ONTARIO POWER GENERATION

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N-FORM-11597-R000*

Scope of Work

(This document does not preclude the ES MSA, COIR or Other Contractual requirements)

1. Project Overview

Project #: 16-31555 **Project Title:** Darlington Heavy Water Management Building West Annex

Facility: Darlington **Document #:** NK38-SOW-38000-10011 **Revision #** 000

Problem Statement/Background:

The work under this Scope of Work is for Engineering, Procurement and Construction in support of the remaining construction of a new Heavy Water Management Building West Annex (HWMB West Annex) located at the Darlington Nuclear Generating Station (DNGS) in the municipality of Clarington, Ontario. OPG will be the Constructor under the OH&SA.

The new HWMB West Annex with Heavy Water (D_2O) drum handling capability is required to provide additional D_2O storage on site to support Darlington Refurbishment. The new HWMB West Annex is also required to facilitate Tritium Removal Facility (TRF) and DNGS operational improvements.

To meet the needs of Darlington refurbishment the new HWMB West Annex storage systems shall be Available for Service (AFS) no later than 19-April-2017.

2. Scope Overview

Description of Work:

This work was previously awarded as an Engineer, Procure, and Construct (EPC) contract to an ES-MSA contractor; however due to changes in OPG's contract strategy, OPG is seeking a new General Contractor (henceforth referred to as "Contractor") to complete the remaining engineering, procurement and construction work as described in this scope of work document.

Revision 0 of the design was issued on April 30, 2015, and 11 incomplete EC's were turned over for completion. The Contractor will be responsible for the balance of all remaining engineering for the project. **Appendix I** documents the engineering scope for the Contractor. Field engineering support for completion of the seismic dyke (completed by others) below 100 m elevation will be done by OPG. Civil construction for the building basement work (i.e. seismic dike construction below 100 m elevation), with the exception of 100 m slab, is assigned to others, and subsequently the new Contractor will assume completion of the remaining construction of the facility.

Extensive information about the work to be completed resides in the EC packages in Asset Suite (Passport) as well as the EC Working Files (accessed under Topic Notes in the EC Panel), and the 3D model.

OPG staff have provided all available documentation, and assistance as necessary to facilitate smooth transition of these modifications to the new Contractor, as described in the engineering transition plan in **Appendix I.**

Every effort has been made to generate a complete and accurate scope of work. Supplementing this was an OPG led collaborative review of the design and schedule information to support the Contractor's understanding of this scope. This included items such as, but not limited to, collaborative review of the scope of work, design packages, in progress assessing packages, materials status, schedule review, field walk downs, and estimate development. The Contractor shall assume that no hazardous materials or contaminants are present at the job site. Any contamination introduced by the Contractor will be the responsibility of the Contractor.

A detailed breakdown of the current project status follows below.

Site Preparation :

The new HWMB West Annex will be located inside the Darlington Nuclear Generating Station protected area, between the TRF/HWMB and SG Fuel Oil Tank 2. All existing services (underground and aboveground) on the building footprint have been removed/relocated to support installation of caissons along the building perimeter. Additional relocations for pipe chase installation and power supply installation will be required and is included in the scope of this contract. Completion (reinstallation) of some of the permanent relocates is outstanding as detailed below.

The Work plans for the following scope are located in **Appendix A**. The Contractor shall be responsible to complete the remaining procurement, installation planning (assessing and scheduling), construction, commissioning, Available for Service (AFS) and closeout work associated with each design package in this section.

*Associated with N-MAN-00120-10001-SCOPE, Nuclear Projects Scoping Process

EC#	Design EC Title	Discipline	Field Status	Notes
120400	TMOD Yard Drainage	CIVIL	Partially Complete	Small portion of TMOD (TRF Loading Dock Roof Drain line to MH413) remains to be removed after EC#120341 completion
120415	TMOD SG Cable Duct - temporary cables connection	ELEC	Partially Complete	Temporary cables in service for cable duct removed under EC#120340; TMOD to be removed after completion of PMOD
120340	PMOD Relocation of SG Cable Duct	ELEC	Partially Complete	Existing cable duct removed, new duct to be installed upon completion of HWMB-WA and cutting off of the caisson piles
120341	Relocation of TRF loading dock roof/condensate and underground Line	MECH	Partially Complete	Line removal in yard complete, new line drain to be tied from West Annex
120670	RELOCATION OF GAS SERVICES INSTRUMENTATION	I&C	Partially Complete	Argon conduit has been installed. Temporary cables have been installed for helium & oxygen systems, with conduit relocation to be performed after completion of pipe chase/tunnel works.
120406	Tie-in to DIOTs	MECH	In-progress	This scope is completed by others. However, this scope under other EC's include tie-in to these lines. EC provided for information only.

Known relocates required to support Pipe Chase installation:

The Contractor shall be responsible to complete any required engineering, procurement, installation planning (assessing and scheduling), construction, commissioning, Available for Service (AFS) and closeout work associated with the buried interferences with the proposed pipe chase.

Designation	Description	Reference Dwgs	Notes
Known Interferences			
600 CSP	Yard Drainage CSP	NK38-D1H-10249-1343, NK38-D0H-15200-1004	Relocated per EC#120353
7811-L18-W10APAA	Foam fire line	NK38-D1H-10249-1343	Section of pipe removed & reinstalled per WO#03044931, no relocation
4" PVC Conduit	TRF I&C cables Conduit	NK38-D1S-57500-0030	See EC#120670 change papers
7572-L801-N1ANE(Spare)	TRF Nitrogen (abandoned)	NK38-D1H-10249-1343	
A1 1/2ATC	TRF Argon line (abandoned)	NK38-D1H-10249-1343	Abandoned per EC#122210
Ground grid	500 MCM bare copper ground cable	NK38-D0S-57600-0002	Relocated per EC#120670 (see change papers as EC not closed yet)
D2O caisson tie-backs	Caisson tiebacks	NK38-DRAW-23810-10001 to 10004	Installed by EllisDon/AnchorShoring; Drawings may not reflect as-built
* Services relocated by D2O Project with the intent to avoid future pipe chase			
7210-L921-W30A	TRF LPSW Discharge	NK38-D1H-10249-1343	Relocated per EC#120404; Cathodic protection MA's installed as well
7554-L601-H1/2ANF	TRF Helium Supply	NK38-D1H-10249-1343, NK38-DRAW-75549-10002	Relocated per EC#124052
7551-L701-O2 1ATC	TRF Oxygen Supply	NK38-D1H-10249-1343, NK38-DRAW-75519-10001	Relocated per EC#122212 (see change papers as closeout in progress)

Tie-In/HWMB Relocates:

The table below summarizes the status of tie-ins to the existing station services/systems. The Contractor shall be responsible to complete the remaining procurement, installation planning (assessing and scheduling), construction, commissioning, Available for Service (AFS) and closeout work associated with each design package in this section. The Contractor shall be responsible to execute the tie-ins through scheduling on the Darlington Station execution schedule. The work is currently scheduled with the station and execution dates (start of installation), but require revision based on the

Contractor's schedule. These tie-ins do not require a TRF outage.

Note the Contractor will be responsible to drain lines following isolation by OPG. Where there is tritium content, that work will be completed in rubber areas. All areas of the TRF/HWMB are "Zone 3". The Contractor shall be responsible to complete the remaining procurement, installation planning (assessing and scheduling), construction, commissioning, Available for Service (AFS) and closeout work associated with each design package in this section.

EC#	Design EC Title	Discipline	Field Status	Notes
121327	Reconfiguration of the D2O Cleanup System	MECH	Not started	To be executed in this contract scope. Likely rubber area.
120405	Tie-in to D2O Cleanup System	MECH	Not started	To be executed in this contract scope. Likely rubber area.
120401	Tie-in to Moderator D2O Supply	MECH	Not started	To be executed in this contract scope. Likely rubber area.
120402	Tie-in to PHT D2O Supply/Transfer System	MECH	Not started	To be executed in this contract scope. Likely rubber area.
120408	Tie-in to Upgrader System	MECH	Not started	To be executed in this contract scope. Likely rubber area.
120427	Tie-in to Domestic Water System	MECH	Not started	To be executed in this contract scope
120428	Tie-in to Demineralised Water	MECH	Not started	To be executed in this contract scope
120426	Tie in and transfer Sewage System	MECH	Cancelled	Cancelled
120720	Tie-in to Fire Protection Water	MECH	Not started	To be executed in this contract scope
120557	Tie-in to Breathing Air	MECH	Not started	To be executed in this contract scope
EC#	**Design EC Title**	**Discipline**	**Field Status**	**Notes**
120452	Relocation of Mech Lines in Loading Bay	MECH	Not started	To be executed in this contract scope
120577	Relocation of Elec/IC Lines in Loading Bay	ELEC	Not started	To be executed in this contract scope

Dike Complete:

Dike complete or "Ready for Tanks" Milestone is defined, for the purpose of this SOW, as OPG acceptance of the completion of the curing of basement foundation slabs (raft slab & topping slab), and internal and external walls. This *excludes* the 100 m elevation slab or the removal of the shoring cross braces, which is to be executed by the Contractor. Ready for Tanks milestone includes installation of all cast in place embedments.

Mechanical and electrical work will be executed within this footprint after the "Ready for Tanks" milestone by the Contractor.

Cast-in-place embedments in the seismic dike (below 100 m elevation) are excluded from the Contractors scope.

Excavation:

To facilitate the excavation of the building 14.5 meters below grade, a shoring system consisting of caisson wall of 160 caissons and multi-level tie-backs has been installed. Due to proximity of excavation to the adjacent buildings and buried services, internal bracing (struts) was required to compliment the tie-backs. The Contractor executing the scope of work outlined in this document will be responsible to hoist all tanks and mechanical equipment into the newly poured seismic dyke foundation through the existing temporary bracing systems following dyke construction, prior to pouring of the 100 m floor slab. This scope of work will be critical path, and will be detailed in the Process Section further below.

Notes:

The internal bracing for the shoring is generally designed to allow installation of the tanks prior to pouring the 100 m floor slab. However, some of the tanks will need to be moved under the cross braces into their final position (see NK38-DRAW-23810-10001). The Contractor shall develop rigging equipment and lifting procedures with the OEM (Babcock & Wilcox) support to safely install the tanks in the basement.

Removal of the struts and cutting down of the caissons is included in the Contractor's scope.

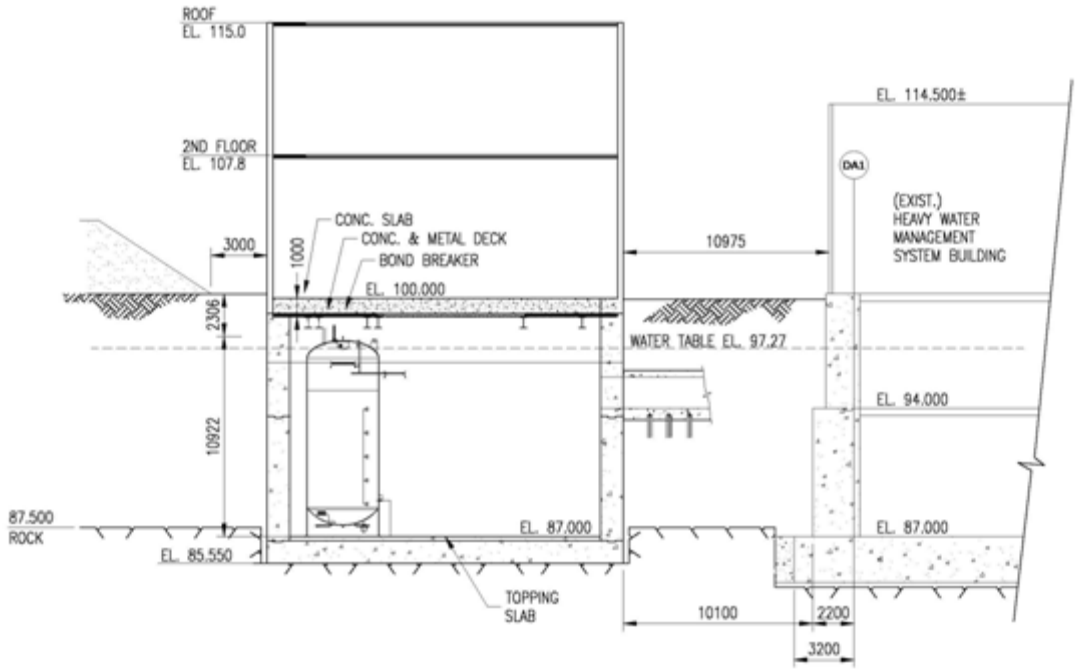
OPG will provide dewatering system equipment (weir tanks, filters, etc). Connection of dewatering equipment for the pipe chase installation and connection to the dewatering system is included in the Contractors scope.

Building (Civil):

The following is a summary of the civil Design Packages, and their current execution status. To date, the shoring system was installed, excavation is complete, mud slab poured, rock anchors installed, and raft slab installed, and first lift of the exterior walls are in progress. The civil portion of this work listed below is presently assigned to others up to dike completion below the 100 m elevation floor slab.

The Contractor shall install maintenance platforms at 94 elevation, structural steel erection in basement, construction of the 100 m elevation floor slab, permanent stair tower installation, and all above ground, civil/building structure, the causeway, and the pipe tunnel to existing HWMB.

The picture depicts the current design for the HWMB.



Please refer to Construction Specification (NK38-DS-23800-10001) for civil details for the ECs in the table below. Completion of remaining civil installation by the Contractor is to be per the Construction Specification.

The Contractor shall be responsible to complete the remaining procurement, installation planning (assessing and scheduling), construction, commissioning, Available for Service (AFS) and closeout work associated with each design package in this section.

EC#	Design EC Title	Discipline	Field Status	Notes
120471	#81 Seismic Dike	CIVIL	In Progress	Requires completion of 100 m elevation slab, following basement walls, foundation (raft & topping) slabs are complete. As part of completing this optional scope, cutting of the piles (~ 1 m below grade) is required. See shop drawings for details (reference documents to this EC).
121447	#83 Storage Tank Supports and Topping Slab	CIVIL	Not started	Excluded from the scope of this work with the exception of tank supports, and active drainage sump installation. Remaining work following "Ready for tanks" is included in

				Contractor scope.
120343	#78 Building Design, Architectural and Structural	CIVIL	Not started	Included in scope.
120906	#80 Causeway Connecting West Annex to Loading Dock	CIVIL	Not started	Included in scope.
123130	#99 DEC Buried Pipe Chase Between TRF and West Annex	CIVIL	Not started	Included in this scope. It is assumed dewatering can be achieved via the box drain pump outs through the dewatering skid. Note, engineering, procurement, and construction for any relocates inside the existing HWMB as a result of the pipe chase penetration is included in the Contractor scope.
121146	#84 Maintenance Platform	CIVIL	Not started	Included in scope.
121147	#85 Hoists	CIVIL	Not started	Included in scope.
121322	#82 Radiation Shielding Design	CIVIL	N/A	This is a contingency EC, to be developed for provision of permanent shielding in certain areas, if required after completion of radiation analysis by OPG.

Note: A BOM does not exist for EC#120343 or EC#120906 (causeway civil) per NK38-CORR-38000-0460009.

Process systems:

A total of 25 storage tanks (supplied and free issued by OPG) will be installed to store heavy water from the Moderator, Heat Transport, Cleanup systems, etc. Support equipment such as piping, valves, pumps, instrumentation & controls will be provided to monitor and operate the facility. Heavy water transfer capability from the existing HWMB tanks, the TRF facility, and DNGS Units 1 through 4 to the new storage tanks will be provided through additional tie-ins. In addition, there are tanks for RVs discharge, active drainage, and inactive drainage (which shall be free issued by OPG). The maximum tank dry weight is approximately 17,500 lbs.

The process system installation is on critical path, and the Contractor will be scheduled on a 5 x 20 hour shift schedule + a 10 hour shift on Saturday. OPG is looking for best industry practices regarding pipe installation, and expects details regarding pre-fabrication plan and modularization to be reviewed and a business case presented to support cost/schedule advances to the project schedule. Lastly, automatic and/or orbital welding technology, or equivalent welding techniques are to be considered to support the schedule for this project.

The 25 storage tanks are being fabricated by others, and can be ready for delivery to OPG East Warehouse between September 1, 2015 and November 15, 2015. There are an additional 3 non-storage tanks that will be procured by OPG, delivered to OPG East Warehouse by January 30, 2016. The Contractor shall be responsible for receiving the tanks at Darlington Site from OPG. The Contractor retains, as part of this scope, care and custody of the storage and non-storage tanks until installation. The Contractor shall unload and store the tanks at the designated storage area at Darlington site. The Contractor is responsible for lifting and installing the tanks within the dike area per the design. The scope includes all procurement of outstanding permanent materials & consumables (outside of welding consumables) for the below design packages.

Code class approval has been completed by the CNSC for ECs 120421, 120422, 120423, 120424 and provisional registration for these ECs with the TSSA has been obtained.

The table below summarizes the status of tie-ins to the existing station services/systems. The Contractor shall be responsible to complete the remaining procurement, installation planning (assessing and scheduling), construction, pre-commissioning check-out and testing,, Available for Service (AFS) and closeout work associated with each design package in this section.

EC#	Design EC Title	Discipline	Field Status	Notes
120421	#46-1 (38110) Tanks/Piping for D2O Supply	MECH	Not started	To be executed in this contract scope. This system is the priority system to place in service, in particular the PHT tanks.
120422	#47-2 (38110) Tanks/Piping for TRF Outgoing	MECH	Not started	To be executed in this contract scope. This design package is for the TRF operational improvement scope.
120423	#46-2 (38500) Tanks/Piping for Downgraded	MECH	Not started	To be executed in this contract scope. This design package is required for refurbishment.
120424	#47-1 (38410) Tanks/Piping for D2O Clean Up	MECH	Not started	To be executed in this contract scope. This design package is for the TRF operational improvement scope.

120488	#68 Storage Tank/Equipment Control System	I&C	Not started	To be executed in this contract scope.
120489	#69 Storage Tank Level Indicators	I&C	Not started	To be executed in this contract scope
120523	#53 Drum Filling/Testing/Cleaning	MECH	Not started	To be executed in this contract scope. This design package is for the TRF operational improvement scope.

Auxiliary Process Systems:

The table below summarizes the status of tie-ins to the existing station services/systems. The Contractor shall be responsible to complete the remaining procurement, installation planning (assessing and scheduling), construction, commissioning, Available for Service (AFS) and closeout work associated with each design package in this section.

EC#	Design EC Title	Discipline	Field Status	Notes
121133	#33 (75160 & 75110) Instrument Air and Service Air System	MECH	Not started	To be executed in this contract scope
121326	#96 Elec and I&C for new Instrument/Service Air Compressors	ELEC	Not started	To be executed in this contract scope
121320	#52 (73870 & 38300) Chilled Water and Air Conditioning Units	MECH	Not started	To be executed in this contract scope
121805	I&C and power for chilled water system	ELEC/I&C	Not started	To be executed in this contract scope
121318	#95 (SCI 63830) DEC for D20 Vapour Recovery	ELEC/I&C	Not started	To be executed in this contract scope
121319	#94 (SCI 38300) DEC for D20 Vapour Recovery	MECH	Not started	To be executed in this contract scope
120784	#27 (79710 & 38210) Active Plant Drainage + D2O Liquid Recovery Sump	MECH	Not started	All scope of this EC not embedded into the raft slab to be executed in this contract scope
120485	#54 Misc Electrical Power to Pump Motors & Equip (Active/inactive), CDF rack	ELEC	Not started	To be executed in this contract scope
120643	#50-2 (SCI 79110) Inactive Plant Drainage	MECH	Not started	To be executed in this contract scope
120491	#71 (67989) Fixed Gaseous Effluent Radioactivity Monitoring	I&C	Not started	To be executed in this contract scope
120492	#74 (62341 & 62330) FAATM and FAAGM	I&C	Not started	To be executed in this contract scope
120493	#66 (63860) D2O Leak Detection System (Beetles)	I&C	Not started	To be executed in this contract scope

Building Electrical Services:

The building electrical loads will be supplied by a new distribution network being installed as part of project 10-73821 DN Electrical Power Distribution System. A backup electrical power supply will also be provided by the Contractor to maintain critical loads in service. The following is a summary of the Design Packages, and their current status.

All civil support work such as concrete pad and installation of enclosure for backup generator, trenching/boring for cable installation etc will remain responsibility of the Contractor and shall be executed per the applicable sections of project construction specification (NK38-DS-23800-10001).

The Contractor shall be responsible to complete the remaining procurement, installation planning (assessing and scheduling), construction, commissioning, Available for Service (AFS) and closeout work associated with each design package in this section.

EC#	Design EC Title	Discipline	Field Status	Notes
127218	Cable Duct from SWG53 to D2O/RFRISA buildings	ELEC	Not started	To be executed in this contract scope. Note, installation of the cable duct shown on NK38-DRAW-25750-10001 to MH1010 will be completed by others.
120472	#56 Electrical Power Supply for West Annex	ELEC	Not started	To be executed in this contract scope. Note, this EC includes cable duct between MH9002 and the HWMB-WA.
120474	#57 Back-up Power	ELEC	Not started	To be executed in this contract scope
120478	#63 MCC Design	ELEC	Not started	To be executed in this contract scope
120479	#55 Building Lighting and Electrical Distribution System	ELEC	Not started	To be executed in this contract scope
120475	#58 Uninterruptible Power Supply (UPS)	ELEC	Not started	To be executed in this contract scope
120476	#59 Grounding System for West Annex	ELEC	Not started	All scope of this EC not embedded into the foundation slab/walls to be executed in this contract scope
120477	#60 Cable Support Systems	ELEC	Not started	To be executed in this contract scope
127532	Misc building electrical and I&C	ELEC	Not started	To be executed in this contract scope
129058	DESIGN-DNGS HWMB WEST ANNEX	ELEC	Not Started	To be executed in this contract scope

	120/208V NORMAL/BACKUP POWER DISTRIBUTION SYSTEM			

Building Services Systems::

The following design packages are for the building services systems. The Contractor shall be responsible to complete the remaining procurement, installation planning (assessing and scheduling), construction, commissioning, Available for Service (AFS) and closeout work associated with each design package in this section.

EC#	Design EC Title	Discipline	Field Status	Notes
120615	#43 Fire Protection Design (Standpipe & Cabinets)	MECH	Not started	To be executed in this contract scope
120616	#42 Sprinkler System	MECH	Not started	To be executed in this contract scope
120351	#64 (67870) Fire and Smoke Detection System	I&C	Not started	To be executed in this contract scope
120494	#77 Ventilation System I&C	I&C	Not started	To be executed in this contract scope
121323	#51 Steam Heating, Condensate, Ventilation	MECH	Not started	To be executed in this contract scope
120349	#73 (60220 & 69040) Telephone/LAN	I&C	Not started	To be executed in this contract scope
120588	#44 Building Plumbing, Emergency Shower & Eyewash, Sewage, Domestic Water	MECH	Not started	To be executed in this contract scope
120352	#65 (60215) Public Address System	I&C	Not started	To be executed in this contract scope
120481	#75 (62321) Personnel and Portal Monitors	I&C	Not started	To be executed in this contract scope

Procurement Status

The vast majority of materials supporting this scope shall be procured as part of this scope of work by the Contractor. The Contractor scope excludes procurement, supply, interim storage and maintenance of :

1. 25 main process tanks (See Appendix G for list of tanks excluded) Target Delivery Date to OPG: November 15, 2015
2. Vapour recovery heat exchangers Target Delivery Date to OPG: March 15, 2016
3. Class 3/6 pumps (See Appendix G for list of pumps excluded) Target Delivery Date to OPG: January 15, 2016
4. 3 auxiliary / non-storage tanks (RVs discharge, active drainage, and inactive drainage tanks) Target Delivery Date: TBD
5. See **Appendix L** for list of valves procured by OPG

OPG will free issue all except the valves. The Contractor will perform full receiving inspection on behalf of OPG for valves procured by OPG. See Appendix L. This includes full receiving inspection per requirements of applicable codes and standards and the Certificate of Authorization holder obligations. Contractor to promptly report and deficiencies to OPG; OPG will retain responsibility for disposition issues to be addressed by the valve supplier. Contractor to produce receiving inspection report, along with a copy of all history docket documentation received from the vendor to OPG.

A list of key material Technical Specifications can be seen in **Appendix F**. **Appendix G** includes the list of equipment tags for tanks and pumps ordered by RCMT. Utilizing this equipment and installing per design under the Contractor's QA is part of the scope of this work. **Appendix H - Vendor List for Key Major Equipment** includes a list of vendors previously engaged to supply the listed equipment. The supply of the listed material is not currently assigned to the listed vendors (i.e. no purchase order has been awarded).

Workplans:

OPG will prepare the workplans per N-INS-08120-10011 for the project. The Contractor shall provide support for OPG in the form of providing input, reviewing, and signing as reviewer for workplans related to installations covered in this scope. The work plan is a planning/co-ordination procedure, and does not replace elements of the Contractor's QA program (such as, but not limited to, Comprehensive Work Packages, Inspection Test Plans, etc).

Engineering

The completion of detailed design "Revision 0" was available April 30th, 2015; however some ECs will be transitioned with discrete deliverables only, and will not be "Revision 0" complete.

Initial issue, or "Revision 0/Rev 0", is considered progression of all design elements with exception of vendor design data, which will be provided by OPG as part of this scope of work. Rev 0 for the main process systems will be released to allow pre-fabrication to begin. The Contractor will prepare subsequent revisions (as some are already a revision higher than 1), or "Revision 1", of the drawings upon receipt of vendor technical data.

Field engineering support for the procurement and construction scope performed by the Contractor shall be provided by the Contractor.

See **Appendix I** for the list of final transition of ECs to the new Contractor.

All currently completed and draft drawings have been provided to the Contractor. As well, the latest 3D model has also been provided for reference purposes. The Contractor shall be responsible to co-ordinate with OPG to support completion of the design with regards to supplying material vendor technical data. The Contractor shall update existing calculations, if required, using analysis software with the original file in the native format from the original Design Agency made available to the Contractor by OPG.

For list of all Design Engineering changes, associated work orders, and work plans, see **Appendix A**.

For ECs transitioned to the Contractor at Rev 0, the Contractor shall assume accountability of the ECs for engineering support during installation, commissioning, Available For Service and closeout.

Also, several ECs for new HWMB-WA were accepted at Rev 0 by exception, without vendor documentation. These Rev 0 ECs are not released for construction. The Contractor shall initiate procurement of these large materials, and complete Rev 01 EC package, incorporating all missing vendor information in Rev 0 and include disposition of all open issues in EC Issues Tracking File (ITF) at Rev 0, changes to Online Wiring (OLW), Third Party Fire evaluation, HFE , Fire Hazard Assessment etc.

All design progression as part of this scope shall be in compliance with N-PROC-MP-0090 and associated governance. The below summarizes some of the key deliverables identified in the governance, but is not exhaustive.

Miscellaneous Engineering Deliverables per N-PROC-MP-0090 include items such as:-

- Maintain and update Design Plan for Master ECs
- Revision of previously completed documents to incorporate new information related to vendor material information and/or constructability review (constructability review updates pending OPG approval)
- Maintain up to date Issues Tracking File (ITF) and progress closure of outstanding issues
- Design manual preparation, changes/addendums to existing design manuals (See ECs 127515 and 127514)
- Detailed Commissioning Specifications (DCS) and Commissioning Reports
- Updates for any documents identified by Document Scoping Checklist
- Final TSSA Registration for systems with Provisional TSSA Registration only at Rev 0
- Provide material substitution (i.e. DBOM update) to suit purchasing or field needs
- Incorporate Field Changes into Design EC Revision prior to system energization for commissioning
- Completion of MPER Report (See Appendix I, EC 120491)
- Management and close-out of Project EC 120412

Closeout

- Drawings, non-drawings (BOMs, SCL, CALCs etc) update
- Asset Suite Design EC closeout (including AEL launch)
- Closeout Design EC
- Closeout Master EC

Engineering support to procurement

- Prepare/Revise technical specifications as required
- Respond to vendor technical inquiries in support of RFQ
- Review and disposition vendor concessions/exceptions/non-conformances
- Perform bid technical evaluation and recommendation
- Accept/Incorporate vendor technical documents into Design EC
- Asset Suite updates for Equipment Bill of Materials (EBOMs), Make/Model updates, Cat ID processing

Other Items:

- Preparation of all outstanding design manuals for this scope. See N-PROC-MP-0065, "Preperation and Revision of System Design Manuals" for reference. (See ECs 127515 and 127514)
- Preperation of all outstanding SAT Compliant Training and Crew Familiarization for this scope.
- Preparation of procedures. See N-PROC-AS-0028, "Development and Review of Technical Procedures" for reference.

The detailed engineering of HWMB-WA will be transitioned to the Contractor. The majority of the design packages will be at Rev 0 (or higher rev) accepted by OPG. 11 EC's will be deliverable based with draft Rev 0 working files, but no engineering stamped drawings/package accepted by OPG. This is because OPG has assessed that both outstanding vendor information and the requirement for constructability input precludes accepting a Rev 0 for these design packages before turnover. For these deliverable based ECs, the Contractor shall complete the engineering through to initial Rev 0 design, and provide subsequent engineering support throughout installation, Available For Service and closeout.

All R00 (OPG accepted) DECs completed by the original Design Agency will be compliant to applicable Codes & Standards, completed in accordance with N-PROC-MP-0090, and approved in Asset Suite by OPG. The Contractor's scope of work is limited to subsequent revisions due to incorporation of final vendor information and non-intent design changes only. Any design intent changes will be approved by OPG (scope, cost, schedule). For clarity, a Rev 00 package involves:

1. COMS are complete;
2. CNSC submissions have been finalized and closed;
3. Provisional TSSA Registration is complete;
4. DECs for Tie-ins have been released for Construction;
5. Design Reports with seismic analysis are finalized;
6. Design assumptions and validation;
7. Calculations
8. All design-related open issues recorded in the ITF (Issue Tracking File) at Rev-00 have been closed;
9. Native files for documents requiring updates.
10. For DEC 120479 & 120476, it is understood that the required Lighting Calculation and Grounding Calculation are completed by the original Design Agency prior to OPG. Acceptance of these DECs at Rev 00.
11. Initial third party reviews

For ECs transitioned to the Contractor at Rev 0, the Contractor shall assume accountability of the ECs for engineering support during installation, commissioning, Available For Service and closeout. Also, several ECs for new HWMB-WA were accepted at Rev 0 by exception, without vendor documentation. These Rev 0 ECs are not released for construction. The Contractor shall initiate procurement of these large materials, and complete Rev 01 EC package, incorporating all missing vendor information in Rev 0 and include disposition of all open issues in EC Issues Tracking File (ITF) at Rev 0, changes to Online Wiring (OLW), Third Party Fire evaluation, HFE , Fire Hazard Assessment etc. See **Appendix I** for status of outstanding ECs to be transitioned to the new Contractor.

Also the Contractor shall be responsible for the design, procurement, installation, commissioning, and Available for Service (AFS) of a temporary modification (TMOD) to allow draining the PHT system into the new PHT tanks. This includes TMOD removal and all closeout work associated with the TMOD.

The purpose of this TMOD is to eliminate the risk of the overall facility not being ready to receive PHT water when required by the Refurbishment Outage. The TMOD will run lines/hoses from the PHT tie-in point (captured in EC 120402) inside the existing facility to the new PHT tanks inside the new HWMB. This option must present a schedule that will eliminate the risk of PHT storage not being available for Start of Refurbishment. The concept for the TMOD to advance the "Ready to Receive D2O" Milestone has been presented in **Appendix J.** It will be further developed upon award and it is dependent on the ability to obtain required TSSA approvals.

All design progression as part of this scope shall be in compliance with N-PROC-MP-0090 and associated governance.

Contracting Services Required: Engineering, Procurement and Construction

Contractor/Owner Interface Requirements: ☒ As per ES MSA COIR (N-COI-00120-00001) unless otherwise stated on the List of Deviations

ES MSA Work Request #: ES 639

Scope of Work

☐ Non-ES MSA vendor to be used (See remainder of SOW for details).

Online/Outage: Online **Specify Outages (If Applicable):**

Work Location: Inside Protected Area

Work will take place primarily in the unzoned area directly west of the existing HWMB. Work will also take place inside the Tritium Removal Facility and Heavy Water Management Building. This includes Zone 3 work, with rubber areas required for radioactive work (i.e. for tie-ins to Heavy Water systems).

Unzoned Area is an area within the zoned area of the facility that is expected to be free of contamination, and is not otherwise classified as Zone 1, 2, or 3.

Zone 2 is an area inside the zoned area that is normally free of contamination but is subject to infrequent cross-contamination due to the movement of personnel and equipment from contaminated areas. This zone may contain enclosed, sealed radioactive systems and sources (i.e., active ventilation ducts, radioactive monitoring pipelines, heavy water piping, and constancy check sources).

Zone 3 is an area inside the zoned area that contains systems and equipment that may be sources of radiation or contamination.

See N-PROC-RA-0014, RADIOLOGICAL ZONING, PERSONNEL/MATERIAL MONITORING AND TRANSFER PERMITS for full details.

3. Approvals		
	Signature	**Date**
Prepared by: Julian Read Section Manager D2O Project	Julian Read	July 30, 2015
Reviewed by: Raza Zaidi Manager Refurbishment Design	Razai	30 July 2015
Approved by: Al Arnott Project Director Darlington and Refurb Projects	Al Arnott	July 30 '15

4. Description of Engineering Work

Contract Engineering Services Required:

☐ **NO (Remainder of this section is not applicable)**

☒ **YES (Check all Applicable Engineering Services and Complete Remainder of this section)**

Conceptual Engineering:	☒ YES	☐ NO
Modification Planning:	☒ YES	☐ NO
Detailed Engineering:	☒ YES	☐ NO
Procurement Engineering Support:	☒ YES	☐ NO
Installation/Commissioning Support:	☒ YES	☐ NO
Available for Service & Project Closeout Support:	☒ YES	☐ NO
Other Engineering/Technical Support:	☒ YES	☐ NO

Additional Comments/Details:

Conceptual Engineering & Modification Planning per N-PROC-MP-0090 as required (i.e. Pipe Chase).

5. Description of Procurement Work

Contract Procurement Services Required:

☒ **YES (Complete remainder of this section)**

☐ **NO (Remainder of this section is not applicable)**

Procurement Responsibility: Both OPG and Contractor.

Miscellaneous Materials, Tools and Equipment: Provided by Contractor.

Additional Comments/Details:

Welding consumables shall be provided by OPG. Miscellaneous tools, consumables (with the exception of welding consumables), and construction support equipment, as required, shall be provided by the Contractor.

Balance of permanent material procurement is in the scope of this contract. All remaining procurement of material shall be completed by the Contractor, unless otherwise directed by OPG.

A Procurement Plan is required for the procurement of all material/equipment required to complete this scope.

A list of key technical specifications for major equipment to be procured can be found in **Appendix F**. The Design EC's contain a full list of technical specifications and material to be procured by the Contractor.

The current D2O Tool Crib will be re-assigned to the Contractor upon full mobilization to the site (following completion of the seismic dike below the 100 m elevation).

6. Description of Construction and Commissioning Work

Contract Construction/Commissioning Services Required:

☒ **YES (Complete remainder of this section)**

☐ **NO (Remainder of this section is not applicable)**

Construction and Commissioning Strategy:

The Contractor shall supply all deliverables outlined in the Contract Owner Interface Requirements (COIR), unless otherwise indicated per a List of Deviations. The Contractor shall be responsible for the balance of construction of the new HWMB West Annex including (but not limited to) completion of outstanding process/electrical systems, and tie-ins to existing station systems. The Contractor shall also be responsible for construction, operation, and maintenance of all temporary construction support infrastructure brought in by the Contractor to facilitate the work.

OPG will remain the project owner and constructor as defined in OHSA and, as such, OPG Work Protection code will apply for all work to be executed (including provision of HoR). Other expectations/deliverables of the Construction phase are as follows:

- Some tie-in activities may be required to be undertaken during off hours (i.e., limited night time hours or weekends).
- The work week is expected to be a 100 hour work week, on a 5 days by 20 hours schedule (two 5 x 8 hour shifts a day plus overtime), with every Saturday (44 per year, which excludes long weekends) budgeted for a 10 hour shift as a separate overtime allowance to be utilized as needed to maintain schedule.
- The Contractor is to follow OPG work planning procedures N-PROC-MA-0022 for innage and N-PROC-MA-0013 for outage, unless approved to deviate by OPG.
- The Contractor is expected to coordinate with OPG resource requirements for any support required to complete construction activities. These support tasks shall be included in the P6 schedule.
- Contractor will sign off to work authorization, excavation cards, drill cards, as necessary.
- The Contractor shall be responsible for equipment labeling and tagging, as per N-PROC-OP-0034 “Equipment Labeling” and D-ED-01520-10001 “Darlington Equipment Identification”.
- Maintain housekeeping at all times to station standards (N-STD-MA-0008).
- With respect to welding, OPG will issue welding consumables to the Contractor upon formal and timely request after the contract award. The Contractor will store/issue/utilize the materials under their own quality program which are expected to be in compliance or equivalent to OPG Nuclear’s welding engineering standards such as N-STW-04800-10001 and N-STW-04800-10010. The Contractor QC personnel are obligated to consult with OPG Welding personnel (supervisor, engineers, program owners) for any need to clarify quality issues or procedural requirements.
- The Contractor will accommodate field oversight activities to be performed by OPG personnel during execution.
- Scaffold shall be supplied and erected by the Contractor. Scaffolding shall be marked to distinguish it from OPG’s scaffold.
- Start of day shift typically is 7 am, and can be modified within union agreements and with OPG approval.
- Provide a copy of all sub-contracts to OPG within 1 week of issuance by the Contractor, to facilitate OPG review of the scope document and terms and conditions.

Construction Sequence

The Contractor shall sequence work to optimize and advance the schedule while minimizing cost.

Progress Updates

The Contractor will provide OPG with a weekly report indicating the status and progress of the Work (including labour hours expended and the expected outstanding labour hours of work), and setting out any deviations or anticipated deviations from the Project Schedule. This will include report on cost and schedule, CPI/SPI, issuance of minutes, earned value, and weekly cash flow forecasts.

Other expectations/deliverables of the Construction phase include:

Work Planning			
1.	Prepare Work Order Assessments in Passport	2.	Project Site Specific Safety Plan
3.	Site Specific Environmental Management Plan	4.	Request and specify laydown area requirements. Erect laydown area barriers.
5.	Job Safety Analyses as per N-INS-08965-10014	6.	Coordinate schedule logic with Darlington Work Control and attend "T minus" reporting meetings
7.	Identify materials requiring Hazmat approval and provide MSDS sheets to OPG for approval	8	Prepare work packages including ITPs and other QA/QC related forms as per the Contractor's Quality Assurance program
Work Execution			
8.	Temporary lighting and grounding	9.	Submit PC1s
10.	Fire Watch	11.	Hoisting and Rigging
12.	Scaffolding	13.	Safe Work Areas
14.	Provide Holder of Record (HoR) and Maintenance Authority (MA) for all work	15.	Provide Safety Officer(s)
16.	Maintain clean work area and dispose of non-active waste	17.	Installation field technical support
18.	Removal of any temporary services installed	19.	Use of the 30/60/90 minute rule for prompt communication of issues to OPG Project Manager and Project Control Centre (PCC)
20.	Sign on to dig and drill/chipping cards as required	21.	Provide all tools and equipment necessary to complete the work scope, except dewatering equipment and radiation PPE
22.	Construction and laydown area fencing	23.	
Administration			
23.	Field Initiated Changes (FIC) / Minor Field Initiated Changes (MINORFIC)	24.	Complete Work Reports in Passport at end of shift where applicable
25.	Compliance with Contract Administration in Oncore including timesheet entry, progress entry, recording of delays, etc, in accordance with N-INS-00150-10001 "Contract Administration in Oncore"	26.	Timely Station Condition Record (SCR) submissions for adverse conditions

Commissioning:

Commissioning responsibilities are outlined in the COIR sections 4.70, 4.71. 4.72, and associated D2O project. In general, commissioning is performed and directed by OPG through OPG prepared work plans. The focus of commissioning is to verify the performance of the constructed works to required design performance requirements. Contractor assistance for commissioning will be provided through:

- Commissioning specifications prepared and issued by the Contractor
- Provision of trades support and their management by the Contractor
- Review of Commissioning Reports prepared by OPG

Pre-Commissioning activities are the responsibility of the Contractor and will be performed to verify the constructed works conform to the project design and quality requirements and are capable of being tested during commissioning. As part of pre-commissioning, the Contractor shall perform the following:

- Prepare and issue Inspection and Test Plans (ITPs) that describe and document the performance of the construction verification / pre-commissioning activities. ITPs will reference applicable test procedures and standards and will identify and document OPG and authorized inspection agency (AIA) witness and documentation tasks. Each ITP will require customer approval to implement and close-out, unless otherwise waived by the customer. Pressure boundary ITPs will be signed off by the TSSA.
- Perform testing, adjustment, and balancing (as applicable) of building services, including fire water, drainage, ventilation/HVAC systems in accordance with ITPs.
- The process systems will be cleaned and flushed with virgin D2O prior to hydrotest/pressure test and leakage checks. Supply and handling of any D2O will be provided by OPG.
- Pre-commissioning construction check-out and test requirements (pre-operational testing activities) shall be aligned with the requirements detailed in N-GUID-09701-10019, NR Check Out and Test Requirements, to ensure construction, workmanship and materials are satisfactory prior to commencing energizing activities

Pre-Commissioning shall include, but not limited to:

Review the Operations Turnover Plan and Issue Tracking File, to ensure deliverables required prior to commissioning have been completed.

Hydrotest/pressure test of Pipelines (or equivalent TSSA approved testing method) per code requirements.

Systematic Conformity Check of Equipment

Static, De-energized Test of Equipment

All construction related Inspection and Test Procedures (ITPs) including Pressure Boundary testing are successfully executed, recorded and available.

Walk downs and pre-tests including start-up verification is complete.

Designer of Record has approved all Field Initiated Changes (FICs) and integrated them on the marked-up as-built drawings required for the commissioning and the Constructor has assured himself that the systems are ready to be commissioned.

A documented declaration by the Designer of Record that the installation executed in the field matches the design drawings and that there are no configuration discrepancies that may prevent execution of the commissioning to prove that installation and performance can meet the Design Requirements.

Identification of all terminal points, open items and documentation that may impact on commissioning.

OPG is planning to utilize virgin D2O instead of light water for pre-commissioning/commissioning activities to secure schedule advantage. This will alleviate the need for light water use during pre-commissioning/commissioning phases.

The Contractor will be responsible to make any required corrections or re-work on its Project Works, during this phase to ensure readiness to turn the system over to OPG for commissioning. During commissioning, the Contractor is responsible to provide construction support to remedy any deficiencies found.

7. Specific Details of Work to be Performed

Modification Design Requirements:

☒ **Complete**

Reference MDR and Modification Outline (if available):

MDRs:

Modification Design Requirements:-

NK38-MDR-38000-10003, " HWMB West Annex Permanent Modifications"

This MDR covers the requirements for the new HWMB-WA civil structure, building, main process systems, electrical and auxiliary systems such as HVAC, Chilled Water, Instrument Air system etc

NK38-MDR-38000-10004, “HWMB West Annex Temporary Modifications and buried services relocation permanent modifications"

This MDR covers the requirements for buried services relocations modifications (i.e. LPSW pipe, Argon/Oxygen tank etc) and temporary modifications created in support of these services relocations.

NK38-MDR-38000-10005, "Temporary modifications in support of construction of the HWMB West Annex"

This MDR covers requirements for construction power, construction water supply and provision for temporary trailers (including LAN, telephone, fire tie-ins) inside the protected area.

NK38-MDR-12320-10001”HWMB West Annex Construction Dewatering System”

This MDR covers requirements for the groundwater dewatering system installed to support excavation and site earthworks.

Master ECs/Modification Outlines:

88528

118632

118880

119821

119824

☐ **MDR Not Available**

Technical/Performance Details:

Refer to **Appendix A – List of Design ECs** for additional details.

NOTE: See Section 16 for references.

8. Other Information

This document does not preclude the ES MSA, COIR or Other Contractual requirements.
Contents of the MDR shall NOT be duplicated in this section.

Environmental:

Work is to be executed consistent with OPG Environmental Procedures and the OPG Accepted Environmental Management Plan to be completed by the Contractor. Soil removal (i.e. for cable duct excavation, and other excavation required to complete this scope of work) will be completed in accordance to the F1 Soil Management Plan. Contractor will produce a Project Specific Environment Management Plan.

Location and Interfacing:

Laydown areas inside and outside PA

- C4 and C5 SATMs
- D9
- F3/F10

A map was provided showing these locations. Co-ordination of the lay down areas will be administered by OPG as multiple contractors will be utilizing these areas to support this project.

Other:

Interfacing Projects

Project#10-73821 (DN Electrical Power Distribution Upgrade): 13.8 kV municipal electrical power supply to HWMB-West Annex is supplied through a new Switchgear (SW53) to be installed under this project. The switchgear is located southwest of the Protected Area and is scheduled to be available for service in Nov 2014.

Project# 10-73810 (Retube & Feeder Replacement Island Support Annex - RFRISA): Project for construction of a 2 storey building west of HWMB-West Annex site. Some of the temporary construction services (such as temporary power supply through T11) are shared between HWMB-West Annex and RFRISA project. Traffic, SATM and general site logistics are to be coordinated with the RFRISA construction team.

Project# 16-34000 (Auxiliary Heating Steam): This project supplies auxiliary heating steam to the station and existing HWMB, which will provide tie-in to the new HWMB-West Annex. This project is expected to be in service by Q3 2015.

Site Construction Trailers:

Two (2) offices and one (1) wash car trailers have been provided inside the PA south of the new HWMB-WA location to support day-to-day operations and oversight of construction activities; one trailer is designated for other personnel to support dyke scope of work, while the second would be made available for the Contractor's and OPG's use. Upon mobilization to site after Ready for Tanks, both trailers will be provided to the Contractor. Two desks will be reserved for OPG use.

Additionally, three (3) office trailers and one (1) wash car have been installed outside the PA in an area designated as D9. Two of these office trailer facilities can be made available for the Contractor's personnel immediately upon contract award, while the remaining trailers will become available upon completion of the Ready for Tank milestone.

Logistics:

This project shall be executed within the Protected Area at the Darlington Nuclear Generating Station in Clarington, Ontario. The power plant will remain in operation during the construction period for this project, requiring careful co-ordination and logistics planning to ensure safe and reliable plant operation, and safe, productive, and cost efficient project performance.

The Contractor shall participate in planning, scheduling, and co-ordination meetings with OPG, and equipment manufacturers as needed. The Contractor shall be responsible for all house-keeping and general tidiness of the site for assigned work areas and ensure compliance with the OPG SATM process, and compliant with the external hazard assessment report (NK38-CORR-03610-0463061) for this project, or identify with sufficient notice the need to update this report should changes be required to support project performance.

To support the construction of the new HWMB West Annex and other projects within the Protected Area (PA), a temporary dewatering system was installed inside the PA and a soil staging pad was constructed outside the PA. Operation of these areas shall be completed by others.

The Contractor shall supply, install and be responsible for inspection of all necessary temporary lifting and rigging equipment such as chain falls, come-a-longs (abiding with the OPG Hoisting and Rigging Handbook), scissor lifts,

tow motors, forklifts, etc.

The Contractor may secure a Space Allocation permit as required from OPG-DN to store field equipment, materials, and supplies (N-INS-09070-10001 and N-PROC-RA-0054). The Contractor will supply the storage cabinet(s) that must meet the appropriate standard required for the type of material being stored.

Unless otherwise noted, OPG expects all equipment and rentals required to complete this scope shall be provided by the Contractor as part of this scope unless otherwise documented and agreed to by OPG in the purchase order.

Craning over the Protected Area security fence is an option. Typically this involves development and approval of a plan, advance communication and authorization from security, as well as RP resources to support.

Other:

A full set of documents for this purchase order, including mark ups of scope to be eliminated, have been provided to the Contractor and shall be the basis of the purchase order. This includes all the latest draft EC documentation not yet formally accepted by OPG.

Other:

Project Execution Plans (for reference)

In order to execute the scope of the project, numerous plans were prepared by the previous vendor and accepted by OPG. Below is a table summarizing the plans available for review. The notes section will indicate if a new plan is required to be developed by the Contractor as part of this scope, or if the previous plan can be assumed to be the process to be executed by the Contractor.

OPG Document Number	Title	Notes
NK38-PLAN-38000-10003	Environmental Plan	Provided for reference. A specific plan shall be prepared by the Contractor as a part of this scope.
NK38-PLAN-38000-10024	Project Safety Plan	Provided for reference. A specific plan shall be prepared by the Contractor as a part of this scope.
NK38-PLAN-38000-10023	Subcontractor Management Plan	Provided for reference. A specific plan shall be prepared by the Contractor as a part of this scope.
NK38-PLAN-38000-10005	Spill Prevention and Contingency Plan	Provided for reference. A specific plan shall be prepared by the Contractor as a part of this scope.
NK38-CORR-03610-0463061	AMEX NSS External Hazards Assessment	Confirmation that this instruction requires no changes is required within 3 weeks of PO award.
NK38-PLAN-38000-10006	Waste Management Plan	Provided for reference. A specific plan shall be prepared by the Contractor as a part of this scope.
N/A	Project Control Plan	A specific plan shall be prepared by the Contractor as a part of this scope to demonstrate how cost and schedule will be managed.
NK38-PLAN-38000-10018	Traffic and Logistics Plan	Provided for reference. A specific plan shall be prepared by the Contractor as a part of this scope.
NK38-REP-38000-10123	Supplementary Geotechnical Investigation: HWMB	Provided for reference.

Temporary Construction Services

A temporary construction power and water source has been installed to support the construction of HWMB-West Annex. Please refer to EC#121835 and EC#121736 for details of the sources and capacity available.

NOTE: This section provides guidance only. The responsibility resides with the Contractor to include all conditions that may apply to the project.

9. Schedule

Schedule Constraints/Requirements:

Schedule

The schedule will be maintained by the Contractor in accordance with N-GUID-00120-10010, Projects and Modifications, Schedule Quality Expectations. This includes items such as the following:

The Contractor will ensure that the Project Schedule provides for sufficient time for review of Submittals by OPG and for the Contractor to revise Submittals in accordance with the terms of this Agreement. OPG shall review and provide comments on the draft Project Schedule. Once OPG has completed its review and any comments from OPG have been incorporated, the Project Schedule shall be final and may only be further amended pursuant to a Project Change Authorization.

The agreed project schedule is to be Level 3, a.k.a. Project Coordination Schedule (PCS), or Publication Schedule. Initially developed as an integrated Critical Path Methodology (CPM) overview of the project, the Level 3 schedule is then maintained as an integrated rollup or summary of the Level 4 schedule activities for reporting status to senior management and to report monthly status. The schedule consists of a set of integrated Level 4 schedules based on CPM and is developed with detailed input from the project management team. The Level 3 schedule spans the whole of the project and is used to support the monthly report. It includes integration of all major milestones, major elements of design (design engineering change package level), engineering, procurement, construction, testing, commissioning and/or start-up. During the execution phase of the project this schedule defines the overall critical path and is the primary coordination tool for the overall project. Audiences for this type of schedule include, but are not limited to program or project managers, CMs or owner's representatives, superintendents, and general foremen.

The schedule is to be integrated into the Primavera Schedule that OPG maintains. OPG's P6 is to the project schedule that is to be regularly updated, monitored, and measured against.

Minimum Requirements for the Schedule

For assigned scope, the Contractor Shall provide:

(1) the dates for delivery of all Submittals, which will include the dates for the Contractor submitting and finalizing each Submittal and the date that OPG shall have reviewed each Submittal;

(2) the dates for starting and entirely finishing each component of the Work, including all Key Milestones;

(3) if applicable, an indication of the total number of days set aside for contingencies and the allocation of these days among the tasks constituting the Work, provided that the Project Schedule shall be based upon the Contractor's Personnel working normal working hours;

(4) support required from OPG relating to access, equipment and manpower,

(5) the resources required by the Contractor to complete each activity, including the date by which OPG has agreed to provide any Free Issue Material, if applicable.

(6) the required shift calendar to maintain the schedule

(7) Delivery dates for all major equipment

(8) Purchase Order Issuance milestones for all permanent plant equipment purchase orders

The standard for scheduling will be Primavera 6 Release 8.2 or subsequent versions as mutually agreed between OPG and the Contractor, or a format otherwise acceptable for each Purchase Order. The Contractor will adhere to such scheduling standards and conventions as may be issued by OPG from time to time to facilitate integration of the Contractor's schedules with OPG schedules for other work being performed by OPG, other contractors to OPG or the Contractor.

Schedule updating will happen on a weekly basis. A monthly level 2 schedule review with OPG senior management will require support as well. Schedule performance metrics (completion, adherence, etc) will be expected weekly with appropriate action taken to ensure minimum 85% schedule adherence, with minimal impacts to critical path.

The Procurement and Construction Schedule for this scope shall meet the expectations per N-GUID-00120-10010, Projects and Modifications – Schedule Quality Expectations.

Adherence to project schedule per ES-MSA.

Need Dates:

Description	Date
OPG Delivery of "Revision 0" design packages	30-Apr-2015 - Complete
OPG Dike Construction Complete (Ready for Tanks)	30-Nov-2015
Prefab piping/supports installation in existing HWMB complete	22-Jan-2016
All Tanks placed in Basement (BCS Milestone)	21-Apr-2016
Capable of receiving refurbishment water Unit 2 – TMOD Staged (BCS Milestone)	30-June-2016
Commissioning Spares List Identified	05-Aug-2016
Electrical Installation Complete	16-Nov-2016
Building Piping Installation Complete	02-Dec-2016
Start commissioning (BCS Milestone)	12-Dec-2016
Building Shell Complete (BCS Milestone)	03-Jan-2017
Final In-Service Declaration Complete & Ready to Receive Moderator Water	**19-Apr-2017**
Project Close-out Complete	24-May-2017

10. Meetings and Communications

☒ As per ES MSA Worksheet unless stated otherwise on the List of Deviations.

☒ Other (Provide Details Below)

Meeting/Communication	Frequency/Timing	Objective
Kick-off Meeting	Within 5 business days of PO award	Review SOW, Contact List
Project Team Meeting	Weekly	Review Project Status. Includes but not limited to construction status, 3 month look ahead, cost/schedule review, and material procurement status.
Construction Team Meeting	Daily	Review field status, schedule updates
Project Control Centre meeting	Daily	
"Plan of Week" schedule review	Weekly	Review 3 week look ahead and review of schedule performance
Level 2 Schedule Review	Weekly	Weekly level 2 schedule review with the project team

11. Training and Qualification

Contractor shall ensure all workers meet OPG training qualifications as per N-TQD-510-00001 (Supplemental BTU Direct Hire And Contract Management Training And Qualification Description).

The Contractor development and delivery of training for new HWMB-West Annex systems to OPG staff is included in this scope of work per **Appendix K**.

12. Quality Assurance Program

☒ See Section 2 of the ES MSA Worksheet.

☒ Other (Provide Details Below)

Comments/Details:

The quality program is to be N286-05 and applicable elements.

13. Applicable Laws, Standards and Codes

As per codes & standards referenced in project MDRs (see section 7)

14. OPG Procedures and Standards

See **Appendix E**

15. Other

Non-conformances:

The Contractor shall manage non-conformances in accordance with APPENDIX C: Non-Conformance Post-Installation Reporting of the COIR.

Includes requirement for Contractor to submit notification by email to: scqs.suppliers@opg.com. Check approved COIR for details.

Space Parts:

Contractor shall supply list of spare parts necessary for startup testing and commissioning of systems specified in Section 6 and procure as needed to meet the commissioning schedule.

16. References

Reference #	Document Name	Document #
1	Contractor/Owner Interface Requirements for Nuclear	N-COI-00120-00001
2	Project Charter – D2O Storage Facility	N-PCH-09701-10001
3	Heavy Water Management Building West Annex Construction Specification	NK38-DS-23800-10001
4	COIR List of Deviations	

17. Appendices

Appendix A – List of Design ECs
Appendix B – 3D Model
Appendix C – Aerial Photo
Appendix D – Building Floor Plans
Appendix E – OPG Standards and Procedures
Appendix F – List of Key Technical Specifications
Appendix G – Tank and Pump Equipment Provided ordered by RCMT
Appendix H – Vendor List for Key Major Equipment
Appendix I – Transition of Engineering
Appendix J – TMOD Basis
Appendix K – Training Program Basis
Appendix L – OPG Supplied Valves

Appendix A – List of Design ECs

Design EC	Design EC Title	Discip.	Field Status	Notes	Work Order #
Building Relocates					
120226	TRF Trailers Removal and LAN Line relocation	ELEC	Complete	AFS signoff/Closeout complete	02839455
120365	Cut/Cap of Abandoned 8" Water Line	MECH	Complete	AFS signoff/Closeout complete	02895255
120366	Cut/Cap of Abandoned 12" Steam & 3" Condensate Lines	MECH	Complete	AFS signoff/Closeout complete	02895257
120364	Cut/Cap of Abandoned 6" Air Line	MECH	Complete	AFS signoff/Closeout complete	02895256
120369	Cut/Cap Abandoned Fire Protection Line	MECH	Complete	Line did not exist in field, closeout complete	02817135
122222	TMOD Relocation of Fuel Pump House #1 Fire Protection Line	MECH	Complete	TMOD removal complete	03044931 02948381 03051964
120400	TMOD Yard Drainage	CIVIL	Partially Complete	Small portion of TMOD (TRF Loading Dock Roof Drain line to MH413) remains to be removed as part of this scope after EC#120341 completion	02895259
120353	Yard Drainage relocation	CIVIL	Complete	AFS signoff/Closeout complete NK38-WPL-15200-0458077 (Complete)	02895260
120404	Relocation of underground LPSW Line	MECH	Complete	Installed during T1301, AFS and closeout complete NK38-WPL-72100-0462898 (Complete)	02956833 02817137
124052	Underground Helium Line Relocation	MECH	Complete	AFS signoff complete, closeout in progress NK38-WPL-75540-0482610 (Complete)	02817134
120415	TMOD SG Cable Duct - temporary cables connection	ELEC	Partially Complete	Temporary cables in service for cable duct removed under EC#120340; TMOD to be removed after completion of PMOD. NK38-WPL-57500-0454368 (Complete)	02817138
120340	Relocation of SG Cable Duct	ELEC	Partially Complete	Existing cable duct removed, new duct to be installed upon completion of seismic dike (and cutting off of caissons) NK38-WPL-57500-0454369 (Draft)	02896628
120341	Relocation of TRF loading dock roof/condensate and underground Line, Driveway, Site Layout and landscaping	MECH	Partially Complete	TRF loading dock roof drain line removal in yard is complete, new line drain to be tied from WA. Landscaping and site grading to be completed at the end of project. NK38-WPL-79110-0458074 (Complete)	02817136
120670	Relocation of Argon/Oxygen/Helium tank conduits	I&C	Partially Complete	Argon conduit has been installed. Temporary cables have been installed for helium & oxygen systems, with conduit relocation to be performed after completion of pipe chase/tunnel works.	03015041 03015042 02929921
122210	Relocation of the Argon tank and piping	MECH	Complete	AFS signoff/closeout complete NK38-WPL-75550-0465092 (Complete)	02973065 02817132
122212	Relocation of the Oxygen Tank and underground piping	MECH	Complete	AFS signoff complete, closeout in progress NK38-WPL-75510-0465093 (Complete)	02817133
Construction Support TMODs					
123123	TMOD for groundwater dewatering system	MECH	Installed	Dewatering system installed and in service (removal to be completed after dewatering system is no longer needed and is excluded from this scope)	03007824

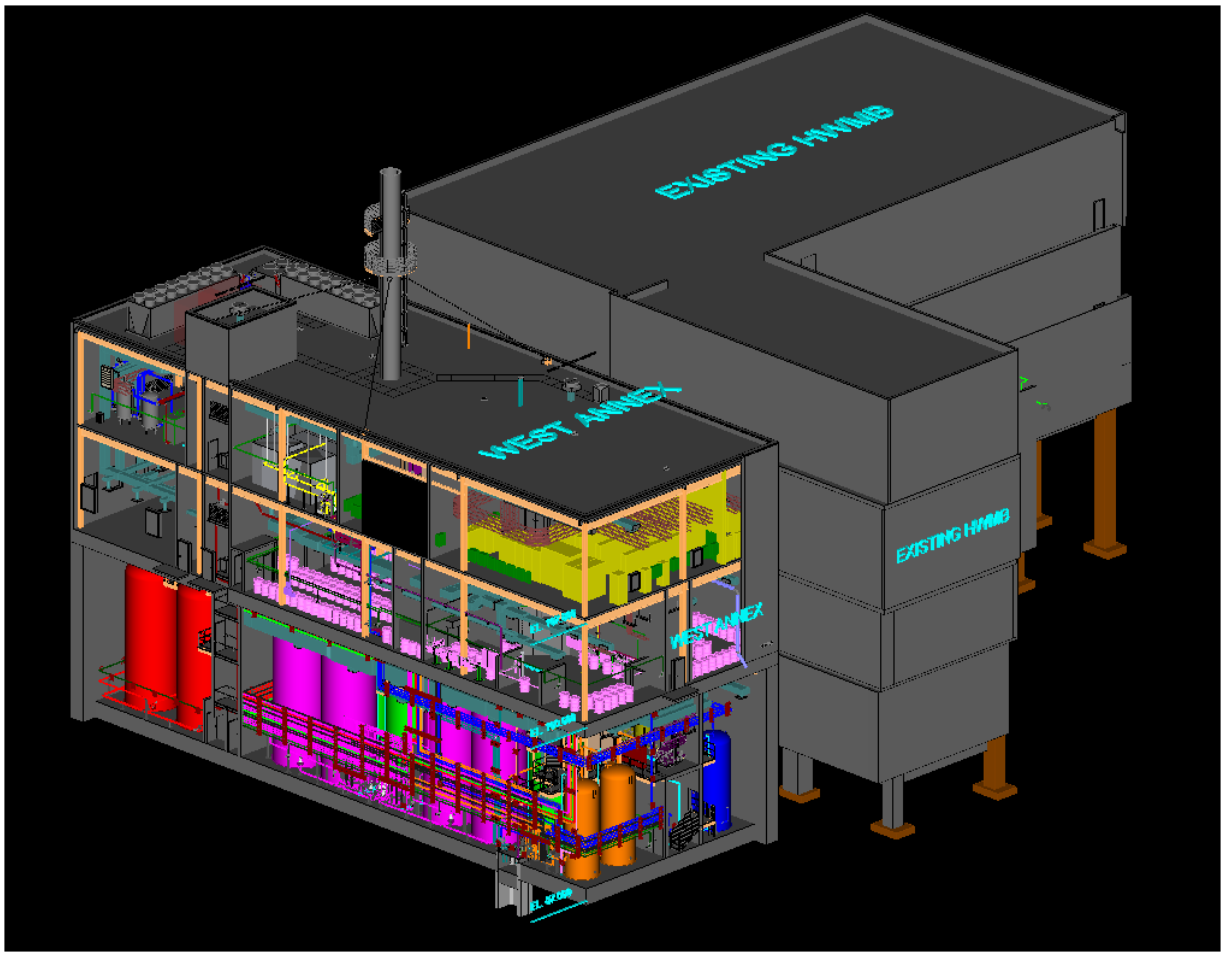
*Associated with N-MAN-00120-10001-SCOPE, Nuclear Projects Scoping Process

Existing HWMB/TRF Tie-ins, relocates, modifications					
120719	Tie-in to Steam & Condensate systems	MECH	Complete	Installed during T1301, AFS and closeout complete NK38-WPL-73680-0458231 (Complete)	02917063 03057951
121579	Tie-in to Inactive Plant Drainage (roof /condensate)	MECH	Complete	Installed during T1301, AFS/closeout complete NK38-WPL-79110-0461501 (Complete)	02917064
120448	Tie-in to TRF Feed and Product	MECH	Complete	Installed during T1301, AFS and closeout complete NK38-WPL-39340-0458036 (Complete)	02910095
121327	Reconfiguration of the D2O Cleanup System	MECH	Not Started	To be executed in this contract scope NK38-WPL-38410-0458072 (Draft)	02989699
120405	Tie-in to D2O Cleanup System	MECH	Partially Complete	To be executed in this scope. NK38-WPL-38410-0492511 (Draft)	02910084
120401	Tie-in to Moderator D2O Supply	MECH	Not started	To be executed in this contract scope NK38-WPL-38110-0458235 (Draft)	02909492
120402	Tie-in to PHT D2O Supply/Transfer System	MECH	Not started	To be executed in this contract scope NK38-WPL-38110-0457864 (Draft)	02910081
120408	Tie-in to Upgrader System	MECH	Not started	To be executed in this contract scope NK38-WPL-38430-0471228 (Draft)	02910088
120427	Tie-in to Domestic Water System	MECH	Not started	To be executed in this contract scope NK38-WPL-72700-0459101 (Draft)	02922412
120428	Tie-in to Demineralised Water	MECH	Not started	To be executed in this contract scope NK38-WPL-74250-0458232 (Draft)	02922411
120426	Tie in and transfer Sewage System	MECH	Cancelled	**Cancelled**	02922408
120720	Tie-in to Fire Protection Water	MECH	Not started	To be executed in this contract scope NK38-WPL-78110-0460301 (Draft)	02922410
120557	Tie-in to Breathing Air	MECH	Not started	To be executed in this contract scope NK38-WPL-75130-0455510 (Draft)	02917061
120452	Relocation of Mech Lines in Loading Bay	MECH	Not started	To be executed in this contract scope NK38-WPL-73680-0460587 (Draft)	02948852
120577	Relocation of Elec/I&C Lines in Loading Bay	ELEC	Not started	To be executed in this contract scope NK38-WPL-50000-0457772 (Draft)	02935756
120483	Tie-In to TRF DCU-4 Computer Hardware	ELEC	Not started	This scope is being executed by others. However, termination of cables at this tie-in as part of I&C is required.	02917066
New Building Construction (Civil)					
120471	#81 Seismic Dike	CIVIL	In progress	Requires completion of 100 elevation slab, following basement walls, foundation (raft and topping) slabs are complete. As part of completing this cope, cutting of the piles (~1 m below grade) is required). See shop drawings for details (reference documents to this EC).	03035593
121447	#83 Storage Tank/Equipment Support	CIVIL	Not started	Excluded from this scope with exception of the tank supports, and active drainage sump installation. Remaining work following “Ready for tanks milestone” is include in Contractor scope.	03139442
120343	#78 Building Design, Architectural and Structural Rev 00	CIVIL	Not started	Included in this scope.	02895260
120906	#80 Causeway Connecting West Annex to Loading Dock	CIVIL	Not started	Included in this scope. NK38-WPL-28000-0460103 (Draft)	03096893
123130	#99-123130 DEC Buried Pipe Chase Between TRF and West Annex	CIVIL	Not started	Included in this scope. It is assumed dewatering can be achieved via the box drain pump outs through the dewatering skid. Note, engineering, procurement, and construction for any relocates inside the existing HWMB as a result of the pipe chase penetration is included in the Contractor scope.	03139461
121146	#84 Maintenance Platform	CIVIL	Not started	Included in scope.	03139166
121147	#85 Hoists	CIVIL	Not started	Included in scope.	03139167

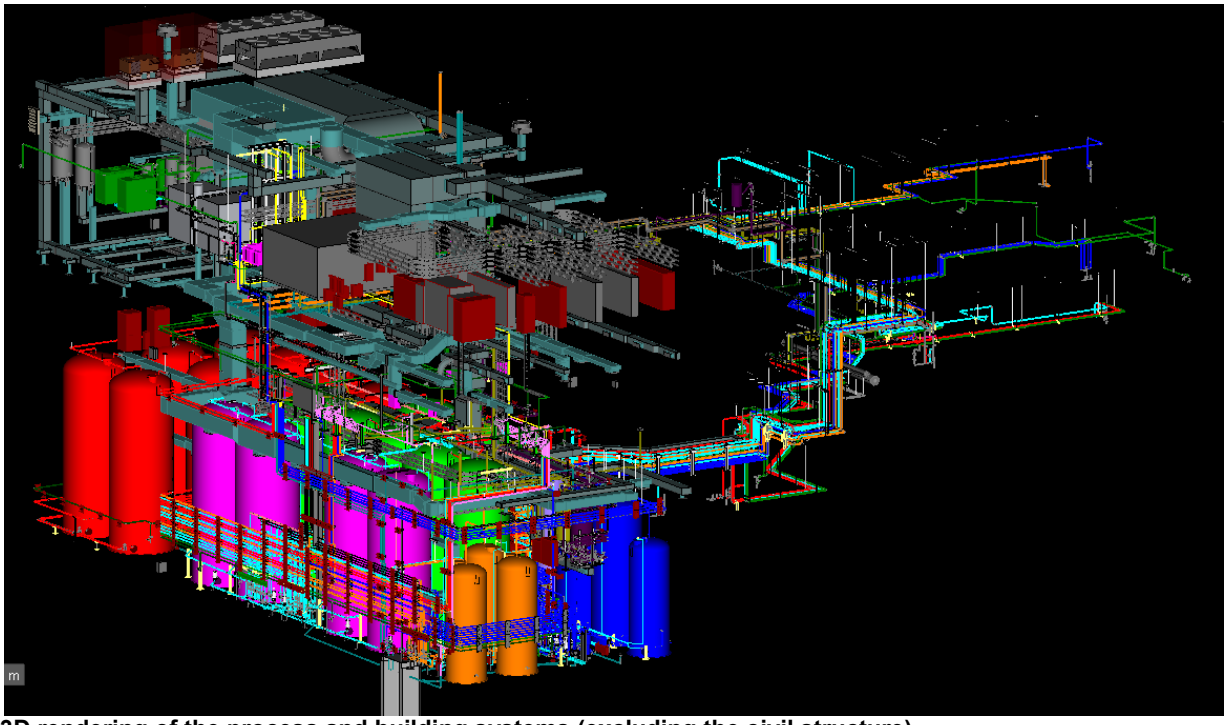
121322	#82 Radiation Shielding Design	CIVIL	N/A	Contingency EC.	03139371
New Building Main Process Systems					
120421	#46-1 (38110) Tanks/Piping for D2O Supply	MECH	Not started	To be executed in this contract scope	03013254 03175001
120422	#47-2 (38110) Tanks/Piping for TRF Outgoing	MECH	Not started	To be executed in this contract scope	03013255 03062557
120423	#46-2 (38500) Tanks/Piping for Downgraded	MECH	Not started	To be executed in this contract scope	03013256
120424	#47-1 (38410) Tanks/Piping for D2O Clean Up	MECH	Not started	To be executed in this contract scope	03013257
120488	#68 Storage Tank/Equipment Control System	I&C	Not started	To be executed in this contract scope	03139146
120489	#69 Storage Tank Level Indicators	I&C	Not started	To be executed in this contract scope	03139147
120406	Tie-in to DIOTs	MECH	In-progress	This scope is completed by others. However, this scope under other EC's include tie-in to these lines. EC provided for information only.	120406
120485	#54 Misc Electrical Power to Pump Motors & Equip (Active/inactive), CDF rack	ELEC	Not started	To be executed in this contract scope	03130594
120523	#53 Drum Filling/Testing/Cleaning	MECH	Not started	To be executed in this contract scope	03139155
New Building Electrical Power Systems					
127218	Cable Duct from SWG53 to D2O/RFRISA buildings	ELEC	Not started	To be executed in this contract scope	03210689
120472	#56 Electrical Power Supply for West Annex	ELEC	Not started	To be executed in this contract scope NK38-WPL-53300-0493893 (Not Started)	03139135
120474	#57 DEC Back-up Power	ELEC	Not started	To be executed in this contract scope	03139136
120478	#63 MCC Design	ELEC	Not started	To be executed in this contract scope	03139140
120479	#55 Building Lighting and Electrical Distribution System (receptacles)	ELEC	Not started	To be executed in this contract scope	03139141
120475	#58 Uninterruptible Power Supply (UPS)	ELEC	Not started	To be executed in this contract scope	03139137
129058	DESIGN-DNGS HWMB WEST ANNEX 120/208V NORMAL/BACKUP POWER DISTRIBUTION SYSTEM	ELEC	Not Started	To be executed in this contract scope	N/A
120476	#59 Grounding System for West Annex	ELEC	Not started	All scope of this EC not embedded into the foundation slab/walls to be executed in this contract scope	03139138
120477	#60 Cable Support Systems	ELEC	Not started	To be executed in this contract scope	03139139
New Building Auxiliary Process Systems					
121133	#33 (75160 & 75110) Instrument Air and Service Air System	MECH	Not started	To be executed in this contract scope	03139165
121326	#96 Elec and I&C for new Instrument/Service Air Compressors	ELEC	Not started	To be executed in this contract scope	03139439
121320	#52 (73870 & 38300) Chilled Water and Air Conditioning Units	MECH	Not started	To be executed in this contract scope	03139365
121805	I&C and power for chilled water system	ELEC/I&C	Not started	To be executed in this contract scope	03210691
121318	#95 (SCI 63830) DEC for D20 Vapour Recovery	ELEC/I&C	Not started	To be executed in this contract scope	03139168
121319	#94 (SCI 38300) DEC for D20 Vapour Recovery	MECH	Not started	To be executed in this contract scope	03139169
120784	#27 (79710 & 38210) Active Plant Drainage + D2O Liquid Recovery Sump	MECH	Not started	All scope of this EC not embedded in the raft slab to be executed in this contract scope	02922413

120643	#50-2 (SCI 79110) Inactive Plant Drainage	MECH	Not started	To be executed in this contract scope	02955472 03239813
120491	#71 (67989) Fixed Gaseous Effluent Radioactivity Monitoring	I&C	Not started	To be executed in this contract scope	03139149
120492	#74 (62341 & 62330) FAATM and FAAGM	I&C	Not started	To be executed in this contract scope	03139150
120493	#66 (63860) D2O Leak Detection System (Beetles)	I&C	Not started	To be executed in this contract scope	03139151
New Building Misc Support Systems					
120615	#43 Fire Protection Design (Standpipe & Cabinets)	MECH	Not started	To be executed in this contract scope	03139161
120616	#42 Sprinkler System	MECH	Not started	To be executed in this contract scope	03139164
120351	#64 (67870) Fire and Smoke Detection System	I&C	Not started	To be executed in this contract scope	03139134
120494	#77 Ventilation System I&C	I&C	Not started	To be executed in this contract scope	03139154
121323	#51 Steam Heating, Condensate, Ventilation	MECH	Not started	To be executed in this contract scope	
120349	#73 (60220 & 69040) Telephone/LAN	I&C	Not started	To be executed in this contract scope	03109729
120588	#44 Building Plumbing, Emergency Shower & Eyewash, Sewage, Domestic Water	MECH	Not started	To be executed in this contract scope	03139158
120352	#65 (60215) Public Address System	I&C	Not started	To be executed in this contract scope	03109728
120481	#75 (62321) Personnel and Portal Monitors	I&C	Not started	To be executed in this contract scope	03139144

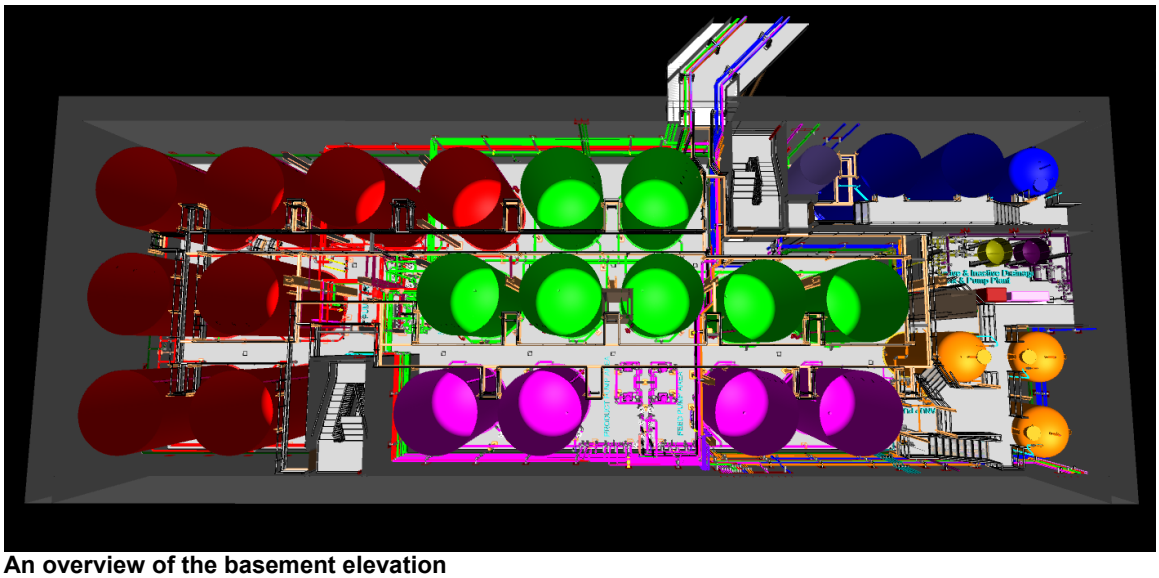
Appendix B – 3D Model



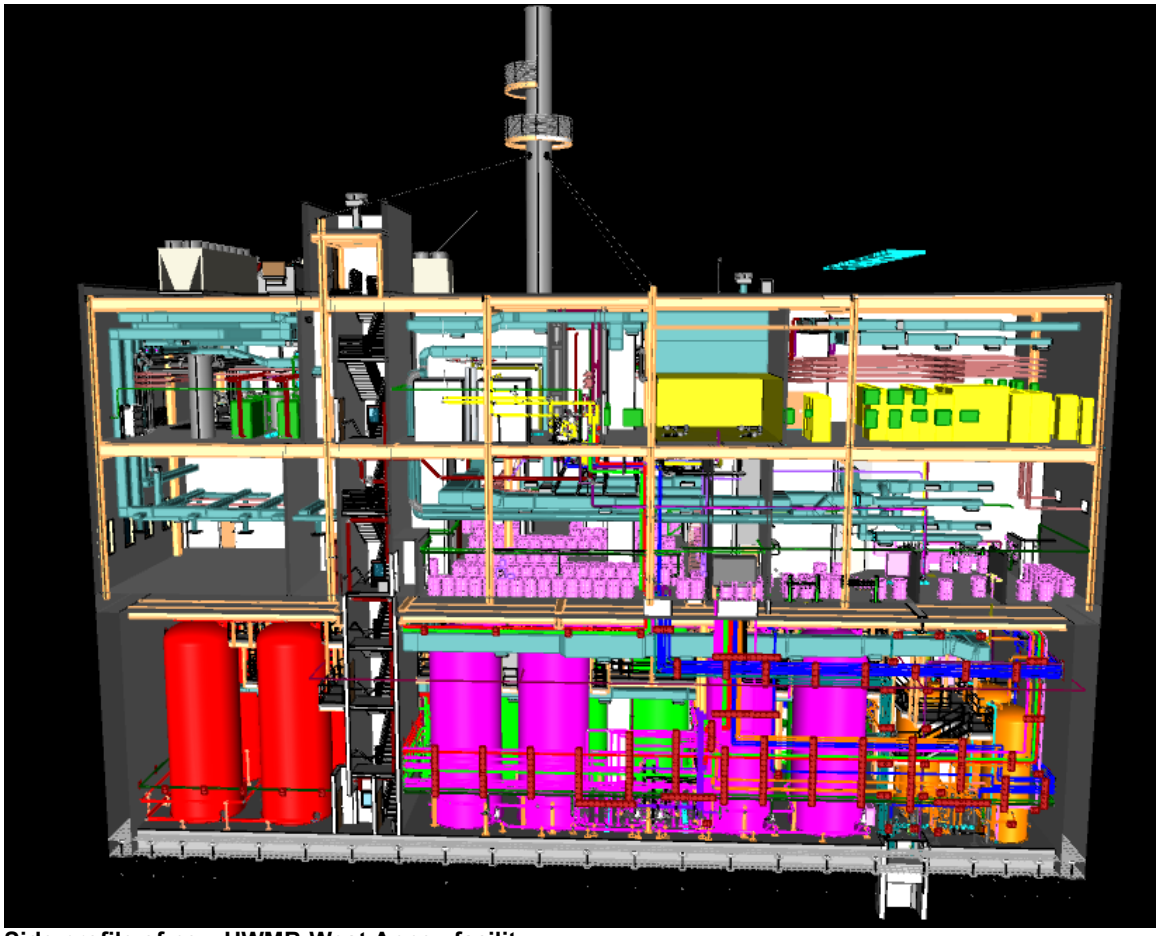
3D rendering of the new Heavy Water Management Building West Annex



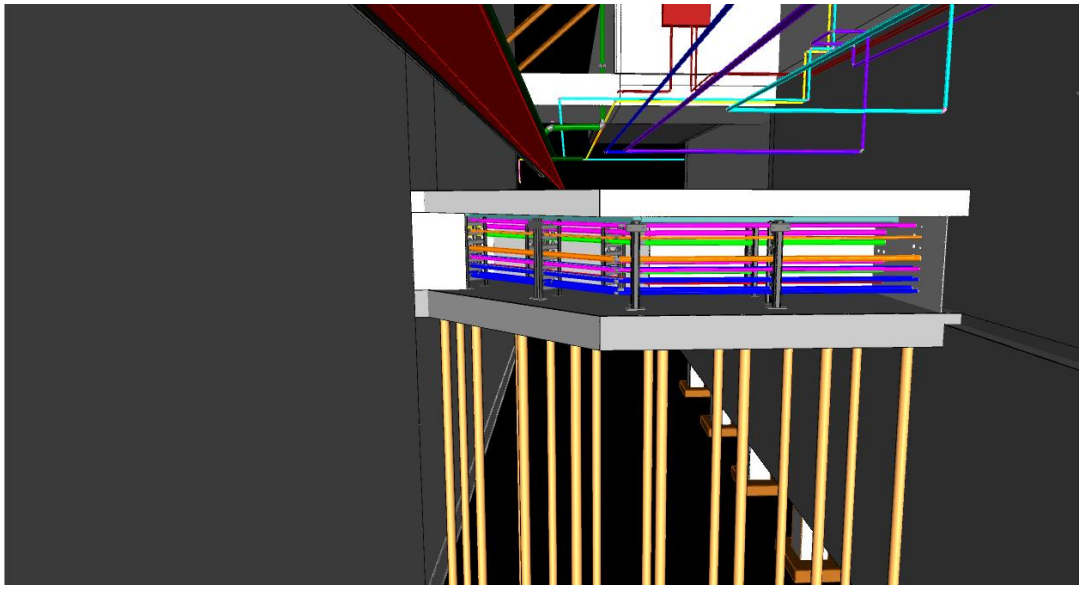
3D rendering of the process and building systems (excluding the civil structure)



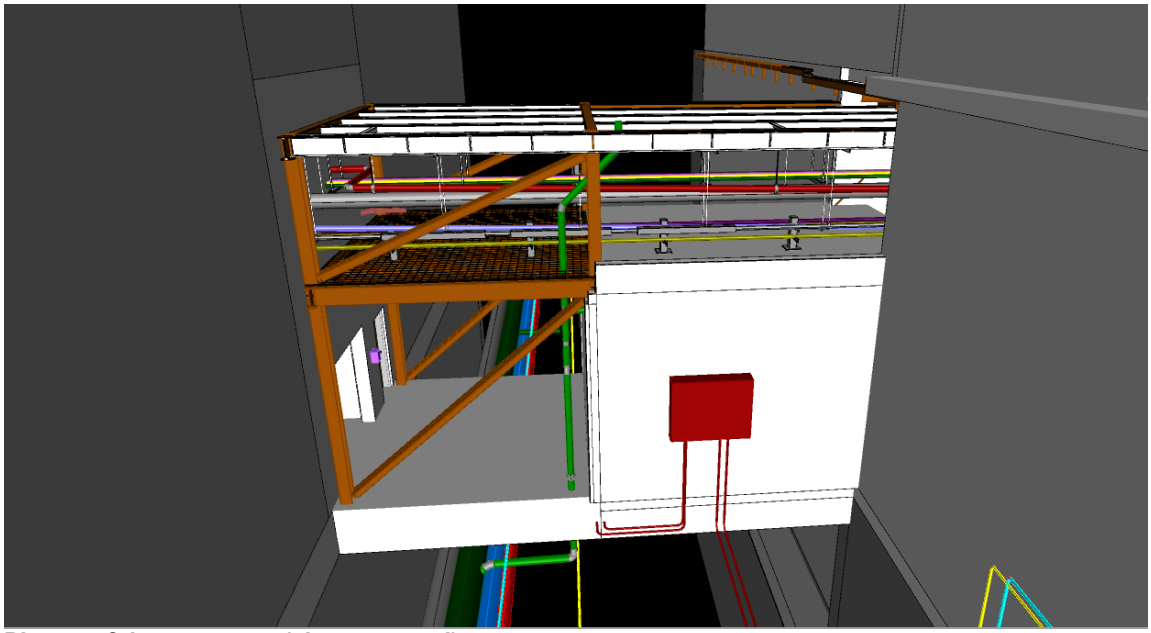
An overview of the basement elevation



Side profile of new HWMB-West Annex facility

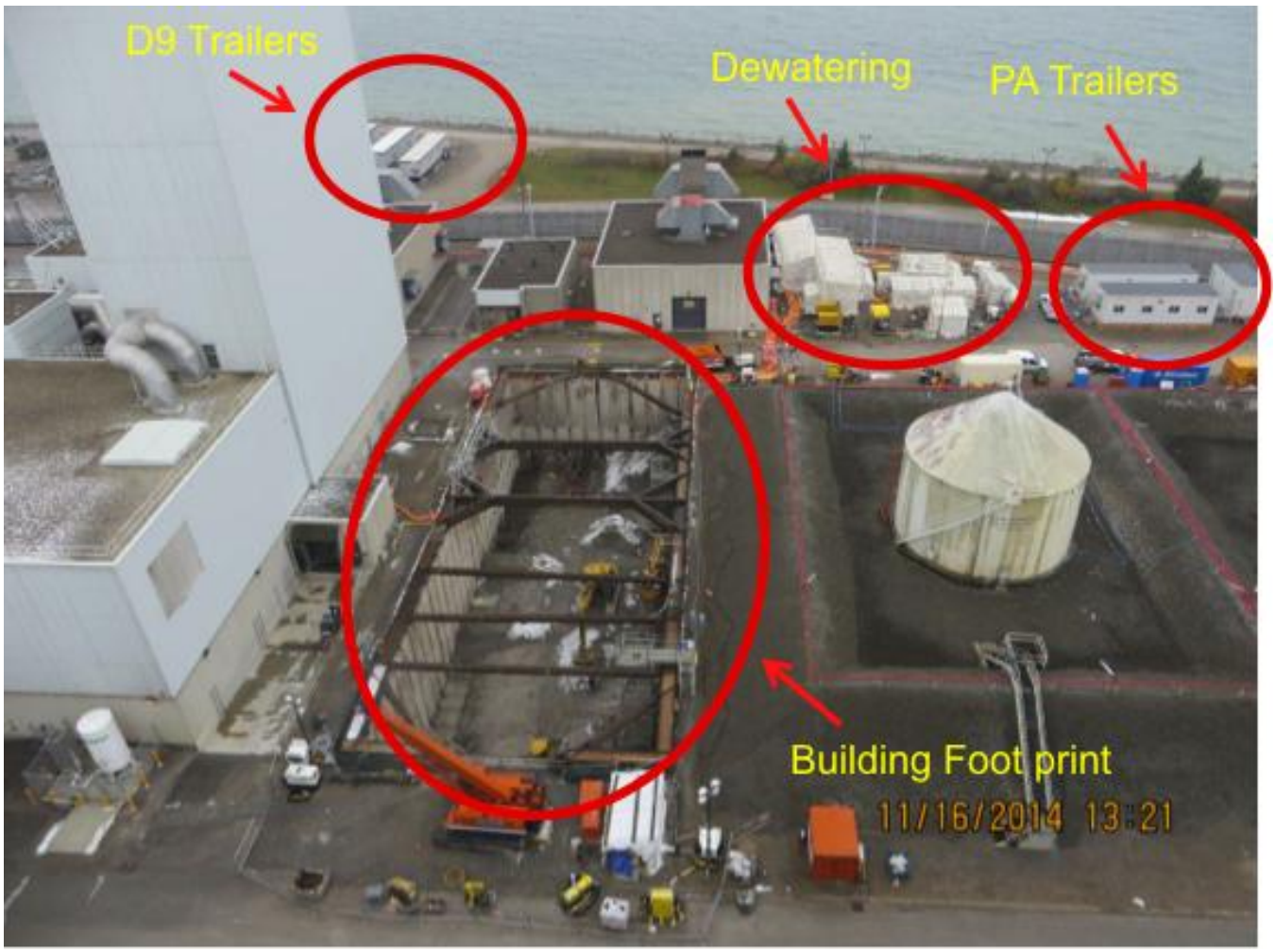


3D rendering of the buried pipe tunnel at 94 m elevation between new HWMB-West Annex and existing HWMB/TRF



Picture of the causeway (above ground)

Appendix C – Aerial Photo

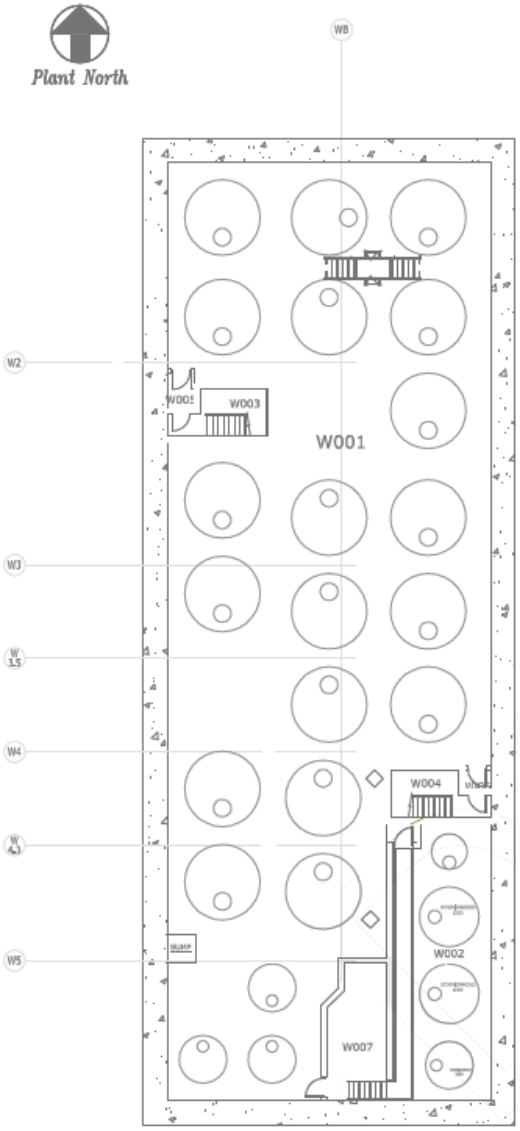


Aerial photo of the new HWMB West Annex footprint as of Nov 2014 (looking South from Unit 2 Reactor Building roof)

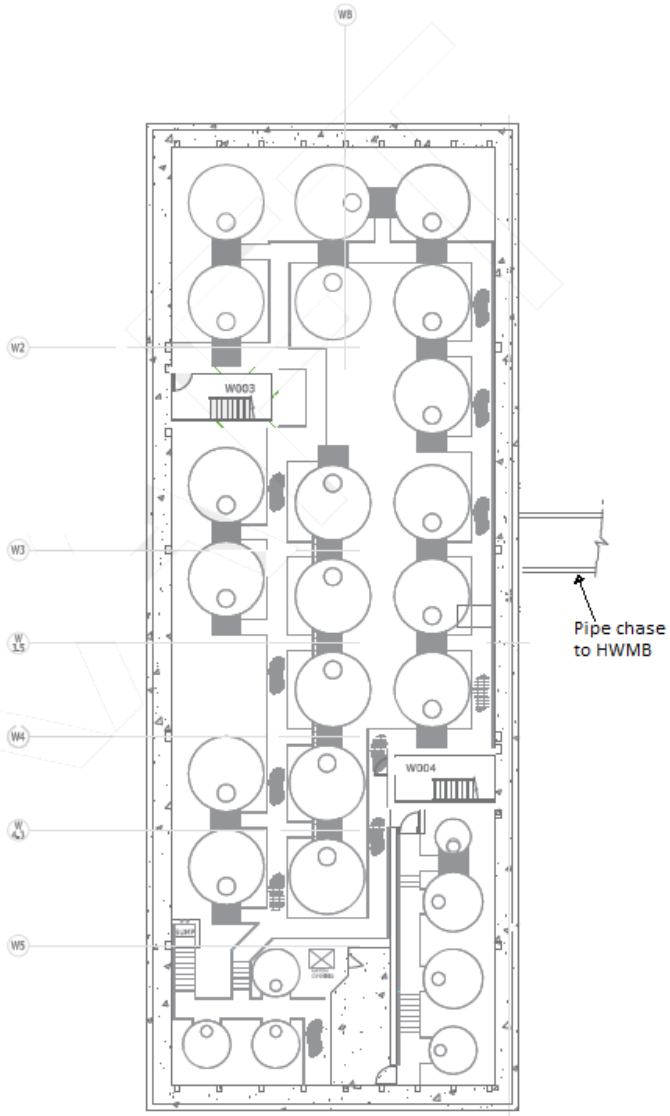
A picture dated July 16, 2015 showing the dewatering system and the edge of the trailers at the top right.

Note the cross struts in this picture, discussed previously within the scope of work. These are forecasted to remain during tank installation and are currently designed to be removed following curing of the 100m elevation floor slab. As such, working around, through, and under these struts is in the scope of this work.

Appendix D – Building Floor Plans



BASEMENT PLAN EL. 87.0



PLATFORMS AT EL. 94.0

Plant North
Causeway to existing HWMB/TRF
W109
W202
W206
W207
W203
FIRST FLOOR PLAN
ELEV. 100.0
2ND FLOOR PLAN EL. 107.8
ROOF PLAN EL. 115.0

18. OPG GOVERANCE, Policies, standards and procedures

In addition to procedures listed in N-DAI-00150-10000, below is a summary list (this list is not exhaustive).

Controlled Document Number	Controlled Document Title
N/A	OCCUPATIONAL HEALTH & SAFETY ACT (OH&SA)
N/A	CORPORATE SAFETY RULES – COMMON SAFETY RULES
N-GUID-00700-10000	GUIDE TO MODIFICATIONS PROCEDURE
N-PROG-MA-0015	WORK PROTECTION
N-LIST-08400.00-10002	WORK PROTECTION MANUAL INDEX
N-PROC-MA-0008	WORK INITIATION, APPROVAL, AND PRIORITIZATION
N-PROC-MA-0031	CONTROL OF UNSECURED EQUIPMENT IN A SEISMICALLY QUALIFIED AREA AND CONTROL OF SEISMIC ROUTE INTEGRITY
N-PROC-MA-0070	CALIBRATION OF FIELD EQUIPMENT
N-PROC-OP-0013	CONTROL OF SYSTEM CHEMISTRY
N-PROC-OP-0034	EQUIPMENT LABELLING
N-PROC-RA-0013	RADIATION PROTECTION
N-PROC-RA-0022	PROCESSING STATION CONDITION RECORDS
N-PROC-RA-0027	RADIOACTIVE WORK PLANNING EXECUTION AND CLOSE OUT
N-INS-00150-10001	CONTRACT ADMINISTRATION IN ONCORE
N-INS-07080-10000	HAZARDOUS MATERIAL CONTROL
N-INS-07080-10002	LABELLING STORAGE USE AND DISPOSAL OF HAZARDOUS MATERIAL IN THE FIELD
N-INS-08121.3-10000	IMPLEMENTATION OF PRE-START HEALTH AND SAFETY REVIEW (PSR)
N-INS-08965-10014	JOB SAFETY ANALYSIS PROCESS
N-INS-60110-10000	ON-LINE WIRING UPDATING AND DESIGN
D-ED-01520-10001	DARLINGTON EQUIPMENT IDENTIFICATION
N-LIST-01300-10000	BOUNDED DOCUMENT SET
N-LIST-01300-10006	LIST OF ACTIVE ENGINEERING STANDARDS AND GENERIC ENGINEERING SPECIFICATIONS
N-LIST-01300-10007	ONTARIO HYDRO DESIGN STANDARDS AND SPECIFICATION
N-STD-01161-10000	DRAFTING PRESENTATION STANDARD AND PRACTICES
N-STI-69000-10000	SOFTWARE CATEGORIZATION
N-STM-01110-10001	NUCLEAR CONSTRUCTION REQUIREMENTS
N-STM-01110-10002	DESIGN AND CONSTRUCTION REQUIREMENTS
N-STM-01110-10003	PIPING STANDARDS MANUAL
N-STM-01110-10005	TUBING DESIGN GUIDE
N-STM-04940-10006	STEEL VALVES NOMINAL PIPE SIZE 3 AND LARGER FOR CRITICAL SERVICE
N-STW-04800-10000	WELDING PROCEDURES INDEX
N-STW-04800-10001	CONTROL AND HANDLING OF WELDING CONSUMABLES
N-STD-OP-0031	MONITORING OF RADIOACTIVITY IN EFFLUENTS
N-MAN-06700-10002	HUMAN FACTORS ENGINEERING GUIDE FOR VENDORS
N-RPP-03415.1-10000	RADIATION PROTECTION POLICIES AND PRINCIPLES
N-RPP-03415.1-10001	RADIATION PROTECTION REQUIREMENTS
N-TQD-510-00001	SUPPLEMENTAL BTU DIRECT HIRE AND CONTRACT MANAGEMENT TRAINING AND QUALIFICATION DESCRIPTION
NK38-OPP-03600	OPERATING POLICIES AND PRINCIPLES
N-STM-01110-10001	NUCLEAR CONSTRUCTION REQUIREMENTS
N-INS-08965.12-10000	CONVENTIONAL SAFETY INCIDENT MANAGEMENT

*Associated with N-MAN-00120-10001-SCOPE, Nuclear Projects Scoping Process

N-INS-08965-10020	CONFINED SPACES – ESTABLISHING AND EXECUTING ENTRY
N-INS-08965-10021	ELECTRICAL SAFETY
N-INS-09106-10011	CONTROL OF LIFTED ELECTRICAL LEADS
N-INS-08965-10035	FALLING OBJECTIVE PREVENTION
N-INS-08965-10028	HEAT AND COLD STRESS IN THE WORKPLACE
N-INS-08965-10001	OPERATION OF IN-PLANT / OFF-ROAD VEHICLES
N-INS-08100-10002	PICKERING AND DARLINGTON TRAFFIC MANAGEMENT
N-PROC-MA-0012	WORK PROTECTION
N-STD-MA-0001	WORK PROTECTION
N-INS-08960-10001	WORKING AT HEIGHTS
N-STD-MA-0006	SCAFFOLDS AND TEMPORARY WORK STRUCTURES
N-MAN-09071-10001	TRAINING BASIS FOR RADIATION PROTECTION
N-PROC-MA-0006	WORK PERFORMANCE
N-PROC-MA-0018	FOREIGN MATERIAL EXCLUSION
N-PROC-MA-0021	TROUBLESHOOTING PLANT EQUIPMENT
N-PROC-OP-0005	PRE-JOB BRIEFING AND POST-JOB DEBRIEFING
N-PROG-MA-0004	CONDUCT OF MAINTENANCE
N-STD-MA-0004	POST-MAINTENANCE TEST
N-STD-OP-0012	CONSERVATIVE DECISION-MAKING
N-STD-OP-0015	OBSERVATION AND COACHING
N-STD-OP-0009	REACTIVITY MANAGEMENT
N-STD-TR-0001	CONDUCT OF TRAINING
N-PROG-AS-0002	HUMAN PERFORMANCE
N-STD-OP-0004	SELF-CHECK PROGRAM
N-POL-0001	NUCLEAR SAFETY POLICY OF THE OPG BOARD OF DIRECTORS
N-STD-OP-0002	COMMUNICATIONS
N-INS-09106-10001	FOREIGN MATERIAL EXCLUSION PLANNING
N-MAN-08965-10000 SHT SEC A14.1	PERSONAL PROTECTIVE EQUIPMENT
N-INS-09180-10015	LIFT PLANNING
N-STD-MA-0018	HOISTING AND RIGGING
N-INS-09180-1000	SCAFFOLD BUILDERS HANDBOOK
N-STD-MA-0008	STATION MATERIEL CONDITION HOUSEKEEPING AND INSPECTION
N-PROC-RA-0054	CONTROL OF TRANSIENT MATERIAL AND SPACE ALLOCATION WITHIN THE SITE
N-STD-OP-0013	MAIN CONTROL ROOM ACCESS
N-INS-08965-10013	USE OF WARNING SIGNS AND BARRICADES FOR CONVENTIONAL SAFETY HAZARDS
N-PROG-RA-0013	RADIATION PROTECTION
N-PROC-RA-0014	RADIOLOGICAL ZONING, PERSONNEL/MATERIAL MONITORING AND TRANSFER PERMITS
N-PROC-RA-0017	SEGREGATION AND HANDLING OF RADIOACTIVE WASTE
N-PROG-RA-0013	ENVIRONMENTAL POLICY
N-PROG-OP-0006	ENVIRONMENTAL MANAGEMENT
N-STD-OP-0026	SPILL MANAGEMENT

Appendix F – List of Key Technical Specifications

Below is a list of key technical specifications. This list is not exhaustive and reference to the design ECs is required for a complete list.

A.1.1.1 PO SCHED ACT	A.1.1.2 Description	A.1.1.3 DEC	A.1.1.4 SPEC
ENG-85330	Ball Valves (QTY 116)	Various	NK38-DS-38000-10003 DESIGN SPECIFICATION FOR CLASS 3 NPS 1 ASME CLASS 150 BALL VALVES FOR HWMB WEST ANNEX NK38-VSS-38000-10018 BALL VALVE NPS 1 S.S. ASME CLASS 150 BUTT-WELD ENDS NK38-VSS-38000-10019 BALL VALVE NPS 1\2 S.S. ASME CLASS 300 BUTT-WELD ENDS NK38-VSS-38000-10020 BALL VALVE NPS 3\4 STAINLESS STEEL ASME CLASS 300 BUTT WELD ENDS NK38-VSS-73690-10002 "1"" STAINLESS STEEL BALL VALVE" NK38-VSS-73870-10004 "1"" BALL VALVE FOR D2O WEST ANNEX CHILL WATER SYSTEM" NK38-VSS-73870-10005 "1 1/2"" BALL VALVE FOR D2O WEST ANNEX CHILL WATER SYSTEM" NK38-VSS-75500-10001 BALL VALVE NPS 1 COPPER ALLOY NK38-VSS-75510-10001 BALL VALVE NPS 1 COPPER ALLOY OXYGEN-CLEAN NK38-VSS-79710-10004 BALL VALVE NPS 1\2 S.S. ASME CLASS 150 MNPT ENDS
ENG-54680	Relief Valves (QTY 63)	Various	NK38-DS-38000-10016 DESIGN SPECIFICATION FOR CLASS 3 OVERPRESSURE PROTECTION SAFETY RELIEF VALVES FOR D2O STORAGE TANKS IN HWMB WEST ANNEX NK38-DS-38000-10017 DESIGN SPECIFICATION FOR CLASS 3 OVERPRESSURE PROTECTION SAFETY RELIEF VALVES IN HWMB WEST ANNEX 1-1\2X2 S.P.=689 KPA(G) (100 PSIG) NK38-DS-38000-10018 DESIGN SPECIFICATION FOR CLASS 3 OVERPRESSURE PROTECTION SAFETY RELIEF VALVES IN HWMB WEST ANNEX 1-1\2X3 S.P.=207 KPA(G) (30 PSIG) NK38-VSS-38000-10024 RELIEF VALVE, 2X3, S.S., S.P.=103 KPA(G) (14.9 PSIG) NK38-VSS-38110-10021 RELIEF VALVE 2X3 S.S. ASME CLASS 150 - DARLINGTON NUCLEAR DIVISION VALVE SPECIFICATION DATA SHEET NK38-VSS-38110-10027 RELIEF VALVE 1-1\2X3 S.S. NK38-VSS-38110-10028 RELIEF VALVE, 3\4X1 S.S. S.P.=2015 KPA(G) (292 PSIG) NK38-VSS-38110-10029 RELIEF VALVE 3\4X1 S.S. S.P.=1379 KPA(G) (200 PSIG) NK38-VSS-38110-10030 RELIEF VALVE 3\4X1 S.S. S.P.=621 KPA(G) (90 PSIG) NK38-VSS-38410-10002 RELIEF VALVE 3\4X1 S.S. S.P.=414 KPA(G) (60 PSIG) NK38-VSS-38500-10008 "NC3 1 1/2 "" SWING CHECK VALVE FOR 1 2 3 4 - 38500-NV208" NK38-VSS-38910-10001 RELIEF VALVE 1X1-1\2 S.S. NK38-VSS-38910-10002 RELIEF VALVE 1X1-1\2 S.S. GAS SERVICES NK38-VSS-38910-10003 RELIEF VALVE 1X1 S.S. FOR D2O DRUM CLEANING STATION
ENG-54670	Air Release & Vacuum Breaking Valves (QTY 12)	Various	NK38-DS-38000-10001 DESIGN SPECIFICATION FOR CLASS 3 NPS 2 ASME CLASS 150 AIR RELEASE VALVES FOR HWMB WEST ANNEX NK38-DS-38000-10002 DESIGN SPECIFICATION FOR CLASS 3 NPS 2 ASME CLASS 150 VACUUM RELIEF VALVES FOR D2O STORAGE TANKS IN HWMB WEST ANNEX NK38-VSS-38110-10022 AIR RELEASE VALVE NPS 2 S.S.
ENG-85430	Globe Valves (QTY 104 of 199)(excludes Stm & Con in HVAC DEC)	Various	NK38-VSS-38000-10010 GLOBE VALVE NPS 2 S.S. ASME CLASS 300 BUTT-WELD ENDS NK38-VSS-38000-10011 GLOBE VALVE NPS 3 S.S. ASME CLASS 300 BUTT-WELD ENDS NK38-VSS-38000-10012 GLOBE VALVE NPS 3-1\2 S.S. ASME CLASS 300 BUTT-WELD ENDS NK38-VSS-38000-10013 GLOBE VALVE NPS 1\2 S.S. ASME CLASS 300 BUTT-WELD ENDS NK38-VSS-38000-10014 GLOBE VALVE NPS 1\2 S.S. ASME CLASS 150 BUTT-WELD ENDS NK38-VSS-38000-10015 GLOBE VALVE NPS 3\4 S.S. ASME CLASS 150 BUTT-WELD ENDS NK38-VSS-38110-10026 GLOBE VALVE PNEUMATICALLY OPERATED NPS 3 S.S. CLASS 300 BUTT-WELD ENDS NK38-VSS-39340-10001 GLOBE VALVE NPS 1 ASME CLASS 300 NON-NUCLEAR (CLASS 6) - DARLINGTON NUCLEAR DIVISION VALVE SPECIFICATION DATA SHEET NK38-VSS-73680-10007 "3"" GLOBE VALVE (SCH 40)VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10012 "2"" GLOBE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10013 "1.5"" GLOBE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10014 "1.5"" GLOBE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10015 "0.5"" GLOBE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-79710-10003 GLOBE VALVE NPS 1-1\2 S.S. ASME CLASS 150 SOCKET-WELD ENDS NK38-VSS-38000-10010 GLOBE VALVE NPS 2 S.S. ASME CLASS 300 BUTT-WELD ENDS NK38-VSS-38000-10011 GLOBE VALVE NPS 3 S.S. ASME CLASS 300 BUTT-WELD ENDS NK38-VSS-38000-10012 GLOBE VALVE NPS 3-1\2 S.S. ASME CLASS 300 BUTT-WELD ENDS NK38-VSS-38000-10013 GLOBE VALVE NPS 1\2 S.S. ASME CLASS 300 BUTT-WELD ENDS

			NK38-VSS-38000-10014 GLOBE VALVE NPS 1\2 S.S. ASME CLASS 150 BUTT-WELD ENDS NK38-VSS-38000-10015 GLOBE VALVE NPS 3\4 S.S. ASME CLASS 150 BUTT-WELD ENDS NK38-VSS-38110-10026 GLOBE VALVE PNEUMATICALLY OPERATED NPS 3 S.S. CLASS 300 BUTT-WELD ENDS NK38-VSS-39340-10001 GLOBE VALVE NPS 1 ASME CLASS 300 NON-NUCLEAR (CLASS 6) - DARLINGTON NUCLEAR DIVISION VALVE SPECIFICATION DATA SHEET NK38-VSS-73680-10007 "3"" GLOBE VALVE (SCH 40)VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10012 "2"" GLOBE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10013 "1.5"" GLOBE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10014 "1.5"" GLOBE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10015 "0.5"" GLOBE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-79710-10003 GLOBE VALVE NPS 1-1\2 S.S. ASME CLASS 150 SOCKET-WELD ENDS
ENG-85280	Check Valves (QTY 113)	Various	NK38-DS-38000-10008 DESIGN SPECIFICATION FOR CLASS 3 NPS 1 ASME CLASS 150 CHECK VALVES FOR HWMB WEST ANNEX NK38-DS-38000-10009 DESIGN SPECIFICATION FOR CLASS 3 NPS 1-1\2 ASME CLASS 150 CHECK VALVES FOR HWMB WEST ANNEX NK38-DS-38000-10010 DESIGN SPECIFICATION FOR CLASS 3 NPS 2 ASME CLASS 150 CHECK VALVES FOR HWMB WEST ANNEX NK38-DS-38000-10011 DESIGN SPECIFICATION FOR CLASS 3 NPS 3 ASME CLASS 150 CHECK VALVES FOR HWMB WEST ANNEX NK38-DS-38110-10022 DESIGN SPECIFICATION FOR CLASS 3 CHECK VALVE FOR TRF SYSTEM TIE-IN NK38-DS-38410-10018 DESIGN SPECIFICATION FOR CLASS 3 CHECK VALVE FOR D2O CLEANUP SYSTEM TIE-IN NK38-DS-38430-10006 DESIGN SPECIFICATION FOR CLASS 3 CHECK VALVE FOR HEAVY WATER UPGRADER SYSTEM TIE-IN NK38-VSS-38000-10003 NOZZLE CHECK VALVE NPS 1 S.S. ASME CLASS 150 B UTT-WELD ENDS NK38-VSS-38000-10004 NOZZLE CHECK VALVE NPS 3 S.S. ASME CLASS 300 B UTT-WELD ENDS NK38-VSS-38110-10019 CHECK VALVE NPS 2 ASME CLASS 150 NON-NUCLEAR (CLASS 6) - DARLINGTON NUCLEAR DIVISION VALVE SPECIFICATION DATA SHEET NK38-VSS-73680-10002 CHECK VALVE NPS 2 ASME CLASS 600 NON-NUCLEAR (CLASS 6) - DARLINGTON NUCLEAR DIVISION VALVE SPECIFICATION DATA SHEET NK38-VSS-73680-10017 "3"" SWING CHECK VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10018 "2.5"" SWING CHECK VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10019 "2"" SWING CHECK VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10020 "1.5"" SWING CHECK VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10022 "1"" CHECK VALVE (SCH 80) CS" NK38-VSS-73689-10002 CHECK VALVE NPS 2 ASME CLASS 150 NON-NUCLEAR (CLASS 6) NK38-VSS-79110-10001 NOZZLE CHECK VALVE NPS 2 CARBON STEEL ASME CLAS S 600 SOCKET-WELD ENDS
ENG-85160	Last 3 tanks (Non-Storage Tanks: RV discharge, Active Drn, Inactive Drn) - Required for	120784 (M) 120643 (M) 120423 (M)	NK38-DS-38500-10013 DESIGN SPECIFICATION FOR CLASS 3 RV DISCHARGE TANK OF WEST ANNEX BUILDING NK38-SPEC-79110-10002 INACTIVE PLANT DRAINAGE TANK NK38-SPEC-79710-10002 TECHNICAL SPECIFICATION DATA SHEET FOR ACTIVE PLANT DRAINAGE TANK NK38-TSM-38500-10002 SUPPLEMENTARY TECHNICAL SPECIFICATION FOR NUCLEAR CLASS 3 RV DISCHARGE TANK FOR WEST ANNEX BUILDING
ENG-54650	Diaphragm Valves (QTY 342) - expedite for elev 87 pre-fab if required - phased delivery for balance of valves	Various	NK38-DS-38000-10004 DESIGN SPECIFICATION FOR CLASS 3 NPS 1 ASME CLASS 150 MANUAL ISOLATION VALVES FOR HWMB WEST ANNEX NK38-DS-38000-10005 DESIGN SPECIFICATION FOR CLASS 3 NPS 1-1\2 ASME CLASS 150 MANUAL ISOLATION VALVES FOR HWMB WEST ANNEX NK38-DS-38000-10006 DESIGN SPECIFICATION FOR CLASS 3 NPS 2 ASME CLASS 150 MANUAL ISOLATION VALVES FOR HWMB WEST ANNEX NK38-DS-38000-10007 DESIGN SPECIFICATION FOR CLASS 3 NPS 2-1\2 ASME CLASS 150 MANUAL ISOLATION VALVES FOR HWMB WEST ANNEX NK38-DS-38000-10012 DESIGN SPECIFICATION FOR CLASS 3 NPS 1 ASME CLASS 150 PNEUMATIC ISOLATION VALVES FOR HWMB WEST ANNEX NK38-DS-38000-10013 DESIGN SPECIFICATION FOR CLASS 3 NPS 1-1\2 ASME CLASS 150 PNEUMATIC ISOLATION VALVES FOR HWMB WEST ANNEX NK38-DS-38000-10014 DESIGN SPECIFICATION FOR CLASS 3 NPS 2 ASME CLASS 150 PNEUMATIC ISOLATION VALVES FOR HWMB WEST ANNEX

			NK38-DS-38000-10015 DESIGN SPECIFICATION FOR CLASS 3 NPS 2-1\2 ASME CLASS 150 PNEUMATIC ISOLATION VALVES FOR HWMB WEST ANNEX NK38-DS-38110-10020 DESIGN SPECIFICATION FOR CLASS 3 ISOLATION VALVE FOR MODERATOR D2O SUPPLY SYSTEM TIE-IN NK38-DS-38110-10021 DESIGN SPECIFICATION FOR CLASS 3 ISOLATION VALVE FOR TRF SYSTEM TIE-IN NK38-DS-38410-10017 DESIGN SPECIFICATION FOR CLASS 3 ISOLATION VALVE FOR D2O CLEANUP SYSTEM TIE-IN NK38-DS-38430-10005 DESIGN SPECIFICATION FOR CLASS 3 ISOLATION VALVE FOR HEAVY WATER UPGRADER SYSTEM TIE-IN NK38-VSS-38000-10001 DIAPHRAGM VAVLE NPS 1 S.S. ASME CLASS 150 NK38-VSS-38000-10005 DIAPHRAGM VALVE, NPS 1/2, S.S., ASME CLASS 150, BUTT-WELD ENDS NK38-VSS-38000-10006 DIAPHRAGM VALVE, NPS 3/4, S.S., ASME CLASS 150, BUTT-WELD ENDS NK38-VSS-38000-10007 DIAPHRAGM VALVE NPS 1-1\2 S.S. ASME CLASS 150 BUTT-WELD ENDS NK38-VSS-38000-10008 DIAPHRAGM VALVE NPS 3-1\2 S.S. ASME CLASS 150 BUTT-WELD ENDS NK38-VSS-38110-10020 DIAPHRAGM VALVE NPS 2 ASME CLASS 150 NON-NUCLEAR (CLASS 6) - DARLINGTON NUCLEAR DIVISION VALVE SPECIFICATION DATA SHEET NK38-VSS-38110-10024 DIAPHRAGM VALVE PNEUMATICALLY OPERATED NPS 1-1\2 S.S. CLASS 150 BUTT-WELD ENDS NK38-VSS-38110-10025 DIAPHRAGM VALVE PNEUMATICALLY OPERATED NPS 2 S.S. CLASS 150 BUTT-WELD ENDS NK38-VSS-38110-10038 DIAPHGRAM VALVE NPS 2 ASME CLASS 150 NON-NUCLEAR (CLASS 6) NK38-VSS-74250-10007 DIAPHRAGM VALVE, NPS 3/4, S.S., ASME CLASS 150, SOCKET-WELD ENDS NK38-VSS-74250-10008 DIAPHRAGM VALVE, NPS 1, S.S., ASME CLASS 150, SOCKET-WELD ENDS NK38-VSS-74250-10009 DIAPHRAGM VALVE NPS 2 S.S. ASME CLASS 150 SOCKET-WELD ENDS NK38-VSS-75100-10001 DIAPHRAGM VALVE NPS 1\2 BRONZE NK38-VSS-75100-10002 DIAPHRAGM VALVE NPS 3\4 BRONZE NK38-VSS-75100-10003 DIAPHRAGM VALVE NPS 1 BRONZE NK38-VSS-75100-10004 DIAPHRAGM VALVE NPS 1-1\2 BRONZE NK38-VSS-75100-10005 DIAPHRAGM VALVE NPS 2 BRONZE NK38-VSS-79710-10001 DIAPHRAGM VALVE NPS 1-1\2 S.S. ASME CLASS 150 SOCKET-WELD ENDS NK38-VSS-79710-10002 DIAPHRAGM VALVE NPS 3 S.S. ASME CLASS 150 BUTT-WELD ENDS
ENG-55200	CCI Drier	121319 (M)	NK38-TSM-38300-10001 TECHNICAL SPECIFICATION FOR D2O VAPOUR RECOVERY SYSTEM DRYER UNIT, HEAVY WATER MANAGEMENT BUILDING WEST ANNEX
ENG-85560	Munter Drier	121319 (M)	NK38-TSM-73690-10001 TECHNICAL SPECIFICATION FOR VENTILATION SYSTEM DRYER HEAVY WATER MANAGEMENT BUILDING WEST ANNEX
ENG-55430	Stack Monitor	120491 (I&C)	NK38-TS-67989-10004 TECHNICAL SPECIFICATION HEAVY WATER MANAGEMENT BUILDING WEST ANNEX STACK MONITOR
ENG-86860	Building Stack	121323 (M)	NK38-TS-73690-10003 VENTILATION EXHAUST STACK FOR THE HMB WEST ANNEX
ENG-55400	UPS	120475 (E)	NK38-TS-53300-10003 600V UPS FOR D2O MANAGEMENT WEST ANNEX FACILITY
ENG-55110	IA/SA Atlas Copco	121133 (M) 121136 (IC)	NK38-TSM-75160-10001 AIR COMPRESSORS FOR INSTRUMENT AND SERVICE AIR SUPPLY TO WEST ANNEX D2O MANAGEMENT BUILDING
ENG-76710	Control Panels (Marsh)	120488 (I&C) 120489 (I&C)	NK38-TSI-60712-10001 INTERMEDIATE CONTROL PANEL 63800-PL10116 D20 SUPPLY SYS. HWMB - WEST ANNEX NK38-TSI-60712-10002 INTERMEDIATE CONTROL PANEL 63800-PL10117 D2O DOWNGRADED AND CLEANUP SYS. HWMP - WEST ANNEX
ENG 55070	HVAC Major Equip	121323 (M)	NK38-TSM-73690-10004 AIR HANDLING UNIT TO PROVIDE VENTILATION AND HEATING FOR THE D2O MANAGEMENT BUILDING WEST ANNEX NK38-TSM-73690-10005 EXHAUST FAN UNIT TO PROVIDE VENTILATION FOR THE D2O MANAGEMENT BUILDING WEST ANNEX NK38-TSM-73690-10006 FILTRATION UNITS TO PROVIDE FILTRATION OF CONTAMINATED EXHAUST AIR DISCHARGING FROM THE D2O MANAGEMENT BUILDING WEST ANNEX
ENG-79140	HVAC Control (JCI)	124094 (IC)	NK38-TS-67369-10001 TECHNICAL SPECIFICATION HEAVY WATER MANAGEMENT BUILDING WEST ANNEX HVAC ELECTRICAL, INSTRUMENTATION AND CONTROL SYSTEMS
ENG-55290	MCCs (EATON)	120478 (E)	NK38-TSE-53300-10004 HEAVY WATER MANAGEMENT BUILDING WEST ANNEX DARLI

			NGTON TECHNICAL SPECIFICATION FOR MOTOR CONTROL CENTER
ENG-55150	Chiller	121320 (M)	NK38-TSM-73870-10002 CHILLED WATER TECHNICAL SPECIFICATION
ENG-55470	Back-Up Power Diesel Gen	120474 (E)	NK38-TSE-53300-10003 BACKUP DIESEL GENERATOR FOR D2O MANAGEMENT WEST ANNEX FACILITY
ENG-55230 ENG-55270	Switchgear 13KV & 600V	120472 (E)	NK38-TSE-53300-10002 METAL-ENCLOSED SWITCHGEAR ASSEMBLY FOR DNGS D2O MANAGEMENT WEST ANNEX FACILITY INCLUDING 2500 KVA 13.8KV\600V DRY TYPE TRANSFORMER
ENG-85430	Globe Valves (QTY 95 of 199) (only stm & con in HVAC DEC)	121323	NK38-VSS-38000-10010 GLOBE VALVE NPS 2 S.S. ASME CLASS 300 BUTT-WELD ENDS NK38-VSS-38000-10011 GLOBE VALVE NPS 3 S.S. ASME CLASS 300 BUTT-WELD ENDS NK38-VSS-38000-10012 GLOBE VALVE NPS 3-1\2 S.S. ASME CLASS 300 BUTT-WELD ENDS NK38-VSS-38000-10013 GLOBE VALVE NPS 1\2 S.S. ASME CLASS 300 BUTT-WELD ENDS NK38-VSS-38000-10014 GLOBE VALVE NPS 1\2 S.S. ASME CLASS 150 BUTT-WELD ENDS NK38-VSS-38000-10015 GLOBE VALVE NPS 3\4 S.S. ASME CLASS 150 BUTT-WELD ENDS NK38-VSS-38110-10026 GLOBE VALVE PNEUMATICALLY OPERATED NPS 3 S.S. CLASS 300 BUTT-WELD ENDS NK38-VSS-39340-10001 GLOBE VALVE NPS 1 ASME CLASS 300 NON-NUCLEAR (CLASS 6) - DARLINGTON NUCLEAR DIVISION VALVE SPECIFICATION DATA SHEET NK38-VSS-73680-10007 "3"" GLOBE VALVE (SCH 40)VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10012 "2"" GLOBE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10013 "1.5"" GLOBE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10014 "1.5"" GLOBE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10015 "0.5"" GLOBE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-79710-10003 GLOBE VALVE NPS 1-1\2 S.S. ASME CLASS 150 SOCKET-WELD ENDS NK38-VSS-38000-10010 GLOBE VALVE NPS 2 S.S. ASME CLASS 300 BUTT-WELD ENDS NK38-VSS-38000-10011 GLOBE VALVE NPS 3 S.S. ASME CLASS 300 BUTT-WELD ENDS NK38-VSS-38000-10012 GLOBE VALVE NPS 3-1\2 S.S. ASME CLASS 300 BUTT-WELD ENDS NK38-VSS-38000-10013 GLOBE VALVE NPS 1\2 S.S. ASME CLASS 300 BUTT-WELD ENDS NK38-VSS-38000-10014 GLOBE VALVE NPS 1\2 S.S. ASME CLASS 150 BUTT-WELD ENDS NK38-VSS-38000-10015 GLOBE VALVE NPS 3\4 S.S. ASME CLASS 150 BUTT-WELD ENDS NK38-VSS-38110-10026 GLOBE VALVE PNEUMATICALLY OPERATED NPS 3 S.S. CLASS 300 BUTT-WELD ENDS NK38-VSS-39340-10001 GLOBE VALVE NPS 1 ASME CLASS 300 NON-NUCLEAR (CLASS 6) - DARLINGTON NUCLEAR DIVISION VALVE SPECIFICATION DATA SHEET NK38-VSS-73680-10007 "3"" GLOBE VALVE (SCH 40)VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10012 "2"" GLOBE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10013 "1.5"" GLOBE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10014 "1.5"" GLOBE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10015 "0.5"" GLOBE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-79710-10003 GLOBE VALVE NPS 1-1\2 S.S. ASME CLASS 150 SOCKET-WELD ENDS
ENG-87160	Chiller IC	121805 (IC)	NK38-TSI-67387-10001 CHILLED WATER INSTRUMENTATION SPECIFICATION
ENG-85380	Gate valves (65)	Various	NK38-VSS-38210-10005 GATE VALVE NPS 1 S.S. ASME CLASS 150 BUTT-WELD ENDS NK38-VSS-38210-10006 GATE VALVE NPS 1\2 S.S. ASME CLASS 150 BUTT-WELD ENDS NK38-VSS-73680-10001 GATE VALVE NPS 2 ASME CLASS 150 NON-NUCLEAR (CLASS 6) - DARLINGTON NUCLEAR DIVISION VALVE SPECIFICATION DATA SHEET NK38-VSS-73680-10003 GATE VALVE NPS 6 ASME CLASS 150 NON-NUCLEAR (CLASS 6) - DARLINGTON NUCLEAR DIVISION VALVE SPECIFICATION DATA SHEET NK38-VSS-73680-10004 "4"" GATE VALVE (SCH 40) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10005 "3"" GATE VALVE (SCH 40) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10006 "3"" GATE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10008 "2.5"" GATE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10009 "2"" GATE VALVE (SCH 40) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10010 "2"" GATE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10011 "1.5"" GATE VALVE (SCH 80) VALVE SPECIFICATION DATA SHEET" NK38-VSS-73680-10023 "3\4"" GATE VALVE (SCH 80) CS" NK38-VSS-73689-10001 GATE VALVE NPS 2 ASME CLASS 150 NON-NUCLEAR (CLASS 6) NK38-VSS-78110-10013 GATE VALVE NPS 4 FLANGE ENDS FOR FIRE PROTECTION SERVICES NK38-VSS-78110-10014 "GATE VALVE 10"" CAST IRON" NK38-VSS-79110-10004 GATE VALVE NPS 3 CARBON STEEL ASME CLASS 150 BUTT-WELD ENDS

TBD	Active and Inactive drainage transfer pumps (4 at 45K)	120784 120643	NK38-SPEC-79710-10001 TECHNICAL SPECIFICATION DATA SHEET FOR ACTIVE PLANT DRAINAGE PUMPS AND W\MOTOR AND INACTIVE DRAINAGE PUMP W\MOTOR
TBD	Hoists	121147	NK38-TS-76158-10001 TECHNICAL SPECIFICATION DATA SHEET FOR HOIST 0-76 158-HO10 HWMB WEST ANNEX NK38-TS-76158-10002 TECHNICAL SPECIFICATION DATA SHEET FOR HOIST AND TROLLEY SYSTEM 0-76158-HO11 HWMB WEST ANNEX NK38-TS-76158-10003 TECHNICAL SPECIFICATION DATA SHEET FOR HOIST AND TROLLEY SYSTEM 0-76158-HO12 NWMB WEST ANNEX
ENG-23140	Liquid Recovery drainage sump pump	120478	NK38-DS-38210-10001 DESIGN SPECIFICATION FOR CLASS 3 SUMP PUMP OF WEST ANNEX BUILDING NK38-TSM-38000-10002 SUPPLEMENTARY TECHNICAL SPECIFICATION FOR NUCLEAR CLASS 3 PUMPS FOR WEST ANNEX BUILDING
ADD to sched	Cable Duct for Bldg Pwr (Long Lead items)	127218 (E)	NK38-TSE-57100-10005 HEAVY WATER MANAGEMENT BUILDING WEST ANNEX, DARLINGTON TECHNICAL SPECIFICATION FOR 15KV TECK POWER CABLE, 3C-250MCM

Appendix G - Tank and Pump Equipment Provided ordered by RCMT

The following tanks and pumps have been ordered by RCMT and are to be installed under the Contractor QA program.

E-Tag	Equipment Name	Capacity (Mg)	E-Tag	Equipment Name	Capacity (Mg)
0-38110-TK14	TANK, PHT	100	0-38110-TK27	TANK, MODERATOR	100
0-38110-TK15	TANK, PHT	100	0-38110-TK28	TANK, MODERATOR	100
0-38110-TK16	TANK, PHT	100	0-38110-TK29	TANK, TRF PRODUCT	100
0-38110-TK17	TANK, PHT	100	0-38110-TK30	TANK, TRF PRODUCT	100
0-38110-TK18	TANK, PHT	100	0-38110-TK31	TANK, TRF FEED	100
0-38110-TK19	TANK, PHT	100	0-38110-TK32	TANK, TRF FEED	100
0-38110-TK20	TANK, PHT	100	0-38500-TK8	TANK, DOWNGRADED	50
0-38110-TK21	TANK, PHT	100	0-38500-TK9	TANK, DOWNGRADED	50
0-38110-TK22	TANK, MODERATOR	100	0-38500-TK10	TANK, DOWNGRADED	25
0-38110-TK23	TANK, MODERATOR	100	0-38410-TK7	TANK, CLEAN UP	25
0-38110-TK24	TANK, MODERATOR	100	0-38410-TK8	TANK, CLEAN UP	25
0-38110-TK25	TANK, MODERATOR	100	0-38410-TK9	TANK, CLEAN UP	25
0-38110-TK26	TANK, MODERATOR	100			

E-Tag	Equipment Name
0-38110-P11	PHT D2O PUMP
0-38110-P12	PHT D2O PUMP
0-38110-P17	MODERATOR D2O PUMP
0-38110-P18	MODERATOR D2O PUMP
0-38110-P13	TRF PRODUCT PUMP
0-38110-P14	TRF PRODUCT PUMP
0-38110-P15	TRF FEED PUMP
0-38110-P16	TRF FEED PUMP
0-38500-P7	DOWNGRADED D2O PUMP
0-38500-P8	DOWNGRADED D2O PUMP
0-38410-P5	CLEAN UP D2O PUMP
0-38410-P9	CLEAN UP D2O SUPPLY PUMP
0-38210-P4	BUILDING RECOVERY SUMP PUMP

Appendix H - Vendor list for key Major Equipment

The supply of the listed material is not currently assigned to the listed vendors (i.e. no purchase order has been awarded). However, the following companies have been engaged in RFP processes for material procurement previously. This is provided for information only.

DEC	Description	Target Vendor
121319 (M)	CCI Drier	CCI
121319 (M)	Munter Drier	Munter
120488 (I&C) 120489 (I&C)	Control Panels	MARSH
120491 (I&C)	Stack Monitor	Canberra
120475 (E)	UPS	Gutor
Various	Air Release & Vacuum Breaking Valves (QTY 12)	Flowserve
120784 (M) 120643 (M) 120423 (M)	Last 3 tanks (Non-Storage Tanks: RV discharge, Active Drn, Inactive Drn)	Babcok & Wilcox
124094 (IC)	HVAC Control (JCI)	JCI
120478 (E)	MCCs (EATON)	Westburne (Eaton)
Various	Globe Valves	Velan Newman Hattersly Swagelok Curtiss Wright
120474 (E)	Back-Up Power Deisel Gen	Cummins
120472 (E)	Switchgear 13KV & 600V	Schneider
121133 (M) 121136 (IC)	IA/SA Atlas Copco	Atlas Copco
121147	Hoists	TorontoElectric

Appendix I – Transition of Engineering Scope

Note, the below summarizes key outstanding engineering information to be incorporated into design. However, please note it is the contractor accountability to support all field engineering and incorporation of material information into the design for all remaining EC's listed in Appendix A as applicable.

Deliverable Based (Y/N)	EC	DEC Title	Outstanding RCMT Deliverables	New Contractor Design completion scope in addition to planning, assessesing, installation, commissioning , Available for Service and Closeouts as required per N-PROC-MP-0090
Y	120478	#63 DEC for MCC design	- Deliverable Based - Technical Specifications - CBD - OLW - Cable routing only - SLD - Asset Suite Updates (including MEL) - MCC Allocation Sheet - Preliminary Relay Settings - BOM - Analysis & Location Drawings is in scope and is currently covered by EC120472	Finalization of Engineering of RCM Deliverables - Technical Specifications (revisions as required or new if required) - CBD - OLW - Cable routing only - SLD - Asset Suite Updates (EBOM) - MCC Allocation Sheet - Relay Settings - BOM - CBD Additional - Cable routing - Asset Suite Panels populated - Fuse Data Sheets - Vendor Document Acceptance - EAD - EBOM updates
Y	121320	0-73870-DSGN-CHILLED WATER SYSTEM	Flow Diagram Technical Specification Isometrics MEL BOM Human Factors Part A Draft Overpressure Protection Report	Finalize Engineering of the below: Flow Diagram Technical Specification Isometrics MEL BOM Human Factors Part A Overpressure Protection Report Provide CNSC submission Provide TSSA Registration Vendor Document Acceptance
Y	121322	#82 DEC for Radiation Shielding Design	Deliverable Based Analysis for Civil Design Aspects (Confirms shielding is adequate)	Provide Engineering if modifications (piping penetrations) cause shielding issues Design of additional shielding panels
Y	120474	#57 DEC for back up power source design	- Deliverable based -Technical Specifications - Site/equipment layout drawings - SLDs - Draft Fuse data sheets	Finalization of Engineering of RCM Deliverables - Technical Specifications - CBD - OLW - Cable routing only - SLD

*Associated with N-MAN-00120-10001-SCOPE, Nuclear Projects Scoping Process

Deliverable Based (Y/N)	EC	DEC Title	Outstanding RCMT Deliverables	New Contractor Design completion scope in addition to planning, assessesing, installation, commissioning , Available for Service and Closeouts as required per N-PROC-MP-0090
				- MEL - Asset Suite Updates (EBOM) - Relay Settings - BOM - Architectural and Civil Drawings - Mechanical Drawings - MOE Regulatory Approval - Fuse Data Sheets - Vendor Document Acceptance - EAD - EBOM updates - Third Party Fire Review depending on Fire Form - Software acceptance
Y	120475	#58 DEC for uninterruptible power supply (UPS) system	Deliverable Based -Technical Specifications (revision required, need transformer specs) - Human Factors Assessment (preliminary, without vendor information) - EAD (includes instrument panel locations) - EWD (Outside Gutor Equipment) - Fuse Datasheets - SLD - Panel Drawings for 45V panel - CBD - OLW (except inside Gutor equipment - Analysis (sizing calcs, demand for UPS, etc.) - Asset Suite Updates (including MEL) - BOM	Finalization of Engineering of RCM Deliverables - Technical Specifications - CBD - OLW - Cable routing only - SLD - MEL - Asset Suite Updates (EBOM) - Relay Settings - BOM - Fuse Data Sheets - Vendor Document Acceptance - EAD - EBOM - Third Party Fire Review depending on Fire Form - Software acceptance
Y	120472	#56 DEC for electrical power Supply for the Heavy Water Management Building West Annex	- Deliverable Based - Equipment Location Drawing - Electrical Analysis - Technical Specifications - CBD - OLW - Cable routing only - SLD - Asset Suite Updates (including MEL) - Fuse Data Sheets - Preliminary Relay Settings - BOM - Draft cable run details between new building and back up generator (MH2)	Finalization of Engineering - Equipment Location Drawing - Electrical Analysis - Technical Specifications - CBD - SLD - Asset Suite Updates (including MEL) - Fuse Data Sheets - Relay Settings - BOM - Cable run details between new building and back up generator (MH2) Vendor Document Acceptance - EBOM - OLW
Y	120494	#77 (SCI 67369)DEC for Ventilation System(design instrumentation for the new HVAC equipment)	- Deliverable based -Technical Specifications	Finalization of Engineering of -Technical Specifications - Electrical layout drawings

Deliverable Based (Y/N)	EC	DEC Title	Outstanding RCMT Deliverables	New Contractor Design completion scope in addition to planning, assessesing, installation, commissioning , Available for Service and Closeouts as required per N-PROC-MP-0090
			- Electrical layout drawings - Incorporation of RFI 135	- Instrument calibration specification - Vendor Document Acceptance - Electrical Arrange Drawing - Relay Settings - Fuse Sheet - Software acceptance
Y	120491	(SCI 67989) DEC for Fixed Gaseous Effluent Radioactivity Monitoring	- Deliverable Based -Technical Specifications - Electrical layouts - P&ID/Flow Diagram - MPER Report	Finalization of Deliverables Technical Specifications - Electrical layouts - Flow Diagram MPER Report Cable Routing Vendor Document Acceptance
Y	121805	0-67387-DSGN - I&C and Power for Chilled Water System	Deliverable based - Technical specifications	Completion of Rev 0 with vendor information and constructability review.
Y	123130	0-23840-Buried Pipe Chase between HWMB / TRF and West Annex	Deliverable Based Detail Drawings BOM Rev 0 EC - As of Stop Work Direction from OPG Project 2015-02-18 and turnover of docs	Completion of Rev 0 with vendor information and constructability review. Vendor Document Acceptance Required relocates to be evaluated and included as well.
Y	127532	0-56000-DSGN-DNGS HWMB West Annex Misc. Bldg Electrical and I&C (Doors, Hoist, Water Heater, etc.)	Deliverable Based This EC is for the miscellaneous components. Some technical specification data sheets and voltage drop calculations have been completed Examples: hoist specs, door specs, weight scales for drums, etc.	Finalization of Deliverables Technical Specifications - Electrical layouts Cable Routing Vendor Document Acceptance
N	120616	#42 DEC for Sprinkler System	Flow Diagram Flow Calculation Third Party Fire Review Planned view layouts AEL Component specs	Vendor Document Acceptance Completion of AEL Full TSSA Registration
N	120615	#43 DEC for Fire Protection Design (Standpipe & Fire hose Cabinets)	Flow Diagram Flow Calculation Third Party Fire Review Planned view layouts AEL Component specs	Vendor Document Acceptance Completion of AEL Full TSSA Registration
N	120481	#75 (SCI 62321) DEC for Personnel and Portal Monitors	- Incorporate Descoping -Technical Specifications - Human Factors Assessment - Equipment Location Drawings - Instrument Location Drawings - EWD - CWD	- Vendor Document Acceptance - Asset Suite Update of EBOM - Instrument Calibration Specifications - Update BOMS - Cable routing - Fuse Data Sheets - EBOM updates

Deliverable Based (Y/N)	EC	DEC Title	Outstanding RCMT Deliverables	New Contractor Design completion scope in addition to planning, assessesing, installation, commissioning , Available for Service and Closeouts as required per N-PROC-MP-0090
			- Control Panel (cubicle) Drawings - Instrument Panel/Rack Drawings - Instrument Tubing Layout Drawings - CBD - OLW - Asset Suite Updates (including MEL) - BOM	
N	121326	#96 DEC for Elec and I&C for new IA/SA Compressors	-Technical Specifications - EWD - CBD - OLW - Asset Suite Updates (including MEL) - ICS - BOM	Cable routing Instrument Calibration Specification Update - Vendor Document Acceptance - Software acceptance - Electrical Panel Drawings - OLW - Wiring portion EWD CWD
N	121133	#33 (SCI 75160) & (SCI 75110) DEC for the Common Instrument Air and Service Air	Flow Diagram Isometrics MEL BOM Sizing Calculation (Outstanding) Human Factors Part A Overpressure Protection Report TSSA Registration	Third Party Fire Protection Review Report (based on Fire Impact Evaluation) Human Factors Assessment Electrical Analysis (Load Flow/Voltage Drop, Short Circuit/Protection Coordination, etc.) - Assumption is it will be all covered by EC120472 Motorized Equipment Calculations - Part of EC's installing the motors? EAD - Part of EC120472 Vendor Installation Drawings Vendor Detail Assembly and BOM Vendor Manual Design Manual - Deviation Already
N	121147	#85 DEC to provide/design a hoisting device	Calculation for Load Design Drawing MEL BOM Specification	Vendor Document Acceptance Completion of AEL and EBOM
N	120351	#64 (SCI 67870) DEC for Fire and Smoke Detection System	- Third Party Fire Protection Review Report -Technical Specifications - Human Factors Assessment - Equipment Location Drawings - Instrument Location Drawings - EWD - Fuse Allocation Drawings or Fuse Data Sheets - Control Logic Diagrams - CWD - Control Panel (cubicle) Drawings - Instrument Panel/Rack Drawings - CBD - OLW - Asset Suite Updates (including MEL) - BOM	Cable routing Instrument Calibration Specification Update - Vendor Document Acceptance Software Acceptance

Deliverable Based (Y/N)	EC	DEC Title	Outstanding RCMT Deliverables	New Contractor Design completion scope in addition to planning, assessesing, installation, commissioning , Available for Service and Closeouts as required per N-PROC-MP-0090
N	120423	#46-2 (SCI 38500) DEC for the new D2O Storage Tanks, piping & associated equipment for Downgraded	Flow Diagram Design Specification Design Reports Piping Isometrics Hanger/Support Drawings Penetration Details Flow Calculation BOM Component Specifications MEL EBOM Provisional TSSA Registration Human Factors Dispositions OPG Accepted OPPR	Engineering of machine guard around tubing that could be damaged - Ex.Pump Drain lines - Vendor Document Acceptance - Final OPPR - Final TSSA Registration - Engineering to support Commissioning and Testing - Update Design Specification and Design Report as required
N	120424	#47-1 (SCI 38410) DEC for the new D2O Storage Tanks, piping & associated equipment for D2O Clean Up	Flow Diagram Design Specification Design Reports Piping Isometrics Hanger/Support Drawings Penetration Details Flow Calculation BOM Component Specifications MEL EBOM Provisional TSSA Registration Human Factors Dispositions OPG Accepted OPPR	Engineering of machine guard around tubing that could be damaged - Ex.Pump Drain lines - Vendor Document Acceptance - Final OPPR - Final TSSA Registration - Engineering to support Commissioning and Testing - Update Design Specification and Design Report as required
N	120422	#47-2 (SCI 38110) DEC for the new D2O Storage Tanks, piping & associated equipment for TRF Outgoing	Flow Diagram Design Specification Design Reports Piping Isometrics Hanger/Support Drawings Penetration Details Flow Calculation BOM Component Specifications MEL EBOM Provisional TSSA Registration Human Factors Dispositions OPG Accepted OPPR	Engineering of machine guard around tubing that could be damaged - Ex.Pump Drain lines - Vendor Document Acceptance - Final OPPR - Final TSSA Registration - Engineering to support Commissioning and Testing - Update Design Specification and Design Report as required
N	121318	#95 DEC for new D2O Vapour Recover I&C and Electrical	-Technical Specifications - Human Factors Assessment (Preliminary without vendor documents) - CBD - Equipment Location Drawings - Instrument Location Drawings	Cable routing Instrument Calibration Specification - Vendor Document Acceptance - Software Acceptance - Final OLW

Deliverable Based (Y/N)	EC	DEC Title	Outstanding RCMT Deliverables	New Contractor Design completion scope in addition to planning, assessesing, installation, commissioning , Available for Service and Closeouts as required per N-PROC-MP-0090
			- EWDs - for alarms - OLW - for alarms	
N	120421	#46-1(SCI 38110) DEC for the new D2O Storage Tanks, piping & associated equipment for D2O Supply System	Flow Diagram Design Specification Design Reports Piping Isometrics Hanger/Support Drawings Penetration Details Flow Calculation BOM Component Specifications Provisional TSSA Registration Human Factors Dispositions OPG Accepted Provisional OPPR	Engineering of machine guard around tubing that could be damaged - Ex.Pump Drain lines - Vendor Document Acceptance - Final OPPR - Final TSSA Registration - Engineering to support Commissioning and Testing - Update Design Specification and Design Report as required
N	120523	#53 DEC for Drum facility filling testing, cleaning, and handling	Flow Diagram Design Specification Design Reports Piping Isometrics Hanger/Support Drawings Penetration Details Flow Calculation BOM Component Specifications Provisional TSSA Registration Human Factors Assessment	- Vendor Document Acceptance - Final OPPR - Final TSSA Registration - Engineering to support Commissioning and Testing - Tool Design Integration (support from TRF will be provided) - Software acceptance
N	120485	#54 DEC for Electrical Power to Pump Motors & Equip. / I&C for Inactive &	-Technical Specifications - Instrument Calibration Calculations (can be part of ICS) - Human Factors Assessment - Equipment Location Drawings - Instrument Location Drawings - EWD - Fuse Allocation Drawings or Fuse Data Sheets - Control Logic Diagrams - CWD - Control Panel (cubicle) Drawings - Instrument Panel/Rack Drawings - Instrument Tubing Layout Drawings - CBD - OLW - Asset Suite Updates (including MEL) - ICS - BOM	Cable routing Instrument Calibration Specification Update - Vendor Document Acceptance - Software acceptance
N	120479	#55 DEC for Building Lighting and Electrical Distribution Systems (receptacles)	- Third Party Fire Protection Review Report (based on Fire Impact Evaluation) -Technical Specifications - Human Factors Assessment - EAD - EWD	- Cable Routing - Engineering of additional electrical lines required as design progresses - Vendor Document Acceptance

Deliverable Based (Y/N)	EC	DEC Title	Outstanding RCMT Deliverables	New Contractor Design completion scope in addition to planning, assessesing, installation, commissioning , Available for Service and Closeouts as required per N-PROC-MP-0090
			- Fuse Allocation Drawings or Fuse Data Sheets - SLD - CWD - Electrical Panel Drawings - CBD - OLW - Asset Suite Updates (including MEL) - BOM - Lighting is LED as currently designed	
N	120488	0-63811-DESIGN-DNGS I&C FOR WEST ANNEX D2O SUPPLY AND TRF FEED & PRODUCT SYSTEM	-Technical Specifications - Instrument Calibration Calculations (can be part of ICS) - Human Factors Assessment (preliminary without vendor info) - Equipment Location Drawings - Instrument Location Drawings - EWD - Fuse Allocation Drawings or Fuse Data Sheets - Control Logic Diagrams - CWD - Control Panel (cubicle) Drawings - Instrument Panel/Rack Drawings - Instrument Tubing Layout Drawings - CBD - OLW - Asset Suite Updates (including MEL) - ICS - BOM	Cable Routing - Instrument Calibration Specification update - EBOM Update - BOM Update - OLW Update - Software acceptance
N	120489	0-63841-DESIGN-DNGS I&C FOR WEST ANNEX D2O CLEANUP AND DOWNGRADED TANK SYSTEM	-Technical Specifications - Instrument Calibration Calculations (can be part of ICS) - Human Factors Assessment (preliminary without vendor info) - Equipment Location Drawings - Instrument Location Drawings - EWD - Fuse Allocation Drawings or Fuse Data Sheets - Control Logic Diagrams - CWD - Control Panel (cubicle) Drawings - Instrument Panel/Rack Drawings - Instrument Tubing Layout Drawings - CBD - OLW - Asset Suite Updates (including MEL) - ICS - BOM	Cable Routing - Instrument Calibration Specification update - EBOM Update - BOM Update - OLW Update - Software acceptance
N	121319	#94 DEC for new D2O Vapour recovery Mechanical	Flow Diagram Design Specification	Finalization of Deliverables Flow Diagram

Deliverable Based (Y/N)	EC	DEC Title	Outstanding RCMT Deliverables	New Contractor Design completion scope in addition to planning, assessesing, installation, commissioning , Available for Service and Closeouts as required per N-PROC-MP-0090
			Piping Isometrics Hanger/Support Drawings Penetration Details Flow Calculation BOM Component Specifications (incl emissions limits) Provisional TSSA Registration Emission limits report	Design Specification Piping Isometrics Hanger/Support Drawings Penetration Details Flow Calculation BOM Component Specifications (incl emissions limits) Final TSSA Registration Update Emission limits report
N	121323	#51 DEC for Effluent Stack and Two Ventilation and Containment Exhaust Systems	Flow Diagram Specifications Isometrics Flow Calcs MEL BOM Descoping exercise Incorporation of RFI 135	Vendor document acceptance Update of impacted deliverables
N	120492	(SCI 62341/62330) DEC for FAATM and FAAGM	-Technical Specifications (N/A for existing Ready CATID's) - Instrument Calibration Calculations (can be part of ICS) - Human Factors Assessment - Equipment Location Drawings - Instrument Location Drawings - EWD - Fuse Allocation Drawings or Fuse Data Sheets - Control Logic Diagrams - CWD - Control Panel (cubicle) Drawings - Instrument Panel/Rack Drawings - CBD - OLW - Asset Suite Updates (including MEL) - ICS - BOM	Vendor Document Acceptance - Instrument Calibration Specification update - Cable routing - Electrical Arrangement Drawing - OLW Update - Software Acceptance
N	120343	DEC for Building Design, Architectural and Structural	Detail (General Arrangement) Drawings Specifications BOM Third Party Fire Review Fire Rated Area Drawings	Human Factors Validation Major Equipment Plan Drawing Vendor Document Acceptance Revise Construction Specification when required
N	127218	0-53800-Design-DNGS HWMB West Annex Cable Duct	Phase 1 which includes installation of cable duct to MH2. Phase 2 incorporating back up generator data is excluded and moved back to EC#120472	Full Phase 2 Design Required Vendor Document Acceptance
N	129058	0-53500-DESIGN-DNGS HWMB West Annex 120/208V Normal/Backup Power	-Third Party Fire Protection Review Report (based on Fire Impact Evaluation) -Technical Specifications - EWD - Fuse Allocation Drawings or Fuse Data Sheets - SLD	Cable Routing Final Relay Settings Vendor Document Acceptance

Deliverable Based (Y/N)	EC	DEC Title	Outstanding RCMT Deliverables	New Contractor Design completion scope in addition to planning, assessesing, installation, commissioning , Available for Service and Closeouts as required per N-PROC-MP-0090
			- CWD - Electrical Panel Drawings - CBD - OLW - Asset Suite Updates (including MEL) - Preliminary Relay Settings - BOM	
	120476	#59 DEC for a new grounding system for the Heavy Water Management Building West Annex	EC Revision to incorporate applicable scope reduction design changes per memo (NK38-CORR-38000-0506902)	Extend grounding into Pipe Chase

Appendix J – TMOD Basis

Engineering the TMOD per N-PROC-MP-0090 is required for the below.

Temporary modifications are required to remove the Primary Heat Transport (PHT) system D2O, and transport D2O from the Heavy Water Management Building (HWMB) to the West Annex Building Storage Facility. The design concept is to use the existing Heat Transport Weigh Tank in the HWMB as a collection point for the drained D2O and existing HT D2O Transfer Pumps to convey the drained D2O through temporary piping (stainless steel) to the PHT Tanks (0-38110-TK14 to TK21, inclusive) in the West Annex Building Storage Facility. Piping at the destination will be manifolded and valved to allow swing operation. All piping routed outdoors will be heat traced and insulated. Tank level instrumentation and controls will regulate the delivery and storage of drained D2O. Temporary power will be provided to pumps and controls. Containment dykes will be installed at HWMB tanks and pumps to manage leaks; D2O leaks will be piped to active drainage. TSSA approvals will be required for pressure boundary systems. New Class 3 material will be sourced from qualified suppliers, complete with requisite supporting documentation (e.g. History Dockets).
The details are as follows:

A. Design Concept and Assumptions:
   - Use existing Heat Transport D2O Weigh Tank (30 m3) in HWMB;
   - Use existing HT D2O Transfer Pumps (P1, P2) in HWMB;
   - Tie-point = HT D2O Transfer Pump (P1, P2) discharge;
   - Install control panel for weigh tank / pump operation;
   - All vents and drains piped to active systems (tie-in to existing active vent and drain systems);
   - Use “existing” PHT D2O Storage Tanks (in Annex basement) with manifold for swings. Tank instrumentation and valving assumed to be installed;
   - TSSA Approvals required;
   - Qualification requirements for procurement of Nuclear Class 3 components.

B. Materials (Order of Magnitude):
   - 600 ft of 2” NPS S40 (Class 300) Nuclear Class 3 stainless steel piping;
   - 300 ft of 6” NPS carbon steel pipe sleeve;
   - Concrete curb for containment of D2O pipe runs inside HWMB;
   - 50 ft of concrete trench with heavy duty cover (outside, from HWMB to Annex);
   - Insulation and heat tracing for external portion of pipe run;
   - Electric Heat Tracing (wiring, panels, controls);
   - Instrumentation and Control Panel at HWMB source;
   - 2” Manual Valves (~ qty 20);
   - Relief Valves, Vents, Drains;
   - Building penetrations (2) and pipe supports (~ qty 30).

*Associated with N-MAN-00120-10001-SCOPE, Nuclear Projects Scoping Process

Appendix K: Training Basis

Training to be conducted in accordance with the training needs assessment.

Appendix L – List of Valves Procured by OPG

These valves are procured by OPG but will be delivered to the Contractor for Receipt Inspection.

CAT ID	SPECS	QUANTITIES	Supplier	Initial Delivery Date
704893	NK38-DS-38000-10001 R001	3	Entertech(USD)	14-Oct-15
709463	NK38-VSS-38110-10022	1	Entertech(USD)	14-Oct-15
704890	NK38-DS-38000-10003	18	Entertech(USD)	8-Sep-15
704868	NK38-DS-38000-10011	1	Entertech(USD)	5-Oct-15
709200	NK38-DS-38000-10009 R003	14	Entertech(USD)	5-Oct-15
709202	NK38-DS-38000-10010 R002	26	Entertech(USD)	5-Oct-15
706088	NK38-VSS-38110-10019	11	Control Valve(pending)	TBD
706077	NK38-VSS-38110-10020 R004	27	Entertech(USD)	8-Sep-15
707846	NK38-VSS-38000-10004	3	Control Valve(pending)	TBD
707744	NK38-VSS-38000-10003 R002	2	Control Valve(pending)	TBD
707897	NK38-VSS-38000-10007 R002	1	Entertech(USD)	8-Sep-15
709190	NK38-DS-38000-10007	13	Entertech(USD)	8-Sep-15
707900	NK38-VSS-38000-10008	31	Entertech(USD)	8-Sep-15
709179	NK38-DS-38000-10005 R002	26	Entertech(USD)	8-Sep-15
707905	NK38-VSS-79710-10002	2	Entertech(USD)	8-Sep-15
707939	NK38-VSS-79710-10001	1	Entertech(USD)	8-Sep-15
708835	NK38-VSS-38000-10018	18	Avon	11-Sep-15
708842	NK38-VSS-38000-10019 R002	53	Avon	11-Sep-15
708856	NK38-VSS-38000-10020 R002	69	Avon	11-Sep-15
707915	NK38-VSS-74250-10009	7	Entertech(USD)	8-Sep-15
708899	NK38-VSS-79710-10004 R001	72	Avon	11-Sep-15
709187	NK38-DS-38000-10006 R001	37	Entertech(USD)	8-Sep-15
707904	NK38-VSS-38000-10006 R002	15	Entertech(USD)	8-Sep-15
709000	NK38-DS-38000-10004 R002	31	Entertech(USD)	8-Sep-15
707332	NK38-VSS-38000-10001 R001	4	Entertech(USD)	8-Sep-15
708293	NK38-VSS-75100-10003 R002	1	Entertech(USD)	8-Sep-15
704878	NK38-DS-38000-10015 R001	4	Entertech(USD)	8-Sep-15
704883	NK38-DS-38000-10012	5	Entertech(USD)	8-Sep-15
709303	NK38-DS-38000-10013 R002	3	Entertech(USD)	8-Sep-15
709307	NK38-DS-38000-10014	19	Entertech(USD)	8-Sep-15
709762	NK38-VSS-38110-10025 R002	2	Entertech(USD)	8-Sep-15

708862	NK38-VSS-38210-10005	7	Entertech(USD)	14-Oct-15
709761	NK38-VSS-38110-10024	0	NOT BUYING	TBD
708864	NK38-VSS-38210-10006 R000	1	Entertech(USD)	14-Oct-15
708578	NK38-VSS-38000-10010	1	Entertech(USD)	14-Oct-15
708585	NK38-VSS-38000-10015 R001	72	Avon	11-Sep-15
708598	NK38-VSS-38000-10013	8	Avon	11-Sep-15
708599	NK38-VSS-38000-10014 R003	30	Avon	11-Sep-15
708594	NK38-VSS-38000-10011	2	Entertech(USD)	14-Oct-15
708595	NK38-VSS-79710-10003	1	Entertech(USD)	14-Oct-15
708596	NK38-VSS-38000-10012 R001	2	Entertech(USD)	14-Oct-15
709766	NK38-VSS-38110-10026	1	Entertech(USD)	14-Oct-15
708859	NK38-VSS-38210-10004	1	Entertech(USD)	14-Oct-15
708867	NK38-VSS-38210-10007	2	Entertech(USD)	14-Oct-15
710196	NK38-TS-63800-10001	4	Entertech(USD)	16-Nov-15
710199	NK38-TS-63800-10002	2	Entertech(USD)	16-Nov-15
710212	NK38-TS-63891-10002	1	Entertech(USD)	16-Nov-15
710221	NK38-TS-63891-10004	1	Entertech(USD)	16-Nov-15
709262	NK38-DS-38000-10017 R001	2	Entertech(USD)	10-Aug-15
709265	NK38-DS-38000-10018 R001	5	Entertech(USD)	10-Aug-15
709458	NK38-VSS-38110-10021	1	Entertech(USD)	10-Aug-15
710352	NK38-VSS-38000-10024	4	Entertech(USD)	10-Aug-15
711016	NK38-VSS-38910-10003	1	Entertech(USD)	10-Aug-15
709851	NK38-VSS-38110-10027	1	Control Valve	23-Oct-15
709852	NK38-VSS-38910-10001 R001	10	Control Valve(pending)	TBD
709853	NK38-VSS-38110-10028 (13720-SPEC-00336 R01)	2	Control Valve	23-Oct-15
709855	NK38-VSS-38110-10029	2	Control Valve	23-Oct-15
709863	NK38-VSS-38410-10002	2	Control Valve	23-Oct-15
709867	NK38-VSS-38500-10008	2	Control Valve	23-Oct-15
709165	NK38-DS-38000-10002	6	Entertech(USD)	10-Aug-15
709461	NK38-VSS-38110-10023	2	Entertech(USD)	10-Aug-15
708996	NK38-DS-38000-10008 R002	15	Entertech(USD)	21-Sep-15
709218	NK38-DS-38000-10016 R001	3	Entertech(USD)	1-Feb-16
710339	NK38-VSS-38910-10002 R001	1	Entertech(USD)	TBD