an operational environment such as the one required by the MSC to deliver weather and environmental services, telecommunications systems are required to acquire observational data from around the globe, and to disseminate weather information (both observed and predicted) in Canada, the US and around the world. Other systems are needed to quality control and prepare data prior to the execution of NWP models. Supercomputers generate huge amounts of data that must be moved to other systems, where they will be processed and transformed in a large number of formats and products, and subsequently disseminated to an increasingly larger community of users. Finally, storage of these very large amounts of data is an essential activity, both for legal reasons and as an essential baseline between new science development and current operational performance (to ensure that better science in models, for example, outperforms the current operational models). R&D requirements, while not as demanding with respect to timeliness, may be more demanding in other regards (e.g., memory, disk). Climate Change modelling involves running climate models to simulate hundreds of years of dynamical time, hence generating huge amounts of data that need to be stored for extensive periods of time.

A major issue faced by any modern SCF is the complexity and cost inherent in establishing the infrastructure required to house, power, and cool all the equipment found in a HPC centre. Several major weather services around the world have either made significant investments in their basic space, electrical and cooling infrastructures over recent years, or have built new facilities in anticipation of future SCF infrastructure needs. With changes in supercomputer technology over the last ten (10) years, requirements for electricity and cooling essential to operate these new machines have increased by more than an order of magnitude. According to November 2012 TOP500 list[3], current systems require up to 12 MW of electrical power for the supercomputer alone (this excludes the electricity costs needed to operate the rest of the computing infrastructure). Additionally, hundreds of tons of cooling power are needed, along with the electrical power to run these air conditioning systems, to evacuate the heat generated. Further, these installations also require Uninterruptible Power Supply (UPS) systems both to provide services on a 24x7 basis (as per the requirements for the MSC) and to allow continuous, uninterrupted operations of these high performance computers.

Therefore, infrastructure needs to be carefully planned and managed in coordination with organizational groups planning and managing the HPC infrastructure. It is not surprising that several centres around the world now have supercomputer rooms with an electrical capacity of 20 MW or more to meet the needs of their future HPC infrastructure.

---

[3]   http://top500.org/lists/2012/11/

Expected Future HPC Requirements

The table below illustrates an approximation of the anticipated capacity requirements that are being sought. Note that these figures may be modified during the RRR phase.

Table 2 Summary of expected growth

Characteristics	2012-2014	Fall 2015	Spring 2018	Fall 2020
HPC Requirements (in multiples of our current configuration – see Annex A: Overview of the Existing NCF Cyberinfrastructure)	**<u>1</u>**	**<u>15</u>**	**<u>39</u>**	**<u>94</u>**
HP-NLS near-line capacity (Petabytes)	**<u>61.8</u>**	**<u>448</u>**	**<u>1302</u>**	**<u>3378</u>**
Available funding	**<u>PUBLISHED at RFP</u>**			

The following is a non-exhaustive list of requirements and features which will be studied and further refined for inclusion in the RRR stage as part of this process. Note that these may be modified during the RRR phase.

1. Supercomputers for operational weather forecasting, climate simulation and other scientific and/or compute-intensive applications

   - Capacity defined by user supplied metrics

   - Large number of processors with high speed 64-bit floating point support

   - High-bandwidth low-latency internode communication

   - Performance measured with GC-supplied benchmark

   - At least 99% service availability

2. Global Storage Cloud

   - High Performance Near Line Storage system (HP-NLS)

     o High Performance Near Line Storage (HSM) Software

     o Dedicated cluster nodes

     o Dedicated disk subsystem

     o Tape and Robotic library subsystems

     o High data availability

     o Absolute data integrity

     o Performance measured with GC supplied benchmark

     o 24x7 SSC staff access for tape manipulation

   - High performance parallel file systems

     o Performance measured with GC supplied benchmark

- o Ability to tune for high I/O Ops and/or throughput
- o Native compatibility with various Unix/Linux distributions

3. High speed local/storage area networks

- Performance measured with GC supplied benchmark
- Multiple protocols: Ethernet, Fibre Channel, Infiniband
- Very high availability

4. Batch scheduling environment

- Flexible scheduler (e.g., queues, pre-emption, job migration, job prioritisation)
- Resource control (e.g., limits on CPU, wall clock, memory)
- Job and process accounting by users/groups
- Log analysis

5. Pre & Post processing Clusters

- 64-bit Linux based Operating System
- High speed interconnect (e.g., Infiniband)
- High performance parallel file systems
- Performance measured with GC supplied benchmark
- At least 99% service availability

6. Vendor supported solution: Hardware, Operating System and Software Development Environment

- Hardware Support
- Traditional Linux/Unix API and CLI (e.g., Bash)
- Profiling and debugging tools for parallel applications (e.g., OpenMP & MPI)
- Fortran and C compilation environment

7. Capacity to provision a fully hosted service distributed over two sites within a reasonable distance from the existing Numerical Computing Facility (in Dorval, QC) for low latency communication

- One supercomputer cluster per site
- One HP-NLS per site
- One Pre/Post processing cluster per site
- High physical security at each site
- Dark fibre links between all sites without repeaters
- Fibre distance of no more than 70 KMs between sites.
- Uptime Institute Tier 2 if each site has a separate building envelope; Tier 4, otherwise

- Each site has separate fire suppression

- Each site has multiple power sources

- Infinite autonomy to failure of single power source

- Secured logistics area at each site

8. Training and conversion assistance

- Training for system and network administrators, application developers and end-users

- HP-NLS data transcription

- System and network support

- Computer access assistance

- System software conversion assistance

- Expert application conversion assistance

9. On-going support for services rendered

- 24x7, 30 minute response hardware support

- 24x7, 30 minute response system software support

10. Options to allow flexible expansion of the requirements and features described above including options to purchase for installation, either as a fully hosted service or installed at any SSC location.

The following is a non-exhaustive list of items SSC is not seeking as part of this process:

- System/Network administration

- Applications for weather forecasting, climate simulation, operational and research

Annex B: ITQ Submission Form

ITQ RESPONSE SUBMISSION FORM	
Respondent full legal name	
Authorized Representative of Respondent for evaluation purposes (e.g., clarifications)	Name:
	Title:
	Address:
	Telephone #:
	Email:
	Procurement Business Number:
Canada's Official Language in which the Respondent will communicate with Canada during all subsequent steps of the solicitation process, including the Review and Refine Requirements as well as the Bid Solicitation phases. **Indicate either English or French**	
Security Clearance Level of Respondent *[include both the level and the date it was granted]* ***[Note to Respondents: Please ensure that the security clearance matches the legal name of the Respondent. If it does not, the security clearance is not valid for the Respondent.]***	
As the person authorized to represent the Respondent, by signing below, I confirm that I have read and understood the entire ITQ including the documents incorporated by reference into the ITQ and the entire Response, and I certify that: 1. The Supplier meets all the mandatory requirements described in the ITQ; and 2. All the information provided in the ITQ Response is complete, true and accurate.	
Name	
Address	
Email	
Signature	
Phone	

Annex C: ITQ Mandatory Criteria Form

ITQ MANDATORY CRITERIA FORM		
M01: Confirmation of presence in the TOP500 list	Confirm Respondent's organisation's presence in the November 2012 TOP500 list	
	a) Is present in the November 2012 TOP500 list (indicate rank of one such system)	
	b) Is not present in the November 2012 TOP500 list (check this box)	
	Rank (between 1 and 500) of one of Respondent's systems on the November 2012 http://www.top500.org list	
M02: Confirmation of execution of Canada Supplied ITQ Gate Test	The mandatory results of the Canada supplied gate test are included.	
	The mandatory results of the Canada supplied gate test are **NOT** attached.	
	The Canada supplied ITQ gate test was successfully completed.	
	The Canada supplied ITQ gate test was not successfully completed	
	Execution time for the successful completion of the Canada supplied ITQ gate test was less than **1000 wall-clock seconds** (indicate execution time).	
	A written description of all modifications and/or additions to the ITQ gate test has been provided.	
	A written description of all modifications and/or additions to the ITQ gate test has **NOT** been provided.	
	The system used for the Gate Test is presently marketed or in development by the Respondent.	
	The system used for the Gate Test is **NOT** presently marketed or in development by the Respondent.	

Annex D: Information and Instructions for Canada Supplied ITQ Gate Test

Respondents are required to compile and run the YY-800 component of the Canada Supplied ITQ Gate Test, hereafter referred to as "the Gate Test". Instructions on how to obtain the source code, sample data and technical instructions to compile and run the test are available at http://collaboration.cmc.ec.gc.ca/cmc/ec-code-samplers/. Version 201301001 must be used. The Gate Test consists of the YY-800 part of the configurations supplied with the data sets.

Successfully running the Gate Test is a mandatory step of the ITQ. Respondents are required to abide by the following rules:

- The Gate Test must be performed on a system marketed or in development by the Respondent.

- No changes to the C and Fortran source code are permitted unless specifically allowed in writing by Canada.

- After the Gate Test has run, the entire content of the folder named "work" as well as the complete text output of the Gate Test must be submitted in the Response.

- No changes to the Gate Test output or work directory are permitted.

It is permitted to modify the build and run scripts in order to adapt them to the characteristics of the Respondent's system. Furthermore, changes may be made to the Gate Test topology, as described in the technical documentation README files, for example by adding more cores for extra performance using a larger MPI domain or SMP parallelisation with more than one OpenMP thread. Automated parallelisation performed by the compiler is also allowed. All modifications and additions must be provided with the Response, including a written description of said changes.

Respondents must demonstrate they have successfully completed a run of the Gate Test on a parallel cluster in 1000 seconds of wall-clock time or less. The numerical results and the timings will be displayed as part of the Gate Test output. Reference values are provided in a file named out_YY-800 for the Respondents to ascertain that their runs are successful and their results are accurate. The Respondents' results must be within 5% of the mean values provided for the variables 192UT1, 192VT1, 192TT1, 192ST1 and 192HU:P. The calculated values that need to be compared to the reference values are found towards the end of a completed Gate Test listing, in a section identified as "BLOC STAT 192". The wall-clock timing for a completed Gate Test is given on the listing line that contains the text "GEMDM Wall clock".

Results obtained by running the Gate Test will be verified by Canada.

This Gate Test was prepared solely to qualify Respondents during the ITQ phase. A benchmark suite including larger configurations, code enhancements and additional tests is intended to be provided during a subsequent phase of the procurement process.