

# Gardom Pond Dam

## Frequently Asked Questions

Capital Regional District | August 2019

### What is the current status of the project?

The outlet channel stream construction is now complete from south of the dam embankment down to the property on Razor Point Road. The culvert improvement has been completed across Razor Point Road and asphalt will be reinstated shortly. During the pond lowering process, outflow was diverted into the newly constructed outlet channel to test riprap fortification and construction and monitor water quality. The water continues to flow well, contains no visible sediment and is monitored daily.

The pond level is now reaching the original stream outlet level and preparation for the final stage of the decommissioning work is underway. The contractor has temporarily left site for approximately one week during which time the dam embankment and exposed shoreline will dry out. Construction will resume upon their return and will include the completion of the outlet channel directly south of the embankment, modifications to the existing fire standpipe, completion of the RPID waterline connection and lowering of the dam embankment.

Once this remaining construction is complete the final stage of the work will involve revegetation of the exposed shoreline, landscaping and clean-up.

### What stakeholders were consulted during development of the project?

The six water license holders held on Gardom Pond dam are wholly responsible for the ongoing operation, maintenance and condition of the dam and associated piping and spillway.

The CRD, through the Pender Island Parks and Recreation Service, is one of six water license holders; the five remaining water license holders are private property owners. The Dam Safety Office has provided notice that the dam no longer meets provincial standards and remedial works are required. The dam was built in approximately 1978 and the BC Dam Safety Branch has classified the Downstream Failure Consequence as "High" in 1997.

The dam decommissioning concept was developed over several years considering, and in consultation with, the following stakeholders:

- The six water license holders held on Gardom Pond dam
- Ministry of Forests, Lands, Natural Resource Operations & Rural Development, Regional Dam Safety Officer
- Ministry of Transportation and Infrastructure, South Island Operations Manager

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- Pender Island Fire Rescue, Fire Chief
- Islands Trust, Regional Planning Manager
- Island Trust Fund, Manager
- Razor Point Improvement District with regards to their land encumbrance for water supply lines, Trustee

### Was remediation of the dam considered?

Yes, in 2016, at the request of the water license holders, the CRD Board provided permission for a referendum to request that costs be shared by the electorate. The water license holders decided not to pursue this option.

### Will the existing fire protection standpipe remain operational?

It is estimated that there will remain sufficient water volume in the decommissioned reservoir to satisfy fire protection provided by the Gardom Pond dry hydrant. The Fire Underwriters Survey and National Fire Protection Association 1142 require a minimum volume of 24,000 imperial gallons in order to supply a flow rate of 200 gallon/minute for two hours. Based on available bathymetry, at a reduced reservoir level of 84 m, the resulting volume would be approximately 900,000 imperial gallons.

### How will the environment be protected?

An Environmental Impact Assessment report, prepared by the project Qualified Environmental Professional (QEP), provides minimum requirements for environmental protection. In addition, the Contractor is required to submit their own Environmental Management Plan which will be reviewed by the project QEP. The project QEP will be actively monitoring the construction work.

A revegetation plan will be finalized for the newly exposed pond shoreline once soil conditions can be verified.

### What is the cost of decommissioning? What was the cost estimate for remediation?

Advanced Energy Systems is the successful tender for the decommissioning work. The decommissioning work involves removal of the dam embankment and reinstatement and fortification of the original stream outlet. The

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project has received grant funding from the National Disaster Mitigation Fund in the amount of \$460,000 and it is anticipated that this will cover all project related costs.

The total cost to remediate the dam has been estimated in the range of \$1.3-\$1.5 million.

### How accurate are the construction cost estimates referenced above?

The construction cost estimate was developed based off an engineered design. The accuracy is directly linked to the completeness of design and on the assumption of certain ground conditions. A 'Class B' or Substantive Estimate was developed for this project which is based on preliminary design drawings, which include the designs of all major systems, as well as the result of all site investigations. This level of estimate is typically used for the establishment of realistic cost objectives and is the level of estimate used to obtain project approval. This level of estimate was used with the decommissioning effort and proved to be accurate.

The estimated construction cost forms the basis of the cost and other added costs, such as Engineering design, project management, regulatory requirements, contingencies and inflationary factors (i.e. for time delays from time of estimate to construction). The cost estimate for the work was assembled by a senior Engineer in 2013 with the total being \$938,025 at that time. The same firm updated the analysis and estimate in 2015 to be \$1,098,526. CRD Engineering staff then applied local inflation factors for 2016, 2017 and 2018 to arrive at the estimated range of \$1.3-\$1.5 million.

The work required for this project can be divided into two components, the first being the work on the downstream outlet for the water leaving the pond and the second being the work on the dam itself. The first item would have to be performed regardless of the type of work selected for the dam (i.e. upgrade or decommission). This work is required as the existing outlet channel is not capable of handling a significant amount of flow and would be greatly overwhelmed during a heavy rain event, or in the event of a dam breach from a large storm or seismic event. Approximately half of the current project costs are related to the work downstream of the dam.

### Why is the timing important?

To minimize financial impact to the legally responsible water license holders, the CRD secured a grant to cover the majority, if not all, of the total project cost to decommission the dam. The deadline associated with the funding program is March 2020. Timing of the lowering of the pond corresponds to the recommendation of the

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environmental impact assessment report which states the lowering occur in the dry period between July and September to eliminate risk of a flooding event occurring during construction.

Following a second environmental review, the environmental professional confirmed bird nesting clearance. The contractor's water lowering work plan has been reviewed by both the engineer of record, the owners Qualified Environmental Professional (QEP) and the site QEP. The outflow of the hose is being monitored daily for sediment. The contractor is using the existing piping infrastructure which minimizes the risk of interaction with amphibians. As the level is further reduced, the site will be continually monitored for any required fish salvage - as per the recommendations and requirements provided in the environmental impact assessment. The lowering is expected to take approximately 20 days.

Lowering of the water level and the work on the dam must be completed in July and August as per the original schedule. There has been no acceleration of the construction schedule to date.

### When was the pond created?

In 1979 a private developer completed the construction of the pond by excavating the existing depression, clearing it of vegetation and placing a man-made earth embankment at Gardom Lane.

### What is a Water License?

In BC, the right to divert and use surface water or groundwater is authorized by a license in accordance with the statutory requirements of the Water Sustainability Act. Six (6) licenses are registered to Gardom Pond. The CRD, under the Pender Island Parks & Recreation Commission, is one holder and the remaining five (5) are private land owners whom front the water body. In 1995 the first application for a license was made.

A water license database is available through the province which provides specifics of each water license use.

### What is the Downstream Dam Failure Consequence Classification for Gardom Pond?

The Province requires all dams to be assigned a Downstream Dam Failure Consequence classification. This classification system takes into account what should happen if the dam did fail by looking downstream in the

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inundation zone where the flood wave would travel. Gardom Pond carries a High Consequence classification as multiple lives would be at risk and damage to people's homes and public roads would be significant.

### How is dam safety managed?

Inspection requirements vary from dam to dam depending on the Downstream Dam Failure Consequence classification. The provincial Water Act Dam Safety Regulation mandates that dams with a High classification have a Dam Safety Review done every 10 years and be formally inspected every year. The Act also mandates that site surveillance be carried out every week, complete with a report, and that an Operations and Maintenance Manual and an Emergency Procedure Plan be maintained.

### What is the current condition of Gardom Pond dam?

A detailed geotechnical and hydraulic assessment has identified many areas of concern and the dam is non-compliant with current safety requirements.

#### Slope Stability

The dam was not designed to sustain an earthquake. Following an earthquake, large fissures and cracks in the dam structure would appear which would result in internal erosion ultimately causing a partial or full breach of the dam. The time for the breach to develop is unpredictable and may be instantaneous following an earthquake.

#### Piping

All dams require a means to regulate the level of the water body retained. This allows the level to be reduced in the event of a spillway blockage or extreme rain event. The low level outlet piping at Gardom Pond is in poor condition, is inadequately sized and would require replacement if the dam was to remain.

#### Overtopping and Spillway Failure

The spillway is undersized to handle a significant rainfall event and would cause overtopping of the dam should such an event occur. Once overtopping begins, the dam would begin to erode, ultimately leading to a partial or full breach of the dam.

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### How has the condition of the dam affected the Water License Holders? Have properties downstream of the dam been affected?

Both the water license holders and properties downstream of the dam have encountered difficulties obtaining house insurance and building permits and selling their properties. In addition, the water license holders are liable for the dam and any damages incurred due to the condition of the dam.

### Has the impact on local groundwater been considered? (UPDATED August 9, 2019)

Building on a 2011 study by Ryzuk Geotechnical, in 2013 the Engineering firm AECOM was engaged to prepare an evaluation report on the Gardom Pond dam that would compare the impacts and costs of upgrading the dam to current Provincial Dam Safety Standards with the impacts of decommissioning the dam, based on conceptual designs.

As part of the AECOM study, Thurber Engineering was engaged for a further geotechnical assessment as well as to perform an assessment of potential water supply impacts. The scope of work for the latter included a review of available well drilling logs, a review of pertinent surficial geology mapping and a request to selected property owners to fill out a water supply survey questionnaire. The assessment was to be qualitative in nature, and was only to provide comments on the relative risk (e.g. low, medium, high) of there being potentially negative impacts to the wells.

The summary of the assessment of potential water supply impacts is as follows:

“In our opinion, based on the well construction details and depths of bedrock fractures identified in the driller’s reports, the presence of Gardom Pond is unlikely to have a significant effect on the nearby well yields and water quality. From the limited information reviewed here, the relative risk to significant impact to groundwater wells as a result of dam decommissioning is considered low. A more detailed assessment of the potential impacts would require the installation of monitoring wells and an extended period of groundwater monitoring which is outside the scope of this study.”

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