Heritage Impact Assessment

Coniston GS Life Extension Project Project,

Wanapetei River, City of Greater Sudbury,

District of Sudbury, Ontario.

CHIA Report
November 21, 2022

Heritage Impact Assessment Report

Prepared for:

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Executive Summary

ARCADIS Canada Inc. (Arcadis) has retained Northwest Archaeological Assessments (Andrew Hinshelwood, PhD, CAHP) and Unterman McPhail Associates (UMcA) to undertake a Heritage Impact Assessment (CHIA) for the proposed redevelopment of Coniston Generating Station (GS) on behalf of Ontario Power Generation (OPG). OPG is undertaking the Ontario Waterpower Association Class Environmental Assessment (OWA Class EA) process in order to support a life extension decision for this existing hydroelectric generating station. OPG has decided that a re-development option is the most prudent decision and plans to replace the existing facility with a new 6 MW facility for the Coniston GS. The work will result in the replacement of the existing powerhouse, penstocks and headworks, and revision of the downstream part of the forebay inlet structure with a new powerhouse and intake structure. The project is being carried out under the Class EA for Waterpower Projects prepared by the Ontario Waterpower Association (OWA) (February 2018, Eighth Edition).

The property was evaluated against O.Regs 9/06 and 10/06 and documented in a CHER in March 2017. In May 2018, the OPG Heritage Working Group identified Coniston GS as a ***provincial heritage property*** (PHP) (of local significance) as defined by the Standards and Guidelines.

This CHIA assesses potential impacts to the Coniston GS resulting from the proposed redevelopment. Identified direct impacts for the project include removal of identified heritage attributes of the PHP (powerhouse, penstocks, headworks, all powerhouse equipment including the generators and turbines, and the downstream portion of the forebay canal). Identified indirect impacts include dredging and excavation of the modified tailrace. Positive impacts to redevelopment include the continued use of the Coniston GS site for hydroelectric power generation purposes on the Wanapitei River, continuing an over 100-year identifiable and defining cultural heritage landscape and its retention for hydroelectric power generation thus reinforcing the significant physical, functional and visual linkages between the GS facility's built heritage resources.

The following five (5) recommendations are provided to OPG to address the effects of the identified impacts to the Coniston GS.

1. Powerhouse and Headworks

   It is recommended that a Cultural Heritage Documentation Report (CHDR) is prepared for the built heritage resources of the Coniston GS property. This will address OWA Mitigation Option 8 (b), *Undertake full recording and documentation of existing building*, specifically, the existing powerhouse, headworks, and penstocks. This documentation will take place prior to demolition

   The (CHDR), which will require additional fieldwork and draw on the information contained in the CHER and CHIA, be prepared for OPG by a professional heritage consultant in good standing with the Canadian Association of Heritage Professionals (CAHP). The heritage consultant may convene an interdisciplinary team to support aspects of documentation and to ensure the completeness of the documentation report. The CHDR should include new information providing detail on the dimensions, materials, components and location, as well as an historical summary of the development of the Coniston GS, historical and contemporary photographs of the structures, photographic key plans and available design drawings.

Upon completion, the document record shall be deposited with appropriate institutions, including but not limited to the OPG official document repository system and the Sudbury Local Library or the Archives of Ontario.

2. Equipment

   It is recommended that some significant pieces of equipment from the powerhouse, such as a representative turbine and/or generator, be retained and repurposed in the commemoration of the original Coniston GS insofar as it is safe and feasible. This will address OWA Mitigation Option 6, *Retain built heritage attributes as a monument or remnant for viewing purposes only*. It is further recommended OPG develop an Interpretation Plan to commemorate the cultural heritage value of the site that would incorporate original plant equipment and a plaque describing the original development of Coniston GS and its role in regional industrial development. One possible location for such an installation is near the junction of the access road and Coniston Hydro Road, where there is an existing static display of the early 'crab winch'. The specific location and accessibility should be determined by OPG with due consideration for traffic and public safety. OPG may also consider retaining and preserving several smaller representative items for display at the redeveloped facility.

3. Dredging and Excavation

   Dewatering, excavation and dredging associated with redevelopment may reveal details of past use, engineering, or construction at Coniston GS. Therefore, consideration should be made to the implementation of OWA Mitigation Option 8 (b) when planning and scheduling this work. Specifically, during the period that the area is dewatered, a visual review of the area should be made in order to fully document any heritage features.

4. Allocation of Cultural Heritage Reports

   OPG will retain copies of all cultural heritage reports prepared (CHER, CHIA and CHDR) within the OPG official document repository system. Additionally, OPG will provide digital or hard copies of the reports to the Greater Sudbury Public Library. Consideration should also be given to providing support to the library for the work associated with intake and cataloguing the reports.

5. Coniston GS Cultural Landscape

   It is recommended that OPG ensure that the design of the new generating station is sympathetic to the Coniston GS cultural landscape as it currently exists. This includes consideration of the placement, materials, and architectural detail of the new facility, as well as consideration of preserving parts of the current facility by incorporating them into the proposed design.

1.0 Introduction

Coniston GS is accessed via Coniston Hydro Road from Highway 17 at the village of Coniston, located within the City of Greater Sudbury. The access road leads over the main dam and inlet to the south bank of the river where the facility is primarily located. At the time the CHER was prepared, the generating station comprised the main dam with sluiceways, inlet, forebay canal, headworks, penstocks, powerhouse, tailrace, transformer house (carpenters' shop) and maintenance shop. The stone masonry powerhouse, with structural modification dating to the 1950s, contains three units with an installed capacity of 4.75 MW. Unit 1 was shut down in 2013. Unit 2 was shut down in 2019. The penstock leading to Unit 1 collapsed under a vacuum while being drained, and remains inoperable.

1.1 Purpose of Study

Ontario Power Generation (OPG). OPG has commenced an environmental assessment process to extend the life of the 4.75 megawatt (MW) Coniston GS hydroelectric generating station. The planning and decision-making process has resulted in a decision to replace the existing facility with a new 6 MW facility.[1] ARCADIS Canada Inc. (Arcadis) retained Northwest Archaeological Assessments (Andrew Hinshelwood, PhD, CAHP) with Technical Report Review by Unterman McPhail Associates (UMcA) to undertake a cultural heritage impact assessment (CHIA) for the proposed redevelopment of Coniston Generating Station (GS) on behalf of OPG. The project is being carried out under the Class Environmental Assessment (Class EA) for Waterpower Projects prepared by the Ontario Waterpower Association (OWA) (February 2018, Eighth Edition).

OPG has determined that the existing Coniston GS has reached the end of its expected service life. Through the initial phases of the project OPG examined several alternatives to extend the life of the station, of which three (3) alternatives were advanced for further study to arrive at the preferred alternative. The Project team comprising of representatives from OPG, KGS Group (OPG's engineer) and Arcadis (the environmental consultant) provided input into the assessment of the three (3) alternatives. The following alternatives selected for detailed evaluation included redevelopment of the site with a new powerhouse, refurbishment of the existing powerhouse, and overhaul of the existing powerhouse. Redevelopment was identified as the preferred alternative. Mitigation and impact measures for this alternative include completing a heritage documentation report for the built heritage resources at the property, retaining some of the powerhouse equipment as a monument for viewing purposes, examining the dewatered tailrace for additional heritage features and allocation of reports to provide public access to the heritage information compiled.

Coniston GS has been evaluated using the 2010 Ontario Heritage Act (OHA) *Standard and Guidelines for Conservation of Provincial Heritage Properties* (*Standards &Guidelines*). Unterman McPhail Associates undertook the cultural heritage evaluation of the property on behalf of OPG. The Cultural Heritage Evaluation Report (CHER) and the Statement of Cultural Heritage Value (SCV), were finalized in March 2017. The CHER concluded Coniston GS fulfilled the evaluation criteria for determining the cultural heritage value or interest set out in Ontario Regulation 9/06 under the *Ontario Heritage Act* (OHA) for

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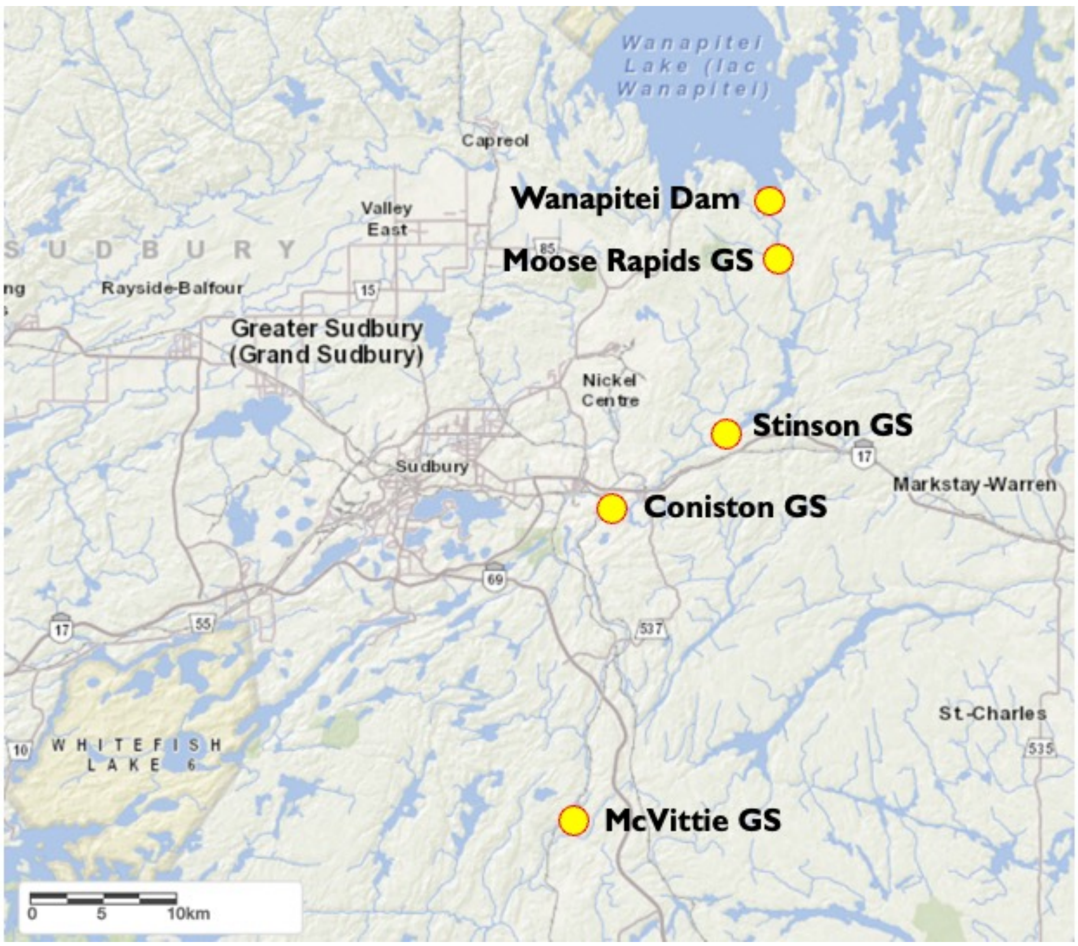
[1] The capacity of the facility with all three of the original units is 4.75 MW. Unit 1 and Unit 2 have been shut down for technical reasons, and the remaining unit, Unit 3, has a capacity of 2.7 MW. The 6 MW estimate is for both a refurbished or redeveloped plant.

local significance; however, it was determined the property did not meet the criteria for provincial significance in Ontario Regulation 10/06. In May 2018, the OPG Heritage Working Group identified Coniston GS as a provincial heritage property (PHP) as defined by the Standards and Guidelines.

This CHIA provides an assessment of the impacts to Coniston GS as a result of the proposed redevelopment. It sets out conservation and mitigation recommendations that summarize how the Coniston GS Life Extension Project should proceed in order to best protect and document the cultural heritage value and the heritage attributes of the identified cultural heritage resources. The report draws upon a site review undertaken in July 2020, building on the data collected previously during preparation of the CHER.

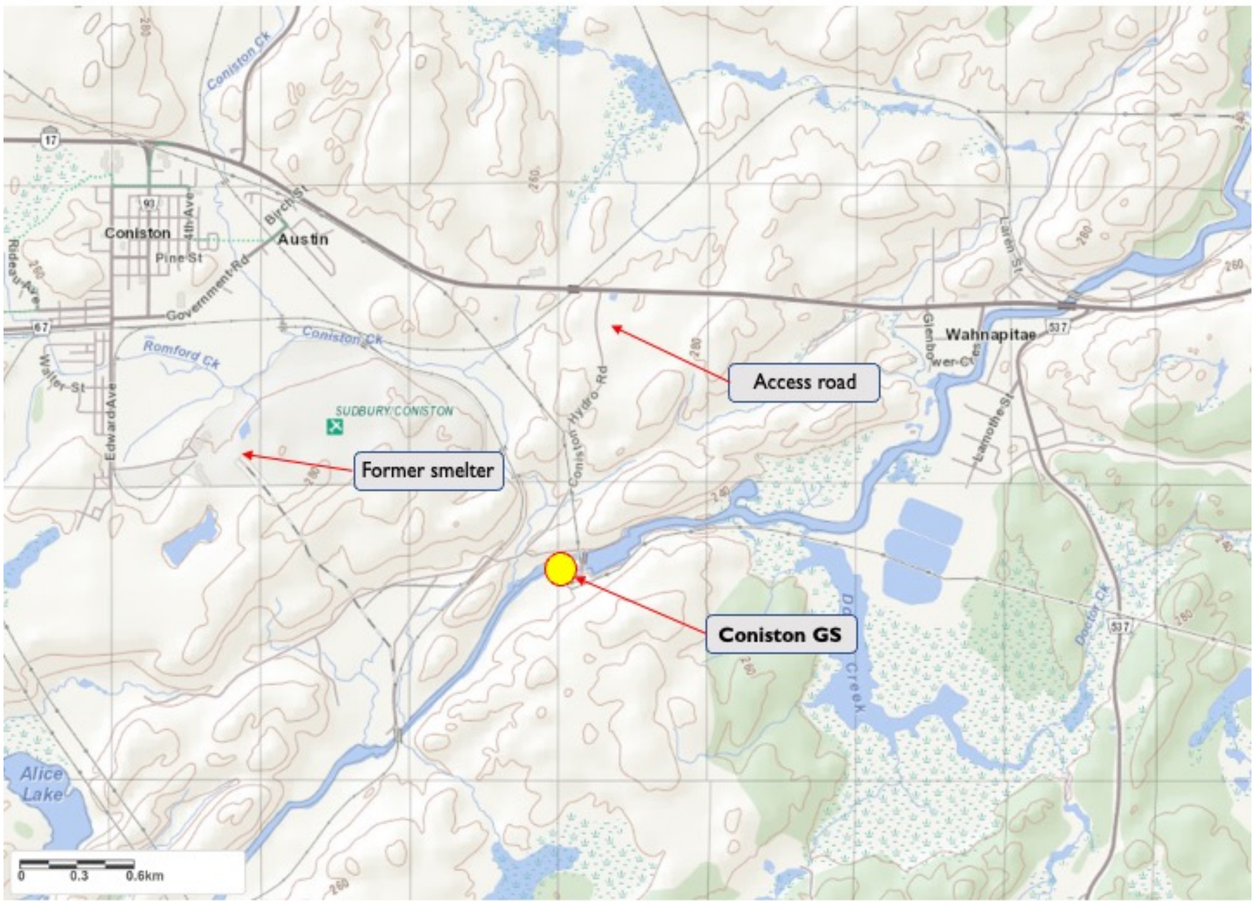
1.2 Description of the Property



Map 1: Regional location of Coniston Generating Station, Wahnapitei River.

Coniston GS hydroelectric facility is located within the boundary of the City of Greater Sudbury. The facility is located on the Wanapitei River 16 km east of the city centre of Sudbury. The community of Coniston is situated to the northwest of the generating station and the community of Wahnipitae is located upstream on the Wanipitei River. The Wanapitei River is a tributary of the French River and has its headwaters north of Coniston at Wanapitei Lake. Coniston GS is downstream of OPG's Stinson GS and upstream of McVittie GS (Map 1). Specifically, the generating station is situated near the former Town of Coniston on Lot 1, Concession 2 in the geographic Township of Neelon in the District of Sudbury.

Coniston GS is accessible from Highway 17 via Coniston Hydro Road, running south. The community of Coniston is accessed by Regional Road 93, and Coniston Hydro Road intersects Highway 17 about 2.6 kilometres east of Regional Road 93. At the facility, the access road leads over the main dam and inlet to the south bank of the river where the facility is primarily located (Map 2).



Map 2: Location of Coniston Generating Station.

The Provincial Heritage Property (PHP) comprises Coniston GS and main dam with sluiceways, inlet, forebay canal, headworks, penstocks, powerhouse, tailrace and access road (Figures 1 and 2).[2] The maintenance shop, which is a contemporary structure, and ancillary features including the transformer

[2] The transformer house, later repurposed as the carpenters' shop, had been removed prior to the July 2020, site visit.

station, the transmissions lines and the former operators' colony, which are not within the ownership of OPG, do not form part of the Provincial Heritage Property.

Hydro-electric power is supplied to the 115 kV transmission system from Consiton through a switchyard located at the Consiton GS. The two facilities are operated as separate entities, following the separation of the generation facilities from the distribution and transmission facilities, as required under the *Energy Competition Act, 1998*.

1.3 Report Format

This CHIA follows the ministry's *Information Bulletin 3: Heritage Impact Assessments for Provincial Heritage Properties* (January 31, 2017). This CHIA also draws upon experience of the consultants in the preparation of HIAs for provincial ministries, prescribed public bodies and municipalities.

The report includes the following information:

- Introduction (Section 1)
- Statement of cultural heritage value or interest (Section 2);
- Description of the existing conditions (Section 3);
- Description and purpose of the proposed activity (Section 4);
- Assessment of the impacts from the proposed activity (Section 5);
- Considered alternatives and mitigation measures (Section 6);
- Discussion of community engagement (Section 7); and,
- Recommendations or preferred conservation strategies (Section 8).

Figures are included in the report in the manner best suited to supporting the text. Photographs are credited in the associated caption. For the purposes of this report, the Wahnapitei River is considered to flow from east to west through the study area.

1.4 Project Personnel

For Northwest Archaeological Assessments	Andrew Hinshelwood, PhD, CAHP Heather Hopkins, PhD
For Unterman McPhail Associates	Richard Unterman, MA, CAHP
For ARCADIS Canada Inc.	Phil Shantz, MES, MCIP, RPP

2.0 Statement of Cultural Heritage Value

2.1 Heritage Recognition

Coniston GS is recognized as a PHP as set out under the *Standards & Guidelines* (2010). The description of the PHP, the statement of cultural heritage value or interest and the identification of heritage attributes as set out in Sections 2.2, 2.3 and 2.4, respectively were developed initially for the 2017 CHER (Unterman McPhail Associates 2017).

Coniston GS has not been evaluated for federal heritage value and is not recognized as a federal government heritage resource. Furthermore, the facility is not commemorated through a local, provincial or federal plaque program. Consultations with the City of Greater Sudbury confirm Coniston GS is not municipally listed and is not designated under the OHA. No formally recognized heritage properties were identified in proximity to the subject property in the City of Greater Sudbury.

A Stage 1 archaeological assessment was completed on Coniston GS in 2016 by Woodland Heritage. The assessment evaluated the property as containing no areas of archaeological potential, and additional archaeological assessment work was not recommended in advance of the proposed Coniston GS Redevelopment. The existing extensive and intensive disturbance at the facility as the main factor in the evaluation of archaeological potential.

2.2 Description of the PHP

The hydroelectric generating facility known as Coniston GS is located on the Wanapitei River near the community of Coniston within the City of Greater Sudbury. Specifically, the generating station is situated on Lot 1, Concession 2 in the geographic Township of Neelon in the District of Sudbury.

At the time the CHER was completed (2017), the Provincial Heritage Property comprised Coniston GS and main dam with sluiceways, inlet, forebay canal, headworks, penstocks, powerhouse, tailrace, transformer house (carpenters' shop) and access road (Figure 1). Between 2016 and the property inspection associated with this report in 2020, the transformer house (carpenters' shop) has been removed and replaced with a new fenced-in transformer pad. The maintenance shop, which is a contemporary structure, and ancillary features including the transformer station, the transmissions lines and the former operators' colony, which are not within the ownership of OPG, do not form part of the Provincial Heritage Property (Figure 2).

2.3 Statement of Cultural Heritage Value or Interest

The Wahnapitae Power Company under the partnership of Frank Cochrane and William McVittie developed Coniston GS to provide electrical power to the Sudbury area. The company was incorporated in 1902; the construction of Coniston GS was commenced in 1904 and the first unit was place in service in 1905. Additional units were added in 1907 and 1915. Coniston GS was the first of three interconnected generating stations constructed by the Wahnapitae Power Company on the Wanapitei River. The reliable power produced by Coniston GS contributed to the economic growth of Sudbury as well as the mining industry of the Sudbury Basin. Frank Cochrane and William McVittie are both noted business pioneers in Sudbury and are recognized for their contributions as builders of the Sudbury District. Cochrane went on to become a well-known and successful politician who served as the mayor of Sudbury and as a cabinet minister at both the provincial and federal levels. The Wahnapitae Power Company retained its connection with the Cochrane and McVittie families until the HEPC, later Ontario Hydro and now OPG, acquired the company in 1929-1930.

Coniston GS is an early example of a hydroelectric generating station from the first part of the 20th century. Dating to 1905, it is one of the oldest stations remaining in operation in the province, the third oldest station within OPG's portfolio and the oldest facility in operation on the Wanapitei River. In terms of materials, Coniston GS is a rare example of a generating station exhibiting stone construction for important components of the facility, rather than the more typical concrete. The layout of the plant followed standard engineering technology and its design was well executed as its continued use attests. Coniston GS retains significant components of its original equipment including three horizontal Francis style turbines and three alternating current generators that would be considered obsolete by today's standards. The plant has been modified over the years to maintain operations, but it retains significant elements of its design character and key components.

Coniston GS comprising main dam and sluiceways, inlet, forebay canal, headworks, penstocks, powerhouse, tailrace and transformer house clearly conveys its function and age as a hydroelectric complex dating to the early 20th century. It remains in partial use and as the oldest station on the waterway and one of the oldest in the Sudbury area the facility is a tangible asset that makes an important contribution to the understanding of the history of hydroelectric generation and the mining industry in the region. The plant retains its traditional relationship with Sudbury as well as the community of Coniston. Its proximity and accessibility to Sudbury heightens its interpretive potential.[3]

2.4 Description of Heritage Attributes

Heritage attributes, i.e., character defining elements, of Coniston GS include, but are not limited to, the following details (Figure 1):

1. Main dam with sluiceways constructed of concrete, comprising five sluices and carrying a road deck. A log chute was formerly located in the left gravity section of the dam.
2. Inlet constructed of concrete and comprising two bays with trash racks on the upstream side and carrying a road deck.
3. Forebay canal constructed of stone and concrete and lined in concrete.
4. Headworks constructed of stone with outlets for four penstocks. Concrete has been placed over the stone on the main wall encasing the penstocks.
5. Penstocks constructed of rivetted steel and supported on concrete saddles.
6. Powerhouse

[3] Unterman McPhail Ltd. 2017. OPG Heritage Review Process Statement of Cultural Heritage Value, Coniston Generating Station, Wanapitei River, City of Greater Sudbury, Ontario. Section 2.2.1.

    a. Exterior comprising a two-storey structure with concrete foundations, stone walls and flat roof with stepped up section at the west end to accommodate switchgear. The original door, window and tailrace openings are generally segmental arch shaped with stone voussoirs. The east elevation contains a large opening for the movement of equipment into the powerhouse and the main pedestrian entranceway. A regular pattern of window openings characterizes the north and south walls.
    b. Interior containing full height generator floor to the north, mezzanines to the south and west and arched openings with radiating brick voussoirs under the south mezzanine.
    c. Equipment comprising three horizontal Francis type turbines with four runners per unit manufactured by Jenkes Machine Co. (Unit 1), Jenkes Machine Co. with Charles Barber & Sons runner (Unit 2) and Canadian Allis Chalmers (Unit 3) and three alternating current generators manufactured by Canadian General Electric Co. Limited of Toronto.
7. Tailrace that runs a short distance from below the powerhouse to the Wanapitei River.
8. Transformer house (Demolished between 2016 and 2022)
    a. Exterior comprising a one-storey brick structure with gable roof, two large window openings with brick voussoirs on each of the north and south walls and circular openings for switchgear, now closed in, on the west gable end wall.
    b. Interior with exposed wood frame roof structure.
9. Channel of the Wanapitei River with exposed rocky shoreline below the main dam.
10. Access road on the north bank of the Wanapitei River that crosses over the main dam and inlet and provides access to the facility on the south bank of the river.

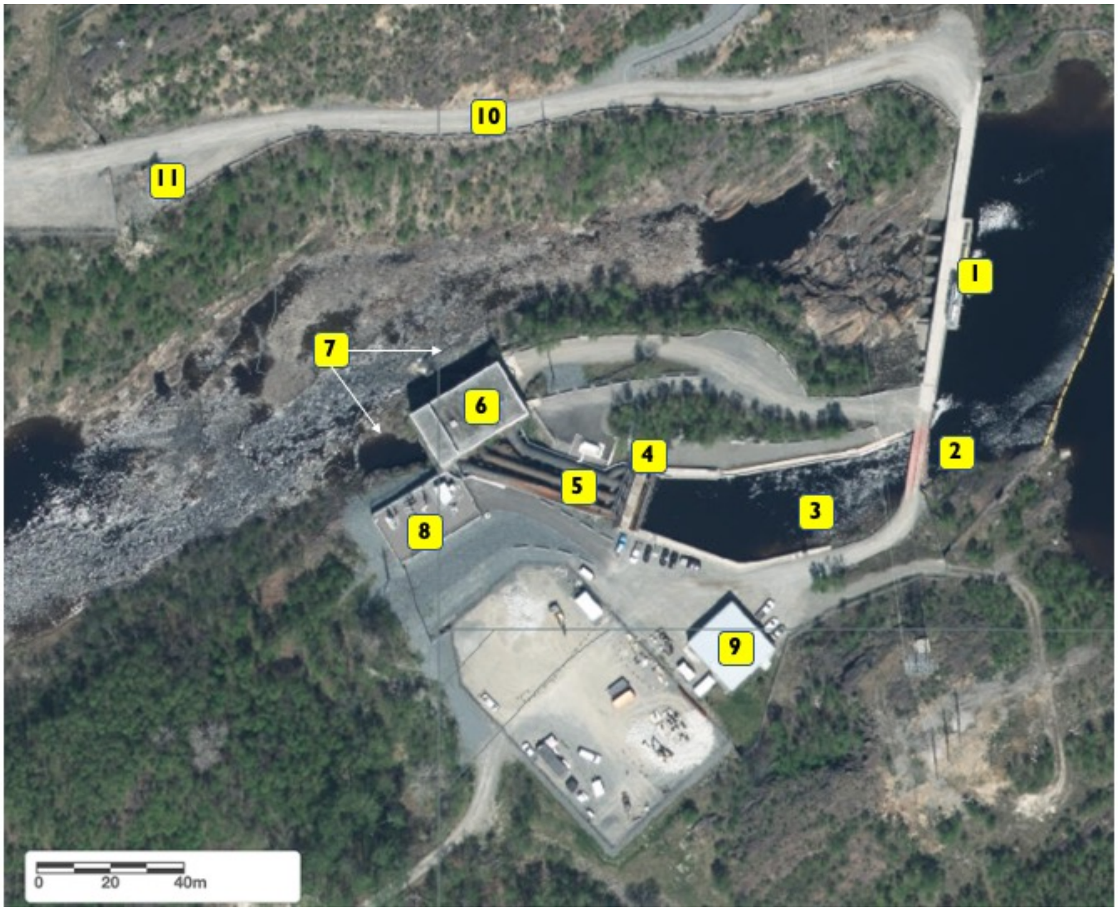


Figure 1: Coniston GS built heritage resources: 1) dam, 2) inlet sluices, 3) forebay canal, 4) headworks, 5) penstocks, 6) powerhouse, 7) tailrace and Wanapitei River channel, 8) switch yard (site of former transformer house), 9) maintenance building and yard, 10) access road, 11) potential location for static equipment display.

Coniston GS is accessible from Highway 17 via Coniston Hydro Road, running south. The community of Coniston is accessed by Regional Road 93, and Coniston Hydro Road intersects Highway 17 about 2.6 kilometres east of Regional Road 93. Coniston Hydro Road continues beyond the access road to the GS to the south end of the industrial park at the former Mond Nickle Company smelter site. Mond Nickle was a major customer of Coniston GS starting in 1913. The site of the smelter, built in 1954 and 1959, remain visible from Coniston (Figure 3).

3.0 Assessment of Existing Conditions

Coniston GS hydroelectric facility is located within the boundary of the City of Greater Sudbury. The community of Coniston, now part of the City of Greater Sudbury, is situated about 3 km to the northwest of the generating station. The Wanapitei River is a tributary of the French River and has its headwaters north of Coniston at Wanapitei Lake. Coniston GS is downstream of OPG's Stinson GS and upstream of McVittie GS (Map 1). Specifically, the generating station is situated near the former Town of Coniston on Lot 1, Concession 2 in the geographic Township of Neelon in the District of Sudbury.

Initial research and reporting were completed in 2016 by Richard Unterman and Barbara McPhail of Unterman McPhail Associates, Heritage Resource Management Consultants, and Jean Simonton, Heritage Consultant, on behalf of OPG. The research supported the preparation of three reports:

- Cultural Heritage Research Report,
- Cultural Heritage Evaluation Report (CHER), and
- Statement of Cultural Heritage Value (SCHV).

Additional fieldwork was completed in July 2020 by Andrew Hinshelwood in support of the CHIA. This work included a review of the heritage attributes of the property, identification of any changes or new information since the earlier fieldwork, and to review the property relative to the recommended feasible options presented in the KGS Group Pre-Feed Optimization Study, dated November 2019.[4]

3.1 Site Conditions

The development of the Wanapitei River for hydroelectric generation purposes has altered the natural characteristics of the waterway. The primary difference is water level changes associated with the water control structures and construction of generating facilities.

3.2 Built Heritage Resource Description

The Coniston GS contains the following built heritage resources:

- dams with sluiceways,
- inlet sluices,
- forebay canal,
- headworks,
- penstocks,
- powerhouse,
- transformer yard, and,
- tailrace.

[4] KGS Group. 2019. Coniston Generating Station Redevelopment Project, Definition Phase Pre-Feed Optimization Study, Draft Rev A. Report prepared for Ontario Power Generation. Dated November 1, 2019. KGS Group Project 18-0017-003.

Together these structures make up the generating station complex. The facility has a normal operating head of 16.5 metres. The powerhouse contains three double Francis units operating at a head of 16.5 m, with capacities of 0.9 MW (Unit 1 installed 1905, shut down 2013), 1.15 MW (Unit 2 installed 1907, shut down 2019) and 2.7 MW (Unit 3 installed 1915). The station has a total installed capacity of 4.75 MW, with a plant discharge flow of 44 m3/s at maximum plant flow and 33 m3/s at peak efficiency.

The facility access road leads over the main dam and inlet to the south bank of the river where the facility is primarily located. Coniston GS is located adjacent to a recently re-developed Hydro One switchyard which has replaced the former Hydro One Coniston Transformer Station (TS).

Table 1 provides a concise description of the property in its current condition. The Table also provides details of the on-site investigation(s) including any significant changes in the current physical or material condition of the property from the approved Statement of Cultural Heritage Value, the site investigation and, for each heritage attribute, whether it is in good, fair, or poor condition.

Table 1: Property description, investigation, and condition.

Heritage Attribute	Site investigation	Condition
Dams and sluiceways. The main dam is a concrete structure with five sluices and left and right concrete gravity wall sections built in 1938 (Figure 4), replacing an earlier log crib dam (Figure 5). A second dam controls flow to the forebay. This dam is concrete and also dates to 1938. The structures support a single traffic lane and is currently reinforced with temporary metal ramps (Figure 6). Main dam is about 80 metres in length, and forebay dam about 20 metres. A gravel service ramp provides access to the powerhouse from between the two dams (Figure 7).	July 2020, A. Hinshelwood examined the property on foot accessing the structure from the sides and top. Figures 4 – 7.	good
Forebay canal. The forebay canal (Figure 8) is approximately 75 x 20 metres. The canal is original and was rehabilitated in the 1980s and lined with concrete. On the north side, a stone embankment reinforces the forebay, while the south side support is included in the base for an access trail to the transformer station and main employee entry to the powerhouse (Figure 9).	July 2020, A. Hinshelwood examined the property on foot accessing the structure from the sides and top. Figures 8 – 9.	good
Headworks. The headworks occupy the west end of the forebay canal and date to the original 1904 construction (Figure 5). Stone masonry walls are visible on the north and south sides, while the west face has been encased in concrete since construction (Figure 10). As designed, the headworks include outlets for four penstocks. Two penstocks were coupled in 1915 to provide an increased volume of water to Unit 3. Each gate is operated by a single hydraulic hoist (Figure 11). The hoists replaced the original manual hoists and timber gates at an	July 2020, A. Hinshelwood examined the property on foot accessing the structure from the north and south sides and the access gantry. Figures 10 – 11.	good

unknown earlier date. At the time of the fieldwork, the gates for Units 1 and 2 were closed to reduce flow.		
Penstocks. Three penstocks supply the turbines. Unit 1 and Unit 2 penstocks are 2.44 metres in diameter and about 42 metres (Unit 1) and 47 metres (Unit 2) in length. The penstock supplying Unit 3 is 3.05 metres in diameter and 38 metres in length. Each penstock is constructed of rivetted steel, and rest on concrete saddles (Figure 12). The penstocks were installed as each Unit was installed: Unit 1 (1905), Unit 2 (1907) and the coupled penstock for Unit 3 (1915; Figure 13). Unit 1 was shut down in February 2013. Unit 2 was shut down in 2019. Both penstocks are currently out of service, and the Unit 1 penstock has collapsed due to a vacuum that formed during dewatering when the air vent proved to be frozen shut.	July 2020, A. Hinshelwood examined the property on foot accessing the structure from the north and south sides and the access gantry. Figures 12 – 13.	Fair to poor
Powerhouse. The powerhouse is original to the site and includes much of the original, 15 x 15m two-storey stone building (Figure 14) and 15 x 30m extension (Figure 15). Stone masonry construction with poured concrete foundation walls in extension. Access to the building is by doors on the east, south and west walls. A large service door provides access to the plant floor on the east wall. The remaining doors access the mezzanine level. Window and door openings are segmental arch-shaped openings, with stone voussoirs, although some have been modified to be smaller or completely sealed. The windows and doors are generally newer than original, dating to the 1950's reconstruction. The building has been extensively and significantly modified from its original form. The north wall, parallel to the Wanapitei River, has seven window bays in a regular arrangement, and an outflow for Unit 3 at the east end beneath a low, concrete arch. The 1915 addition is visible in a slight change in the stonework (Figure 15). The east face includes one window and a large service door on the ground level, and two windows and a pedestrian door on the upper level (Figure 16). All positioned within original openings, although the upper-level door has been resized to fit a smaller standard metal door, accessed from a metal gangway from the embankment supporting the headworks. The service door is a metal replacement of the original. The concrete foundation of the extension is visible at ground level (Figure 17). The south wall also a seven-bay form, with the westernmost altered for a pedestrian entry (Figure 18). The three penstocks enter below. There are also three windows on the lower level on either side of the Unit 2 and 3 penstocks. The penstocks for Units 1 and 2 enter through openings set into stonework foundations (Figure 19). Concrete has been added around the intake at Unit 2 as a later repair (Figure 20). The Unit 3 penstock enters through a formed opening set into the concrete	July 2020, A. Hinshelwood examined the property on foot accessing the structure directly from the west, south and east, with observations made from the north across the river. Figures 14 – 28.	Good to fair

foundation wall (Figure 20). The low arch above the pedestrian entry is asymmetric to the current door reflecting the repurposing of an original window opening (Figure 21). The larger opening has been closed in with stone. Evidence on the exterior wall (paint, roofing tar) likely mark a shed addition and removal, date unknown. Two attachments to the exterior south wall are noted: an undated bracket for electrical service above the intake for Unit 2 penstock (Figure 22) and a post-1950 alarm speaker at the southeast corner (Figure 23). The west exterior wall reflects several (undated) modifications due to changing technical requirements. In the original building, the upper level included two windows on the north side and apertures for wiring associated with two switches to the south (Figure 24). On the lower level there was one window below the switching apparatus, and a large service door toward the river. This door is aligned with the loading door in the east wall opposite. The outflow for Units 1 and 2 is through a single stone arch with stone voussoirs. Damage dating to a fire in 1954 led to replacement of the roof and gables. Also, post-fire reconstruction saw windows on the upper level closed in with stone; one completely closed, the other reduced to fit a standard metal door. A metal walkway was installed to provide access to the door and exterior equipment. One of the more striking aspects of the powerhouse is the contrast in materials used in the original and in the post-1952-fire reconstruction. The original four bay building had a wooden gable roof (Figure 14). The roof was extended to the east in 1915. The 1952 fire destroyed the roof and the upper courses of stonework on the walls. The gable roof was demolished and replaced with a flat roof constructed of concrete panels over steel girders (Figure 27). The roof was stepped up at the western end to accommodate switching equipment. A concrete cap to the exterior walls was built up to support the new roof and stabilize the stonework below. In the elevated western section, translucent lights were placed in the east face overlooking the rest of the roof to provide ambient light to the interior (Figure 28). West wall alterations include formed elements for six transformers and switchgear (Figure 25). Three apertures and anchors are provided for each switch operating in the powerhouse, along with metal brackets to support transformers and other controls. Equipment for four switches was in place during the 2016 property inspection (Figure 26), however, all exterior equipment had been removed by July 2020. Overall, the reconstructed roof changes the appearance of the original powerhouse to a blockier profile.		

Powerhouse Interior: The powerhouse interior includes a main hall housing the generators and associated equipment, and a mezzanine that forms an upper storey in the south half of the building (Figure 29). Three generating units with corresponding turbines are present, numbered west to east (Figures 30 and 31), and positioned under the mezzanine (Figures 32 and 33). Technical summary (Unterman McPhail Associates 2016): Three units using horizontal Francis type, double runner turbines directly connected to Canadian General Electric generators. Each unit was designed operate under a head of 53-ft. (16 m). Turbines • Unit 1: 1905, 1200 hp, Jenckes Machine Co., 300 rpm. • Unit 2: 1907, 1800 hp, Jenckes Machine Co., 300 rpm with Charles Barber & Sons runners, • Unit 3: 1915, 3500 hp, Canadian Allis-Chalmers, 257 rpm. Generators Canadian General Electric Co. Limited of Toronto manufactured the three alternating current generators for the plant. • G1: capacity 1000 kVA, • G2: capacity 1250 kVA, and • G3: capacity 2500 kVA. OPG advise that G2 was rewound in 1950 and again in 1983. G3 was rewound in 1983. G1 underwent repairs of an unspecified nature in 1944 and shut down February 2013. The original turbine driven exciters and Woodward and Lombard governors have been replaced. Turbines for Units 1 and 2 are separated from the generators by a brick wall, with brick arch openings aligned with the edge of the mezzanine above. Two staircases provide access from the main floor to the mezzanine, one on the north wall leading to a walkway on the western wall, and another between G2 and G3. The existing stairs are metal and may be located in original stair location. Switchgear, controls, and office space currently occupy the mezzanine with the eastern part of the area enclosed for use as office space.	July 2020, A. Hinshelwood examined the property on foot with access to all parts of the interior area and mezzanine. Figures 29 to 33	

Transformer building: A transformer building, later used as a carpentry shop, and now demolished, was located southwest of the powerhouse. The building was constructed sometime before 1914, when the powerhouse was expanded, and possibly as early as 1907 before the second unit came online. This building was constructed of brick masonry and featured a wood frame gable roof. Two large window openings topped with segmented arches featuring brick voussoirs were symmetrically placed on the north and south walls. The west gable included six circular openings for switchgear (Figure 34), while the east gable included a double leaf access door. Transformers owned by the Wahnapitae Power Company, Mond Nickel Company, and the Moose Mountain Company were housed in the building. They were moved to an outside yard in the 1950s (or earlier), with the building repurposed as a carpentry shop. The building had two additions over time, a slightly smaller gable roofed building, later replaced with a flat roofed shed/passage connected to the powerhouse at the south pedestrian access door. The building and the shed/passage were present in 2016 but removed and replaced with the transformer yard by 2020.	July 2020, A. Hinshelwood Building demolished at time of inspection. Figure 34	
Tailraces: Two tailraces were built for the outflow from the turbines. One, exiting the powerhouse on the west (downstream) end of the building, serves outflow from Units 1 and 2. The channel has been cut into the underlying bedrock, the bedrock wall on the south side of the tailrace is visible. The opening for the tailrace is constructed of stone, segmental arch-shaped with stone voussoirs (Figure 15). This tailrace is noted on early blueprints as being between six and seven metres deep, and 6.7 metres wide. The second tailrace exists the powerhouse to the north, perpendicular to the flow of the river. This tailrace exits the building through a segmented arch in the north wall. It is slightly larger than the first and constructed of concrete similar to the balance of the foundation for the 1915 addition (Figure 15).	July 2020, A. Hinshelwood Health and safety did not allow close examination of the features. Examined from riverbank and gantry along west side of powerhouse. Figure 15	
Access Road: The access road runs east from Coniston Hydro Road. Between the intersection and the gate, a relatively large gravel area provides parking and marshalling space for vehicles / equipment. Inside the gate, a small rock outcrop carries a plaque and decommissioned "crab winch" formerly used to raise stop logs in the dam. Beyond the south shoulder of the road the ground drops sharply toward the river and a series of Jersey barriers have been positioned for safety. The access road runs about 250 metres from the gate to a right-angle bend near	July 2020, A. Hinshelwood examined on foot with no restrictions to access.	

the north end of the dam. From this bend, the road runs first across the two dam structures before turning to the west along the south side of the forebay canal to access the facility. The road has been constructed along an expedient route that follows relatively level terrain from the main road.		

3.2.1 Discussion

This section elaborates on the information contained in Table X.

Dams with sluiceways

Two concrete dams control the flow of the Wanapitei River as part of Coniston GS. The main dam is a concrete structure with five sluices and left and right concrete gravity wall sections built in 1938 (Figure 4). The concrete dam replaces a log crib dam with six sluices and a log slide. The log crib dam was constructed as part of the original development of the site in 1903 and 1904. One early photograph of the headworks and penstocks may include a partial view the original dam (Figure 5). A second dam at the inlet controls flow into the forebay. This dam is concrete and also dates to the 1938 construction when the original log structure was replaced. The structures support a single traffic lane providing access to the site, and is currently reinforced with temporary metal ramps (Figure 6). The main dam is about 80 metres in length, and the forebay dam about 20 metres. At the separation point between the two dams a gravel service ramp provides access to the powerhouse (Figure 7).

Condition: good.

Forebay canal

Description: The forebay canal (Figure 8) is approximately 75 metres long and 20 metres wide. The concrete and stone canal was lined with concrete in the mid-1980s. The forebay canal occupies the downslope side of the dam, and the natural topography provides wall support. On the north side, a stone embankment reinforces the forebay, while the south side support is included in the base for an access trail to the transformer station and main employee entry to the powerhouse (Figure 9).

Condition: good.

Headworks

The headworks control the flow of water to the penstocks and date to the original 1904 construction (Figure 5). The headworks occupy the west end of the forebay canal. Stone walls are visible on the north and south, while the west face has been encased in concrete since construction (Figure 10). As designed, the headworks include outlets for four penstocks. The installation of Unit 3 in 1915 included coupling two penstocks to provide an increased volume of water to the unit under operation. The headworks includes four hydraulically operated hoists to manage four steel gates. The hydraulic hoists replaced the original manual hoists and timber gates (Figure 11) at an unknown earlier date. At the time of the fieldwork, two of the gates were closed to reduce flow through the penstocks serving Units 1 and 2.

Condition: good.

Penstocks

Three penstocks connect the headworks to the turbines. The penstocks supplying Units 1 and 2 are 2.44 metres in diameter and about 42 metres (Unit 1) and 47 metres (Unit 2) in length. Each penstock is constructed of rivetted steel, and rest on concrete saddles (Figure 12). The penstock supplying Unit 3 is 3.05 metres in diameter and 38 metres in length. The penstocks were installed commensurate with the units they supply: Unit 1 (1905) and Unit 2 (1907) are each fed by a single penstock and Unit 3 (1915) is fed by two penstocks, which converge into a single penstock just below the headworks (Figure 13). Each penstock has an air vent mounted directly in front of the downstream face of the headworks structure. As a result of the condition of the penstock, Unit 1 was shut down in February 2013. Unit 2 was shut down in 2019. Both penstocks are currently out of service, and the Unit 1 penstock has collapsed due to a vacuum that formed during dewatering when the air vent proved to be frozen shut.

Condition: fair to poor.

Powerhouse

The powerhouse is a rectangular plan, two-storey stone building, originally measuring about 15 by 15 metres in size (Figure 14), and later expanded to 15 by 30 metres (Figure 15). Construction is of (presumably) local stone, a material that is considered unusual for generation facilities of this period.[5] Access to the building is by doors on the east, south and west walls. A large door provides access to the main plant floor on the east wall, and the remaining doors access the mezzanine level. All of the window and door openings are segmental arch-shaped openings, with stone voussoirs, although some have been modified to be smaller or completely sealed. The windows and doors are generally newer than original, and may date to the 1950's reconstruction. The building has been extensively and significantly modified from its original form.

The north wall runs along the south bank of the Wanapitei River. It is marked by seven window bays in a regular arrangement, and an outflow for Unit 3 at the east end beneath a low, concrete arch at the base of the wall.[6] The western four windows mark the original structure. When the building was extended in 1915 to facilitate the installation of Unit 3 three more windows at a slightly wider spacing were added. Each of the windows are set in openings with a slight arch above. A subtle change in the stonework, including the size of stone used and mortar can be discerned between the original structure and the addition (Figure 15). In addition, in the original building the stonework extended to the foundation, where it sits on the original bedrock, while the visible foundation of the extension is concrete. The east face of the building includes one window and a large service door on the ground level, and two windows

[5] Unterman McPhail Associates. 2017. OPG Heritage Review Process Cultural Heritage Research Report, Coniston Generating Station, Wanapitei River, City of Greater Sudbury, Ontario. March 2017.

[6] Unterman McPhail Associates (ibid.) state that the tailraces exiting the powerhouse are all cut into the underlying bedrock, and bedrock is visible as the south wall of the tailrace for Units 1 and 2 in the west wall.

and a pedestrian door on the upper level (Figure 16). The openings for the windows and large service door appear to be original, while the upper level door has been resized to fit a smaller standard metal door. The door is accessed by a gangway from the embankment supporting the headworks. The service door is metal and is likely a replacement for the original. Concrete foundations of the extension are visible at ground level beneath the lower-level window, and rise to the height of the top of the window bay at the south end of the wall (Figure 17).

The south wall of the building is punctuated on the upper level by six windows and a pedestrian entry (Figure 18), and on the lower level by the three penstocks. There are also three windows on the lower level on either side of the penstocks for Units 2 and 3. The penstocks for Units 1 and 2 enter the building through openings set into the stonework beneath shallow arches (Figure 19). Concrete has been added around the intake at Unit 2 as a later repair (Figure 20). The Unit 3 penstock enters through a formed opening set into the concrete foundation wall (Figure 20). At the west end of the south wall there is a modified pedestrian entry. The low arch above the door is asymmetric to the current door reflecting the repurposing of an original window opening (Figure 21). The larger opening has been closed in with stone. Part of the exterior wall at this entry has been painted white and a horizontal band of tar is noted above the door but below the arch. Two vertical timber members are also attached to the wall at this point. The paint, wood and tar likely mark the level of a former shed roof, since removed. Two attachments to the exterior south wall are noted: a bracket for electrical service above the intake for Unit 2 penstock (Figure 22) and an alarm or speaker at the southeast corner (Figure 23). The electrical bracket is mounted on the stonework and is undated, while the alarm, mounted on the concrete portion of the wall, post-dates the 1950s reconstruction.

The west exterior wall shows the greatest range of modifications, likely made in response to changing technical requirements. In the original building, the upper level included two windows on the north side and apertures for wiring associated with two switches to the south (Figure 24). On the lower level there was one window below the switching apparatus, and a large service door toward the river. This door is aligned with the loading door in the east wall opposite. The outflow for Units 1 and 2 is below the early electrical connections, constructed of stone with a low arch of stone voussoirs.

The powerhouse was damaged by a significant fire in 1952. Following the fire, the west wall was raised to accommodate interior space needs and designed to facilitate communication between the powerhouse and transformer / distribution infrastructure. The addition to the upper part of the wall includes formed elements that provide for mounting six transformers and switchgear (Figure 25). Three apertures and anchors are provided for each switch operating in the powerhouse, along with metal brackets to support transformers and other controls. Equipment for four switches was in place during the 2016 property inspection (Figure 26),[7] however, all exterior equipment had been removed by July 2020. At some date, possibly as part of the 1954 post-fire reconstruction, the windows on the upper level were closed in with stone, one completely and the other reduced in size a refitted with a standard metal door. A metal walkway was installed to provide access to the door and exterior equipment.

One of the more striking aspects of the powerhouse is the contrast in materials used in the original and in the post-1952-fire reconstruction. The original four bay building had a wooden gable roof (Figure 14). This structure was extended to the east in 1915 continuing the gable roof. A fire in 1952 destroyed the

[7] Ibid., page 22, Figure 11.

roof, and likely damaged some of the upper courses of stone. The gable roof and possibly the upper courses of stonework were demolished and replaced with a flat roof constructed of concrete panels over steel girders (Figure 27). The roof was stepped up at the western end to accommodate switching equipment. A concrete cap to the exterior walls was built up to support the new roof, and possibly to stabilize the stonework below. In the elevated western section, translucent lights were placed in the east face overlooking the rest of the roof to provide ambient light to the interior (Figure 28). Overall, the reconstructed roof changes the appearance of the original powerhouse to a blockier profile.

The interior of the powerhouse includes a main hall housing the generators and associated equipment, and a mezzanine which houses ancillary activities (Figure 29). The three generating units are organized from west to east (Figures 30 and 31), with corresponding turbines positioned against the south wall under the mezzanine (Figures 32 and 33). Unterman McPhail Associates provide the following information on the turbines and generators:

> The three units in the powerhouse use horizontal Francis type, double runner turbines directly connected to Canadian General Electric generators. Each unit was designed operate under a head of 53-ft. (16 m).
>
> The turbines are identified as follows,
>
> - Unit 1: 1905, 1200 hp, Jenckes Machine Co., 300 rpm.
> - Unit 2: 1907, 1800 hp, Jenckes Machine Co., 300 rpm with Charles Barber & Sons runners, and
> - Unit 3: 1915, 3500 hp, Canadian Allis-Chalmers, 257 rpm.
>
> The Canadian General Electric Co. Limited of Toronto manufactured the three alternating current generators for the plant. Their capacity is as follows,
>
> - G1: 1000 kVA,
> - G2: 1250 kVA, and
> - G3: 2500 kVA.
>
> Information from OPG indicates G2 was rewound in 1950 and again in 1983. G3 was rewound in 1983. G1 underwent repairs of an unspecified nature in 1944. The unit was shut down in February 2013. The original turbine driven exciters and Woodward and Lombard governors have been replaced. (Unterman McPhail Associates 2017 RR pages 23-24)

The interior of the powerhouse is divided into the main floor and a mezzanine running the length of the south half of the building. The turbines are positioned under the mezzanine, and the generators stand in the open, two-storey section of the facility. The turbines for Units 1 and 2 are separated from the generators and enclosed by a brick wall, with brick arch openings defining the edge of the mezzanine above. The space between the Unit 3 and G3 is open. Two staircases provide access from the main floor to the mezzanine, one on the north wall leading to a walkway on the western wall, and another between G2 and G3. The location of the stairways may have been established during initial construction or expansion of the powerhouse, although the metal staircases may have replaced earlier wooden stairs.

Switchgear, controls and office space currently occupy the mezzanine with the eastern part of the area enclosed for use as office space.[8]

Transformer building

A transformer building, later the carpenter's shop and now demolished, was located southwest of the powerhouse. The building was constructed sometime before 1914, when the powerhouse was expanded, and possibly as early as 1907 before the second unit came online. This building was constructed of brick masonry and featured a wood frame gable roof. Two large window openings topped with segmented arches featuring brick voussoirs were symmetrically placed on the north and south walls. The west gable included six circular openings for switchgear[9] (Figure 34), while the east gable included a double leaf access door. The building housed transformers owned by the Wahnapitae Power Company and used for their Sudbury power supply, as well as transformers belonging to the Mond Nickel Company and the Moose Mountain Company. The transformers were transferred to an outside yard in the 1950s (or earlier), and the building was later repurposed as a carpenter's shop. Two separate buildings were attached to the east wall of the transformer building: a slightly smaller gable roofed building, which was later replaced with a flat roofed shed/passage connected to the powerhouse at the south pedestrian access door. The building and the shed/passage were present in 2016 but removed and replaced with the transformer yard by 2020.

Tailraces

The tailraces include constructions associated with the powerhouse and its operation. Two tailraces were built for the outflow from the turbines. One, exiting the powerhouse on the west (downstream) end of the building, serves outflow from Units 1 and 2. The channel has been cut into the underlying bedrock, and the bedrock wall on the south side of the tailrace is visible. The opening for the tailrace is constructed of stone, segmental arch-shaped with stone voussoirs (Figure 15). This tailrace is noted on early blueprints as being between six and seven metres deep, and 6.7 metres wide. The second tailrace exists the powerhouse to the north, perpendicular to the flow of the river. The second tailrace exits the building through a segmented arch in the north wall, slightly larger than the first tailrace and constructed of concrete similar to the balance of the foundation for the 1915 addition (Figure 15).

Access road

The access road for the facility runs east from the intersection with Coniston Hydro Road. Between the intersection and the gate, a relatively large gravel area provides parking and marshalling space for vehicles / equipment. Adjacent to the road inside the gate a small rock outcrop carries a plaque and

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[8] The Final OPG Heritage Review Research Report includes additional detail regarding the schedule of changes at the transformer house, noting, "At an unknown date the transformers were relocated from the transformer house to an exterior site on the west side of the building. They were subsequently removed from that location and replaced with an indoor transformer in the powerhouse" (Unterman McPhail Associates 2017: 25). This is connected to other changes made around automation at the facility, "The switchboard shown in a historical photograph … at the west end of the south mezzanine has been removed. … A transformer and four breakers remain inside the powerhouse and under control of OPG" (Unterman McPhail Associates 2017: 25-26).

[9] We note that the powerhouse was provided with openings sufficient for six switches in the original design, and in the post-fire reconstruction. As with the headworks, the transformer building appears to have been constructed in anticipation of the total capacity of the facility after expansion of the power house and installation of Unit 3 in 1915.

decommissioned "crab winch" used to raise and lower stop logs in the dam.[10] Beyond the south shoulder of the road in this section the surface drops sharply toward the river and a series of Jersey barriers have been positioned for safety. The access road runs about 250 metres from the gate to a right-angle bend near the north end of the dam. From this bend, the road runs first across the two dam structures before turning to the west along the south side of the forebay canal to access the maintenance building and other parts of the facility. The road has been constructed along an expedient route that follows relatively level terrain from the main road.

[10] The crab winch is embossed with "Muskoka Foundry Ltd. / Bracebridge Ont." In a building now hosting a 'shopping, dining and entertainment' complex, was the site of Muskoka Foundry Ltd., which operated between 1917 and the early 1950s. https://muskokafoundry.com/about-muskoka-foundry/

4.0 Description and Purpose of the Proposed Activity

4.1 Introduction

The following description and purpose of the proposed activity at the Coniston GS is based on the material provided by OPG and Arcadis to the consultants.

OPG has determined that the existing Coniston GS has reached the end of its expected service life. Two units at the station have already been taken out of service. Unit 1 was shut down in 2013 and unit 2 was shut down in 2019. Unit 3 continues to operate but is derated from its design capacity due to aging equipment issues. As a result of the unit shutdowns and the small capacity of the turbines, the existing facility is unable to use the water resources effectively. The purpose of the project is to extend the life of the site and to increase the Coniston GS capacity from the original 4.75 MW - of which only 2 MW is currently in operation - to approximately 6 MW (while at the same time not altering the approved levels and flows for the facility identified in the Wanapitae River Water Management Plan). The intent is to maximize the annual energy generation at the site while achieving an acceptable rate on OPG's investment and addressing qualitative risk factors.

Coniston GS has been a candidate for life extension for a number of years and has been operated in a "run-to-fail" mode with little long-term work at the site. Through the initial phases of the project OPG examined several alternatives to extend the life of the station, of which three (3) alternatives were advanced for further study to arrive at the preferred alternative.

4.2 Alternatives

The Project team comprising of representatives from OPG, KGS Group (OPG's engineer) and Arcadis (the environmental consultant) provided input into the assessment of the three (3) alternatives. The following alternatives were selected for detailed evaluation.

Alternative 1 – Redevelopment of site with a new powerhouse

An entirely new station will be constructed, likely just upstream of the existing powerhouse in the vicinity of the existing intake structure and penstocks. The existing powerhouse, intake structure and penstocks will be demolished. The new station will have two horizontal units that are expected to produce just over 6 MW. Implementation of this alternative will involve the following high-level scope:

- Construction of a new powerhouse, with all new water-to-wire equipment and an integrated intake structure.
- Removal of all existing power equipment and demolition of the existing powerhouse.
- Demolition of the existing intake structure and penstocks.
- Minor rehabilitation of the intake canal walls to tie into the new station intake and repair any deficiencies.
- Connection to existing substation.

Alternative 2 – Refurbishment of the existing powerhouse

Major modification and civil work will occur within the powerhouse to replace the current units with two new units in two of the existing bays. The existing intake structure and penstocks will be replaced. The upgraded station will have two units that are expected to produce approximately 5.5-6 MW. Implementation of this alternative will involve the following high-level scope:

- Excavation and civil work to remove existing units and expand two of the existing bays to accommodate new units.
- Installation of new turbine/generator equipment into the existing powerhouse, including all new electrical and balance of plant equipment.
- Modifications to the powerhouse superstructure to allow for new units, including removal of mezzanine, construction of hatches in the existing roof to lift in new equipment and alteration of wall openings where penstocks enter the building.
- Demolition of existing intake structure and penstocks and replacement with new.
- Minor rehabilitation of the intake canal walls to tie into the new intake structure and repair any deficiencies.
- Connection to existing substation.

Alternative 3 – Overhaul of the units in the existing powerhouse

This option involves like for like replacement of end-of-life equipment in the station to extend the life of the Unit 3 and bring Units 1 & 2 back into service. The existing intake structure and penstocks will be replaced. The upgraded station will restore the capacity of the station back to the original 4.75 MW. Implementation of this alternative will involve the following high-level scope:

- Replacement of end-of-life equipment including turbine runners, generators and most electrical and balance of plant equipment.
- Demolition of existing intake structure and penstocks and replacement with new.
- Minor rehabilitation of the intake canal walls to tie into the new intake structure and repair any deficiencies.
- Connection to existing substation.

4.3 Draft Final Site Plan

To date, a draft plan of the preferred alternative has been prepared. OPG has selected a station configuration that will have two horizontal units rated at a total of just over 6 MW. Figure 35 shows the proposed Draft Final Site Design for the Coniston GS.

Figure 35: Proposed Draft Final Site Design for the Coniston GS.

5.0 Impact Assessment

5.1 Introduction

This section provides an assessment of the potential effects of the proposed redevelopment.

The conservation of cultural heritage resources is considered to be a matter of public interest. Adverse impacts, as outlined in the Ministry of Tourism, Culture and Sport (MTCS) *Information Bulletin 3: Heritage Impact Assessments for Provincial Heritage Properties* (January 31, 2017) can be described as 'direct' when there is a permanent and irreversible impact on the cultural heritage value or interest of a property or result in the loss of a heritage attribute on all or part of the provincial heritage property or 'indirect' when an activity adversely affects a property's cultural heritage value or interest and/or heritage attributes. A discussion of impacts should also consider positive outcomes that may affect a property by conserving or enhancing its cultural heritage value or interest and/or heritage attributes.

Examples of direct adverse impacts on a provincial heritage property may include, but are not limited to:

- Removal or demolition of all or part of any heritage attribute.
- Removal or demolition of any building or structure on the provincial heritage property whether or not it contributes to the cultural heritage value or interest of the property (i.e. non-contributing buildings).
- Any land disturbance, such as a change in grade and/or drainage patterns that may adversely affect a provincial heritage property, including archaeological resources.
- Alterations to the property in a manner that is not sympathetic, or is incompatible, with cultural heritage value or interest of the property. This may include necessary alterations, such as new systems or materials to address health and safety requirements, energy-saving upgrades, building performance upgrades, security upgrades or servicing needs.
- Alterations for access requirements or limitations to address such factors as accessibility, emergency egress, public access, security.
- Introduction of new elements that diminish the integrity of the property, such as a new building, structure or addition, parking expansion or addition, access or circulation roads, landscape features.
- Changing the character of the property through removal or planting of trees or other natural features, such as a garden, that may result in the obstruction of significant views or vistas within, from, or of built and natural features.
- Change in use for the provincial heritage property that could result in permanent, irreversible damage or negates the property's cultural heritage value or interest.
- Continuation or intensification of a use of the provincial heritage property without conservation of heritage attributes.

Examples of indirect adverse impacts on a provincial heritage property may include, but are not limited to:

- Shadows that alter the appearance of a heritage attribute or change the viability of an associated natural feature or plantings, such as a tree row, hedge or garden.
- Isolation of a heritage attribute from its surrounding environment, context or a significant relationship.
- Vibration damage to a structure due to construction or activities on or adjacent to the property.
- Alteration or obstruction of significant view of or from the provincial heritage property from a key vantage point.

Examples of positive impacts may include, but are not limited to:

- Changes or alterations that are consistent with accepted conservation principles, such as those articulated in MTCS's *Eight Guiding Principles in the Conservation of Historic Properties*, *Heritage Conservation Principles for Land Use Planning*, Parks Canada's *Standards and Guidelines for the Conservation of Historic Places in Canada*.
- Adaptive re-use of a property – alteration of a provincial heritage property to fit new uses or circumstances of the property in a manner that retains its cultural value or interest.
- Public interpretation or commemoration of the provincial heritage property.

5.2 Identification of Potential Impacts

Discussion of potential impact at Coniston GS addresses the potential and adverse effects associated with the proposed preferred Alternative 1. This alternative includes demolition of the existing powerhouse, penstocks, and intake to be replaced by new construction. The potential impacts of this project are principally associated with the removal of the existing powerhouse and other hydro-electric components that relate to the original layout and construction of the generation station.

5.2.1 Direct Impacts

Powerhouse, penstock, and headworks removal

OPG is planning to remove the existing powerhouse and penstocks, and the downstream portion of the intake channel, including the headworks, as part of the redevelopment. The existing powerhouse and penstocks will be demolished, with the location of the existing powerhouse scheduled to be within the new tailrace. The downstream portion of the intake channel, including the headworks and part of the forebay canal will be demolished, with the forebay canal partially reconstructed to align with the new intake structure.

The powerhouse, penstocks and intake channel dating from 1905 – 1915 were identified as heritage attributes of the PHP that contribute to the cultural heritage value or interest of the property.

Equipment removal

All equipment will be removed from the powerhouse. Elements of the equipment, such as the generators and turbines that date to 1905 – 1915, were identified as heritage attributes of the PHP that contribute to the cultural heritage value or interest of the property.

5.2.2 Indirect Impacts

Excavation and dredging of the tailrace

Excavation is anticipated throughout the proposed construction area. Specifically, excavation under the existing penstocks and in the area of the existing powerhouse will be required to facilitate new construction. Excavation and dredging within the footprint of the existing tailrace will be carried out as part of the redevelopment. The proposed excavation and dredging will be carried out in areas previously disturbed by the initial construction of the facility.

Both the tailrace and the exposed rocky shoreline of the Wanapitei River below the main dam were identified as heritage attributes of the PHP that that contribute to the cultural heritage value or interest of the property.

5.2.3 Positive Impacts

Character

The continued use of the Coniston GS property for hydroelectric power generation will retain the overall cultural landscape value and historical context of the property. Although no heritage features beyond the dam and sluiceways will remain following redevelopment, the facility continues the over 100 year history of hydroelectric power generation at the site.

6.0 Considered Alternatives and Mitigation Measures

The alternative for the rehabilitation or redevelopment of Coniston GS have been set out in Section 4.2. Consideration of engineering, cost and qualitative variables has led to a determination that redevelopment is the sole viable option for the facility.

5.1 Alternatives

The Project team comprising of representatives from OPG, KGS Group (OPG's engineer) and Arcadis (the environmental consultant) provided input into the assessment of the three (3) alternatives. The following alternatives were selected for detailed evaluation.

Alternative 1 – Redevelopment of site with a new powerhouse

An entirely new station will be constructed, likely just upstream of the existing powerhouse in the vicinity of the existing intake structure and penstocks. The existing powerhouse, intake structure and penstocks will be demolished. The new station will have two horizontal units that are expected to produce just over 6 MW. Implementation of this alternative will involve the following high-level scope:

- Construction of a new powerhouse, with all new water-to-wire equipment and an integrated intake structure.
- Removal of all existing power equipment and demolition of the existing powerhouse.
- Demolition of the existing intake structure and penstocks.
- Minor rehabilitation of the intake canal walls to tie into the new station intake and repair any deficiencies.
- Connection to existing substation.

Alternative 2 – Refurbishment of the existing powerhouse

Major modification and civil work will occur within the powerhouse to replace the current units with two new units in two of the existing bays. The existing intake structure and penstocks will be replaced. The upgraded station will have two units that are expected to produce approximately 5.5-6 MW. Implementation of this alternative will involve the following high-level scope:

- Excavation and civil work to remove existing units and expand two of the existing bays to accommodate new units.
- Installation of new turbine/generator equipment into the existing powerhouse, including all new electrical and balance of plant equipment.
- Modifications to the powerhouse superstructure to allow for new units, including removal of mezzanine, construction of hatches in the existing roof to lift in new equipment and alteration of wall openings where penstocks enter the building.
- Demolition of existing intake structure and penstocks and replacement with new.
- Minor rehabilitation of the intake canal walls to tie into the new intake structure and repair any deficiencies.
- Connection to existing substation.

Alternative 3 – Overhaul of the units in the existing powerhouse

This option involves like for like replacement of end-of-life equipment in the station to extend the life of the Unit 3 and bring Units 1 & 2 back into service. The existing intake structure and penstocks will be replaced. The upgraded station will restore the capacity of the station back to the original 4.75 MW. Implementation of this alternative will involve the following high-level scope:

- Replacement of end-of-life equipment including turbine runners, generators and most electrical and balance of plant equipment.
- Demolition of existing intake structure and penstocks and replacement with new.
- Minor rehabilitation of the intake canal walls to tie into the new intake structure and repair any deficiencies.
- Connection to existing substation.

6.2 Evaluation of Alternatives

OPG's Engineer, KGS Group, completed conceptual designs and high-level cost estimates for the alternatives. OPG financial evaluation of the alternatives was undertaken and included consideration of construction costs, operating and maintenance costs, energy produced and station life. The analysis showed that Alternative 3 was not a feasible option, as it was inferior in terms of lifecycle cost per energy produced and service life of the asset as compared to the other two alternatives. Alternatives 1 and 2 were both deemed to be feasible.

A qualitative analysis was completed for the two remaining options, comparing the benefits and risks of the redevelopment and refurbishment alternatives. The assessment considered 22 qualitative factors, grouped into 3 broad categories: (1) Environmental Considerations, (2) Operations and maintenance benefits, and (3) Construction advantages and risks. While Alternative 2, Refurbishment, did provide some environmental advantages in that the footprint of the construction may be slightly smaller and include retention of the original powerhouse, overall Alternative 1, Redevelopment, scored better in the assessment. In particular, constructing a new generating station eliminates the construction risks associated with modifying a building that is greater than 100 years old. It also enables the design to incorporate many operational and maintenance benefits that will improve energy generation, safety and water management for the life of the new station. As a result, Alternative 1, redevelopment, was identified as the preferred alternative.

Generally, proposed site alterations should seek to minimize or avoid adverse effect to cultural heritage resources. Interventions should be managed to be sympathetic with the value of the resources. When adverse impacts are unavoidable, it may be necessary to implement mitigation measures that alleviate the deleterious effects to the cultural heritage resource. The principal heritage philosophy for the protection of cultural heritage resources is retention *in situ* and the preservation of the material integrity to the maximum extent possible, consistent with public safety. Mitigation measures lessen or negate anticipated adverse impacts to cultural heritage resources.

The MTCS *Information Bulletin 3*, which provides guidance on the preparation of the HIA of Provincial Heritage Properties states:

The Heritage Impact Assessment must describe the alternative options and mitigation measure that were assessed in order to avoid or reduce any negative impacts to the property's cultural heritage value or interest. Further, these should be consistent with the relevant conservation strategies established in the adopted Strategic Conservation Plan where one exists

An approved Strategic Conservation Plan is not in place for the Coniston GS.

Appendix B, Section 2.3 Heritage Resources of the OWA's Class EA for Waterpower Projects includes the following advice:

The following mitigation options are arranged according to level or degree of intervention from minimum to maximum. They are to be applied in rank order such that Option 1 must be shown to be non-viable, before Option 2 can be considered, and so on. It is understood that conservation plans will be integrated into all options.

1. *Retain existing built heritage attributes with no major change.*
2. *Restore missing or deteriorated elements where physical or documentary evidence (e.g., photographs or drawings) exist.*
3. *Retain existing built heritage attributes, but sympathetically modified.*
4. *Retain existing built heritage attributes with sympathetically designed new structures in proximity.*
5. *Retain existing built heritage attributes with limitations on use or adapted for a new use.*
6. *Retain built heritage attributes as a monument or remnant for viewing purposes only.*
7. *Relocate built heritage attributes to an appropriate new site for continued use or adaptive re-use.*
8. *Remove and/or replace built heritage attributes with a sympathetically designed structure, and*
    a. *Salvage building elements for incorporation into new structure or for future conservation work.*
    b. *Undertake full recording and documentation of existing building.*

6.3 Assessment of Conceptual Design Alternatives and OWA Mitigation Measures

This section contains a discussion of the preferred conceptual design alternative and the mitigation measures for heritage resources considered appropriate for waterpower projects in the OWA's Class EA for Waterpower Projects (February 2018, Eighth Edition). Conservation recommendations for the project are included in Section 8.0.

Overall, the landscape features of Coniston GS as a hydro-electric generation facility will be unchanged. The focus of the re-development project is the 1905 - 1915 powerhouse and intake structure. The Preferred Alternative 1 will replace the existing powerhouse, penstocks, and headworks with a new powerhouse and intake structure that effectively overwrites the existing structures. The dams, sluiceways and parts of the forebay canal, as well as the general location of the tailrace will be unchanged from the present configuration. The Wanapitei River through this section will continue in its modified form. Access to the location will remain via Coniston Hydro Road. The transformer and distribution facilities also under control of Hydro One Networks Inc. will continue in place. All of these elements will continue to evolve over time with maintenance and upgrades at this active industrial site.

We note here as well that the existing powerhouse is not generally visible to the public. Access to the preferred viewing location is by way of a little used industrial road and a section of the private road leading to the site. The existing powerhouse is also significantly modified from its original form when the roof was reconstructed following a fire in the 1950s. Further, other significant components of the facility have been replaced for operational reasons, such as the former transformer building / carpenter shop. The penstocks leading to Units 1 and 2 have also been identified as falling below contemporary structural standards, with penstock 1 currently in a state of collapse.

Powerhouse and Headworks

The existing powerhouse and headworks will be demolished and removed to allow for new construction. The headworks and penstocks will be replaced with a new intake structure directing flow to the turbines. The location of the tailrace for the new structure will match the location of the existing tailraces, although dredging and excavation is required.

Section 4 of this CHIA includes a description of OPG conceptual alternatives analysis used to arrive at its preferred option of redeveloping the Coniston GS. It is noted while OPG reviewed two alternatives for the reuse of the existing powerhouse, both alternatives involved new mechanical and electrical equipment. The equipment currently operating or within the powerhouse cannot be retained or reused. None of the equipment can be re-purposed for use given its age and condition. The equipment is over 100 years of age, and provides considerably less power – when all units are operating, than the proposed contemporary replacement units. Currently, two of the turbine / generator units are off-line, with Unit 1 having been out of service for nearly a decade. As noted, the penstocks have been evaluated and found to be near or below current engineering standards. The headworks are also over 100 years old, and will be redundant with the new intake structure.

Refurbishment or adaptive reuse of the powerhouse would require significant engineering inputs to completely reconfigure the interior to accept the new mechanical and electrical equipment. The connection between new penstocks and the powerhouse would also require that the exterior wall be modified, removing exterior heritage elements (arches, voussoirs) that contribute heritage value. Given that the powerhouse is already significantly altered in terms of the visual elements of the original building, additional revision to the fabric would increase the visual complexity and reduce the heritage value of the structure. Modifications to the existing powerhouse in refurbishment would be matched by extensive redevelopment of the exterior elements including significant reconstruction of the forebay canal, headworks, and penstocks. These constitute essentially new construction at the site.

The selected alternative was chosen largely on the basis that constructing a new generating station eliminates the construction risks associated with modifying the existing structure as determined through OPG evaluation. As indicated in Section 6.1, three alternative conceptual designs were reviewed. OPG financial evaluation included consideration of construction costs, operating and maintenance costs, energy produced, and station life. Alternative 3, overhaul of the existing facility, was found not to be feasible. Alternatives 1 and 2 were both deemed feasible.

A qualitative analysis was completed for the two remaining options, comparing the benefits and risks of the redevelopment and refurbishment alternatives. As noted above, this analysis determined that Alternative 1, redevelopment, avoided inherent risks found in Alternative 2, refurbishment of the existing powerhouse. This led to Alternative 1 being identified as preferred.

As a general principle, proposed site alterations should seek to minimize or avoid adverse effect to cultural heritage resources, with interventions managed to be sympathetic with the value of the resources. When adverse impacts are unavoidable, mitigation measures should be engaged. Mitigation measures lessen or negate anticipated adverse impacts to cultural heritage resources. Under the preferred alternative, the existing powerhouse will be located in the tailrace of the new facility, and construction without demolition is not possible. Therefore, mitigation options (Section 6.1) 1 through 6 are not feasible.

Mitigation option 7, *Relocate built heritage attributes to an appropriate new site for continued use or adaptive re-use,* is not considered a feasible mitigation strategy for the original powerhouse building. Constructed of stone in two stages, and concrete during a later, post-fire restoration, the powerhouse is unlikely to be relocated at a reasonable cost.

Mitigation option 8, includes (a), salvage and incorporation of elements of the heritage structure into future construction, and (b) recording and documentation of the existing building. The powerhouse has been constructed of local stone, and the key visual elements are found in the mason's art in construction. There are no notable elements that could be separated from the building for incorporation into the new structure.

Mitigation option 8(b) is feasible and reasonable, and the direction to *Undertake full recording and documentation of existing building*, is a required mitigation action.

Penstocks

Demolition of the headworks and penstocks to replace them with a new intake structure is a functional requirement of the new powerhouse design. Improved flow to the proposed new generation units cannot be achieved using the existing configuration of water delivery. Redevelopment will improve flow conditions allowing the new generating station to generate power at full capacity in support of the economic and technical rationale for the new generating station. Therefore, OWA Mitigation Options 1 to 7 are not considered to be feasible.

The OWA mitigation option 8 (b), *Undertake full recording and documentation of existing building,* is considered to be a viable conservation action to be undertaken by OPG.

Equipment

The equipment currently in the powerhouse is obsolete. All equipment is scheduled to be removed from the existing powerhouse as part of the Preferred Alternative.

Most of the equipment in the powerhouse is over 100 years old and does not meet contemporary design standards and requirements of hydropower equipment. Further, a hydroelectric powerhouse is designed to operate as an integrated unit, from headwork to tailrace. Reuse of individual components from a former configuration would introduce engineering challenges and associated costs, and would not support OPG quality and safety standards. Therefore, the OWA Mitigation Options 1 to 5 are not considered to be feasible.

The OWA Mitigation Option 6, *Retain built heritage attributes as a monument or remnant for viewing purposes only,* and Mitigation Option 7*, Relocate built heritage attributes to an appropriate new site for continued use or adaptive re-use,* are both viable actions.

Excavation of the forebay and tailrace

The forebay and the tailrace will be retained, de-watered and excavated as part of site redevelopment. Therefore, the OWA Mitigation options 3, *Retain existing built heritage attributes, but sympathetically modified, and option 8, Undertake full recording and documentation,* are considered to be viable actions.

7.0 Summary of Community Engagement

Unterman McPhail Associates consulted with the City of Greater Sudbury during the preparation of the CHER. The municipality has not identified the Coniston GS of cultural value or interest. The property is not listed in a local inventory. Furthermore, no formally recognized heritage properties were identified in proximity to the subject property. Follow up contact with the City during preparation of the CHIA indicated no change to this condition.

Unterman McPhail Associates also consulted with the Ontario Heritage Trust (OHT) to determine if the OHT held a heritage easement on the property. No easement was registered, and the OHT had not commemorated the site or the property. The Ministry of Heritage, Sport, Tourism and Culture Industries has not included the property in the List of Provincial Heritage Properties. Finally, at the Federal level, the property is not included in the Canadian Register of Heritage Properties. Follow up with these agencies during preparation of the CHIA indicated no change to this status for Coniston GS.

No additional consultation was undertaken in 2020 for the purpose of this report.

Public Open House #1, held virtually between November 6, 2019 received one heritage related comment. The commenter indicated that they did not favour reuse of the powerhouse due to its age and possible associated costs. No comments pertaining to cultural heritage were received during Open House #2.

A draft copy of this CHIA report has been provided to planning staff with the City of Greater Sudbury for review. The staff have been engaged by OPG in an ongoing fashion on all facets of the proposal development.

8.0 Recommendations

The CHER (March 2017) for the Coniston GS determined, through the application of the "Criteria for Determining Cultural Heritage Value or Interest" under Ontario Regulation 9/06, that the Coniston GS is of cultural heritage value or interest, due to its physical or design value, historical or associative value and contextual value. Therefore, it is a ***provincial heritage property*** (PHP) as defined by the *Standards and Guidelines*.

The Coniston GS does not fulfill the evaluation criteria for provincial significance as set out in Ontario Regulation 10/06. Therefore, it is **not considered** to be a ***provincial heritage property of provincial significance*** (PHPPS) as defined by the *Standards and Guidelines*. We anticipate that as a result of this evaluation, Coniston GS will be added to the List of Provincial Heritage Properties and as a PHP the provisions of the *Standards & Guidelines* apply to the Coniston GS.

The following five (5) recommendations are provided to OPG to address the effects of the identified impacts to the Coniston GS.

1. Powerhouse and Headworks

   It is recommended that a Cultural Heritage Documentation Report (CHDR) is prepared for the built heritage resources of the Coniston GS property. This will address OWA Mitigation Option 8 (b), *Undertake full recording and documentation of existing building*, specifically, the existing powerhouse, headworks, and penstocks. This documentation will take place prior to demolition

   The (CHDR), which will require additional fieldwork and draw on the information contained in the CHER and CHIA, be prepared for OPG by a professional heritage consultant in good standing with the Canadian Association of Heritage Professionals (CAHP). The heritage consultant may convene an interdisciplinary team to support aspects of documentation and to ensure the completeness of the documentation report. The CHDR should include new information providing detail on the dimensions, materials, components and location, as well as an historical summary of the development of the Coniston GS, historical and contemporary photographs of the structures, photographic key plans and available design drawings.

   Upon completion, the document record shall be deposited with appropriate institutions, including but not limited to the OPG official document repository system and the Sudbury Local Library or the Archives of Ontario.

2. Equipment

   It is recommended that some significant pieces of equipment from the powerhouse, such as a representative turbine and/or generator, be retained and repurposed in the commemoration of the original Coniston GS insofar as it is safe and feasible. This will address OWA Mitigation Option 6, *Retain built heritage attributes as a monument or remnant for viewing purposes only*. It is further recommended OPG develop an Interpretation Plan to commemorate the cultural heritage value of the site that would incorporate original plant equipment and a plaque describing the original development of Coniston GS and its role in regional industrial development. One possible location for such an installation is near the junction of the access road and Coniston Hydro Road, where there is an existing static display of the early 'crab winch'. The specific location and accessibility should be determined by OPG with due consideration for traffic and public safety. OPG may also consider retaining and preserving several smaller representative items for display at the redeveloped facility.

3. Dredging and Excavation

   Dewatering, excavation and dredging associated with redevelopment may reveal details of past use, engineering, or construction at Coniston GS. Therefore, consideration should be made to the implementation of OWA Mitigation Option 8 (b) when planning and scheduling this work. Specifically, during the period that the area is dewatered, a visual review of the area should be made in order to fully document any heritage features.

4. Allocation of Cultural Heritage Reports

   OPG will retain copies of all cultural heritage reports prepared (CHER, CHIA and CHDR) within the OPG official document repository system. Additionally, OPG will provide digital or hard copies of the reports to the Greater Sudbury Public Library. Consideration should also be given to providing support to the library for the work associated with intake and cataloguing the reports.

5. Coniston GS Cultural Landscape

   It is recommended that OPG ensure that the design of the new generating station is sympathetic to the Coniston GS cultural landscape as it currently exists. This includes consideration of the placement, materials, and architectural detail of the new facility, as well as consideration of preserving parts of the current facility by incorporating them into the proposed design.

Sources

Ministry of Tourism, Culture and Sport (now Ministry of Heritage, Tourism, Sport and Culture Industries). 2010. *Standards & Guidelines for Conservation of Provincial Heritage Properties*. April 28, 2010.

Ministry of Tourism, Culture and Sport (now Ministry of Heritage, Tourism, Sport and Culture Industries). 2014. *Standards & Guidelines for Conservation of Provincial Heritage Properties, Heritage Identification & Evaluation Process.* June 3, 2014.

Unterman McPhail Associates. *OPG Heritage Review Process: Cultural Heritage Research Report, Coniston Generating Station, Wanapitei River, City of Greater Sudbury, Ontario*. January 2017, Revised March 2017.

Unterman McPhail Associates. 2017. *OPG Heritage Review Process: Evaluation Report, Coniston Generating Station, Wanapitei River, City of Greater Sudbury, Ontario.* February 2017, Revised March 2017.

Unterman McPhail Associates. 2017. *OPG Heritage Review Process: Statement of Cultural Heritage Value, Coniston Generating Station, Wanapitei River, City of Greater Sudbury, Ontario.* February 2017, Revised March 2017.

Ontario Waterpower Association. 2022. *Class Environmental Assessment for Waterpower Projects*, Ninth Edition.

Ontario Power Generation. 2019. *Project Description for Agency Review: Coniston Generating Station Redevelopment Project.* Prepared for OPG by Arcadis Canada, Inc. and KGS Group Consulting Engineers, June, 2019

Figures

Figure 2: Coniston GS Provincial Heritage Property (PHP), reproduced from Unterman McPhail (SCHV 2017).

Figure 3: Aerial and oblique views showing former smelting works chimneys in distance, marked by yellow arrows.

Figure 4: View of dam and sluiceways (2020).

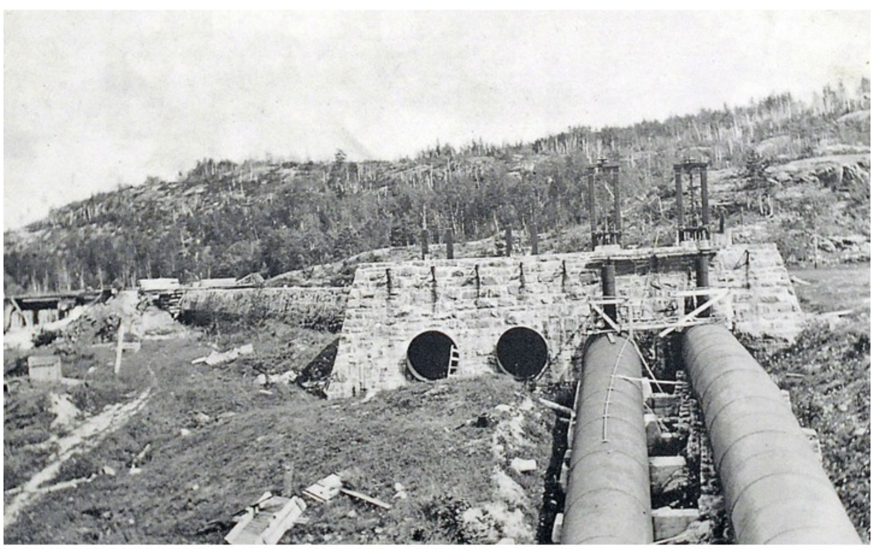

Figure 5: Headworks and penstocks 1 and 2 under construction. Dam visible to left of photo. Source, OPG. Reproduced from Unterman McPhail (SCRR 2017).

Figure 6: Access road crossing the dam and entrance to forebay canal. Note metal vehicle ramps.

Figure 7: Service road running from between the two dam structures and the east entry to powerhouse.

Figure 8: Forebay canal with headworks in distance. Note smelter chimneys on horizon.

Figure 9: Downstream end of forebay canal at headworks. Note stone construction, powerhouse with flat 1954 roof in distance.

Figure 10: View of the headworks.

Figure 11: View of the headworks. Hoists are open to allow flow to penstock serving Unit 3.

Figure 12: Penstocks as they enter the powerhouse. Unit 3 penstock, foreground, enters through concrete foundation wall. Note concrete saddles under Unit 2 penstock, and different entry angles.

Figure 13: Penstocks showing coupling of two penstocks for Unit 3 in foreground. Note Unit 1 penstock in collapsed state.

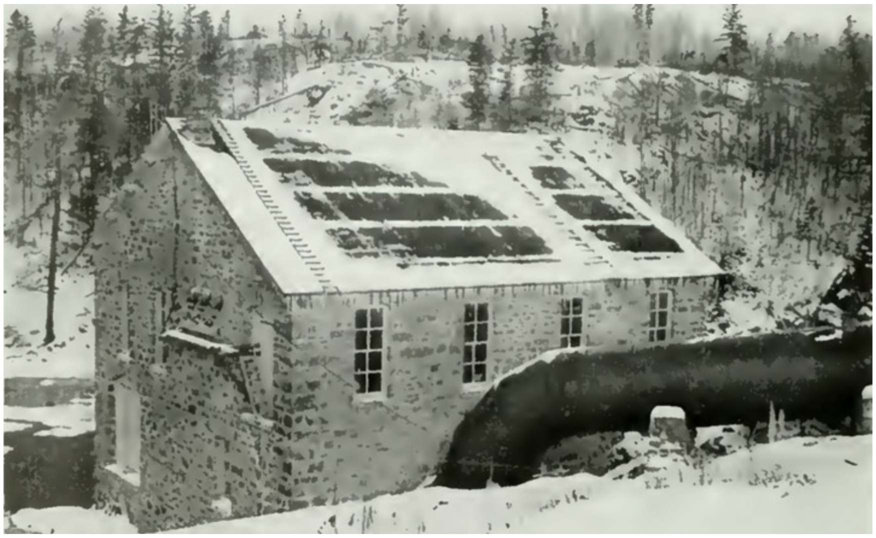

Figure 14: Historic (pre-1915) view of the original powerhouse. Note steep angle of entry of Unit 1 penstock, electrical equipment on west wall, and the gable roof. Source, OPG. Reproduced from Unterman McPhail (SCRR 2017).

Figure 15: View of the powerhouse from the north bank of the Wanipetei River showing west and north faces and post-1954 roof. The 1915 extension can be discerned by the difference in stonework and mortar.

Figure 16: View of east wall, powerhouse. Window in Figure 17 on lower level to the left of the loading door.

Figure 17: East wall transition from stonework to concrete foundation level. Penstocks can be seen through the chain fence.

Figure 18: General view of east and south walls. Former transformer building / carpenter shed, now a transformer / switch facility in the upper left of photo.

Figure 19: View of penstock to Unit 1, entry to powerhouse through stone arch. Note voussoirs and stone infill.

Figure 20: Entry of Unit 2 penstock, with concrete patching, and Unit 3 penstock through concrete foundation wall of the 1915 extension. Note windows in lower level.

Figure 21: South wall, west end. Repurposed window to entry door, window arch above horizontal tar line marking former shed roof, and whitewashed wall section.

Figure 22: South wall showing wiring bracket. Note 1950s concrete wall beginning directly above the original window arches.

Figure 23: South and east walls

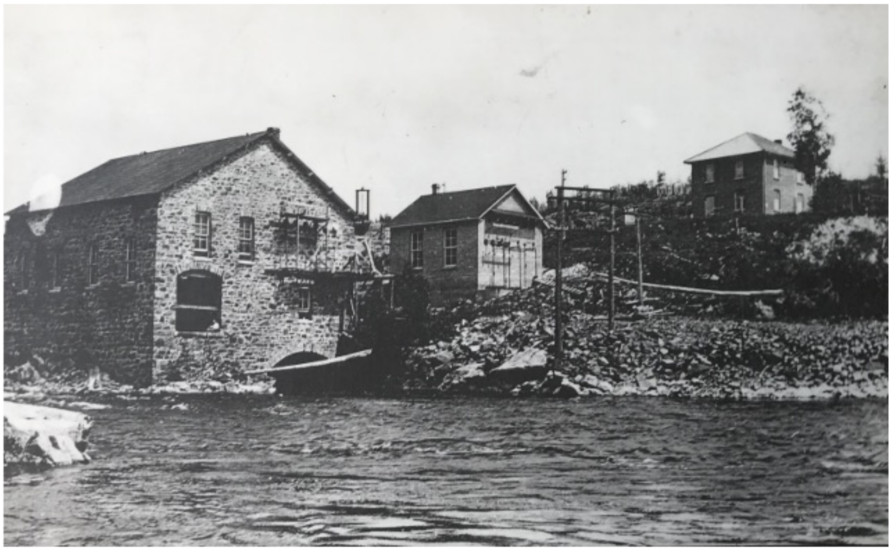

Figure 24: pre-1915, showing original powerhouse, transformer building and a staff residence on the hill. Source, OPG. Reproduced from Unterman McPhail (SCRR 2017).

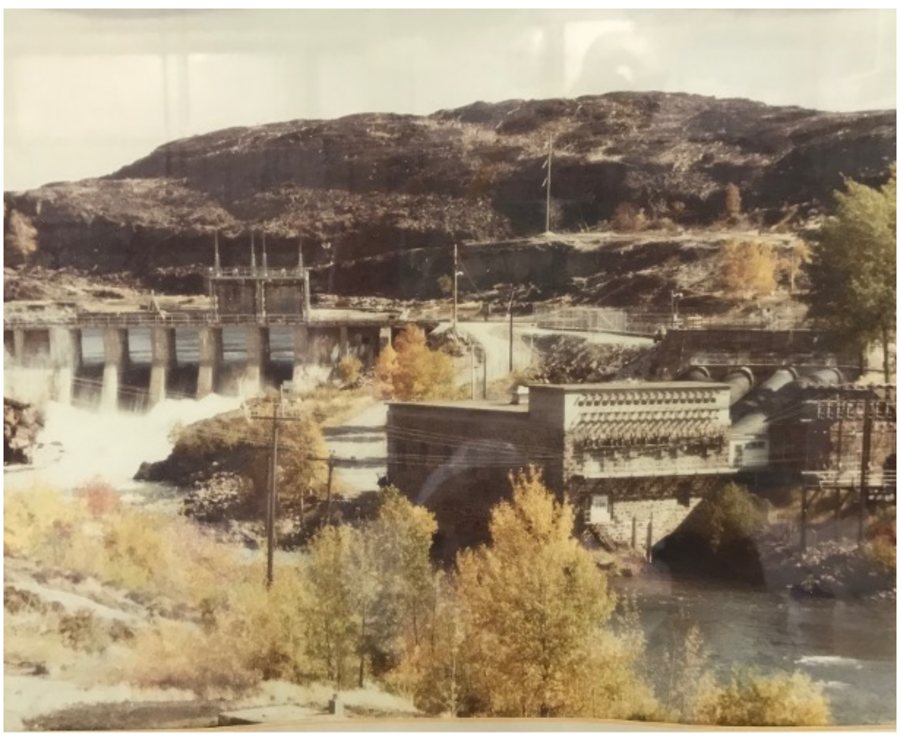

Figure 25: post-1954 showing six switches on exterior wall and other features of the property. Source OPG.

Figure 26: 2016 West wall of powerhouse. Reproduced from Unterman McPhail (SCRR 2017).

Figure 27: view of powerhouse interior showing ceiling form.

Figure 28: View across penstocks showing powerhouse roof, with lift and lights on east face.

Figure 29: Powerhouse interior 2020. Unit G1 foreground, Unit G2 beneath yellow crane, and Unit G3 at end, next to service door (open) in distance.

Figure 30: View from mezzanine. Unit G1 to left, Unit G2 to right. Stairs to mezzanine along south wall.

Figure 31: View from mezzanine. Unit G3 in foreground, service door to right.

Figure 32: View from top of west stairs showing Units G2 and G3 as well as upper mezzanine.

Figure 33: Powerhouse interior detail showing brick partition supporting mezzanine, brick arch above door, and Unit 1 turbine.

Figure 34: Former Transformer House, later Carpenter Shop, demolished between 2016 and 2022. Reproduced from Unterman McPhail (SCRR 2017).

Figure 35: Draft Final Site Design for the Coniston GS Redevelopment.