Request IR-1:

Page 1 of the application explains the project will include installing new instrumentation, replace the Programmable Logic Controllers (PLCs), network infrastructure and transfer data to the NS Power Data Centre.

(a) Will the replacement of the PLCs be the same as NS Power currently uses or will it be a new technology?

(i) Is this an All-In-One PLC or will multiple devices be required?

(ii) If not an All-In-One PLC, please explain why?

(b) Please describe the new instrumentation that will be installed and if it will replace older infrastructure or if it is a new asset to be integrated with existing equipment.

(c) Please confirm or explain otherwise that the network infrastructure will be replaced and upgraded with the same network infrastructure used at the Avon 2 Hydro Station.

(d) Please explain what is involved with the data transfer in terms of the investment/upgrade.

Response IR-1:

(a) It will be new technology. The replacement PLC is a significant technological upgrade for Avon 2. It was selected to align with systems used at other NS Power plants, allowing for standardization and operational flexibility across Hydro Generation.

(i) Yes, this is an all-in-one PLC with multiple slots for configurable cards.

(ii) N/A.

(b) Some of the instrumentation being installed is entirely new and will be integrated with existing equipment, while other components are replacements of existing infrastructure.

NS Power will be installing the following new instrumentation:

- Wicket gate transducer (measures the position of the wicket gate to determine amount of water being passed through the turbine)
- Encoder (measures/monitors the turbine shaft rotational speed)
- Vibration accelerometers (measures vibration in the unit)
- Eddy current probes (monitors vibration of the turbine shaft)

NS Power will be replacing the following existing components:

- RTDs (Resistance Temperature Detectors measuring temperature of critical components)
- Lake level transducers (measure reservoir / lake water elevations)

(c) Avon 2 currently does not have an integrated operational technology network. This project will include the installation of a process network to enable the use DNP3 (Distributed Network Protocol 3) and other data formats for operation, enhanced monitoring, and data collection. DNP3 is a non-routable communication protocol developed and used almost exclusively by utilities. NSP uses it for all serial communication with our RTUs.

(d) NS Power will be installing a Layer 3 switch to segment networks by protocol using separate VLANS. The Layer 3 switch will connect the PLC, the voltage regulator, the protection elements within the plant, and the RTU for operation and annunciation. This infrastructure will enable the collection of relevant vibration and temperature data, consistent with NS Power's broader enhanced monitoring initiatives. These upgrades are essential to be able to quickly and easily understand the data being collected, respond to unplanned outages efficiently while ensuring system security.

Request IR-2:

Page 2 of the application states NS Power will apply a familiar methodology to reduce risk. Please describe this methodology.

Response IR-2:

NS Power applies a structured methodology when executing control system upgrades. This approach includes the following stages:

1. Preliminary Assessment
    a. Site Survey: Inspect the existing hydro unit, control panels, instrumentation, actuators, and communication systems.
    b. Documentation Review: Gather and review all existing documentation—schematics, wiring diagrams, PLC programs, SCADA configurations, and maintenance logs.
    c. Stakeholder Consultation: Engage operators, maintenance personnel, and management to understand current issues, desired improvements, and operational goals.

2. Define Site Specific Upgrade Objectives
    a. Performance Goals: Improve efficiency, reliability, automation, remote monitoring, or grid compliance.
    b. Scope of Work: Decide whether the upgrade includes:
        (i) PLC replacement or reprogramming
        (ii) HMI/SCADA modernization
        (iii) Instrumentation and actuator upgrades
        (iv) Communication protocol updates
        (v) Integration with remote monitoring

3. System Design
   a. Control Architecture:
      (i) This is standardized using lessons learned from Sheet Harbour and Wreck Cove upgrades while considering any additional site specific requirements.
   b. Select PLCs
      (i) PLC Arrangement is now standardized based on Wreck Cove and Small Hydro needs.
   c. Functional Specification:
      (i) Define site specific control logic (e.g., start/stop sequences, load control, fault handling).
      (ii) Define safety interlocks and alarms.
      (iii) Define tripping and protection matrix.
   d. Equipment Selection
      (i) Ensuring alignment with standardized equipment across fleet while meeting site specific needs.

4. Project Planning
   a. Detailed Scope Development
   b. RFP Process
      (i) Long lead item identification.
   c. Schedule creation
      (i) Critical path identification.
   d. Resource planning

5. Implementation
   a. Procurement
      (i) Acquisition of all specified materials.
   b. Decommissioning
      (i) Removal of defined materials.

c. Construction

(i) Installation of new materials.

d. Commissioning

e. Training

f. Enhanced Support

6. Post-Upgrade Support

a. Updated Schematics, manuals, and software backups.

b. Monitoring.

c. Enable remote diagnostics and performance tracking.

7. Maintenance Plan:

a. Preventative Maintenance (PM) Lists.

Request IR-3:

Page 2 under "Why do this project this way?" notes that lessons learned from past projects have been reviewed and incorporated into this project. Please describe which lessons learned have been incorporated into this project and how NS Power has prepared to address issues "proactively".

Response IR-3:

Lessons learned from previous projects that are being incorporated into this project include:

Category	Lesson Learned	Addressing Proactively – How?
Schedule	Commissioning took longer than anticipated.	Build sufficient lead time into the schedule for commissioning. Develop a detailed commissioning plan with step-by-step activities to estimate realistic duration.
Resources	Commissioning took longer than anticipated.	Ensure critical resources for commissioning have sufficient and dedicated time in their schedules to support commissioning activities.
Testing & Commissioning	Additional testing required to reduce start-up issues.	Perform full FAT (Factory Acceptance Test) and SAT (Site Acceptance Test). Simulate start/stop, alarms, trips, and emergency sequences.

Category	Lesson Learned	Addressing Proactively – How?
Schedule	Station Service power was disconnected during plant outage and took longer than anticipated to coordinate temporary back up power supply.	Arrange temporary station service power supply in project planning to reduce risk of delays.
Schedule	Long lead items (e.g., sensors, transducers) caused delays; missing hardware added extra time.	Identify and order long-lead equipment early. Confirm all accessories (nuts, bolts, cables) are included in supply.
Scope Management	Design of control panel required changes mid-project.	Expand scope definition upfront: include governor starter motors, junction box consolidation, grounding review, and any utility control panels.
Scope Management / Instrumentation	Back lake level measurement signals (feeding the head pond) were not fully scoped or coordinated.	Verify that signals are working, properly wired, and reach the plant PLC. Coordinate with Telecom and other groups for commissioning, and plan for new hardware if needed.
Budget	Labour insufficiently budgeted (low).	Labour estimate for this project is based on actual labour for previous control projects.
Documentation & Training	Staff unfamiliar with new systems.	Provide detailed manuals, version-controlled software, and practical operator/maintenance training.

Request IR-4:

Page 2 under Contingency Statement explains that one of the project's risks is from market volatility for contracted installation, commissioning and additional refurbishments.

(a) Is any of the equipment purchased for this project American or sourced from the United States?

(i) If so, what are the tariffs on those goods?

1. Was a Canadian and non-American alternative considered?

(b) Please describe the additional refurbishments.

(c) The quote on page Attachment 1, Page 1 states "firm fixed pricing". Please explain how the anticipated market volatility will affect this project.

(d) Please estimate the value from the possible market volatility.

Response IR-4:

(a) Several categories of equipment for this project are sourced from Canadian suppliers, with certain components originating from both Canada and the United States:

a. **Control cabinets** were assembled in Canada, with components sourced from both Canada and the United States.

b. **Auxiliary cabinets** were also assembled in Canada using a mix of Canadian and U.S. components.

c. **Cabling** came from a facility in Canada (Ontario).

Any applicable tariffs on U.S.-sourced components were incorporated into vendor pricing. As the project is being delivered under a fixed-price contract, tariffs are not expected to impact the overall project cost.

Canadian-sourced alternatives were pursued and adopted wherever feasible. In cases where U.S. components were included, this was due to limited availability, specific technical requirements, or supply chain constraints. The approach taken ensured that the major equipment assemblies were Canadian-manufactured or assembled, while balancing affordability, quality, schedule, and reliability considerations.

(b) Additional refurbishments or replacements may be required but cannot be fully assessed until after the existing assets are removed. These may include items such as cabling and relay replacements. Some elements of the cable sections or relays are assuming to be re-used however their current condition cannot be fully assessed until decommissioning of the system begins.

(c) The quote on Attachment 1, Page 1 is provided on a firm fixed-price basis. As a result, market volatility will not affect the cost of this specific item. While broader market conditions may influence other elements of the project estimate, the fixed-price structure ensures that the major equipment costs remain protected from such variability. Market volatility impacting the project overall is discussed further in (d) below.

(d) The value at risk from market volatility is known to some extent at this stage in project development. For example, installation costs were anticipated to be approximately $100K based on actual costs from CI C0024484. Upon recent completion of this RFP, actual costs are now expected to be $130K, which will utilize approximately 20% of the budgeted project contingency. Further market risk is expected to be negligible. All major component items (control cabinets, auxiliary cabinets, cabling) are under firm, fixed-price contracts. The installation contract is also fixed price. This means that both the supply and installation contractors have already accounted for market conditions within their pricing.

Request IR-5:

Page 2 under Contingency Statement explains that changes from the schedule may result in overtime and spending the project's contingency budget. How much time has NS Power budgeted for this project?

(a) Please compare the amount of time planned for this project to previous projects involving control upgrades at other hydro stations.

Response IR-5:

(a) NS Power has a total of 427 person-days budgeted for this project. A comparison of the time budgeted for this project versus previous control upgrade projects is provided below.

Project	Submission Year	Total Budgeted Labour (person-days)
47551 HYD SHH Controls	2016	281
47163 HYD Tusket Controls Upgrade	2016	207
49039 HYD Lequille Controls Upgrade	2017	260
49036 HYD AVO 2 Controls Upgrade	2025	427

It is worth noting that the increase in budgeted labour (person-days) for this CI is mainly due to a change in methodology. NS Power is completing design work for the PLC and control panel internally, rather than contracting electrical design to an engineering firm. This approach is expected to improve the overall schedule by reducing delays associated with design reviews and updates, and by delivering a solution more tailored to operational needs.

While full labour actual spend values are not currently available due to cyber attack, the commissioning labour estimates have also been increased based on lessons learned from previous control upgrade projects. Additionally, post-commissioning support has been

included in the labour estimate and will be provided internally by NS Power engineering staff to provide a more user-friendly end product.

Request IR-6:

Did NS Power issue a Request for Proposals for this project?

(a) If so, how many vendors submitted estimates?

(b) If not, why not?

Response IR-6:

Yes.

(a) NS Power issued two Requests for Proposals (RFPs) for the major project components.

Control Panel Fabrication

- 6 vendors invited to submit proposals, 2 proposals received.

Installation

- 10 vendors invited to submit proposals, 1 proposal received.

(b) N/A

Request IR-7:

Is Attachment 1 from the same vendor as in Attachment 2?

Response IR-7:

No, Attachment 1 (Vendor 1 for control panel fabrication) is not from the same vendor as in Attachment 2 (Vendor 2 for field breaker panel fabrication). Two different vendors were selected because of the different skills/scope of services they provide.