Grand River Conservation Authority
Cambridge, Ontario

GRCA Water Control Infrastructure Asset Management Plan

H372538-0000-200-230-0003
Rev. 0
October 16, 2024

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Report

GRCA Water Control Infrastructure Asset Management Plan

H372538-0000-200-230-0003

			Skinner, Robin		
2024-10-16	**0**	**Approved for Use**	**R. Skinner**	**K. Tuskes**	**J. Westermann**
DATE	**REV.**	**STATUS**	**PREPARED BY**	**CHECKED BY**	**APPROVED BY**
				Discipline Lead	**Functional Manager**

Ver: 04.05

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Executive Summary

The Conservation Authority Act requires Asset Management Plans for certain types of infrastructure to be implemented by December 31, 2024 (Ontario Reg. 686/21). The Act identifies water and erosion control infrastructure to be addressed specifically to "mitigate risks to life and damage to property resulting from flooding or to assist in flow augmentation."

Hatch Ltd. (Hatch) has prepared an Asset Management Plan (AMP, or Plan) for the Grand River Conservation Authority (GRCA) which identifies recommended spending over the next 20 years to maintain the water and erosion control assets in a state of readiness to maintain public safety, manage floods and provide minimum water flows. Unless used for water regulation purposes, spending on power generation assets or on recreational features is not included in the AMP.

Over the next 20 years, capital spending of approximately $31 million is recommended in the AMP. This is on top of GRCA's spending on routine operations covering staff, utilities, insurance, taxes and day-to-day maintenance (approximately $1.5 million per year for multi-purpose dam sites alone). As a test of the AMP, Hatch compared spending amounts (capital and operating) with spending at similar facilities in Hatch's database and found the spending levels to be appropriate, or even somewhat higher than the benchmarks. Life cycle spending on water control assets tends to increase with age after about 40 years and GRCA's water and erosion control assets are generally 40 to 80 years at the start of the current 20-yr plan.

This AMP highlights the next 5 years in detail, during which approximately $17 million in spending is planned for projects addressing previously identified needs. The primary projects include concrete repairs at the Conestogo Dam and embankment repairs on the Bridgeport dike, as well as undertaking dam and dike safety reviews for all sites in which the prior review is either not available or is outdated. Additional spending for up to 70 individual smaller projects at 14 facilities over the next 5 years is also forecasted in the plan.

The AMP also includes budget allowances for future uncertainties, which may result from dam safety study recommendations or normal wear and tear on facilities as they are exposed to weather events. Asset management planning is a continuous task, and planning for future condition (and risk) assessments is essential. This is typically done in the form of ongoing inspections, dam safety reviews, flood mapping and all other related activities required to manage and operate water control facilities with the highest degree of public safety and property preservation possible. The AMP must be considered a "living document" that is updated on a regular basis to consider the environment and its impact on the structures, normal aging, emerging degradation, as well as other unforeseen influences or changes in standards/codes.

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1. Introduction

This document presents the Asset Management Strategy and Asset Management Plan (AMP, or Plan) for the Grand River Conservation Authority's (GRCA's) flood control infrastructure. This document is meant to form the basis for GRCA to manage these assets in accordance with GRCA's mission and in support of the communities which they serve.

This document is not intended to rigidly dictate the management of the water control infrastructure assets but rather to present a decision support framework for that management.

Hatch Ltd. (Hatch) was retained in September 2023 to carry out specific asset management tasks for GRCA. Hatch's scope included:

- condition assessments of eight dam sites, which provide flood control or flow augmentation functions (the primary dam/reservoir assets within GRCA's portfolio)
- potential failure mode analysis (PFMA) of the same eight dam sites
- a review of prior assessments and documentation on GRCA's key dike assets
- preparation of an AMP for all GRCA's water and erosion control infrastructure based on the conditions found plus input from GRCA's engineering and operations departments.

The Condition Assessment, PFMA studies, and the review of dike assets are separate documents (2024).[1,2,3]

Key understandings necessary for the creation of the Plan included:

- overview of GRCA water and erosion control infrastructure
- asset management definitions and concepts
- core services delivered by GRCA flood[4] control assets
- recent spending on flood control assets
- summary of condition for the various assets
- Plan development and methodology.

Near-term (5-yr) spending is provided in detail, along with establishment of the estimated spending expected over the next 20 years. The primary difference between near-term and longer-term project lists are the level of certainty for a budget and level of repair required for a selected site. The nature of asset management for water control facilities is that day-to-day

1 "Condition Assessment Report," Hatch Ltd., H372538-0000-230-0001, 2024.
2 "Potential Failure Mode Analysis Report," Hatch Ltd., H372538-0000-230-0002, 2024.
3 "Dikes and Floodwalls Within GRCA Report," Hatch Ltd., H372538-0000-2A0-066-0001, 2024.
4 "Flood" control, "water" control, and "water and erosion" control are used interchangeably in this report.

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wear from normal weathering and use is expected; however, all facilities must be maintained in a state of readiness to handle extreme weather events of unknown severity and location.

The Plan does not include decommissioning costs over the next 20 years since no assets are intended to be decommissioned, nor does the Plan review replacement costs (in the accounting sense), since the assets are in reasonably good operational condition, with no foreseen need for outright replacement.

Finally, the Plan includes closing remarks on follow-on tasks and recommendations to be included in GRCA's ongoing needs assessments and planning activities.

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2. Overview of GRCA Water and Erosion Control Infrastructure

The following list of dams and dikes are the principal water and erosion control facilities managed by GRCA (Table 2-1).

Multi-purpose dams and their reservoirs serve many purposes such as flood control, recreation, power generation and water storage for low-flow augmentation. Small dams are local amenities that provide water for storage, recreation, or even fire suppression to nearby communities. Dikes are typically linear features which serve the main purpose of flood protection by retaining and/or redirecting water which is often associated with high-flow events.

In total, there are 14 facilities included in the AMP (the multi-purpose dams, dikes, and Damascus). Twenty sites counted as “Small Dams” in GRCA’s accounting are not included in the AMP on the basis that they do not provide flood control or flow augmentation service.

Table 2-1: List of Dams and Dikes[1]

Multi-Purpose Dams	Dikes	Small Dams
Conestogo[2]	Bridgeport	Damascus[2]
Shand[2]	Brantford	Balance of Small Dams (20 sites)[3]
Guelph Lake[2]	New Hamburg	
Luther[2]	Cambridge	
Shade’s Mills[2]	Caledonia	
Woolwich[2]	Drayton	
Laurel Creek[2]		

Notes:
1. Source: grwatershedmap2020final.pdf (grandriver.ca), and GRCA.
2. Site inspected by Hatch engineering team for the development of this AMP.
3. Excluded from the AMP.

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3. Definitions, Concepts and Principals

Guiding the development of the AMP are certain concepts and principals presented in this section.

3.1 Definitions and Concepts

The AMP developed for GRCA lists prospective spending, necessary to maintain the assets for their principal function of flood control and flow augmentation. Operational expenditure (OPEX) spending is a necessary part of asset management too and is reviewed later in this report.

Asset Management Plan (AMP): A tactical plan for managing and maintaining an organization's infrastructure to deliver an agreed standard of service.

Operational Expenditure (OPEX): Is day-to-day spending on staff, utilities, outsourced services, service vehicles, tools, training and typically small self-performed projects requiring few consumables. An example of an OPEX cost would be outsourced groundskeeping services.

Major Maintenance: Retains the asset through major renewal work with a cost exceeding the established corporate limits of unassigned spending allowances in OPEX budgets and requires additional management approvals. The renewal work may consist of replacing a major part of an existing asset (asset within an asset, like cables on a wire rope hoist), in which case the asset's age is a blend of old and new, and its reset age is taken into consideration. GRCA uses the term "Betterment" which is understood to be the same as Major Maintenance.

Capital Expenditure (CAPEX): Spending on outright replacement of assets; investments which could be depreciated from a financing/tax perspective. CAPEX budgets generally include for the costs of professional services for design and specifications, plus construction management. Due to the brownfield nature of the work, this could be upwards of 30% of the cost; design and construction management may also be self-performed by GRCA personnel.

For purposes of reporting, CAPEX and Major Maintenance (or Betterment) are both types of major, non-operations spending and are collectively known as CAPEX here on.

Condition Assessment: An inspection of structures, mechanical and other components of the dam to assess their current condition and documents it. It includes inspection by experienced engineers and discussions with operators to understand how the components are functioning.

Potential Failure Mode Analysis (PFMA): A documented process which brings together stakeholders from different backgrounds (operators, water managers, engineers) to identify components or operations of a dam which may result in failure. The process is intended to

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enhance dam safety by identifying critical areas of concern and identifying shortcomings in data/information about a dam or dike. A failure under this assessment would be an uncontrolled release of water or an inability to release or provide flows for flow augmentation.

3.2 Core Services

This AMP focuses on water control infrastructure only. This includes dam and dike facilities and their sub-facilities that regulate minimum water flows and impound/release floodwater flows. This aligns with the Conservation Authority Act mandate and GRCA's mission (below).

> "*We will work with local communities to reduce flood damage, provide access to outdoor spaces, share information about the natural environment, and make the watershed more resilient to climate change*."

The AMP does not plan spending for power generation or recreational purposes, except for power generation assets that serve as flow regulation features. Improvements to or expansion on power generation assets requires a business case factoring potential revenues and costs and are treated separately in GRCA's planning.

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4. Summary of Recent Spending

Recent CAPEX spending (2019 to 2023) on GRCA's assets included in this Plan is presented below. Spending during this period (4 years) was approximately $5 million. Project spending on any one component or asset rarely exceeds $1 million, and most projects executed by GRCA are typically $100,000 or less. Figure 4-1 shows that spending is dominated by civil/structural repairs. WECI-funded[5] spending, which is what Figure 4-1 shows, is the majority funding source, amounting to approximately $4 million of the total spent during the period.

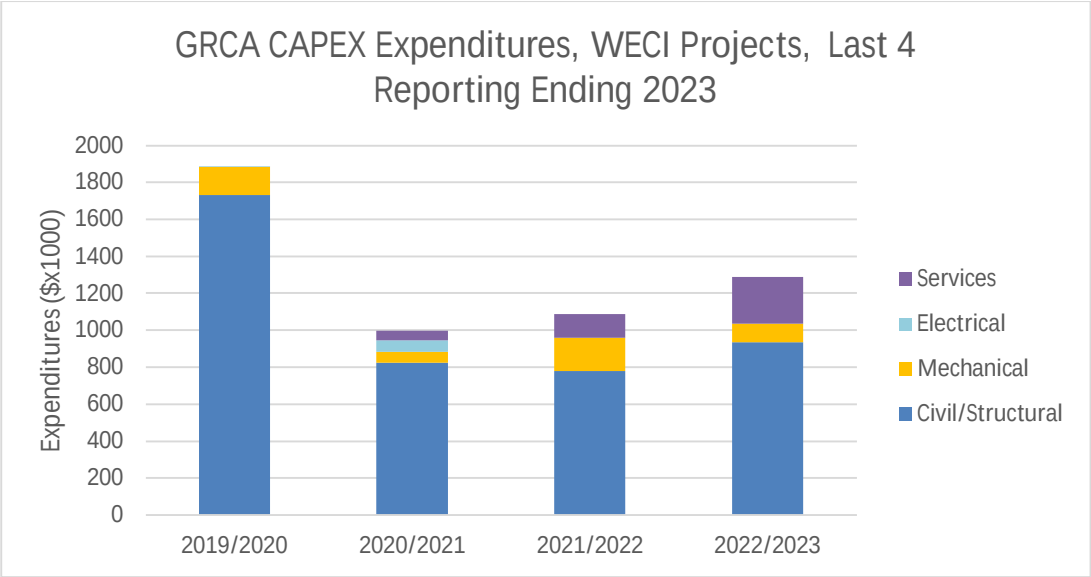

Figure 4-1: GRCA CAPEX Spent, WECI Projects, 2019/2020 to 2022/2023

In 2024 (which is not charted and is incomplete at the time of writing), the most notable spending was on the Conestogo Dam's 2024 concrete repair project, which upon completion is expected to total around $1.5 million.

5 WECI is Ontario Ministry of Natural Resources - Water and Erosion Control Infrastructure Fund; this fund supports the majority of GRCA's CAPEX spending.

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5. Method for Creating the Asset Management Plan

Procedures used to create the AMP are presented in this section. Asset management is an ongoing process; the steps outlined here can and should be reviewed and adjusted in the future. Furthermore, Hatch's scope of condition assessment did not encompass all of GRCA's assets, and similar condition assessments of these other assets will be required within the Plan.

5.1 Standard of Service

The purpose of GRCA's water and erosion control infrastructure is to provide *flood control and low-flow augmentation*. This is referred to as "Standard of Service" in this Plan.

Standard of Service is captured in the Plan via the following:

- dam and dike safety reviews
- design adequacy assessments (stability, flood handling)
- component condition (assessment, reliability review, benchmarking)
- dam and reservoir risk assessments (PFMA)
- replacement and repair project planning and implementation
- performance improvement project planning and implementation.

5.2 Condition Assessment

5.2.1 Multi-Purpose Dams Plus Damascus

For the seven multi-purpose dams (principal GRCA facilities), plus Damascus, a condition assessment was undertaken by Hatch in November of 2023 and expressions of condition were logged. The adopted rating system is noted in Table 5-1.

Table 5-1: Rating System for Component Condition

Rating	Condition Description	Details
1	Excellent (E)	No noticeable defects. Some aging or wear may be visible.
2	Very Good (VG)	Only minor deterioration or defects are evident.
3	Good (G)	Some deterioration or defects are evident but function is not significantly affected.
4	Fair (F)	Moderate deterioration. Function is still adequate.
5	Poor (P)	Serious deterioration in at least some portions of the structure. Function is inadequate.
6	Very Poor (VP)	Extensive deterioration. Barely functional.
7	Failed (FD)	No longer functions. General failure or complete failure of a major structural component.

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A summary of the condition assessments is presented in Appendix A and detailed in the associated Condition Assessment report. Most of the dam assets which Hatch reviewed are in “Good” condition, with some “Fair” or “Poor,” and some “Very Good” or “Excellent.” There were no assets deemed “Very Poor” or “Failed.” All sites are in good working order and are designed, operated, and maintained to meet their required service.

5.2.2 Dikes

Hatch reviewed reports and information on four of six dikes for which information was available. Hatch did not visit the dike sites.

A separate report summarizing the condition of the dikes was prepared by Hatch[6]. The dikes reviewed are generally in fair/good condition (as reported by other consultants) but require investment to maintain their Standard of Service.

5.2.3 Balance of Small Dams

GRCA-owned small dams do not provide any flood control or flow augmentation services and, as such, are out of scope of this AMP.

5.3 Prioritization

Replacement and repair projects are forecast so that the Standard of Service may be sustained. Timing of the projects are based on component age and condition. For example, a component which has not reached its end of life but is troublesome and unreliable may receive a fair or poor condition rating. This would lead to an adjustment of the remaining service life and, therefore, impact the recommended schedule for project implementation. (In other words, a component that may last 50 years with 20 years remaining life may be brought forward for replacement before its remaining 20 years of life is up because of its poorer condition.) However, the opposite is also true – assets that are in very good condition do not need immediate prioritization because of their favorable state.

5.4 CAPEX Estimates

The AMP is a spending program that lists prospective projects and associated spending year by year over the next 20 years. The Plan lists mechanical and electrical assets whose adjusted remaining life falls below 20 years and, therefore, are candidates for CAPEX spending. The asset may be in “good condition” presently, but over the next 20 years is expected to experience natural deterioration and potential scarcity of parts.

Added to the Plan is spending on assets or components deemed to be in “fair” or “poor” condition (regardless of expected remaining life). This includes assets in fair or poor condition but with very long asset life (like dikes and structural assets), since they would be expected to need major maintenance.

6 “Dikes and Floodwalls Within GRCA Report,” Hatch Ltd., H372538-0000-2A0-066-0001, 2024.

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Also added to the Plan are costs for inspection work and professional services necessary for regulatory approvals, which are outside normal operating costs.

The Plan has its spending allocated by site and trade, and considers the priorities identified in the PFMA study and functional mandates of GRCA.

The AMP also recognizes OPEX spending, which must maintain the asset's day-to-day functional requirements. The condition assessment and PFMA studies have shown those functional requirements are currently being maintained. GRCA may choose to increase OPEX by self-performing some of projects (those with relatively small budgets), thereby shifting a project from major maintenance to OPEX.

The method and assumptions for CAPEX spending estimates are follows:

- Costs derived from Hatch and GRCA recent experience – budgetary quotes were not obtained from the market.
- Structural assets would be subject to major maintenance, not replacement.
- Plan does not include decommissioning costs.
- Professional services, such as design, specifications and construction management, are included in the replacement costs.

Professional services for ongoing dam and dike safety reviews, additional condition assessments, flood mapping, and like services also form part of the AMP. Dam safety reviews and engineering assessments performed as part of the Plan may identify significant projects to address dam safety or regulatory compliance that has not been necessarily accounted for in the 20-yr CAPEX.

5.5 GRCA Staff Input and Workshop

Hatch and GRCA held a workshop on the initial draft of the Plan on October 3, 2024. Input from that workshop, and follow-up input from GRCA staff, has been incorporated into this AMP.

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6. Asset Management Plan Highlights

As stated in the prior section, this AMP is a prospective spending program developed via condition assessments and experienced judgement to maintain the Standard of Service required of the assets. The details of the spending program, by site, project and year, are in provided in Appendix B.

Overall, there are 131 identified Projects in the Plan**.** A Project is defined as spending at the component level, at a particular site, in a particular calendar year; while a component may be a gate, or a spillway, or an embankment feature. Extensive refurbishments that are "multi-year" in nature are counted as multiple single-year projects to analyze yearly spending amounts. Some owners refer to multi-year projects as a "program."

6.1 Near-Term CAPEX Spending Plan (Years 1 to 5) - $17 Million

Near-term spending (in the initial 5-yr period of the plan) is identified as $17 million spread over 15 sites and 76 projects (in year 2024 dollars). The principal projects in the near term are concrete repairs at Conestogo Dam, embankment repairs on Bridgeport dike, and professional services for dam safety reviews. Hatch notes that the upcoming spending contained in this Plan in the near-term averages around $4 million per year, which is considerably more than the average of spending in years 2019 to 2023 (which averaged a little more than $1 million per year). Deferment or advancement of projects in the near term may be considered by GRCA, guided by asset condition, Standard of Service, economies of scale, and cost leveling. Some of the large expenditures for construction (Bridgeport and Brantford dikes) are estimates based on high level assessment of alternatives in the environmental assessment process and will be refined at detailed design stages and through the construction tendering process.

Summary of near-term spending follows in Figure 6-1, Figure 6-2 and Figure 6-3.

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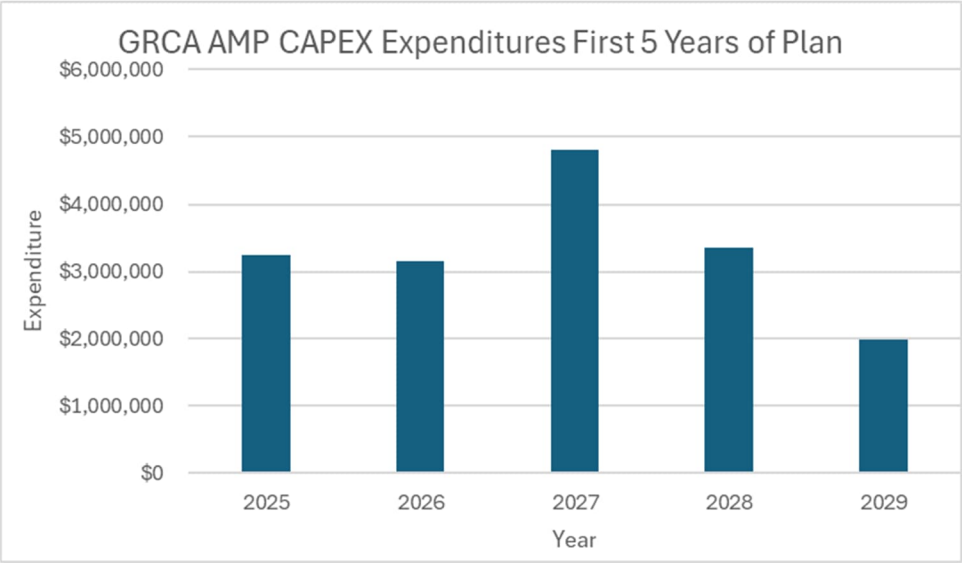

Figure 6-1: Asset Management Plan CAPEX Expenditures - First 5 Years of Plan

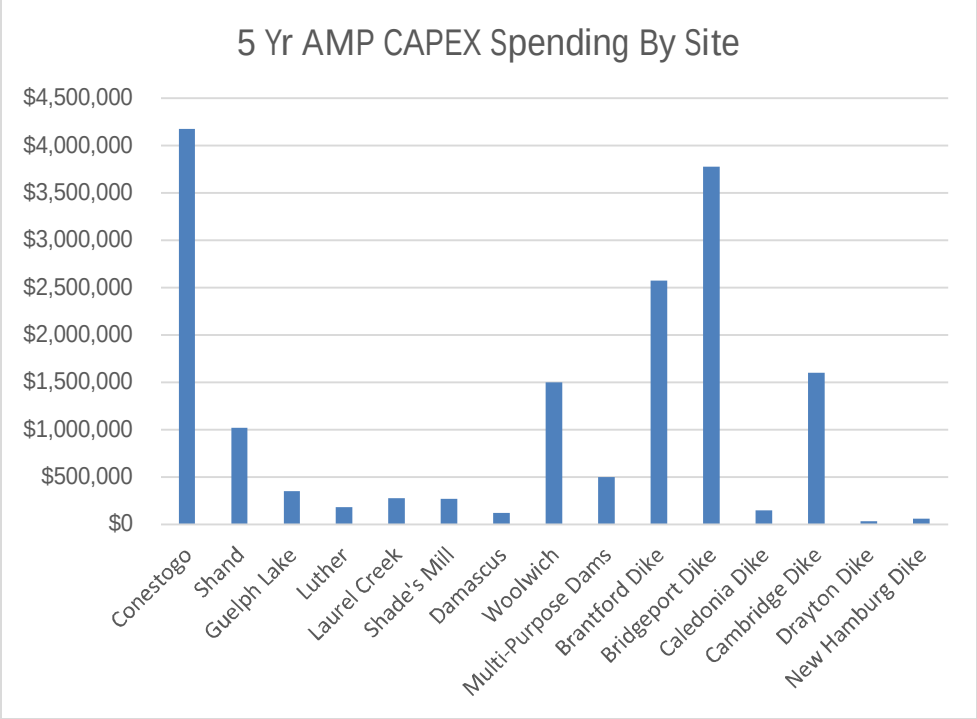

Figure 6-2: 5-Yr Asset Management Plan CAPEX Spending By Site

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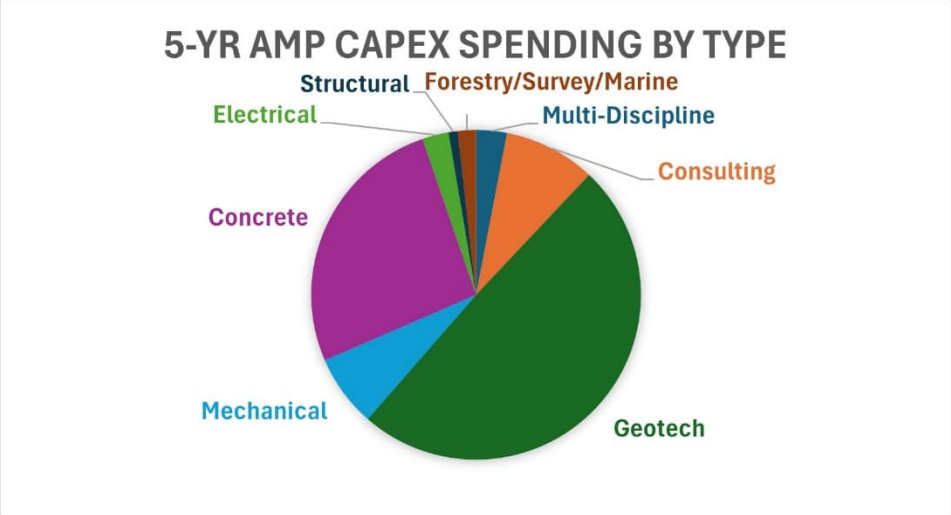

Figure 6-3: 5-Yr Asset Management Plan CAPEX Spending By Type

6.2 Longer-Term Budget Requirements (Years 6 to 20) - $14 Million

In the longer term, spending is less per year than near-term spending at a little less than $1 million per year. This is comparable to the 2019 to 2023 spending period. The total expected spending from years 6 to 20 is approximately $14 million, making the total expenditures for the 20-yr plan approximately $31 million.

The longer-term plan covers all sites, including small dam sites. Spending will be informed by dam and dike safety reviews plus ongoing condition assessments. However, there are unknown factors that may impact spending, such as “new” regulatory requirements and the evolving understanding of climate change impacts (which could lead to enhanced impacts from flooding or drought).

The spread of spending over the entire 20-yr time frame for this AMP is presented in Figure 6-4 below.

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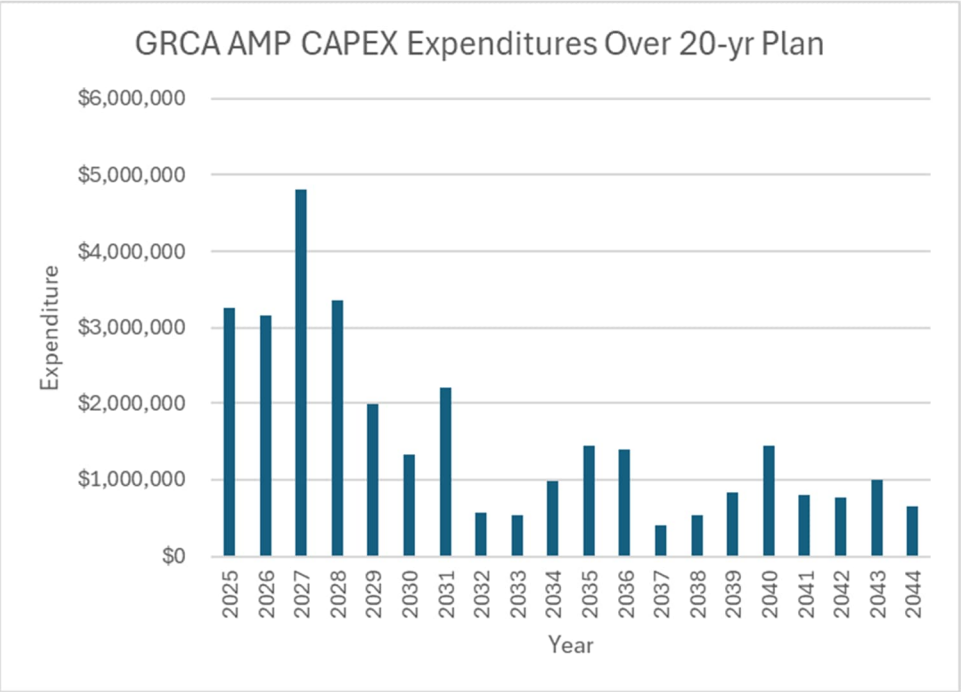

Figure 6-4: Asset Management Plan CAPEX Expenditures Over 20-Yr Plan

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7. CAPEX and OPEX

7.1 OPEX Comparison to Similar Facilities

For the primary multi-purpose dams (seven sites), Hatch was provided operating costs which total approximately $1.5 million, or roughly $220,000 per site.

Operating costs in Hatch's database of dams comparable to GRCA's multi-purpose dams is about $250,000 per each site. However, sites in Hatch's database tend to be more remote in nature and larger in size, which can significantly impact operating costs.

Overall, given the condition found, the spending by GRCA on OPEX meets Hatch's expectations.

7.2 CAPEX Comparison to Similar Facilities

Hatch has analyzed public domain data on hydro facility spending (primarily from the Federal Energy Regulatory Commission in the United States) and plotted proposed spending for the seven GRCA multi-purpose dam sites assessed by Hatch against the overall dataset. The AMP forecasts approximately $900,000 per year for the seven multi-purpose dam sites, while the publicly available data (benchmark) suggests around $500,000 per year over the next 20 years[7].

The public domain data is only a guide and is dominated by sites much larger than GRCA's (where economies of scale are more favorable). Nonetheless, the benchmark exercise was a reasonableness check of the spending program in this AMP, and Hatch concludes that the spending amounts envisaged are reasonable and appropriate.

7.3 CAPEX and OPEX Combined Spending

For the seven multi-purpose dams, and assuming OPEX spending is maintained at current levels (in year 2024 dollars), the following is estimated spending as part of this AMP over the next 20 years:

- OPEX: approximately $30.0 million
- CAPEX: approximately $16.5 million.

OPEX is essential to asset management and is the dominant spending factor that has taken place historically. Amongst other things, operations staff are the first witnesses to maintenance requirements (or component breakage) at the sites. OPEX spending levels must be sustained to maintain the required Standard of Service.

[7] The database is in terms of dollars per megawatt per year, escalated to year 2024 dollars. For dam sites without power generation, Hatch assigned proxy values of generation to compare to the database. These proxy values were 0.05 MW for Luther, Laurel Creek and Shade's Mills; and 0.1 MW for Woolwich.

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8. GRCA's Asset Renewal Procurement Strategy

This AMP does not speak to methods of funding for CAPEX. This report is intended to act as a technical report establishing the reasons for funding.

In general, funds for future spending will come from GRCA's historical sources such as revenue from power generation, levies, and grants from provincial agencies and municipal partners. Funding itself is beyond the scope of this report.

GRCA in the past outsourced the larger value CAPEX projects, including the definition phase studies. Minor works may be self-performed depending on availability of GRCA resources (staff, expertise and equipment).

From an execution point of view, projects go through a series of definition steps, and the exact definition of projects and their associated budgets may take several years to refine and finalize. Projects involving in-water work have higher levels of risk associated with them and must be planned accordingly. The definition is not just technical scope, but execution methods as well. Standard of Service must be maintained through construction and timing of projects is also a factor. There are seasonal productivity differences to consider plus restrictions due to crucial fish spawning periods. There is also planning around, and planning for, coincident floods which are not only in the spring, but can take place in summer (thunderstorms), fall (hurricane remnants), and mid-winter melts (meltwater runoff).

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9. Recommendations

Recommendations for future AMPs, and facility renewal in general, have emerged during the preparation of this Plan, plus the Condition Assessment, PFMA study, and review of dikes reports:

- The hazard potential classifications of the multi-purpose dams are out of date and some pre-date the Ministry of Natural Resources and Forestry criteria established in the 2011 Lakes and Rivers Improvement Act Administrative Guide. Bringing this body of information up to date would be part of dam safety reviews, which is included in the Plan.
- Relatively little information was available on the condition of Drayton and Caledonia dikes, and this needs to be improved. Future budgeting for improvements to these dikes was made based on historical norms.
- The Plan itself, and in particular the project list, needs to be regularly updated and expanded as new information emerges, down to the component level (such as gates and embankment features) where possible to support planning and budgeting.
- With respect to the power generation feature of three multi-purpose dam sites (Conestogo, Shand and Guelph Lake), refurbishments to power generation components are not part of this AMP if these components do not provide water and erosion control functions. However, they provide revenues that may be considered part of GRCA's funding strategy, and to count on those revenues, their power generation service needs to be maintained. Individual cost/benefit analysis on the power generation assets will need to be made as part of future versions of the AMP.

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Appendix A
Summary of Condition

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Table A-1: GRCA - Matrix of Hatch-Reviewed Dam Assets - Structural/Geotechnical

Site	Left Embankment (Facing Downstream)	Right Embankment (Facing Downstream)	Other Embankment (Earth)	Spillway Single Sluice	Spillway Dual Sluices/ Outlets	Spillway - Multiple Sluices (Piers/ Walls)	Spillway Tunnel	Emergency Spillway/ Other Spillway	Powerhouse Structure	Gatehouse/ Generator House	Platforms/ Stairs/ Railings/ Deck
Conestogo	G	VG				P			VG	[G]	[G]
Shand	VG	VG				G			G		G
Guelph Lake	G	G	[G]			G		[G]	VG		G
Luther	VG	VG		G						G	G
Laurel Creek	G	G			G			VG		G	[G]
Shade's Mills	G	G			G		NR	G			VG
Damascus	G	G		VG			NR	G			VG
Woolwich	F	F				G				G	G

Legend: G = Good, VG = Very Good, F = Fair, P = Poor, E = Excellent.
[G] = described in Condition Assessment but grade not given, no concerns raised.
NR = not reported (but also no concerns raised).

Notes:
Laurel Creek - other spillway refers to flashboards.
Conestogo - Upstream poor, downstream good (upstream repairs is work in progress).
Budget set aside in Asset Management Plan.
Budget for Professional Services (Studies) set aside in Asset Management Plan.

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Table A-2: GRCA - Matrix of Hatch-Reviewed Dam Assets - Mechanical

Site	Spillway Gates	Spillway Gate/Logs Overhead Hoist(s)	Spillway Logs	Service Logs/ Bulkheads and Lifting	Intake Gate	Intake Gate Hoist	Turbine	Turbine Inlet Valve	Turbine Governor	Outlet Valve(s)/ Gate	Emergency Diesel (Stationary)	Portable Diesel Generator	Sump/ Dewatering System	Balance-of-Plant Mechanical
Conestogo	G	G		F	G	VG	G	VG	G	P	G		F	VG
Shand	G			VP	VG		G	G	F	F	VG	VG	F	VG
Guelph Lake	G	G/F					F	G		F	VG		F	G
Luther		E	VG	F						F/VG	G			
Laurel Creek	F/E									G	G			
Shade's Mills	G									G	E			
Damascus		[G]	G							F				
Woolwich	VG	G		G						G	VG			

Legend: G = Good, VG = Very Good, VP = Very Poor, F = Fair, P = Poor, E = Excellent.
[G] = described in Condition Assessment but grade not given, no concerns raised.

Notes:
Guelph Lake - spillway + overflow gates.
Woolwich - regulating gates + discharge valve.
Conestogo - gates include bubbler (part of mechanical balance of plant).
Spillway Hoists (Conestogo, Guelph Lake), overhead wires on 7-yr replacement cycle at present.
Shand - gate side roller (refurbishment) in 2017, otherwise original.
Guelph Lake - generator is AC motor in reverse, frequent trips, belt issue.
Guelph Lake - glycol system part of mechanical balance of plant (used for gate guide and sill heating).
Luther/Shade's Mills - outdoor generator (no mechanical balance of plant associated as a result).
Luther regulating gate - fair, actuator - very good.
Laurel Creek - gate actuator is excellent (screw-stem lifting system, part of the gate which is fair for gate, and good for stem).
HVAC for diesel generator is included in mechanical balance of plant, along with heating services, and distribution of utilities, and service lifts (elevator).
Budget set aside in Asset Management Plan.
Budget for Professional Services (Studies) set aside in Asset Management Plan.

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Table A-3: GRCA - Matrix of Hatch-Reviewed Dam Assets - Electrical

Site	Generator	Transformer/Switchgear/ Motor Control Center	Generator Protection and Control	AC Station Service and Distribution	Instrumentation/ Communications	Balance-of-Plant Electrical
Conestogo	G	G	E	[G]	[G]	[G]
Shand	G	G	E	[G]	[G]	[G]
Guelph Lake	G	G	E	[G]	[G]	[G]
Luther				NR	NR	NR
Laurel Creek				NR	NR	NR
Shade's Mills				G	G	G
Damascus						
Woolwich				G	G	G

Legend: G = Good, E = Excellent.
[G] = described in Condition Assessment but grade not given, no concerns raised.
NR = not reported in Condition Assessment, no concerns raised by review team.

Notes:
Shand has gate guide heaters, included in balance of plant.
Governors are reported in mechanical.
Budget set aside in Asset Management Plan.

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Appendix B
Asset Management Plan Projects List

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GRCA Asset Management Plan Project List

Version October 15, 2024

Plant	Trade	Asset	Project	Source (PFMA, CA, DSR, GRCA)	Calender Age (Years)	Present Condition	Expected Life (Years)	Remaining Life Unadjusted for Condition (Years)	Invest by (Maximum 2044)	Spend ($2024)	Source/Comment	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Conestogo	Consulting	Plant	Dam Safety Review	PFMA	69	na	na	na	2026	$150,000	internal services estimate	-	$150,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conestogo	Geotech	Dam	Seepage Assess't (part of DSR)	PFMA	69	na	na	na	2026	$20,000	internal estimate	-	$20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conestogo	Consulting	Plant	Update Existing Drawings	PFMA	69	na	na	na	2028	$50,000	allowance, requires quanity review	-	-	-	$50,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conestogo	Mechanical	Spillway Gates	Major Refurbishment	CA	69	Good	60	-9	2030	$400,000	allowance, mainly painting/repairs (recent work done)	-	-	-	-	-	$400,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conestogo	Mechanical	Bubbler	Replace Air Blower	CA	na	Good	15	na	2030	$10,000	reflects small prime mover equipment scope	-	-	-	-	-	$10,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conestogo	Mechanical	Spillway Hoist Cables	Replace (Maj Mtc)	CA	0	Good	7	7	2032	$25,000	general experience with similar scopes, including GRCA	-	-	-	-	-	-	-	$25,000	-	-	-	-	-	-	-	-	-	-	-	-
Conestogo	Mechanical	Spillway Hoist	Replace or Major Refurb	CA	69	Good	50	-19	2039	$150,000	GRCA and Hatch data similar projects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$150,000	-	-	-	-	-
Conestogo	Mechanical	Intake Gate	Refurbishment	CA	69	Good	60	-9	2035	$80,000	cost varies based on ability to isolate gate for refurb.	-	-	-	-	-	-	-	-	-	-	$80,000	-	-	-	-	-	-	-	-	-
Conestogo	Mechanical	Stationary Diesel	Replace	CA	69	Good	40	-29	2030	$75,000	100kW, at 750/kW (general power experience)	-	-	-	-	-	$75,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conestogo	Mechanical	Stop Logs	Major Refurbishment	CA	54	Fair	50	-4	2030	$120,000	Offsite blast/paint/refurb, ~$20/ft2 + truck/lifting	-	-	-	-	-	$120,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conestogo	Mechanical	Draft Tube Valve	Refurbish	CA	18	Poor	50	32	2028	$50,000	Allowance, requires quick install because of service	-	-	-	$50,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conestogo	Mechanical	Sump Pumps	Replace	CA	69	Fair	60	-9	2028	$100,000	Pumps and new mounting, sump maintenance, electrics	-	-	-	$100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conestogo	Concrete	Spillway (Upstream)	Concrete Repairs	CA	69	Poor	100	na	2025	$1,700,000	Next phase work (Phase 1 done for < $1.8M)	$1,700,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conestogo	Concrete	Spillway (Upstream)	Concrete Repairs	CA	69	Poor	100	na	2026	$100,000	Next phase work (Phase 1 done for < $1.8M)	-	$100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conestogo	Concrete	Spillway (Downstream)	Concrete Repairs	CA	69	Poor	100	na	2026	$1,000,000	GRCA/Consultant Estimate	-	$1,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conestogo	Concrete	Spillway (Downstream)	Concrete Repairs	CA	69	Poor	100	na	2027	$1,000,000	GRCA/Consultant Estimate	-	-	$1,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conestogo	Electrical	Balance of Plant	Replace as Needed	CA	varies	Good	na	na	2034	$30,000	Follows general electrical spend, GRCA data	-	-	-	-	-	-	-	-	-	$30,000	-	-	-	-	-	-	-	-	-	-
Shand	Consulting	Plant	Dam Safety Review	PFMA	84	na	na	na	2025	$150,000	internal services estimate	$150,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shand	Mechanical	Spillway Gates	Gate Travel Testing	PFMA	na	na	na	na	2025	$40,000	internal services estimate	$40,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shand	Concrete	Stop Logs Slots	Gain Repairs	CA	varies	na	na	na	2025	$150,000	Allowance (in water work), currently out for tender	$150,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shand	Electrical	Plant	Warning Lights	CA	new	na	na	na	2027	$30,000	Packaged lighting product, small electrial addition	-	-	$30,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shand	Mechanical	Discharge Valves	Major Refurbishment	CA	varies	Good	na	na	2028	$150,000	Allowance, requires quick install because of service	-	-	-	$150,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shand	Mechanical	Sump Pumps	Replace	CA	na	Fair	60	na	2028	$100,000	Pumps and new mounting, sump maintenance, electrics	-	-	-	$100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shand	Concrete	Spillway Pier Nose	Repair	CA	84	Fair	100	na	2028	$300,000	Allowance, work over water adds to cost	-	-	-	$300,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shand	Concrete	Spillway Misc. Maintenance	Repair	CA	84	Good	100	na	2035	$500,000	Allowance, upstream work requires water controls	-	-	-	-	-	-	-	-	-	-	$500,000	-	-	-	-	-	-	-	-	-
Shand	Electrical	Balance of Plant	Replace as Needed	CA	varies	Good	na	na	2033	$30,000	Follows general electrical spend, GRCA data	-	-	-	-	-	-	-	-	$30,000	-	-	-	-	-	-	-	-	-	-	-
Shand	Concrete	Wing Wall Repairs	Repair	CA	84	Fair	na	na	2028	$100,000	Allowance, work over water adds to cost	-	-	-	$100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Guelph Lake	Consulting	Plant	Dam Safety Review	PFMA	49	na	na	na	2028	$150,000	internal services estimate	-	-	-	$150,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Guelph Lake	Marine	Spillway	Underwater Inspections	PFMA	49	na	na	na	2029	$30,000	Estimate for dive service, inspection videos	-	-	-	-	$30,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Guelph Lake	Forestry	Emergency Spillway	Brushing	CA	49	na	na	na	2027	$40,000	Cost based on extensive brushing done, another site	-	-	$40,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Guelph Lake	Concrete	Spillway	Major Maintenance	CA	49	Good	100	51	2040	$400,000	Allowance, upstream work requires water controls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$400,000	-	-	-	-
Guelph Lake	Mechanical	Spillway Hoist Wire	Replace (Maj Mtc)	CA	0	Good	7	7	2032	$25,000	general experience with similar scopes, including GRCA	-	-	-	-	-	-	-	$25,000	-	-	-	-	-	-	-	-	-	-	-	-
Guelph Lake	Mechanical	Spillway Hoist	Replace	CA	49	Good	50	1	2039	$150,000	GRCA and Hatch data similar projects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$150,000	-	-	-	-	-
Guelph Lake	Mechanical	Overflow Gate Hoist	Replace	CA	32	Fair	50	18	2039	$80,000	Allowance, based on capacity and similar projects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$80,000	-	-	-	-	-
Guelph Lake	Mechanical	Sump Pumps	Replace	CA	49	Fair	60	11	2028	$100,000	Pumps and new mounting, sump maintenance, electrics	-	-	-	$100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Guelph Lake	Electrical	Balance of Plant	Replace as Needed	CA	varies	na	na	na	2035	$30,000	Follows general electrical spend, GRCA data	-	-	-	-	-	-	-	-	-	-	$30,000	-	-	-	-	-	-	-	-	-
Guelph Lake	Mechanical	Draft Tube Valve	Replace	CA	43	Fair	50	7	2026	$30,000	Small valve in tight location, brownfield inefficiencies	-	$30,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Guelph Lake	Mechanical	Turbine Generator	Major Refurbishment	CA	42	Fair	60	18	2042	$100,000	"Micro" hydro in size, budget at 50% of new ($2500/kW)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$100,000	-	-
Guelph Lake	Mechanical	Domestic Water	Major Refurbishment	CA	49	Good	60	11	2030	$20,000	Allowance, relatively small equipment collection	-	-	-	-	-	$20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Guelph Lake	Mechanical	HVAC Upgrades	Major Refurbishment	CA	49	Good	50	1	2030	$20,000	Allowance, relatively small equipment collection	-	-	-	-	-	$20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Luther	Consulting	Plant	Dam Safety Review	PFMA	na	na	na	na	2028	$80,000	internal services estimate	-	-	-	$80,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Luther	Marine	Reservoir	Add Debris/Safety Boom	PFMA	new	na	na	na	2027	$100,000	allowance, extensive marine work	-	-	$100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Luther	Survey	Major Structures	Survey	PFMA	na	na	na	na	2027	$5,000	land surveyor crew, 1-2 days	-	-	$5,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Luther	Mechanical	Regulating Gate	Major Refurbishment	CA	33	Fair	60	27	2038	$40,000	Small gate but submerged. Fair rating inpacts timing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$40,000	-	-	-	-	-
Luther	Mechanical	Service Stop Logs	Partial Replacement	CA	33	Fair	50	17	2034	$40,000	Collection of wooden timbers (cut/trim/transport)	-	-	-	-	-	-	-	-	-	$40,000	-	-	-	-	-	-	-	-	-	-
Luther	Electrical	Balance of Plant	Replace as Needed	CA	varies	Good	na	na	2035	$15,000	Follows general electrical spend, GRCA data	-	-	-	-	-	-	-	-	-	-	$15,000	-	-	-	-	-	-	-	-	-
Laurel Creek	Consulting	Plant	Dam Safety Review	PFMA	na	na	na	na	2025	$80,000	internal services estimate	$80,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Laurel Creek	Structural	Plant	Improve Access to Disch Valve	CA	new	na	na	na	2029	$50,000	Civil/structual scope mainly, layout constrained	-	-	-	-	$50,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Laurel Creek	Mechanical	Discharge Valve	Replace	CA	57	Fair	50	-7	2029	$30,000	Allowance, requires quick install because of service	-	-	-	-	$30,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Laurel Creek	Mechanical	Spillway Gates	Refurbish	CA	57	Fair	60	3	2029	$120,000	Painting and minor repairs	-	-	-	-	$120,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Laurel Creek	Electrical	Balance of Plant	Replace as Needed	CA	varies	Good	na	na	2035	$15,000	Follows general electrical spend, GRCA data	-	-	-	-	-	-	-	-	-	-	$15,000	-	-	-	-	-	-	-	-	-
Shade's Mill	Consulting	Plant	Dam Safety Review	PFMA	na	na	na	na	2026	$80,000	internal services estimate	-	$80,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shade's Mill	Marine	Reservoir	Reservoir Gauges	PFMA	new	na	na	na	2027	$40,000	Gauges and communications package	-	-	$40,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shade's Mill	Concrete	Spillway and Culvert	Misc Maintenance	CA	56	Good	100	44	2040	$150,000	General concrete repairs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$150,000	-	-	-	-
Shade's Mill	Mechanical	Spillway Gates / Actuator	Refurbish	CA	56	Good	60	4	2029	$50,000	Painting and minor repairs (similar scope as Laurel Cr)	-	-	-	-	$50,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shade's Mill	Mechanical	Discharge Valve	Refurbish	CA	56	Good	50	-6	2030	$20,000	Allowance	-	-	-	-	-	$20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shade's Mill	Electrical	Balance of Plant	Replace as Needed	CA	varies	Good	na	na	2034	$15,000	Follows general electrical spend, GRCA data	-	-	-	-	-	-	-	-	-	$15,000	-	-	-	-	-	-	-	-	-	-
Shade's Mill	Structural	Concrete Guard Rails	Repair	CA	56	Fair	na	na	2029	$100,000	Patch Repair	-	-	-	-	$100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Damascus	Consulting	Plant	Dam Safety Review	PFMA	na	na	na	na	2028	$80,000	internal services estimate	-	-	-	$80,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Damascus	Mechanical	Plant	Log Sizing Study	PFMA	na	na	na	na	2025	$10,000	internal services estimate, part of broader scope	$10,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Damascus	Mechanical	Discharge Valve	Replace or Refurbish	CA	44	Fair	50	6	2029	$30,000	Allowance, requires quick install because of service	-	-	-	-	$30,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Damascus	Mechanical	Discharge Structure	Maintenance (Paint)	CA	44	na	na	na	2030	$30,000	Allowance, $$ influenced by work over/in water.	-	-	-	-	-	$30,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Damascus	Geotech	Embankments	Piezometers	PFMA	new	na	na	na	2030	$50,000	Allowance	-	-	-	-	-	$50,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Damascus	Electrical	Reservoir	Remote Monitoring	PFMA	new	na	na	na	2030	$40,000	Communications package with power supply	-	-	-	-	-	$40,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Woolwich	Consulting	Plant	Dam Safety Review	PFMA	na	na	na	na	2027	$150,000	internal services estimate	-	-	$150,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Woolwich	Geotech	Dam	Settlement Assessment (Update)	PFMA	na	na	na	na	2027	$20,000	internal services estimate, part of broader scope	-	-	$20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Woolwich	Geotech	Dam	Cleaning Dam Drainage	PFMA	na	na	na	na	2027	$50,000	Allowance	-	-	$50,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Woolwich	Electrical	Plant	Update Automatic Response	PFMA	varies	na	na	na	2025	$100,000	Broad package of instruments and PLC, electrics	$100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Woolwich	Mechanical	Spillway Gate Hoist Wire	Replace (Maj Mtc)	CA	0	Good	7	7	2032	$25,000	general experience with similar scopes, including GRCA	-	-	-	-	-	-	-	$25,000	-	-	-	-	-	-	-	-	-	-	-	-
Woolwich	Mechanical	Spillway Gate Hoists	Refurbish	CA	52	Good	50	-2	2042	$160,000	GRCA and Hatch data similar projects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$160,000	-	-
Woolwich	Mechanical	Spillway Gates	Major Maintenance	CA	52	V. Good	60	8	2040	$200,000	Painting and repairs similar to recent work done	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$200,000	-	-	-	-
Woolwich	Mechanical	Stop Logs	Replace	CA	unknwn	Good	na	na	2034	$15,000	Timber logs	-	-	-	-	-	-	-	-	-	$15,000	-	-	-	-	-	-	-	-	-	-
Woolwich	Mechanical	Regulating Gate	Refurbish	CA	52	Good	60	8	2027	$80,000	Allowance, requires quick install because of service	-	-	$80,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Woolwich	Electrical	Balance of Plant	Replace as Needed	CA	varies	Good	na	na	2034	$30,000	Follows general electrical spend, GRCA data	-	-	-	-	-	-	-	-	-	$30,000	-	-	-	-	-	-	-	-	-	-
Woolwich	Concrete	Downstream Spillway	Major Maintenance	CA	52	Good	na	na	2030	$300,000	Allowance for concrete work and minor water control	-	-	-	-	-	$300,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Woolwich	Electrical	Plant	New Electrical Feed (OH to UG)	CA	new	na	na	na	2025	$300,000	linework package, GRCA estimate	$300,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Woolwich	Geotech	Embankments	Major Maintenance	CA	52	Fair	na	na	2028	$800,000	Cost allowance from similar embankment work	-	-	-	$800,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Multi-Purpose Dams	All	All	Upgrades	DSR	na	na	100	na	2029	$500,000	Allowance for DSR Findings High Criticality	-	-	-	-	$500,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Multi-Purpose Dams	All	All	Upgrades	DSR	na	na	100	na	2031	$800,000	Allowance for DSR Findings High Criticality	-	-	-	-	-	-	$800,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Multi-Purpose Dams	All	All	Upgrades	DSR	na	na	100	na	2033	$500,000	Allowance for DSR Findings Medium Criticality	-	-	-	-	-	-	-	-	$500,000	-	-	-	-	-	-	-	-	-	-	-
Multi-Purpose Dams	All	All	Upgrades	DSR	na	na	100	na	2039	$300,000	Allowance for DSR Findings Low Criticality	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$300,000	-	-	-	-	-
Multi-Purpose Dams	Concrete	Spillways/Dams	Major Maintenance	CA	na	na	100	na	2031	$800,000	Concrete Repairs (Dams and Spillways)	-	-	-	-	-	-	$800,000	-	-	-	-	-	-	-	-	-	-	-	-	-

GRCA Asset Management Plan Project List

Version October 15, 2024

Plant	Trade	Asset	Project	Source (PFMA, CA, DSR, GRCA)	Calender Age (Years)	Present Condition	Expected Life (Years)	Remaining Life Unadjusted for Condition (Years)	Invest by (Maximum 2044)	Spend ($2024)	Source/Comment	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Multi-Purpose Dams	Concrete	Spillways/Dams	Major Maintenance	CA	na	na	100	na	2035	$800,000	Concrete Repairs (Dams and Spillways)	-	-	-	-	-	-	-	-	-	-	$800,000	-	-	-	-	-	-	-	-	-
Multi-Purpose Dams	Concrete	Spillways/Dams	Major Maintenance	CA	na	na	100	na	2041	$800,000	Concrete Repairs (Dams and Spillways)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$800,000	-	-	-
Multi-Purpose Dams	Concrete	Spillways/Dams	Major Maintenance	CA	na	na	100	na	2043	$800,000	Concrete Repairs (Dams and Spillways)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$800,000	-
Multi-Purpose Dams	Geotech	Spillways/Dams	Major Maintenance	CA	na	na	100	na	2036	$300,000	Repairs Allowance (Erosion from Ice/Storm Events)	-	-	-	-	-	-	-	-	-	-	-	$300,000	-	-	-	-	-	-	-	-
Multi-Purpose Dams	Mechanical	Gates, Valves, Stoplogs	Major Maintenance	CA	na	na	100	na	2034	$200,000	Gate replacements and major repairs, hoists	-	-	-	-	-	-	-	-	-	$200,000	-	-	-	-	-	-	-	-	-	-
Multi-Purpose Dams	Mechanical	Gates, Valves, Stoplogs	Major Maintenance	CA	na	na	100	na	2037	$200,000	Gate replacements and major repairs, hoists	-	-	-	-	-	-	-	-	-	-	-	-	$200,000	-	-	-	-	-	-	-
Multi-Purpose Dams	Mechanical	Gates, Valves, Stoplogs	Major Maintenance	CA	na	na	100	na	2040	$200,000	Gate replacements and major repairs, hoists	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$200,000	-	-	-	-
Multi-Purpose Dams	Mechanical	Gates, Valves, Stoplogs	Major Maintenance	CA	na	na	100	na	2043	$200,000	Gate replacements and major repairs, hoists	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$200,000	-
Multi-Purpose Dams	Electrical	All	Major Maintenance	CA	na	na	100	na	2034	$150,000	Improvements to power supplies and controls	-	-	-	-	-	-	-	-	-	$150,000	-	-	-	-	-	-	-	-	-	-
Multi-Purpose Dams	Electrical	All	Major Maintenance	CA	na	na	100	na	2039	$150,000	Improvements to power supplies and controls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$150,000	-	-	-	-	-
Multi-Purpose Dams	Electrical	All	Major Maintenance	CA	na	na	100	na	2044	$150,000	Improvements to power supplies and controls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$150,000
Multi-Purpose Dams	All	All	Major Maintenance	CA	na	na	100	na	2037	$200,000	Balance of Plant Misc Repairs (All Trades)	-	-	-	-	-	-	-	-	-	-	-	-	$200,000	-	-	-	-	-	-	-
Brantford Dike	Consulting	Dike Structure	Dike Safety Study	GRCA	40	Fair	100	na	2025	$150,000	GRCA Estimate	$150,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brantford Dike	Consulting	Dike Structure	Dike Safety Study	GRCA	40	Fair	100	na	2026	$100,000	GRCA Estimate	-	$100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brantford Dike	Geotech	Dike Structure	Embankment Repairs	GRCA	40	Fair	100	na	2026	$500,000	GRCA Estimate	-	$500,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brantford Dike	Geotech	Dike Structure	Embankment Repairs	GRCA	40	Fair	100	na	2027	$1,000,000	GRCA Estimate	-	-	$1,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brantford Dike	Geotech	Dike Structure	Embankment Repairs	GRCA	40	Fair	100	na	2028	$250,000	GRCA Estimate	-	-	-	$250,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brantford Dike	Forestry	Dike Structure	Brushing	GRCA	40	Fair	100	na	2025	$20,000	GRCA Estimate	$20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brantford Dike	Geotech	Birkett Triangle Landfill	Major Maintenance	GRCA	40	Fair	100	na	2026	$50,000	GRCA Estimate	-	$50,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brantford Dike	Geotech	Birkett Triangle Landfill	Major Maintenance	GRCA	40	Fair	100	na	2027	$300,000	GRCA Estimate	-	-	$300,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brantford Dike	Geotech	Birkett Triangle Landfill	Major Maintenance	GRCA	40	Fair	100	na	2028	$200,000	GRCA Estimate	-	-	-	$200,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridgeport Dike	Consulting	Dike Structure	Dike Safety Study	GRCA	44	Fair	100	na	2025	$175,000	GRCA Estimate	$175,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridgeport Dike	Geotech	Dike Structure	Embankment Repairs	GRCA	44	Fair	100	na	2025	$100,000	GRCA Estimate	$100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridgeport Dike	Geotech	Dike Structure	Embankment Repairs	GRCA	44	Fair	100	na	2026	$1,000,000	GRCA Estimate	-	$1,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridgeport Dike	Geotech	Dike Structure	Embankment Repairs	GRCA	44	Fair	100	na	2027	$2,000,000	GRCA Estimate	-	-	$2,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridgeport Dike	Geotech	Dike Structure	Embankment Repairs	GRCA	44	Fair	100	na	2028	$500,000	GRCA Estimate	-	-	-	$500,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caledonia Dike	Geotech	Dike Structure	Erosion Repairs	GRCA	na	na	100	na	2028	$150,000	GRCA Estimate	-	-	-	$150,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cambridge Dike	Consulting	Dike Mechanicals	Pump Room/Bridge Closures	GRCA	45	Good-Fair	100	na	2029	$30,000	GRCA Estimate	-	-	-	-	$30,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cambridge Dike	Geotech	Dike Structure	Repair Floodwall (West)	GRCA	45	Good-Fair	100	na	2025	$250,000	GRCA Estimate	$250,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cambridge Dike	Mechanical	Dike Mechanicals	Pump Room/Bridge Closures	GRCA	45	Good-Fair	100	na	2029	$250,000	GRCA Estimate	-	-	-	-	$250,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cambridge Dike	Mechanical	Dike Mechanicals	Pump Room/Bridge Closures	GRCA	45	Good-Fair	100	na	2030	$250,000	GRCA Estimate	-	-	-	-	-	$250,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cambridge Dike	Consulting	Dike Structure	East Bank Floodwall (Design)	GRCA	45	Good-Fair	100	na	2026	$70,000	GRCA Estimate	-	$70,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cambridge Dike	Geotech	Dike Structure	East Bank Floodwall (Implem't)	GRCA	45	Good-Fair	100	na	2029	$800,000	GRCA Estimate	-	-	-	-	$800,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cambridge Dike	Geotech	Dike Structure	East Bank Floodwall (Implem't)	GRCA	45	Good-Fair	100	na	2028	$200,000	GRCA Estimate	-	-	-	$200,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drayton Dike	Mechanical	Dike Mechanicals	Rubber Backflow Check V/V's	GRCA	na	na	100	na	2026	$35,000	GRCA Estimate	-	$35,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drayton Dike	Geotech	Dike Structure	Embankment/Floodwall Repair	CA	na	na	100	na	2036	$600,000	Repairs Allowance (Erosion from Ice/Storm Events)	-	-	-	-	-	-	-	-	-	-	-	$600,000	-	-	-	-	-	-	-	-
New Hamburg Dike	Forestry	Dike Structure	Brushing	GRCA	54	Fair	100	na	2025	$30,000	GRCA Estimate	$30,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Hamburg Dike	Forestry	Dike Structure	Brushing	GRCA	54	Fair	100	na	2026	$30,000	GRCA Estimate	-	$30,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Hamburg Dike	Geotech	Dike Structure	Slope Improvement	CA	54	Fair	100	na	2031	$600,000	Repairs Allowance (Erosion from Ice/Storm Events)	-	-	-	-	-	-	$600,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Dikes (General)	All	All	Upgrades	DSR	na	na	100	na	2032	$500,000	Allowance for Misc Repairs and Performance Upgrades	-	-	-	-	-	-	-	$500,000	-	-	-	-	-	-	-	-	-	-	-	-
Dikes (General)	All	All	Upgrades	DSR	na	na	100	na	2034	$500,000	Allowance for Misc Repairs and Performance Upgrades	-	-	-	-	-	-	-	-	-	$500,000	-	-	-	-	-	-	-	-	-	-
Dikes (General)	All	All	Upgrades	DSR	na	na	100	na	2036	$500,000	Allowance for Misc Repairs and Performance Upgrades	-	-	-	-	-	-	-	-	-	-	-	$500,000	-	-	-	-	-	-	-	-
Dikes (General)	All	All	Upgrades	DSR	na	na	100	na	2038	$500,000	Allowance for Misc Repairs and Performance Upgrades	-	-	-	-	-	-	-	-	-	-	-	-	-	$500,000	-	-	-	-	-	-
Dikes (General)	All	All	Upgrades	DSR	na	na	100	na	2040	$500,000	Allowance for Misc Repairs and Performance Upgrades	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$500,000	-	-	-	-
Dikes (General)	All	All	Upgrades	DSR	na	na	100	na	2042	$500,000	Allowance for Misc Repairs and Performance Upgrades	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$500,000	-	-
Dikes (General)	All	All	Upgrades	DSR	na	na	100	na	2044	$500,000	Allowance for Misc Repairs and Performance Upgrades	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$500,000
											Total by Year -->	$3,255,000	$3,165,000	$4,815,000	$3,360,000	$1,990,000	$1,335,000	$2,200,000	$575,000	$530,000	$980,000	$1,440,000	$1,400,000	$400,000	$540,000	$830,000	$1,450,000	$800,000	$760,000	$1,000,000	$650,000

4342 Queen Street, Suite 300
Niagara Falls, Ontario, Canada L2E 7J7
Tel: +1 (905) 374 5200

4342 Queen Street, Suite 300
Niagara Falls, Ontario, Canada L2E 7J7
Tel: +1 (905) 374 5200