

4. Springbank Dam Stage 1

4.1 Purpose and Objectives

The focus of Stage 1 of the One River EA was the examination of the future of Springbank Dam. This includes defining the options for the future function of the Springbank Dam, the development of evaluation criteria and performance measures, the evaluation process, and ultimately the selected option for the future function of the dam.

4.2 Background

The original Springbank Dam was built in the 1870s as a water reservoir at a different location downstream of the current dam. The dam failed at various times over the first few decades after the original construction and there was no dam in operation from 1917 to 1929.

The current location was the site of construction for the then new Springbank Dam structure in 1929. This dam was again built to provide a water reservoir and to support recreational opportunities along the river. The dam, when operational, raised water levels in the Thames upstream of the dam to the forks of the Thames area in downtown London and provided deeper water for recreation and access to the river. The dam was not designed to provide any flood attenuation. Typical operation of the dam was from late May until early November when the river was returned to free flowing. The current dam structure is owned by the City of London and has, historically, been operated by the UTRCA (UTRCA, 2015a).

In 2000, a debris field that developed in the river during a rainfall event damaged the dam. A review of the dam condition at that time resulted in recommendations to rehabilitate the dam to meet the then current safety standards. In 2008, during the testing of the new dam, a failure occurred and the dam has not operated since that time.

4.3 Springbank Dam Options

Stage 1 identified three options for the future function of the Springbank Dam, do nothing, free-flowing river, and reinstating the dam.

4.3.1 Do Nothing

Do nothing is a required option under the EA guidelines. It provides a benchmark against which other options are evaluated and defines the future state of the infrastructure should this option be selected. Under this option the Springbank Dam is kept in its current condition by completing a safety and operations review and completing regular, required and on-going maintenance to preserve the structure with no repurposing.

4.3.2 Free-Flowing River

Under this option the Springbank Dam is decommissioned and no longer provides a water retention function. Dam decommissioning may include options for the removal of water retaining equipment, repurposing the dam structure and various river enhancements, ecological enhancements and recreational enhancements upstream. These enhancements work within the hydrologic and hydraulic limitations associated with lower water levels during the summer months when, otherwise, the dam may have functioned to increase water depths upstream. Work to be completed in addition to salvaging dam components and obtaining applicable permits could include removing gates to provide a live bottom to the river and stabilizing the required components and shore structures.

4.3.3 Reinstating the Dam

Under this option the Springbank Dam is reinstated so it provides a water retention function, operating at a similar capacity as it had in the past. Dam repair or reconstruction allows for dam operation during months when higher water levels upstream would promote additional recreational opportunities associated with higher water levels. Reinstating the dam does not preclude adding options like those for repurposing the dam.

4.4 Stage 1 Consultation and Engagement

Consultation with stakeholders, the public and government agencies, and engagement with First Nations and Metis, is an important and necessary part of the EA process. Recognizing the importance of the Thames River to the London citizens, the City of London developed an extensive consultation and engagement process that goes beyond the requirements of the MEA Master Plan EA guideline. The process was initiated with the goal of consulting with all interested stakeholders and engaging with First Nations and Metis communities in meaningful ways while focusing on understanding and incorporating input into the decision-making process. An Agency Advisory Committee was established to receive specific input based on agency mandates related to the dam.

Details of the consultation and engagement activities, input received and responses to comments are summarized in Section 8 and provided in full in Appendix B of this report.

4.4.1 Public Consultation

The Stage 1 public engagement process used a wide variety of tools and approaches to gain widespread and accessible participation in the One River Master Plan EA. These tools and approaches included:

- **Notice of Commencement:** A formal notice to announce the commencement of the EA process was published in a local newspaper, The Londoner on July 20 and July 27, 2017.
- **Stakeholder Meetings:** Nine meetings were held between the City and Stakeholder groups during Stage 1. Their comments and issues were incorporated into the One River EA decision making process. Meetings were held with the following groups:

Nature London	September 29, 2017
Kensington Village Association	September 1, 2017
Thames River Keepers	September 1, 2017
Thames River Rally	September 19, 2017
Friends of the Coves	September 21, 2017
Thames River Anglers Association	August 25, 2017
Thames River Paddling Routes Project	August 25, 2017
London Canoe Club	August 29, 2017
London Rowing Club	August 29, 2017

- **Pop-ups:** The City of London staffed booths and provided background materials on the One River EA at local events during the summer of 2017 (referred to as pop-ups). Pop-up engagement events took place six times over the course of Stage 1 of the One River EA as follows:.

July 23, 2017 12:00 pm – 6:00 pm	Inspiration Fest, Wortley Village
August 3, 2017 11:00 am – 6:00 pm	Rib Fest, Victoria Park
August 10, 2017 3:30 pm – 7:30 pm	River Forks Park
August 11, 2017 7:00 am – 3:00 pm	Springbank Park
August 12, 2017 8:00 am – 3:00 pm	Farmers Market at Western Fair Grounds
August 19, 2017 11:00 am – 3:00 pm	London Tree Fest, Harris Park

- **Survey:** A survey was developed to collect information about London Residents' current use of the Thames River and their ideas and wishes for the future of the river. The survey asked respondents multiple choice and open-ended questions about how they use the river, how they would like to use the river, and what changes they would like to see, if any, in or around the river. The survey was available online at the City's webpage, GetInvolved.london.ca, and in paper format at Pop-up events.
- **Public Information Center 1:** Public Information Centre 1 was hosted on October 18 and 19, 2017. Over 100 people attended each session (with 102 officially signing in for the first and 103 officially signing in for the second). Several stakeholders, including local residents, interest groups, and First Nations representatives provided feedback and input to the EA through correspondence and emails, which are included in the stakeholder consultation summary in Section 8 and Appendix B. A total of 104 pieces of correspondence and/or emails were received during Stage 1 of this EA.
- **Webpage:** The project webpage included the Notice of Public Information Centre 1 as well as a survey, that mirrored consultation activities at the PIC, and was made available until October 27, 2017.
 - Getinvolved.london.ca/OneRiver: <https://getinvolved.london.ca/OneRiver/upcoming-events>
 - London.ca Events Calendar:
 - <https://www.london.ca/calendar/Pages/One-River-Public-Information-Centre.aspx>
 - [london.ca/calendar/Pages/One-River-Public-Information-Centre-2.aspx](https://www.london.ca/calendar/Pages/One-River-Public-Information-Centre-2.aspx)
 - One River EA Page:
 - <https://www.london.ca/residents/Environment/EAs/Pages/One-River-EA.aspx>
- **Social Media:** Social Media (Twitter and Facebook) was used to raise awareness of Public Information Centre 1.
- **Traditional Media:** Local news media coverage was used to raise awareness of the One River Master Plan EA, advertise Public Information Centre 1, and direct the public to the getinvolved.london.ca webpage to learn more and complete the survey. Local coverage included CTV News London and AM980 News (CFPL AM).

Feedback received from the public through these consultation activities is summarized in Section 8 and provided in detail in Appendix B. Feedback received through these consultation activities was incorporated into the development of options, the development of the options evaluation framework including the evaluation criteria, evaluation performance measures, and the options evaluation process.

4.4.2 Agency Consultation

In accordance with the Master Plan EA process, government agencies were provided a Notice of Study Commencement for the One River EA and asked to provide any comments regarding requirements for the conduct of the EA. Specific government agencies were also asked to participate in an Agency Advisory Committee. The objective of the Agency Advisory Committee for both Stage 1 and Stage 2 of the EA was to provide guidance and feedback to the project team on environmental, social/cultural, technical and regulatory issues and challenges that could impact the evaluation of options for the One River EA. The Agency Advisory Committee is comprised of representatives from the MECP, MNRF, UTRCA, LTVCA, and the DFO. A list of members and the agencies they represent is included in Section 1, Section 8 and Appendix B of this report.

Three meetings were held with the Agency Advisory Committee at key milestones during Stage 1 to receive input, guidance, and feedback on the Stage 1 options. The objective was to examine the issues and challenges associated with the evaluation of options for the Springbank Dam. All input was considered in the EA Stage 1 decision-making process and a summary report for the initial three Agency Advisory Committee meetings was completed and is included in Appendix B-5.

The discussions that took place at the initial three Agency Advisory Meetings was facilitated through the presentation of information from a number of subject matter experts including members of the consultant

team, City of London Environmental and Parks Planning Division, and UTRCA staff. The comments that have been provided and that form part of the Agency Advisory Committee report are included in Appendix B-3.

In summary, subject matter experts providing input to the Agency Advisory Committee noted that the current free flowing nature of the river, without the operation of the dam, has resulted in increased available habitat as well as increased populations of native fish, mussel, and reptile species. Reinstating the dam would result in the direct loss of habitat for several endangered and threatened species at risk while creating habitat for non-native or invasive species. Also, without the operation of the dam, many areas within the study area are now considered critical habitat. Other dams along the Thames River, such as the Fanshaw Dam, provide a flood control function essential to protecting life and property, however, the Springbank Dam’s function has been to provide recreational opportunities and does not have a flood control function.

Part of the input, guidance, and feedback, on the Stage 1 options provided by the MECP, DFO, and MNRF was related to the permitting required to implement each of the three options being evaluated for the dam. These comments are detailed in Section 8 and Appendix B-5. The input and comments received from the Agency Committee Members and subject matter experts informed the evaluation of the Springbank Dam options, specifically with respect to the ease of permitting and the potential impacts to the natural environment. Ultimately, the input from the agencies recognized that there were permitting requirements for all three options under consideration and that permitting for reinstating the dam would present the most challenges. The agencies further recognized that the required permits were unlikely to be approved as the destruction of habitat for some species identified in the study area is prohibited by the federal government.

4.4.3 First Nations and Metis Engagement

Several First Nations communities expressed interest in the One River EA, and through early pre-engagement provided input for the project Terms of Reference and the problem/opportunity statement. Specifically,

The river that flows through London’s downtown has many names:

- ***Deshkan Zibiing (known to the Anishnaabeg and Lenape of the Great Lakes);***
- ***Kahwy`hatati (ONYOTA:KA); and,***
- ***The Thames (John Graves Simcoe)***

This river is both our inheritance and our living legacy. It is our collective responsibility to maintain and enhance this shared natural, cultural, recreational and aesthetic resource.

First Nations engagement continued through Stage 1, with the project team contacting the London area First Nations and provincial Metis organizations through mail and email correspondence. One River pamphlets were also sent to the N’Amerind Friendship Centre (Indigenous Friendship Centre) in London to be placed visibly for visitors to see.

A significant part of the Stage 1 First Nations engagement process was a community meeting that took place at the Chippewas of the Thames First Nation (COTTFN), Antler River Senior Centre, 20723 Muncey Road, Muncey, Ontario on December 7, 2017. Sixteen members of the COTTFN attended as well as a member of the Oneida Nation of the Thames River First Nation. Presentation material provided information on various aspects of the EA, including the problem/opportunity statement, the history and current conditions of the study area, evaluation criteria for the EA, and a description of the three options for the future function of the Springbank Dam. Members of the project team including the City of London were available to answer any questions participants had about the EA process, the options for the dam, or the evaluation of options.

Members of the First Nation community were asked to provide their feedback by filling in comment forms. Comments and additional feedback received during the community meeting informed decisions on the

Stage 1 criteria development, evaluation of options, and the planning for future community meetings. A summary of the First Nations comments is included in Section 8 of this report and detailed comments and responses are included in Appendix B-4.

4.5 Evaluation of Springbank Dam Options

4.5.1 Evaluation Approach

The evaluation process for the selection of the preferred option for the Springbank Dam followed the Municipal Engineers Association (MEA) process for Master Plan EAs. The essential nature of the process is that it captures a wide and inclusive range of criteria that provide the opportunity to examine the impact of each of the options on the issues identified through the Problem/Opportunity statement. The criteria for the examination of the three Springbank Dam options were developed through consultation with the City, project stakeholders, the public and engagement with First Nations and Metis communities. The criteria cover the range of potential impacts or changes from what is considered the “Baseline Condition”. This baseline condition was represented by the existing conditions in the river within the boundaries of the study area and the current condition of the Springbank Dam. This baseline condition was defined through the examination of various databases on water quality and the ecological environment, consultation and engagement with the public, stakeholders and First Nations and Metis communities and field efforts conducted as part of Stage 1 to further characterize the existing condition of the river.

4.5.2 Evaluation Criteria

The evaluation of the three options followed the standard EA approach through the development of a comprehensive set of evaluation criteria. Evaluation criteria are grouped in three main categories:

- Natural Environment
- Social/Cultural
- Technical and Economic

The purpose of the evaluation was to identify a preferred option that best satisfied the objectives of the One River EA and eliminated options which did not meet those objectives.

The criteria used to evaluate the Stage 1 Springbank Dam options represent the opportunities and constraints associated with each option under evaluation and are presented in Table 4-1, along with descriptions of the rating scales for measuring impacts. The anticipated impact of the each of the three Springbank Dam options on each of the criteria were evaluated based on the Measure/Indicator defined under each criterion. The rating scales ranges from 1 to 5, with 5 indicating a positive change from the existing conditions, 3 indicating no change from existing conditions, and 1 representing a negative change from existing conditions.

Table 4-1. Evaluation Criteria and Potential Ratings

Category & Criterion	Description	Measure/ Indicator	Rating Scale for Measuring Impacts
Natural Environment			
Water Quality	The potential of the option to maintain or improve water quality.	Potential change in water quality compared to the existing conditions for total suspended solids and total phosphorus.	5 Improvement to water quality from existing conditions (positive effect) 3 No change in water quality from existing conditions (neutral effect) 1 Decrease/degradation in water quality from existing conditions (negative effect)
Geomorphology	The potential of the option to result in a stable river system (i.e. stable streambanks and stream bottom conditions) to optimize sediment transport to support a healthy aquatic environment.	Potential change in the extent and risk of streambank erosion and stream bottom scour compared to the existing conditions.	5 Improvement in the stability of the river system from existing conditions (positive effect) 3 No change in the stability of the river system from existing conditions (neutral effect) 1 Decrease in the stability of the river system from existing conditions (negative effect)
Species at Risk	The potential of the option to protect and enhance the habitat of sensitive species and species at risk (both aquatic and terrestrial).	Potential change in the extent and quality of significant habitats for sensitive species and species at risk compared to the existing conditions.	5 Improvement in the extent and quality of significant habitats for sensitive species and species at risk from existing conditions (positive effect) 3 No change in the extent and quality of significant habitats for sensitive species and species at risk from existing conditions (neutral effect) 1 Decrease in the extent and quality of significant habitats for sensitive species and species at risk from existing conditions (negative effect)
Terrestrial Habitat	The potential for the option to maintain or enhance terrestrial and riparian habitat for both plants and animals.	Potential change in the terrestrial habitat function and production capacity compared to existing conditions	5 Improvement in the terrestrial habitat function and production capacity from existing conditions (positive effect) 3 No change in the terrestrial habitat function and production capacity from existing conditions (neutral effect) 1 Decrease in the terrestrial habitat function and production capacity from existing conditions (negative effect)
Aquatic Habitat	The potential for the option to maintain or enhance habitat for aquatic dependent species.	Potential change in the aquatic habitat function and production capacity compared to existing conditions.	5 Improvement in the aquatic habitat function and production capacity from existing conditions (positive effect) 3 No change in the aquatic habitat function and production capacity from existing conditions (neutral effect) 1 Decrease in the aquatic habitat function and production capacity from existing conditions (negative effect)
Groundwater and Surface Water interactions	The potential of the option to protect or improve groundwater and surface water interactions to maintain or improve water quality and quantity.	Potential changes in the groundwater and surface water interactions compared to existing conditions.	5 Improvement in groundwater and surface water interactions from existing conditions resulting in improvements to water quality and quantity (positive effect) 3 No change in groundwater and surface water interactions from existing conditions resulting in no changes to water quality and quantity (neutral effect) 1 Decrease in groundwater and surface water interactions from existing conditions resulting in degradation to water quality or decrease in water quantity (negative effect)

Category & Criterion	Description	Measure/ Indicator	Rating Scale for Measuring Impacts	
Social/Cultural				
Cultural Heritage	The potential of the option to protect cultural/heritage resources.	Potential of the construction and related changes to the river regime to impact cultural heritage resources.	5 3 1	Potential to improve cultural/heritage resources due to construction and related changes to the river regime No potential to degrade cultural/heritage resources due to construction and related changes to the river regime Potential to degrade cultural/heritage resources due to construction and related changes to the river regime
Public Health & Safety	The potential of the option to minimize risk or liability to community health and safety.	Potential change in risk or liability to community health and safety from existing conditions.	5 3 1	Potential to improve potential risk or liability to community health and safety No change in potential risk or liability to community health and safety Potential to degrade potential risk or liability to community health and safety
Boating Recreation	The potential of the option to provide or enhance boating recreational activities.	Potential change in boating (canoeing, kayaking, etc.) recreational activities and areas from existing conditions.	5 3 1	Improvement in boating recreational activities and areas from existing conditions (positive effect) No change in boating recreational activities and areas from existing conditions (neutral effect) Decrease in boating recreational activities and areas from existing conditions (negative effect)
Fishing Recreation	The potential of the option to provide or enhance fishing recreational activities.	Potential change in fishing recreational activities and areas from existing conditions.	5 3 1	Improvement in fishing recreational activities and areas from existing conditions (positive effect) No change in fishing recreational activities and areas from existing conditions (neutral effect) Decrease in fishing recreational activities and areas from existing conditions (negative effect)
Land- Based Recreation	The potential of the option to provide or enhance land-based recreational activities such as walking, biking and bird watching.	Potential change in land-based recreational activities and areas from existing conditions.	5 3 1	Improvement in land-based recreational activities and areas from existing conditions (positive effect) No change in land-based recreational activities or areas from existing conditions (neutral effect) Decrease in land-based recreational activities or areas from existing conditions (negative effect)
Shoreline Accessibility	The potential of the option to enhance public accessibility to the river.	Potential change in sites and areas for shoreline access from existing conditions.	5 3 1	Improvement in sites and areas for shoreline access from existing conditions (positive effect) No change in sites and areas for shoreline access from existing conditions (neutral effect) Decrease in sites and areas for shoreline access from existing conditions (negative effect)
Aesthetics	The potential of the option to maintain or enhance the visual character of the river corridor.	Potential change in the visual character of the river corridor from existing conditions.	5 3 1	Improvement in the visual character of the river corridor from existing conditions (positive effect) No change in visual character of the river corridor from existing conditions (neutral effect) Decrease in the visual character of the river corridor from existing conditions (negative effect)

Category & Criterion	Description	Measure/ Indicator	Rating Scale for Measuring Impacts	
First Nations Interest	The potential of the option to address First Nations and Métis concerns.	Ability to address First Nations and Métis concerns.	5 3 1	Fully addresses First Nations and Métis interest Partially addresses First Nations and Métis concerns Does not address First Nations and Métis concerns
Urban Revitalization	The potential of the option to encourage investing in London's downtown as the heart of the City to support urban regeneration and revitalization.	Potential to encourage investing in London's downtown.	5 3 1	High potential for encouraging investing in London's downtown in support of urban regeneration and revitalization Moderate potential for encouraging investing in London's downtown in support of urban regeneration and revitalization Low or negative potential for encouraging investing in London's downtown in support of urban regeneration and revitalization
Technical and Economic				
Flood Hazard	The ability of the option to mitigate flood hazards.	Potential change in risk of flood and erosion damage to public infrastructure and private property.	5 3 1	Decrease in potential risk of flooding No change in potential risk of flooding Increase in potential risk of flooding
Carbon Footprint	The ability of the option to minimize carbon footprint.	Potential change in carbon footprint from existing conditions, including the change in energy requirements during construction and operations.	5 3 1	Potential to reduce carbon footprint or energy requirements compared to existing system No change carbon footprint or energy requirements compared to existing system Potential to increase carbon footprint or energy requirements compared to existing system
Constructability	The ease of the option to be constructed and implemented on a technical basis.	Ease of constructing the option, considering land requirements for works and staging areas, construction equipment, timeframe for construction	5 3 1	Easy to implement; no or very little construction requirements Moderately easy to implement; some challenges with construction such as land and equipment requirements, and timeframe for construction Very difficult to implement; major construction challenges such as land and equipment availability and requirements, and long timeframe for construction
Approvability	The ease of the option to obtain required permits and approvals from regulating agencies (e.g. UTRCA, MNRF, MECP, DFO).	Ease of obtaining approvals and permits, including timeframe for receiving	5 3 1	No or very little approval requirements Moderately easy to obtain permits and approvals; some challenges relating to timelines and number of approvals necessary, but conditions are minor Very difficult to receive permits and approvals; timeframe is long and conditions are major
Operations & Maintenance	The ease of the option to be operated and maintained.	Degree of change in operations and maintenance requirements from existing conditions	5 3 1	Lowest degree of change operations and maintenance requirements from existing conditions Moderate degree of change in operation and maintenance requirements from existing conditions Highest degree of change in operation and maintenance requirements from existing conditions

Category & Criterion	Description	Measure/ Indicator	Rating Scale for Measuring Impacts	
Compatibility with existing and planned infrastructure projects	The compatibility of the option with existing and planned public infrastructure projects.	Ability of an option to be integrated with or complement existing and planned infrastructure projects	5 3 1	Very compatible with existing and planned infrastructure Moderately compatible with existing and planned infrastructure Very low compatibility with existing and planned infrastructure
Capital Cost	Relative capital costs.	Capital costs of an option relative to other options	5 3 1	Lowest capital costs Moderate capital costs High capital costs

4.5.3 Options Evaluation

The basis of the options evaluation was an assessment of the impacts associated with each option on the natural, social/cultural, and technical/economic criteria.

4.5.3.1 Natural Environment

The natural environment criteria provided the framework for examining the potential ecological changes anticipated for each of the three Springbank Dam options. Each of the criterion address an aspect of the natural environment and, together, provided a thorough review of potential changes from the baseline condition.

4.5.3.2 Social Cultural

Consultation activities found that stakeholders highly valued the wide range of recreational activities the Thames River corridor offers. The evaluation criteria were developed considering these activities; (i.e. fishing, boating and land-based recreational activities). The stage 1 public consultation process is documented in Section 8 and Appendix B of this report. First Nations and Metis concerns are of key importance to the City and community. Consequently, a separate criterion was developed under the social/cultural environment category to represent their concerns. Additional criteria identified as important in the evaluation of social/cultural impacts included cultural heritage, public health and safety, shoreline accessibility, aesthetics, and urban revitalization.

4.5.3.3 Technical and Economic Considerations

The technical and economic impacts associated with each option was considered equally as important as the impacts on the natural and social/cultural environment in this assessment. The technical and cost criteria identified for assessing options in this Master Plan EA are as follows:

- Flood Protection
- Minimizing carbon footprint and energy use
- Ease of Implementation (construction)
- Ease of Implementation (permits and approvals)
- Operation and Maintenance Requirements
- Compatibility with Existing and Planned Infrastructure
- Relative Capital Costs

A summary of the potential impacts of each of the three dam options on each of the above criteria is presented in the discussion in Table 4-2. Additional details on this assessment can be found in the Stage 1 Report in Appendix A-7.

Table 4-2. Options Evaluation

Natural Environment	
Water Quality	<p>Water quality parameters examined in detail for this criteria evaluation included total suspended solids (TSS) and total phosphorus (TP).</p> <p>TSS are made up of organic materials such as algae and inorganic particles such as sand and silt. TSS made up of sands and silt are normally the result of erosion and runoff of stormwater. Organic particles such as algae are more abundant in surface water that provides better growth conditions such as warmer water with high TP nutrient conditions. TSS is a good indicator of water quality deterioration (Biloka, G. S., R. E. Brazier, 2008). The findings of the water quality analysis completed for the One River EA determined that TSS levels were higher with the dam in place than during the period when the dam was not operational.</p> <p>TP is a nutrient that enters waterways through surface runoff during rainfall events and municipal wastewater discharges. Elevated levels of TP in surface waters can result in the excessive growth of algae which can lead to other impacts such as anoxic conditions (low oxygen levels), (CCME, 2004). The findings of the water quality analysis completed for the One River EA determined that TP levels were higher with an operational dam than during the period when the dam was not operational. TP levels in the Thames River within the study area are above the MECP guideline level of 30 µg/L to avoid excessive plant growth in rivers and streams (MOE, 1994). The impacts of climate change are anticipated to increase the impacts of TSS and TP on the river.</p>
Geomorphology	<p>The assessment made of the Thames River in the study area under the existing condition indicates areas of erosion and instability in the river banks and the river bottom. There are areas of bank erosion and both deposition and scour in the bottom of the river. The river is becoming more stable along its banks through the growth of additional vegetation. The seasonal operation of the Springbank Dam can impact the stability of the river because of the wide fluctuations in seasonal water levels creating areas of erosion at various bank levels and high-water levels would eliminate any vegetation that has returned in the existing condition that has stabilized parts of the river banks. Erosion protection measures are required for either a free-flowing river (option 1) or a river with an operational dam (option 2). The extent of erosion protection required would be substantially greater with the dam in place given a wider range of fluctuations in water elevations.</p>
Species at Risk	<p>SAR and their habitats in the study area have been identified through a variety of studies (UTRCA 2015b) (DFO 2016). Many of the SAR are adapted to the existing conditions in the river and would be negatively impacted by the operation of the Springbank Dam (as in Option 3). Many of the species are adapted to a free-flowing stream environment in their required habitat areas for various life cycle stages.</p> <p>There are several SAR identified in the Thames River like the Silver Shiner fish, the Mudpuppy mussel, Spiny Softshell turtle, the Queensnake, that are negatively impacted by dams and impoundments (B. Cudmore, et.al., 2004).</p> <p>Perhaps the most discussed SAR in the study area is the Spiny Softshell turtle. The reinstatement of the dam would result in a negative impact on the turtle habitat and survival. Recent turtle surveys in 2015 showed a dramatic and unparalleled increase in at-risk turtles since the dam has been out of commission, (UTRCA, 2015b).</p> <p>Additional discussion on SAR in the study area that would be negatively impacted by reinstatement of the Springbank Dam is provided in Appendixes A-1 and A-2 of this report.</p>
Terrestrial Habitat	<p>The terrestrial habitat areas most impacted by the Springbank Dam options are in the riparian zones along the river banks in the study area upstream of the dam structure. The riparian areas along the river have re-established in the existing river condition and although many invasive species have repopulated the riparian areas, the overall impact has been an increase in the density and diversity of plant growth, (UTRCA, 2015). Healthy riparian areas support an increase in wildlife from amphibians to bird species, help to improve water quality by reducing erosion and reducing direct runoff to rivers that can carry excess pollutants. Healthy riparian areas also lower the temperature of surface water by shading rivers and streams and provide organic nutrients to support aquatic life.</p> <p>The reinstatement of the Springbank dam would eliminate the vegetation in the riparian areas upstream of the dam by flooding these areas during months of dam operation and leave these riverbank areas devoid of vegetation for much of the year when the dam was not operational.</p>

<p>Aquatic Habitat</p>	<p>The aquatic habitat in the Thames river upstream of the Springbank dam has been altered considerably since the dam became inoperable in 2008. The river has been flowing freely as a natural flowing system and that annual stability has resulted in the growth of river and floodplain habitats that are important to many species (UTRCA, 2015a).</p> <p>Although there is not a definitive study completed to-date on the change in extent of aquatic habitat health and diversity since the dam became inoperable, Appendix A-1 and A-2 discusses the reported increase in the diversity of various aquatic species that utilize aquatic habitats in the study area.</p>
<p>Ground Water and Surface Water Interactions</p>	<p>The important interaction between groundwater and surface water in any stream environment is the addition of baseflow to the system from groundwater resources. There are limited studies on the relative impact of the dam removal on the contribution of groundwater to river baseflow in the study area, however, in an analysis of the impact of reservoir levels on the interaction between surface water and groundwater by the U.S. Geological Survey, (USGS, 1998) it was determined that increased water elevations resulted in a net discharge to groundwater and lowering water levels resulted in increased surface water recharge. It is anticipated that reinstatement of the Springbank Dam and increasing the water levels in the Thames upstream of the dam would result in a net negative impact on stream baseflow.</p>
<p>Social/Cultural Environment</p>	
<p>Cultural Heritage</p>	<p>The cultural heritage review presented in Appendix A-3 indicated that there are several cultural heritage resources within the study area that must be protected. In addition, the entire floodplain of the Thames River is designated under the Canadian Heritage River System (CHRS). Under the do nothing option, the risk of impacting some of the cultural resources along the River corridor will increase as no river management projects will be implemented. Option 2 (free-flowing river) and Option 3 (reinstating the dam) both provide equal opportunities to protect and enhance cultural resources.</p>
<p>Community Health and Safety</p>	<p>Community health and safety is a core component of the London Plan: <i>“Through the London Plan our community is planning for vibrant, healthy, safe and fulfilling neighbourhoods, attractive and viable mobility alternatives and affordable housing that is accessible to those who need it.”</i></p> <p>Under the do nothing option, the existing dam structure will receive minimal maintenance and no strategy will be implemented to manage the river. Consequently, risks to community health and safety may increase. Under both Option 2 (free-flowing river) and Option 3 (reinstating the dam) the river will continue to be managed to protect human health and safety. For example, river management strategies will consider measures to mitigate risks of erosion and flooding, and provide safe, secure opportunities for individuals to access the river. The risks to human health and safety will therefore be reduced by implementing either option. Given that reinstating the dam provides more control of the river than a free-flowing river, risks to human health and safety may be slightly less if the dam is reinstated and operated properly (i.e. potential for flooding may be reduced).</p>
<p>Recreation</p>	<p>Recreation is an important consideration as indicated in the problem statement for this Master Plan EA which states <i>“It is our collective responsibility to maintain and enhance the Thames River as a shared natural, cultural, recreational and aesthetic resource”</i>.</p> <p>Recognizing the different types of activities and different interest groups involved in using the river and its corridor for recreational activities, three separate criteria have been developed to differentiate the impacts each option will have on the varying types of recreational activities:</p> <ul style="list-style-type: none"> • Boating Recreational Activities: These activities include such water sports as canoeing, rowing and kayaking. It is recognized that reinstating the dam will provide deeper, more calm waters that allow for different types of boating. Boating recreational activities will increase the most by reinstating the dam (Option 3). • Fishing Recreational Activities: With a free-flowing river the number of native fish species will increase, and the invasive fish species will be reduced. Fishing will therefore be improved the most under a free-flowing river (Option 2). • Land-based Recreational Activities: These activities include walking, biking, bird-watching and other sports along the river corridor. Both Option 2 (free-flowing river) and Option 3 (reinstating the dam) offer opportunities to improve land-based recreational activities through proper river management. Reinstating the dam (with controlled water levels) may offer slightly greater opportunities for land-based recreational activities, such as more extensive trails and access along the river front.
<p>Accessibility to the River</p>	<p>If no river management strategies are implemented the river will continue to naturalize with no controls; and accessibility to the river will be reduced as a result. A free-flowing river (Option 2) and reinstating the dam (Option 3), with continued river management will both provide more opportunities to improve sites and areas for shoreline access. Option 3 may provide slightly more opportunities with water levels in the river being controlled.</p>

<p>First Nations and Metis Concerns</p>	<p>First Nations and Métis are interested in maintaining and enhancing the Thames River as a shared natural and cultural resource. The do nothing option partially addresses First Nations and Métis concerns by letting the river return to its natural state over time. However, without the river being managed the river corridor will eventually be degraded. A free-flowing, properly managed river represented by Option 2 will address some of the First Nations and Métis concerns. Option 3 to reinstate the dam did not address the concerns of the COTTFN. At the COTTFN community meeting, participants were asked which of the options they are in favour of for the future of the Springbank Dam. Results collected through comment forms provided show that Option 2 (free-flowing river) was the most preferred.</p>
<p>Investing in London's Downtown</p>	<p><i>“At the root of The London Plan is the goal of building a city that will be attractive as a place to live and invest in a highly competitive world and one that will offer the opportunity of prosperity to everyone – one their own terms and in their own way”</i> (City of London, 2019). Therefore, the potential of the One River Master Plan to provide a strategy that encourages investing in London's downtown as the heart of the City to support urban regeneration and revitalization is very important to the City and its citizens. Do nothing will not support this goal.</p> <p>A free-flowing, managed river has the potential to encourage more investment in London's downtown by bring more people to the river corridor. A controlled river with a higher consistent water level, offers perhaps more potential for investments in London's downtown as it may offer more recreational activities bringing even more people to enjoy the river and London's downtown.</p>
<p>Technical and Economic</p>	
<p>Flood Protection</p>	<p>The ability of an option to mitigate flood hazards is an important consideration in selecting options. The goal is to reduce the risks of flood and erosion damage to public infrastructure and private property. The do nothing option will provide no change in the ability to protect the Thames River corridor from flooding. Management of the river, whether it is free-flowing (Option 2) or the dam is reinstated (Option 3) will help to protect the sensitive areas thereby reducing the risk of flood and erosion damage. Reinstating the dam will control water levels on a season basis, which may serve to reduce the risk of flood or erosion damage more so than if the river is free-flowing (Option 2).</p>
<p>Minimize Carbon Footprint</p>	<p>The MECP is particularly concerned with the ability of infrastructure projects to minimize carbon footprint; works that minimize carbon footprint and associated greenhouse gas emissions are preferred. The options related to the Springbank dam do not significantly impact carbon footprint; all are comparable. There may be slight reductions in greenhouse gas emissions the river corridor becomes more vegetated under Option 2 (free-flowing river) and increase slightly with the construction and operation of the dam under Option 3 (reinstating the dam). However, these changes are minimal and do not reflect a significant variation among the options.</p>
<p>Ease of Implementation</p>	<p>Two criteria related to ease of implementation have been identified, and considered separately in this evaluation:</p> <ul style="list-style-type: none"> • Construction: This criterion considers the ease at which an option may be implemented from a technical basis. The option which would take the least amount of effort to implement is the do nothing as it requires no additional works. Implementing a free-flowing river (Option 2) or reinstating the dam (Option 3), including associated river management works, are both feasible and include various construction activities. Given more construction works are necessary to reinstate the dam, this option is considered more difficult to implement from a construction standpoint. • Permits and Approvals: The Stage 1 Report (Appendix A-8) identified the approvals anticipated for each option based on a review of regulations and consultation with the Agency Review Committee. This indicated that Option 3 (reinstating the dam) will be the most difficult to receive the required permits and approvals. It is expected that it will be difficult to approve without significant rehabilitation and compensation to maintain and enhance environmental sensitive species and habitats that would be threatened if the dam is reinstated and water levels rise.
<p>Operations and Maintenance</p>	<p>The ease at which an option can be operated and maintained was also considered. Reinstating the dam will have the highest degree of operational and maintenance requirements compared to the existing situation and is therefore rated the lowest.</p>

Compatibility with Existing Planned Infrastructure	There are a number of planned infrastructure projects in the Thames River corridor, including those identified in the Thames River Corridor Plan, London Plan and Back to the River design. The do nothing option does not allow the planned infrastructure projects to be incorporated into the One River Strategy. However, both Option 2 (free-flowing river) and Option 3 (reinstating the dam) can be planned and developed to incorporate the future infrastructure projects.
Capital Costs	Capital costs have not been estimated for these options. However, capital costs of each option have been compared on a relative basis (available in the Stage 1 Report in Appendix A-7). As the do nothing option requires the least capital works it is the least expensive option. Option 3 (reinstating the dam) requires re-construction of the dam, along with associated river management works, and is therefore the most expensive. Implementing Option 2 (free-flowing river) would require some minor modifications to the dam as well as associated river management works.

Note:

The Stage 1 Public Consultation process informed this evaluation, the public consultation process is documented in Section 8 of this report.

4.5.4 Options Scoring

The detailed options evaluation matrix and discussion of potential impacts for each detailed criterion can be found in Appendix A-7. This evaluation exercise documented the anticipated impacts for each of the options in relation to the “existing condition” as defined as the state of the current Thames River without the Springbank Dam in operation.

Comparison to the existing condition provided the required baseline for the comparative analysis. Each anticipated impact was given a rating score based on the rating scale identified for each criterion in Table 4-1. Scores were normalized for each criteria category – natural, social/cultural and technical/economic – so that each category was considered of equal importance (scores for each category are out of 5 with 5 being the most preferred and 1 being the least). Scores by category were then summed to provide a score out of 15 for each option. The option with the highest score was ranked as the preferred option.

Table 4-3 presents a summary of the normalized score by criteria category. By normalizing the data, it weighted each criteria category the same, regardless of how many individual criteria make up that criteria category. This normalizing process means that each criteria category was considered of equal importance in the evaluation.

The free-flowing river (Option 2) was ranked highest in terms of natural environment; it provided the most benefits to the natural environment, by improving water quality, aquatic and terrestrial habitats, and protecting and enhancing species at risk. The free-flowing river (Option 2) and reinstating the dam (Option 3) scored similarly on the social/cultural environment category, 4.3 and 4.1 (of 5) respectively. This result was expected as option 2 and option 3 had a similar potential to maintain and enhance social and cultural resources within the study area (with the exception of recreational activities). Option 2 (free-flow river) provided more fishing recreational activities, while Option 3 (reinstating the dam) favored more boating and park shoreline recreational activities. Option 1 (do nothing) received the highest score on the Technical and Economic category as it was the simplest to implement at the lowest cost. Option 2 (free-flowing river) scored second, followed by Option 3 (reinstating the dam). Reinstating the dam’s (Option 2) lower score was due to challenges related to the required permits and approvals.

Table 4-3. Score Summary by Criteria Category

Criteria Category	Option 1: Do Nothing	Option 2: Free-flowing River	Option 3: Reinstating the Dam
Natural Environment	3.0	4.5	1.3
Social/Cultural Environment	2.1	4.3	4.1
Technical and Economic	3.7	3.1	2.1
Total (of 15)	8.8	12.0	7.6

4.5.5 Recommended Springbank Dam Option

Based on the overall assessment, Option 2 – Free-Flowing River rated highest as it provides the most benefits and best met the problem statement objectives to:

- *“maintain and enhance this shared natural, cultural, recreation and aesthetic resource; and*
- *Preserve for future generations this valuable resource and allow people of all abilities to enjoy and access this designated Canadian Heritage River.”*