

**Table 3.1
Springbank Dam – South Bank Erosion Protection Works
Environmental Evaluation of Alternative Solutions**

Alternative Solution	Effectiveness		Estimated Cost	Net Environmental Effects		Required Mitigation Measures
	Advantages	Disadvantages		Natural Environment	Social Environment	
1 - Maintain the status quo ('do nothing').	No present day cost.	<p>Dam safety concerns associated with the damaged south bank erosion protection works would not be resolved. If left unrepaired, the south bank would continue to be susceptible to significant damage if the bank was overtopped during a flood event similar to that, which occurred in July 2000.</p> <p>If left unrepaired, the south bank erosion protection works would continue to deteriorate. Although no present day cost, this would result in more expensive repair costs in the future.</p> <p>If left unrepaired, the south bank area would need to continue to be fenced-off for reasons of public safety. This would negatively affect the public (i.e., fishermen, canoeists, etc.) trying to access the river immediately downstream of the dam.</p>	No present day cost	Continued degradation of the south riverbank from erosion if left unprotected. This could result in additional slope erosion and transport of sediment into the river, negatively affecting fish spawning habitat and water quality.	<p>Continued degradation of the south riverbank from erosion if left unprotected. This could lessen the aesthetic appeal and local tourism value of the dam site and adjacent parklands.</p> <p>Retaining the fence around the south bank area would negatively affect the public (i.e., fishermen, canoeists, etc) trying to access the river immediately downstream of the dam.</p>	<p>The fencing around the south bank area would have to remain in place for reasons of public safety.</p> <p>Escalating future maintenance activities will be required to maintain the condition of the south bank erosion protection works.</p>
2 - Repair the south bank erosion protection works using grouted riprap.	<p>Slightly lower estimated cost than Alternatives 3 or 4.</p> <p>Dam safety concerns associated with the damaged south bank erosion protection works would be resolved.</p> <p>Grouted riprap would have a greater life expectancy and require less maintenance than Alternatives 3 or 4.</p>	Public access (i.e., fishermen, canoeists, etc) down a grouted riprap slope would be difficult and potentially unsafe for persons trying to access the river immediately downstream of the dam. This could be alleviated through the construction of a special pathway through the riprap.	Between \$325,000 and \$375,000	Temporary loss of fish habitat within the dewatered zones downstream from the dam, due to construction of partial cofferdams to isolate working areas.	<p>Long-term land and water-based recreational uses of the reservoir would continue to be the same for the foreseeable future, following the construction period.</p> <p>Construction at the dam site may temporarily impact usage of the parkland immediately surrounding the dam, due to public safety concerns, construction traffic, noise, etc.</p>	<p>Construct temporary partial-width cofferdam downstream of the existing dam.</p> <p>Construct, maintain and carry out standard sediment, erosion and water control measures during construction.</p> <p>Conduct general site restoration after construction including the replanting of any vegetation removed or disturbed at the damsite.</p> <p>Observe a fisheries construction-timing window not to allow any in-water construction between March 15 and June 30 to protect fish reproduction.</p> <p>Implement construction site best management practices to minimize impacts on local community (e.g., limit construction to daytime hours, install warning signs and safety fencing around work site).</p>

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3 - Repair the south bank erosion protection works using gabions.	<p>Dam safety concerns associated with the damaged south bank erosion protection works would be resolved.</p> <p>Gabions could be constructed to provide more improved and safer public access (i.e., fishermen, canoeists, etc) for persons trying to access the river immediately downstream of the dam.</p>	<p>Gabions would require greater maintenance than Alternatives 2 or 5.</p> <p>Higher estimated cost than Alternatives 2, 4 or 5.</p>	<p>Between \$450,000 and \$550,000</p>	<p>Temporary loss of fish habitat within the dewatered zones downstream from the dam, due to construction of partial cofferdams to isolate working areas.</p>	<p>Long-term land and water-based recreational uses of the reservoir would continue to be the same for the foreseeable future, following the construction period.</p> <p>Construction at the dam site may temporarily impact usage of the parkland immediately surrounding the dam, due to public safety concerns, construction traffic, noise, etc.</p>	<p>Construct temporary partial-width cofferdam downstream of the existing dam.</p> <p>Construct, maintain and carry out standard sediment, erosion and water control measures during construction.</p> <p>Conduct general site restoration after construction including the replanting of any vegetation removed or disturbed at the damsite.</p> <p>Observe a fisheries construction-timing window not to allow any in-water construction between March 15 and June 30 to protect fish reproduction.</p> <p>Implement construction site best management practices to minimize impacts on local community (e.g., limit construction to daytime hours, install warning signs and safety fencing around work site).</p>
4 - Repair the south bank erosion protection works using a grout-filled mattress system.	<p>Dam safety concerns associated with the damaged south bank erosion protection works would be resolved.</p>	<p>Public access (i.e., fishermen, canoeists, etc) down a grout-filled mattress slope would be difficult and potentially unsafe for persons trying to access the river immediately downstream of the dam.</p> <p>Slightly higher estimated cost than Alternatives 2 or 5.</p> <p>Grout-filled mattresses would require greater maintenance than Alternatives 2 or 5.</p>	<p>Between \$350,000 and \$400,000</p>	<p>Temporary loss of fish habitat within the dewatered zones downstream from the dam, due to construction of partial cofferdams to isolate working areas.</p>	<p>Long-term land and water-based recreational uses of the reservoir would continue to be the same for the foreseeable future, following the construction period.</p> <p>Construction at the damsite may temporarily impact usage of the parkland immediately surrounding the dam, due to public safety concerns, construction traffic, noise, etc.</p>	<p>Construct temporary partial-width cofferdam downstream of the existing dam.</p> <p>Construct, maintain and carry out standard sediment, erosion and water control measures during construction.</p> <p>Conduct general site restoration after construction including the replanting of any vegetation removed or disturbed at the damsite.</p> <p>Observe a fisheries construction-timing window not to allow any in-water construction between March 15 and June 30 to protect fish reproduction.</p> <p>Implement construction site best management practices to minimize impacts on local community (e.g., limit construction to daytime hours, install warning signs and safety fencing around work site).</p>

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	5 - Repair the south bank erosion protection works using grouted riprap on the slope and armour stone at the toe.	<p>Dam safety concerns associated with the damaged south bank erosion protection works would be resolved.</p> <p>Grouted riprap and amour stone would have a greater life expectancy and require less maintenance than Alternatives 3 and 4.</p> <p>Armour stone could be used for the toe of slope, with the potential of constructing the toe in the wet and potentially reducing overall costs.</p> <p>Similar estimated cost to Alternative 2.</p>		<p>Public access (i.e., fishermen, canoeists, etc) down a grouted riprap slope would be potentially unsafe for persons trying to access the river immediately downstream of the dam. However, armour stone could be selectively used to provide improved and safer public access (i.e., fishermen, canoeists, etc) by constructing a pedestrian pathway.</p>	<p>Between \$250,000 and \$400,000 (depending on coffer-damming)</p>	

**Table 3.2
Springbank Dam – Dam Rehabilitation Works
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Alternative Solution	Effectiveness		Estimated Cost	Net Environmental Effects		Required Mitigation Measures
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1 - Maintain the status quo ('do nothing').	<p>No present day cost.</p> <p>Existing recreational, tourism and biological resources of the area would not be impacted since no construction is proposed.</p>	<p>Operator and public safety concerns associated with the inadequate debris handling capacity would not be addressed.</p> <p>Operator safety concerns with the operation of the stop log gantry hoist would not be addressed.</p> <p>Although no present day cost, future debris blockages, and operational and maintenance requirements for the dam (i.e., stop logs, gantry hoist, etc.) would result in more expensive repair costs in the future.</p>	<p>No present day cost (however, future expensive repair costs would not be avoided)</p>	<p>Dam will continue to be a barrier to fish movement past the damsite during late spring to early fall when stop logs are in place.</p>	<p>Potential for flooding and associated public and dam operator safety concerns, potential property damage and temporary loss of recreational/tourism values in surrounding parklands will continue.</p>	<p>Escalating future maintenance activities will be required to maintain the condition of the dam.</p>
2 - Conduct maintenance repairs to the dam and tailrace, replace stop logs and hoist facilities, implement a debris management system.	<p>Lower estimated construction cost than Alternatives 3 and 4.</p> <p>Operator and public safety concerns associated with deteriorated stop logs and unreliable stop log gantry hoist would be resolved.</p>	<p>Operator and public safety concerns associated with the dam's flood handling capacity due to debris build up would not be fully addressed with the implementation of a debris management system.</p> <p>Retaining the closely spaced stop log gains would not eliminate the potential for debris buildup at the dam and the potential for overtopping during a flood event similar to that which occurred in July 2000.</p> <p>Manual removal of built up debris (from a log boom or at the dam) would continue to be technically challenging, costly and potentially hazardous to personnel during and after flood events.</p> <p>A debris management system such as a floating boom or fixed cable system has been cited as possibly creating additional hazards to persons using the waterway upstream of the dam (Delcan, 1997).</p>	<p>Between \$1.5 and \$2 million</p>	<p>Dam will continue to be a barrier to fish movement past the damsite during late spring to early fall when stop logs are in place.</p> <p>Temporary loss of fish habitat within the dewatered zones downstream from the dam due to construction of local cofferdams to isolate working areas.</p>	<p>Long-term land and water-based recreational uses of the reservoir would continue to be the same for the foreseeable future following the construction period.</p> <p>Construction at the damsite may temporarily impact usage of the parkland immediately surrounding the dam due to public safety concerns, construction traffic, noise, etc.</p>	<p>Construct temporary partial-width cofferdam downstream of the existing dam.</p> <p>Construct, maintain and carry out standard sediment, erosion and water control measures during construction.</p> <p>Conduct general site restoration after construction including the replanting of any vegetation removed or disturbed at the damsite.</p> <p>Observe a fisheries construction-timing window not to allow any in-water construction between March 15 to June 30 to protect fish reproduction.</p> <p>Implement construction site best management practices to minimize impacts on local community (e.g., limit construction to daytime hours, install warning signs and safety fencing around work site).</p>

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3 - Replace the existing stop logs and gates with overflow gates.	<p>Operator and public safety concerns associated with deteriorated stop logs, unreliable stop log gantry hoist would be resolved.</p> <p>Would be highly effective at passing debris and reducing potential for blockage and overtopping during flood events. Associated dam safety concerns would be resolved.</p> <p>Long-term operating costs would be significantly reduced since manual stop log manipulations would be eliminated.</p> <p>Overflow gates would have a longer life span than Alternative 4, resulting in lower long-term operation and maintenance costs.</p> <p>Existing dam deck would be retained, thereby allowing for easy access across the full length of the dam to conduct maintenance activities.</p>	<p>Higher estimated cost than Alternative 2.</p>	<p>Between \$3.5 and \$4.0 million</p>	<p>Dam will continue to be a barrier to fish movement past the damsite during late spring to early fall when the overflow gates are in place.</p> <p>Temporary loss of fish habitat within the dewatered zones downstream from the dam due to construction of partial cofferdams to isolate tailrace/stilling basin working areas.</p>	<p>Long-term land and water-based recreational uses of the reservoir would continue to be the same for the foreseeable future following the construction period.</p> <p>Construction at the damsite may temporarily impact usage of the parkland immediately surrounding the dam due to public safety concerns, construction traffic, noise, etc.</p> <p>Public access across the dam is not currently allowed for safety reasons. However, this alternative would not eliminate the possibility that public access across the existing dam deck could be incorporated into the future use of the dam.</p>	<p>Construct temporary partial-width cofferdam downstream of the existing dam.</p> <p>Construct, maintain and carry out standard sediment, erosion and water control measures during construction.</p> <p>Conduct general site restoration after construction including the replanting of any vegetation removed or disturbed at the damsite.</p> <p>Observe a fisheries construction-timing window not to allow any in-water construction between March 15 to June 30 to protect fish reproduction.</p> <p>Implement construction site best management practices to minimize impacts on local community (e.g., limit construction to daytime hours, install warning signs and safety fencing around work site).</p>
4 - Remove existing stop logs and gates, and install an overflow rubber dam downstream of the existing piers.	<p>Operator and public safety concerns associated with deteriorated stop logs, unreliable stop log gantry hoist would be resolved.</p> <p>Would be effective at passing debris and reducing potential for blockage and overtopping during flood events. Associated dam safety concerns would be resolved.</p> <p>Long-term operating costs would be significantly reduced since manual stop log removals would be eliminated.</p> <p>Existing dam deck would be retained, thereby allowing for easy access across the full length of the dam to conduct maintenance activities.</p>	<p>Does not provide any significant operational, flood handling or debris passage advantages over Alternative 3.</p> <p>Rubber dam would have a shorter life span than Alternative 3 resulting in higher long-term operation and maintenance costs.</p> <p>Higher estimated cost than Alternative 2.</p>	<p>Between \$3.5 and \$4.0 million</p>	<p>Dam will continue to be a barrier to fish movement past the damsite during late spring to early fall when the rubber dam is fully inflated.</p> <p>Temporary loss of fish habitat within the dewatered zones downstream from the dam due to construction of partial cofferdams to isolate working areas.</p>	<p>Long-term land and water-based recreational uses of the reservoir would continue to be the same for the foreseeable future following the construction period.</p> <p>Construction at the damsite may temporarily impact usage of the parkland immediately surrounding the dam due to public safety concerns, construction traffic, noise, etc.</p> <p>Public access across the dam is not currently allowed for safety reasons. However, this alternative would not eliminate the possibility that public access across the existing dam deck could be incorporated into the future use of the dam.</p>	<p>Construct temporary partial-width cofferdam downstream of the existing dam.</p> <p>Construct, maintain and carry out standard sediment, erosion and water control measures during construction.</p> <p>Conduct general site restoration after construction including the replanting of any vegetation removed or disturbed at the damsite.</p> <p>Observe a fisheries construction-timing window not to allow any in-water construction between March 15 to June 30 to protect fish reproduction.</p> <p>Implementation of construction site best management practices to minimize impacts on local community (e.g., limit construction to daytime hours, install warning signs and safety fencing around work site).</p>

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5 - Decommission and remove the dam.	<p>Operator and public safety concerns associated with deteriorated stop logs, unreliable stop-log gantry hoist and damaged erosion protection works would be resolved.</p> <p>Ongoing maintenance and operation costs would be eliminated.</p>	<p>Potentially high total cost given the extent of mitigation and restoration measures required and the economic losses resulting from the elimination of recreational uses.</p> <p>Permanent lowering of the reservoir would eliminate/restrict recreational uses such as boating, canoeing, rowing and fishing, and would detrimentally affect the current social character and values of the area.</p>	<p>About \$1 million (dam removal only)</p>	<p>Long-term improvement in water quality (e.g., natural sediment transport processes, improved flow) as the reservoir returns to its pre-dam state.</p> <p>The reservoir would be restored to its natural, pre-dam riverine state. This would restore more natural biophysical processes to the river and allow for year-round fish passage upstream and downstream of the former damsite.</p> <p>Overall loss of aquatic habitat surface area although fish community of the reservoir could likely adapt to riverine conditions.</p> <p>Increase in early successional wetland/terrestrial vegetation, and potentially floral and wildlife habitat diversity, in the newly exposed floodplains of the river.</p>	<p>Demolition activities at the damsite may temporarily impact usage of the parkland immediately surrounding the dam due to public safety concerns, construction traffic, noise, etc.</p> <p>Permanent lowering of the reservoir would eliminate/restrict recreational uses such as canoeing, rowing, boating and fishing.</p> <p>Removal of the dam and lowering of the river could reduce the local value of adjacent parklands as a natural, historic and local tourist attraction.</p> <p>Aesthetics of the existing reservoir area would be temporarily deteriorated prior to revegetation of the exposed bank areas. Possible long-term reductions in aesthetic views along the existing parkland trails due to potential loss of water view.</p> <p>Elimination of reservoir and boating, canoeing and rowing opportunities would result in economic losses to City, user groups (e.g. London Canoe Club) and tour boat operator.</p>	<p>Construct, maintain and carry out standard sediment, erosion and water control measures during construction.</p> <p>Provide slope regrading, shoreline stabilization and erosion protection measures where necessary using natural channel techniques, such as live stakes, fascines and rip rap protection.</p> <p>Conduct general site restoration after construction including the replanting of any vegetation removed or disturbed at the damsite.</p> <p>Conduct vegetative plantings of native specimen trees and ground species and along exposed shorelines to provide riparian vegetation along the newly created riverbanks.</p> <p>Observe a fisheries construction-timing window not to allow any in-water construction between March 15 to June 30 to protect fish reproduction.</p> <p>Possible fish habitat compensation measures required.</p> <p>Implement construction site best management practices to minimize impacts on local community (e.g., limit construction to daytime hours, install warning signs and safety fencing around work site).</p>