

5. Stage 2 Alternatives Development, Evaluation and Selection of Preferred Alternatives

5.1 Background

The One River EA was conducted in two stages. The purpose of this approach was to first determine the future function of the Springbank Dam, completed during Stage 1 of the One River EA (as described in Section 4 of this report), before developing an overall One River Management Strategy in Stage 2.

The purpose of Stage 2 was to develop the One River Management Strategy which included three components:

- **Springbank Dam:** In Stage 1, the “Free Flowing” River Option was selected to be carried forward to Stage 2. Stage 2 identified and evaluated alternatives for implementing the Stage 1 Option and put forward a selected preferred alternative. This component of the One River EA was completed as a Schedule B Municipal Class EA, allowing the City to move forward with phases 3 and 4 (Detailed Design) of the EA process after the endorsement of the One River Master Plan EA by the City. This is considered “Approach 2” under the MEA Master Planning Process. An Environmental Impact Study (EIS) and Stage 2 Archeological Assessment were completed for the Springbank Dam study area (Figure 5-1). The findings of these investigations are summarized in Section 3 of this report. The detailed findings can be found in Appendix A-5 and A-3 respectively.
- **The Forks of the Thames:** Stage 2 identified and evaluated alternatives and put forward a selected preferred alternative for the Forks of the Thames. The alternatives that were evaluated are based on the award winning design for the Ribbon of the Thames from the Back to the River competition. This component of the One River EA is being completed as a Schedule B Municipal Class EA, allowing the City to move forward with phases 3 and 4 after the endorsement of the One River Master Plan EA by the City. This is considered “Approach 2” under the MEA Master Planning Process. An EIS and Stage 2 Archeological Assessment were completed for the Forks of the Thames study area (Figure 5-1). The findings of these investigations are summarized in Section 3 of this report. The detailed findings can be found in Appendix A-4 and A-3 respectively.
- **River Management Plan:** Stage 2 developed an overall plan for the Thames River within the One River Master Plan EA study area (Figure 1-1) in regard to river access and environmental management. Stage 2 identified and evaluated River Management Plan Alternatives, putting forward a selected preferred alternative for River Management. Schedule B and C projects identified within the One River Master Plan EA as part of the Stage 2 River Management Plan (beyond the Springbank Dam and Forks of the Thames projects) will require additional EA efforts. Schedule A projects may proceed on the basis of this Master Plan. This is considered “Approach 1” under the MEA Master Planning Process. A River Characterization Study and Natural Heritage Assessment were conducted to support the alternative development and evaluation. The findings of these investigations are the basis for the Natural Environment summarized in Section 3 of this report. The detailed findings can be found in Appendix A-1 and A-2 respectively.

The One River Management Strategy incorporated the selected preferred alternatives for both the Springbank Dam and Forks of the Thames in addition to the preferred components of the River Management Plan into a comprehensive vision for the Thames River.

The purpose of this section is to document Stage 2 of the One River EA including the development and evaluation of alternatives.

5.2 Stage 2 Consultation and Engagement

The One River Master Plan EA included an extensive public consultation and engagement program. The public consultation and engagement performed in Stage 2 built upon the consultation and engagement

activities completed in Stage 1. The Stage 2 public consultation activities are summarized in the following sections.

5.2.1 Public Consultation

During Stage 2, the following public consultation activities were conducted:

- **Notice of Commencement:** A notice of commencement of Stage 2 and the first Stage 2 public information center was mailed to the project mailing list and published in a local London newspaper, The Londoner.
- **Public Information Center 2:** Public Information Center 2 was hosted on June 6, 2018. Approximately 200 people attended including several stakeholders, local residents, interest groups, and First Nations representatives. Feedback was provided in the form of surveys and comments to project team members. Several emails providing feedback were also received following the PIC. Presentation materials and communications received during the consultation process are summarized in Section 8 and Appendix B.
- **Public Information Center 3:** Public Information Center 3 was hosted on October 3, 2018. Approximately 200 people attended including several stakeholders, local residents, interest groups, and First Nations representatives. Feedback was provided in the form of surveys and comments to project team members. Several emails providing feedback were received following the PIC. Presentation materials and communications received during the consultation process are summarized in Section 8 and Appendix B.
- **Webpage:** The project webpage included the Notice of Public Information Centre 2 and 3, PIC materials presented as well as an on-line version of the survey that was made available at the PIC.
 - [Getinvolved.london.ca/OneRiver](https://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 2 and 3.
- **Traditional Media:** Local news media coverage was used to raise awareness of the One River Master Plan EA, advertise Public Information Centre 1 and 2, and direct the public to the [getinvolved.london.ca](https://www.getinvolved.london.ca) webpage to learn more and complete the survey.

Feedback received from the public through the Stage 1 and Stage 2 consultation activities is summarized in Section 8 and is provided in detail in Appendix B. The feedback received was incorporated into the development of alternatives for Stage 2, as well as the development of the evaluation frameworks including criteria and performance measures.

5.2.2 Agency Consultation

In accordance with the Master Plan EA process, government agencies were notified of study commencement during Stage 1 of the One River EA and of upcoming PICs during the study process. They were asked to provide comments regarding requirements for the conduct of the EA. Specific government agencies were 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 DFO. A list of members and represented agencies is included in Section 8 and Appendix B of this report.

In addition to the meetings held with the Agency Advisory Committee during Stage 1, two meetings were held over the course of Stage 2. The first meeting presented the Committee with the outcome of Stage 1 and asked for comment on the proposed approach for Stage 2. A second meeting was held with the Agency Advisory Committee to solicit their input on the draft outcome of Stage 2. Summaries of these meetings are included in Appendix B-3.

5.2.3 First Nations and Metis Engagement

First Nations engagement continued throughout Stage 2. The project team contacted the London Area First Nations and provincial Metis organizations through mail and email correspondence.

A meeting was held with First Nations communities on June 11th, 2018, presenting the Stage 2 PIC #2 materials as well as information on other recent projects completed by the City relating to the water quality of the Thames (PPCP and Dingman Creek EA). The second community meeting, presenting the PIC #3 materials, was also held at the COTTFN, Antler River Senior Centre on October 17, 2018.

Members of the First Nations community were asked to provide their feedback by filling in the Stage 2 surveys. Comments and additional feedback received during the community meetings informed decisions on the Stage 2 criteria development, evaluation of alternatives, and planning of subsequent meetings. A summary of First Nations comments is included in Section 8 of this report and detailed comments and responses are included in Appendix B-4.

5.3 Springbank Dam

The “Free Flowing River” Option was selected as the preferred option for the future of the Springbank Dam in Stage 1. In Stage 2, three options for decommissioning the dam were evaluated:

5.3.1 Springbank Dam Alternatives

5.3.1.1 Alternative 1: Do Nothing

Under this alternative the Springbank Dam would be maintained in its current condition. This would include a preventive rehabilitation program with safety inspections at regular intervals. Figure 5-2 illustrates the current Springbank Dam condition and represents the do nothing alternative.

5.3.1.2 Alternative 2: Partial Dam Removal

Under the partial dam removal alternative, dam equipment including (but not limited to) hydraulics, gates, and control room electronics would be removed. This alternative also includes works to improve dam structure stability and removal of the concrete apron on the southern shoreline. This alternative would also include an ongoing preventive rehabilitation and safety inspection program. Figure 5-3 illustrates a birds-eye view of the partial dam removal alternative.

5.3.1.3 Alternative 3: Full Dam Removal

This alternative included the full removal of the Springbank Dam. This included the removal of all dam components and structures and incorporated removal of existing erosion control works along the banks of the river. The riverbank and riverbed would be restored with habitat improvements under this alternative. Figure 5-4 illustrates a birds-eye view of the full dam removal.

5.3.2 Evaluation of Springbank Dam Alternatives

5.3.2.1 Approach

The evaluation process for the selection of the preferred alternative 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 alternatives on the issues identified through the Problem/Opportunity statement. The criteria developed in Stage 1 (Section 4) for the evaluation of the Springbank Dam alternatives were used as a basis for the Stage 2 process. These criteria were customized for each Stage 2 component and incorporate feedback received through the consultation and engagement process. The criteria covered 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. The baseline condition definitions were customized for each Stage 2 component.

5.3.2.2 Evaluation Criteria and Performance Measures

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

- Natural Environment
- Social/Cultural
- Technical and Economic

The purposes of the evaluation were to identify a preferred alternative that best satisfies the objectives of the One River EA and to eliminate alternatives that do not meet the objectives from further consideration.

The criteria used to evaluate the Stage 2 Springbank Dam alternatives are presented in Table 5-1, along with descriptions of the rating scales for measuring impacts. The anticipated impact of the each of the three Springbank Dam alternatives 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 5-1. Springbank Dam Evaluation Criteria and Potential Ratings

Category & Criterion	Description	Measure/Indicator	Rating Scale for Measuring Impacts
Natural Environment			
Water Quality	The potential of the alternative 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 alternative 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)

Category & Criterion	Description	Measure/Indicator	Rating Scale for Measuring Impacts	
Species at Risk	The potential of the alternative 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 3 1	Improvement in the extent and quality of significant habitats for sensitive species and species at risk from existing conditions (positive effect) No change in the extent and quality of significant habitats for sensitive species and species at risk from existing conditions (neutral effect) 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 alternative 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 3 1	Improvement in the terrestrial habitat function and production capacity from existing conditions (positive effect) No change in the terrestrial habitat function and production capacity from existing conditions (neutral effect) Decrease in the terrestrial habitat function and production capacity from existing conditions (negative effect)
Aquatic Habitat	The potential for the alternative to maintain or enhance habitat for aquatic dependent species.	Potential change in the aquatic habitat function and production capacity compared to existing conditions.	5 3 1	Improvement in the aquatic habitat function and production capacity from existing conditions (positive effect) No change in the aquatic habitat function and production capacity from existing conditions (neutral effect) Decrease in the aquatic habitat function and production capacity from existing conditions (negative effect)
Groundwater and Surface Water interactions	The potential of the alternative to protect or improve groundwater and surface water interactions in order to maintain or improve water quality and quantity.	Potential changes in the groundwater and surface water interactions compared to existing conditions.	5 3 1	Improvement in groundwater and surface water interactions from existing conditions resulting in improvements to water quality and quantity (positive effect) No change in groundwater and surface water interactions from existing conditions resulting in no changes to water quality and quantity (neutral effect) Decrease in groundwater and surface water interactions from existing conditions resulting in degradation to water quality or decrease in water quantity (negative effect)
Social/Cultural				
Cultural Heritage	The potential of the alternative 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 related changes to the river regime No potential to degrade cultural/heritage resources related changes to the river regime Potential to degrade cultural/heritage resources related changes to the river regime
Public Health & Safety	The potential of the alternative 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 (positive effect) No change in potential risk or liability to community health and safety (neutral effect) Potential to degrade potential risk or liability to community health and safety (negative effect)
Boating Recreation	The potential of the alternative 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)

Category & Criterion	Description	Measure/Indicator	Rating Scale for Measuring Impacts	
Fishing Recreation	The potential of the alternative to provide or enhance fishing recreational activities.	Potential change in recreational fishing from existing conditions.	5 3 1	Improvement in fishing recreational from existing conditions (positive effect) No change in fishing recreational from existing conditions (neutral effect) Decrease in fishing recreational from existing conditions (negative effect)
Land-Based Recreation	The potential of the alternative to provide or enhance land-based recreational activities such as walking, biking and bird watching along the shoreline.	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 alternative 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 alternative 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)
Technical and Economic				
Flood Hazard	The ability of the alternative to mitigate flood hazards.	Potential change in risk of flood and erosion damage to public infrastructure and private property.	5 3 1	Positive change in potential risk of flooding No change in potential risk of flooding Negative impact in potential risk of flooding
Constructability	The ease of the alternative to be constructed and implemented on a technical basis.	Ease of constructing the alternative, 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; little or no short-term environmental impacts Moderately easy to implement; some challenges with construction such as land and equipment requirements, and timeframe for construction; some short-term environmental impacts, easily mitigated Very difficult to implement; major construction challenges such as land and equipment availability/requirements, long timeframe for construction, environmental impacts difficult to mitigate during construction
Approvals & Permitting	The ease of the alternative to obtain required permits and approvals from regulating agencies (e.g. UTRCA, MNR, MECP, DFO).	Ease of obtaining approvals and permits, including timeframe for receipt	5 3 1	No or very few 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

Category & Criterion	Description	Measure/Indicator	Rating Scale for Measuring Impacts	
Operations & Maintenance	The ease of the alternative to be operated and maintained.	Degree of change in operations and maintenance requirements from existing conditions	5 3 1	Reduction in operation and maintenance requirements from existing conditions (positive effect) No change in operations and maintenance requirements from existing conditions (neutral effect) Increase in operation and maintenance requirements from existing conditions (negative effect)
Potential for reuse/repurpose opportunities	The ability of the structure to provide future benefit to possible community use.	Opportunity for future use over and above existing conditions	5 3 1	Opportunity for addition reuse and repurposing No change from existing opportunities No opportunity for reuse or repurposing
Capital Cost	Relative capital costs.	Capital costs of an alternative relative to other alternatives	5 3 1	Lowest capital costs Moderate capital costs High capital costs
Ability to Finance	Alignment of alternative with financial planning and priority projects.	Ease of including alternative in financial planning for priority projects.	5 3 1	Consistent with the existing Financial Plan Easily able to finance within the City's existing Financial Plan Is not consistent with the existing Financial Plan

5.3.2.3 Springbank Dam Alternative Evaluation

This section describes the impacts assessment on the natural, social/cultural, and technical/economic criteria. The detailed assessment can be found in Appendix A-9. Table 5-2 summarizes the impacts assessment for the alternatives within each criterion.

Table 5-2. Springbank Dam Alternatives Qualitative Evaluation

<i>Natural Environment</i>	
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).</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). 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> <p>No change is anticipated with the do nothing alternative. Alternative 2 and 3 are both anticipated to positively impact water quality by reducing bed scour (and therefore TSS load in the river) when the parts of the dam or the full dam is removed. Alternatives 2 and 3 will also allow sediment upstream to flow more freely downstream and reduce the built up of fine sediment (and potential contaminants) upstream.</p>

<p>Geomorphology</p>	<p>The Thames River at Springbank Dam has had a substantial response to the establishment of a free-flowing system. Previously submerged barforms along the margin have rapidly vegetated, providing some limited floodplain relief and roughness, as well as enhancing riparian habitat. Overall, there is more variability in morphology, habitat and substrates near the old pumphouse extending further upstream as far as the Forks. However, the section directly upstream of the dam is still influenced by the backwater effect of the open dam gates, and presence of riprap along the left bank and into the channel. The scour hole near the downstream side of the south shore near the dam is believed to have been caused by historical operation of the sluice gate (Parish, 2010), rather than by the current free-flowing conditions. However, the existing structure still constricts flow which encourages scour as flow expands during flood conditions.</p> <p>The do nothing (Alternative 1) provides no change to extent and risk of streambank erosion and stream bottom scour from the existing condition. Alternative 2 (Partial Dam Removal) and Alternative 3 (full dam removal) will reduce the risk of streambank erosion and stream bottom scour by increasing the capacity of the channel to convey flow, and reducing the constrictive effect of the dam and its gates. These alternatives will also enhance localized sediment transport and the potential for further natural channel recovery. Alternative 3 (full dam removal) is ranked higher when all structures are removed with the banks being remediated, improving overall stability and function.</p> <p><i>Erosion protection measures along the south bank are required for either a fully or partially removed dam (Alternatives 2 and 3, respectively).</i></p>
<p>Species at Risk</p>	<p>SAR and their respective habitats in the study area have been identified through the Springbank Dam Decommissioning EIS. There are three confirmed SAR and three potential SAR identified in the within or near the study area. The confirmed SAR include Chimney Swift, Spiny Softshell, and Silver Shiner. SAR can be impacted by habitat loss and/or alteration, disturbance/avoidance of habitat, and injury or incidental take. The largest potential impact to SAR will likely result from access and construction, however these impacts would be short-term and isolated.</p> <p>No changes are anticipated for the Do Nothing alternative. Alternative 2 (Partial Dam Removal) and Alternative 3 (full dam removal) both anticipate a positive impact to SAR by enhancing fish passage. Alternative 3 (full dam removal) is ranked higher as the full structure would be removed, leaving no barrier for fish or wildlife passage.</p> <p>Additional discussion on SAR in the study area can be found in Appendix A-5.</p>
<p>Terrestrial Habitat</p>	<p>Terrestrial features present within and surrounding the Springbank Dam include significant valleylands, significant woodlands, and significant wildlife habitat. The terrestrial habitat areas most impacted by the alternatives are the mapped vegetation communities along the southern bank of the Thames River Valley (ELC communities Mineral Treed Shoreline (SHTM1), Willow Gravel Shrub Shoreline (SHSR1-2), and Dry-Fresh Sugar Maple Deciduous (FOD5-1)).</p> <p>No changes are anticipated for the Do Nothing alternative. Alternative 2 (Partial Dam Removal) and Alternative 3 (full dam removal) both anticipate a positive impact to terrestrial habitat by naturalization portions of the shoreline. Alternative 3 (full dam removal) is ranked higher as both banks can be restored if the full structure is removed.</p> <p>Additional discussion on SAR in the study area can be found in Appendix A-5.</p>
<p>Aquatic Habitat</p>	<p>The aquatic habitat in the Thames River at upstream of the Springbank dam has been altered and improved considerably since the dam became inoperable in 2006. There are a variety of habitat features near the dam which could fulfill a number of habitat requirements such as spawning, rearing, food supply, and refuge. The Thames River also provides an important migration corridor for a variety of species; therefore, it can be designated as high fish habitat potential for warm/cool water species. Although the non-operation of the dam gates has improved fish passage, a study completed by Biotactic in October 2010 found that the dam gates still provide some interference to fish passage (Biotactic, 2010).</p> <p>No changes are anticipated for the Do Nothing alternative. Alternative 2 (Partial Dam Removal) and Alternative 3 (full dam removal) both anticipate a positive impact to aquatic habitat by naturalizing portions of the shoreline and unimpeded movement through the dam. Alternative 3 (full dam removal) is ranked higher as the river can fully naturalize the aquatic habitat if there is no impeding structure in the river.</p> <p>Additional discussion on SAR in the study area can be found in Appendix A-5.</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 increased recharge to groundwater and lowering water levels resulted in increased discharge to surface water. Natural river beds and banks areas provide opportunities for these groundwater and surface water interactions to occur. In the study area there are significant groundwater recharge areas located on the north side of the Thames near Springbank. The area is also contained within a highly vulnerable aquifer area (Official Plan Map 6).</p> <p>No changes are anticipated for the Do Nothing alternative or Alternative 2 (Partial Dam Removal). Alternative 3 (full dam removal) anticipates a positive impact to groundwater surface water interaction by increasing the potential for groundwater seeps, due to the reduction in hardened bank surfaces.</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 CHRS. The Springbank Dam is not considered a cultural heritage feature. Both Alternative 1 (do nothing) and Alternative 2 (Partial Dam Removal) will have no impact to cultural heritage features as no changes are intended. Alternative 3 (full dam removal) improves the cultural heritage of the river as it improves the cultural heritage features associated with the Thames River as defined under the CHRS.</p>
<p>Public Health & 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. (City of London, 2019)”</i> Under the do nothing alternative, the existing dam structures will receive minimal maintenance and no strategy will be implemented to manage the river. Consequently, risks to community health and safety will be maintained in their current standard. Alternative 2 (Partial Dam Removal) and Alternative 3 (Full Dam Removal) will improve safety by removing the gates, in the case of Alternative 2, and by removing the gates and piers in the case of Alternative 3.</p>
<p>Boating 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>. 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 alternative will have on the varying types of recreational activities.</p> <p>Boating recreation includes water sports such as canoeing, rowing, and kayaking. Full dam removal (Alternative 3) and Partial dam removal (Alternative 2) both similarly improve the opportunity for boating. In the case of Alternative 2 the removal of the gates improves conditions for boating through the dam pier. Removing the piers and restoration along the riverbank and shoreline improves boating recreation. Currently, the Springbank Dam can be used to launch a boat, under Alternative 3 (full dam removal) boating is improved but access to the bank to launch a boat may be more difficult. Under alternative 2 (partial dam removal) represents an opportunity to improve the existing boating access and slightly improves boating across the dam with the removal of the gates.</p>
<p>Fishing Recreation</p>	<p>Fishing recreation will continue to improve as the Thames River stabilizes with the continued in-operation of the Springbank Dam as the diversity of fish species will increase. Fishing recreation will be most improved by the full removal of the dam (Alternative 3) but will marginally be improved from current conditions under Alternative 2 (Partial Removal).</p>
<p>Land-Based Recreation</p>	<p>For the evaluation the land-based activities were defined as walking, biking, bird-watching, and other sports along the river corridor. The Springbank Dam currently provides land-based recreation activities that would not be available under Alternative 3 (full dam removal). Alternative 2 (Partial Dam Removal) provides opportunities to increase the range of land-based recreation activities available by maintaining the dam abutment.</p>
<p>Shoreline Accessibility</p>	<p>The evaluation defined the shoreline accessibility criteria as the potential of the opportunity of the alternative to enhance public accessibility to the river. Alternative 2 (partial dam removal) enhances the opportunities for shoreline access while also naturalizing the shoreline. Alternative 3 (full dam removal) limits access to the shoreline through bank and shoreline naturalization and erosion protections, a naturalized shoreline is more difficult to access due to bank slope and dense vegetation.</p>

Aesthetics	Aesthetics are subjective and can be defined very differently by various groups. This was demonstrated through the public feedback received throughout Stages 1 and 2. As the Thames river is a designated heritage river, the aesthetics are evaluated based on its heritage river status. Alternative 3 (full dam removal) scores the highest as fully removing the dam and restoring the shoreline is consistent with the vision of the Thames River as a heritage river as defined in "The Thames Strategy: Managing the Thames as a Canadian Heritage River" (UTRCA, 1998).
Technical and Economic	
Flood Hazard	Flood hazard is defined for this evaluation as the ability of an alternative to mitigate flood hazards. This is an important consideration in selecting alternatives. The goal is to reduce the risks of flood and erosion damage to public infrastructure and private property. The do nothing (Alternative 1) and partial dam removal (Alternative 2) alternatives will provide no change in the ability to protect the Thames River corridor from flooding. Alternative 3 (full dam removal) reduces flood risk by reducing the potential for debris obstructing the flow path.
Constructability	Constructability is defined as the ease of the alternative to be constructed and implemented on a technical basis. The alternative that would take the least effort to construct or implement is the do nothing alternative (Alternative 1) as it requires no additional works. Implementing Alternative 3 (full dam removal) is feasible but will require extensive construction efforts as well as mitigation strategies to manage environmental impacts of construction. Alternative 2 (partial dam removal) poses some construction challenges, largely around the removal of the gates in the river bed, but will be simpler to implement compared to Alternative 3.
Permits and Approvals	The stage 1 report (Appendix A-8) identified the approvals anticipated for Springbank Dam alternatives based on a review of regulations and consultation with the Agency Review Committee. The approvals identified with respect to the Springbank Dam alternatives developed in Stage 2. The alternatives required for Alternatives 2 and 3 are very similar in terms of the required permitting and approvals. Alternative 1 requires no approvals or permits.
Operations and Maintenance	The ease at which an alternative can be operated and maintained was also considered. Full dam removal (Alternative 3) will have no ongoing operations and maintenance requirements. Alternative 1 (do nothing) and Alternative 2 (partial dam removal) will require ongoing maintenance of the dam structure. Alternative 1 (do nothing) will require additional maintenance as the structure and dam components age, particularly equipment which is submerged, such as the gates and related hydraulics. These maintenance requirements are not required under Alternative 2 (partial dam removal) as the gates and related hydraulics will be removed.
Potential for reuse/repurpose opportunities	This evaluates the potential opportunities for reuse or repurposing of the Springbank Dam. Alternative 2 (partial dam removal) is the only alternative which provides the opportunity for future reuse or repurposing of the structure. Alternative 1 (do nothing) and Alternative 3 (full dam removal) provide no opportunities for potential future reuse or repurpose.
Capital Costs	Quantitative capital costs have not been estimated for these alternatives. However, capital costs of each alternatives have been compared on a relative basis. As the do nothing alternative (Alternative 1) requires the least capital works it is the least expensive alternative. Alternative 3 (full dam removal) requires the extensive construction to remove the dam and remediate the bank and shoreline and is therefore, the most costly alternative. The implementation of Alternative 2 (partial dam removal) requires moderate construction and includes some shoreline remediation.
Ability to Finance	This criterion evaluates the alignment of the alternative with the City's current financial planning for priority projects. Alternative 1 (do nothing) is consistent with the City's financial planning. Alternative 3 (full dam removal) is not consistent with the financial plan, there are no funds already allocated for the removal of the Springbank Dam. Alternative 2 (partial dam removal) is somewhat consistent with the City's financial plans, funds are not specifically allocated toward the Dam but there is limited ability to finance within the existing financial plan.

Note:

The Stage 2 Public Consultation process informed this information, the public consultation process is documented in Section 8 of this report.

5.3.2.4 Springbank Dam Alternatives Scoring

The detailed alternatives matrix and descriptions of relative impacts for each detailed criterion can be found in Appendix A-9. This exercise documented the anticipated impacts for each of the alternatives in relation to the "existing conditions", defined as the state of the current Thames River and Springbank Dam in the study area.

Comparison to the existing condition provided the required baseline for the comparative analysis (as represented by the Do Nothing alternative [Alternative 1]). Each criterion was scored based on the anticipated impacts of each of the alternatives. As indicated in the evaluation table, scores were normalized for each criteria category – natural, social/cultural and technical/economic – so that each category could be 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 alternative. The alternative with the highest score was ranked as the preferred alternative.

Table 5-3, below, presents a summary of the normalized score by criteria category. By normalizing the data it weights 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.

As indicated in Table 5-3, the Full Dam Removal (Alternative 3) is ranked the highest in terms of the Natural Environment category; it would provide the most benefits to the natural environment by improving water quality, aquatic and terrestrial habitats, and would best protect and enhance species at risk.

Partial Dam Removal (Alternative 2) scored in the middle position for the Natural Environment category and scored the highest in the Social/Cultural Environment category due to the opportunities this alternative provides for boating and fishing recreation as well as shoreline access.

Full Dam Removal (Alternative 3) scored second highest on the Social/Cultural Environment category. Alternative 1 (Do Nothing) scored highest on the Technical and Economic category, largely due to the ease and low cost of implementation. Alternative 2 (partial Dam Removal) score on the Technical and Economic category was similar to Alternative 1 (Do Nothing). Alternative 3 (Full Dam Removal) scored lowest due to the difficulty and cost to implement.

Table 5-3. Springbank Dam Score Summary by Criteria Category

Criteria Category	Alternative 1 Do nothing	Alternative 2 Partial Dam Removal	Alternative 3 Full Dam Removal
Natural Environment	2.8	3.7	4.8
Social/Cultural Environment	3.0	4.1	3.9
Technical and Economic	4.3	4.2	2.7
Total Score	3.4	4.0	3.8

Note:

The detailed evaluation scores for each alternative by each criterion can be found in Appendix A-9.

5.3.2.5 Springbank Dam Selected Preferred Alternative

Based on this scoring exercise, Alternative 2 (Partial Dam Removal) scored the highest and became the preferred alternative. As presented in Table 5-3, Alternative 2 (Partial Dam Removal) was selected primarily due to the scores on the Social/Cultural Environment and Technical and Economic criteria categories.

Figure 5-3 illustrates the selected preferred alternative.

5.4 The Forks of the Thames

The London Community Foundation, in partnership with the City and the UTRCA, held a “Back to the River” competition in 2015. The purpose of the competition was to seek concepts for the revitalization of a five kilometer section of the Thames River radiating from The Forks. The competition jury members selected the Civitas/Stantec team’s “Ribbon of the Thames” as the winning design. The Civitas/Stantec design for The Forks of the Thames included a signature walkway located in Ivey Park providing scenic views of all three branches of the Thames River as well as terracing features from Ivey Park down the

slope to the riverbank. Figure 5-5 shows the Civitas/Stantec award-winning design concept for The Forks of the Thames from the Back to the River competition.

Stage 2 Alternatives developed for the Forks of the Thames are based on the original award-winning Back to the River Design and were developed by the award-winning team in collaboration with the City staff and the One River Master Plan project team.

For the evaluation of the Forks of the Thames alternatives the two primary components, the “ribbon” and the terraces, were evaluated separately. Four alternatives were developed for the Ribbon of the Thames and two alternatives were developed for the terraces at the Forks. The two components were evaluated separately. The evaluation also considered a “Do Nothing” alternative to provide a baseline for alternatives comparison.

This section describes the alternatives for the Forks of the Thames, evaluation process, and the selected preferred alternatives for the Ribbon and Terraces. The selected alternatives for the Ribbon and the Terraces combined represent the overall preferred alternative for the Forks of the Thames.

5.4.1 The Forks “Ribbon of the Thames” Alternatives Development

These alternatives were developed and refined through the public consultation process in Stage 2. The public consultation materials and a summary of feedback on the “Ribbon of the Thames” alternatives are included in Appendix B.

5.4.1.1 Do Nothing

This alternative represented the existing conditions at the Forks of the Thames and served as a basis of comparison for the purposes of the evaluation exercise. Figure 5-6 presents the existing conditions at the Forks of the Thames.

5.4.1.2 Alternative 1: Walkway Supported by Piers in the Thames

This alternative represented the original award winning “Ribbon of the Thames” design. This alternative was described as a walkway stretching over the Thames River at the Forks of the Thames and looping back to the shore, providing a scenic view of all three branches of the Thames River. This walkway is supported by piers in the river.

Figure 5-5 illustrates the Ribbon of the Thames Alternative 1 (Walkway Supported by Piers in the Thames).

5.4.1.3 Alternative 2: Suspended Walkway

This alternative was described as a walk way stretching over the Thames River at the Forks of the Thames and looping back to the shore, providing a scenic view of all three branches of the Thames River. This walkway is suspended over the river.

Figure 5-7 illustrates the Ribbon of the Thames Alternative 2 (Suspended Walkway).

5.4.1.4 Alternative 3: Kensington Bridge Extension and Lookout

This alternative would expand active transportation access on the south side of Kensington Bridge providing multiple scenic views of the Forks of the Thames and branches of the Thames River.

Figure 5-8 illustrates the Ribbon of the Thames Alternative 3 (Kensington Bridge Extension and Lookout).

5.4.1.5 Alternative 4: Land Based Walkway

This alternative was described as a land-based walkway which provides views of all three branches of the Thames River and Forks of the Thames. This walkway is elevated over the shoreline at the Forks of the Thames and is supported by shoreline piers or pillars.

Figure 5-9 illustrates the Ribbon of the Thames Alternative 4 (Land Based Walkway).

5.4.2 The Forks “Terrace” Alternatives Development

The award-winning Ribbon of the Thames design included terracing within Ivey Park to the Thames River shoreline at the Forks. This component of the Forks design is evaluated independently from the Ribbon.

5.4.2.1 Alternative 1: Hardscape

In this alternative, terraces from Ivey Park down the slope toward the Thames River shoreline are largely a hardscaped surface.

Figure 5-10 illustrates the Hardscape Terrace Alternative 1.

5.4.2.2 Alternative 2: Softscape

In this alternative, terraces from Ivey Park down the slope toward the Thames River shoreline are constructed of a hard material, with cut outs for planters and other softscape surfaces.

Figure 5-11 illustrates the Softscape Terrace Alternative 1.

5.4.3 Evaluation of the Forks Alternatives

5.4.3.1 Approach

The evaluation process for the selection of the alternative for the Forks of the Thames 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 alternatives on the issues identified through the One River EA Problem/Opportunity statement. The criteria developed for the evaluation of the Forks of the Thames are based on the criteria developed for the Springbank Dam in Stage 1 of this EA. These criteria were customized for the Forks of the Thames alternatives. These criteria incorporated feedback received through the Stage 1 and Stage 2 consultation process.

The criteria cover the range of potential impacts or changes from what was considered the “Baseline Condition”. This baseline condition is represented by the existing conditions, at the time of the study, in the river and at the Forks of the Thames within the boundaries of the study area.

5.4.3.2 Evaluation Criteria and Performance Measures

The evaluation of the three alternatives 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 purposes of the evaluation were to identify a preferred alternative that best satisfied the objectives of the One River EA and eliminated alternatives that do not meet the objectives from further consideration.

The criteria for the Forks of the Thames alternatives evaluation are presented in Table 5-4, along with descriptions of the rating scales for measuring impacts. The anticipated impact of the each of alternatives 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.

This section describes the impacts assessment on the natural, social/cultural, and technical/economic criteria, additional details on this assessment can be found in Appendix A-9.

Table 5-4. Forks of the Thames Evaluation Criteria and Potential Ratings

Category & Criterion	Description	Measure/Indicator	Rating Scale for Measuring Impacts	
Natural Environment				
Water Quality	The potential of the alternative to maintain or improve water quality.	Potential change in water quality compared to the existing conditions for total suspended solids and total phosphorus.	5 3 1	Improvement to water quality from existing conditions (positive effect) No change in water quality from existing conditions (neutral effect) Decrease/degradation in water quality from existing conditions (negative effect)
Geomorphology	The potential of the alternative 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 3 1	Improvement in the stability of the river system from existing conditions (positive effect) No change in the stability of the river system from existing conditions (neutral effect) Decrease in the stability of the river system from existing conditions (negative effect)
Species at Risk	The potential of the alternative 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 3 1	Improvement in the extent and quality of significant habitats for sensitive species and species at risk from existing conditions (positive effect) No change in the extent and quality of significant habitats for sensitive species and species at risk from existing conditions (neutral effect) 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 alternative 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 3 1	Improvement in the terrestrial habitat function and production capacity from existing conditions (positive effect) No change in the terrestrial habitat function and production capacity from existing conditions (neutral effect) Decrease in the terrestrial habitat function and production capacity from existing conditions (negative effect)
Aquatic Habitat	The potential for the alternative to maintain or enhance habitat for aquatic dependent species.	Potential change in the aquatic habitat function and production capacity compared to existing conditions.	5 3 1	Improvement in the aquatic habitat function and production capacity from existing conditions (positive effect) No change in the aquatic habitat function and production capacity from existing conditions (neutral effect) Decrease in the aquatic habitat function and production capacity from existing conditions (negative effect)

Category & Criterion	Description	Measure/Indicator	Rating Scale for Measuring Impacts	
Groundwater and Surface Water interactions	The potential of the alternative to protect or improve groundwater and surface water interactions in order to maintain or improve water quality and quantity.	Potential changes in the groundwater and surface water interactions compared to existing conditions.	5 3 1	Improvement in groundwater and surface water interactions from existing conditions resulting in improvements to water quality and quantity (positive effect) No change in groundwater and surface water interactions from existing conditions resulting in no changes to water quality and quantity (neutral effect) Decrease in groundwater and surface water interactions from existing conditions resulting in degradation to water quality or decrease in water quantity (negative effect)
Social/Cultural				
Cultural Heritage	The potential of the alternative 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 related changes to the river regime No potential to degrade cultural/heritage resources related changes to the river regime Potential to degrade cultural/heritage resources related changes to the river regime
Public Health & Safety	The potential of the alternative 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 (positive effect) No change in potential risk or liability to community health and safety (neutral effect) Potential to degrade potential risk or liability to community health and safety (negative effect)
Boating Recreation	The potential of the alternative 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 alternative 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 alternative to provide or enhance land-based recreational activities such as walking, biking and bird watching along the shoreline.	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 alternative 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)

Category & Criterion	Description	Measure/Indicator	Rating Scale for Measuring Impacts	
Aesthetics	The potential of the alternative 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)
Urban Revitalization	The potential of the alternative 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 alternative to mitigate flood hazards.	Potential change in risk of flood and erosion damage to public infrastructure and private property.	5 3 1	Positive change in potential risk of flooding No change in potential risk of flooding Negative impact in potential risk of flooding
Carbon Footprint	The ability of the alternative 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	Zero or positive change in carbon footprint or energy requirements compared to existing system Moderate, negative change carbon footprint or energy requirements compared to existing system High, negative change in carbon footprint or energy requirements compared to existing system
Constructability	The ease of the alternative to be constructed and implemented on a technical basis.	Ease of constructing the alternative, 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; little or no short-term environmental impacts Moderately easy to implement; some challenges with construction such as land and equipment requirements, and timeframe for construction; some short-term environmental impacts, easily mitigated Very difficult to implement; major construction challenges such as land and equipment availability/requirements, long timeframe for construction, environmental impacts difficult to mitigate during construction
Approvals & Permitting	The ease of the alternative to obtain required permits and approvals from regulating agencies (e.g. UTRCA, MNRF, MECP, DFO).	Ease of obtaining approvals and permits, including timeframe for receipt	5 3 1	No or very few 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

Category & Criterion	Description	Measure/Indicator	Rating Scale for Measuring Impacts	
Operations & Maintenance	The ease of the alternative to be operated and maintained.	Degree of change in operations and maintenance requirements from existing conditions	5 3 1	Reduction in operation and maintenance requirements from existing conditions (positive effect) No change in operations and maintenance requirements from existing conditions (neutral effect) Increase in operation and maintenance requirements from existing conditions (negative effect)
Compatibility with existing and planned infrastructure projects	The compatibility of the alternative with existing and planned public infrastructure projects.	Ability of an alternative 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 alternative relative to other alternatives	5 3 1	Lowest capital costs Moderate capital costs High capital costs
Ability to Attract Alternate Funding	Potential for the alternative to attract funding from other sources, including philanthropy.	Ability to attract additional funding through philanthropy.	5 3 1	Includes features very likely to attract alternate funding through philanthropy, grants, or programs. Moderately likely to attract alternate funding through philanthropy, grants, or programs. Unlikely to attract alternate funding.
Ability to Finance	Alignment of alternative with financial planning and priority projects.	Ease of including alternative in financial planning for priority projects.	5 3 1	Consistent with the existing Financial Plan Moderate ability to finance within the City's existing Financial Plan Is not consistent with the existing Financial Plan

5.4.3.3 The Forks Alternative Evaluation

This section describes the impacts assessment on the natural, social/cultural, and technical/economic criteria. The detailed assessment can be found in Appendix A-9. Table 5-5 summarizes the impacts assessment for the alternatives within each criterion.

Table 5-5. Forks of the Thames Alternatives Qualitative Evaluation

Natural Environment	
<p>Water Quality</p>	<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).</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. TP levels in the Thames River within the study area are above the MECF 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> <p>A decrease in water quality is anticipated with the do nothing alternative as leaving the existing conditions will result in continued deterioration of the shoreline and water quality as a result. No change is anticipated to water quality for the Ribbon Alternatives 1, 2, 3, and 4. Terracing Alternative 1 is anticipated to negatively impact water quality due to increase in runoff (leading to an increase in TSS) that will result from the hardscaping. Terracing Alternative 2 is anticipated to positively impact water quality by decreasing bank slopes and providing more vegetation buffer to reduce runoff (leading to a reduction in TSS).</p>
<p>Geomorphology</p>	<p>The Thames River in the study area is surrounded by urban land use, and confined by steep, elevated slopes, which include several flood protection dykes and constructed slopes (PARISH 2014). Along the eastern riverbank at the confluence, where the alternative is proposed, is currently engineered with vertically stacked gabion baskets with several lifts. These gabion baskets are showing signs of wear, and potential failure as the wire mesh rusts and disintegrates. Pools are generally associated with confluences, and at the Forks a deep channel scour hole has formed. Downstream of the confluence, the channel develops into a wide, uniform section. A large bar has developed immediately downstream of the confluence, extending outward from the right bank into the centre of the channel.</p> <p>A negative impact on geomorphology is anticipated with the do nothing alternative as leaving the existing conditions will result in continued deterioration of gabion baskets leading to bank failure, and excess scour due to the confined nature of the system. No change is anticipated to geomorphology for the Ribbon Alternatives 2, 3, and 4. Ribbon alternative 1 can have a negative impact on geomorphology as the piers will potentially alter the river hydraulics, leading to additional localized scour. Terracing; Alternatives 1 and 2 are both anticipated to positively impact geomorphology as the design will provide a more stable slope and enlarge the cross section to provide relief compared to the existing confinement. Terracing Alternative 2 is anticipated to more positively impact geomorphology as more natural vegetation will be incorporated into the design.</p> <p>Additional discussion on geomorphology in the study area can be found in Appendix A-1 and A-4 of this report.</p>
<p>Species at Risk</p>	<p>SAR and their respective habitats in the study area have been identified through The Forks of the Thames EIS. There are four confirmed SAR and 8 potential SAR identified in the within or near the study area. The confirmed SAR includes Barn Swallow, Chimney Swift, Eastern Spiny Softshell, and Silver Shiner. SAR can be impacted by habitat loss and/or alteration, disturbance/avoidance of habitat, and injury or incidental take.</p> <p>No changes are anticipated for the Do Nothing alternative. There are potential negative impacts to the SAR from all the Ribbon and Terracing alternative options as the designs are anticipated to bring more people to the River which could disturb the habitat. Ribbon Alternative 1 (Walkway with Pier) could do more harm due to piers disrupting the SAR aquatic habitat. Terrace Alternative 1 (hardscape) could also cause more negative impact as the hardscape reduced the riparian transition and tree cover.</p> <p>Additional discussion on SAR in the study area can be found in Appendix A-4.</p>

<p>Terrestrial Habitat</p>	<p>Terrestrial features present within and surrounding the study area include significant valleylands, significant woodlands, and significant wildlife habitat. The terrestrial habitat areas most impacted by the alternatives are the mapped vegetation communities along the eastern bank of the Forks (ELC polygon MEMM4 (Fresh Moist Mixed Meadow). The riparian areas along this bank are limited due to the gabion baskets lining the bank.</p> <p>No changes are anticipated for the Do Nothing alternative or Ribbon Alternative 3 (Kensington Bridge Extension and Lookout). Ribbon Alternatives 1, 2 and 4 could result in a negative impact to terrestrial habitat as the designs infringe on the existing trees, riparian vegetation and MEMM4 community. Negative impact is anticipated by the Terrace Alternative 1 (hardscaping) as the design will likely require tree removal and the conversion the MEMM4 community to an extension of the existing Parkland (CGL_2). The Terrace Alternative 2 (softscape) may have the same negative impacts but compensate for the loss by providing more native vegetation and improvements to the vegetation along the bank slope.</p> <p>Additional discussion on SAR in the study area can be found in Appendix A-4.</p>
<p>Aquatic Habitat</p>	<p>The aquatic habitat in the Thames River at the Forks is diverse due to the scour cause by the North and South Branch confluence and bar forms that have occurred around Kensington Bridge and downstream since the lowered water levels. Fish habitat mapping showed a mixture of geomorphic units present within this system and including riffles, pools, and runs. There were also nearshore areas containing woody debris which provided areas of refuge for fish.</p> <p>There are a variety of habitat features within the Forks study area which could fulfill a number of habitat requirements such as spawning, rearing, food supply, and refuge. The Thames River also provides an important migration corridor for a variety of species; therefore, it can be designated as high fish habitat potential for warm/cool water species.</p> <p>No changes are anticipated from the Do Nothing options, Ribbon Alternatives 2, 3 and 4 or the Terracing alternatives. Ribbon alternative 1 may have a negative impact on aquatic habitat by introducing additional structures (i.e. piers) to the existing habitat.</p> <p>Additional discussion on SAR in the study area can be found in Appendix A-4.</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 increased recharge to groundwater and lowering water levels resulted in increased discharge to surface water. Natural river beds and banks areas provide opportunities for these groundwater and surface water interactions to occur. Impermeable surfaces in the river bed and banks will impact interactions between groundwater and surface water.</p> <p>No changes are anticipated from the Do Nothing options, Ribbon Alternatives 3 and Terracing Alternative 2. Ribbon Alternative 1, 2, 4 and Terracing option 1 may have a negative impact on groundwater and surface water interactions by introducing impervious features to the bed and banks which could limit these interactions.</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 CHRS. The Kensington Bridge was identified as a heritage structure in the cultural heritage review. This is particularly relevant to the Ribbon Alternative 2 (Kensington Bridge Extension and Lookout). In the Stage 2 Archeological Report, no new archeological sites or cultural remains were discovered at the Forks. Recommendations were made for monitoring during construction should specific depths be disturbed as defined in the report.</p>
<p>Public Health & 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>No changes are anticipated for the Do Nothing alternative, Ribbon Alternative 2 (Suspended Walkway), Ribbon Alternative 4 (Land-based walkway), Terrace Alternative 1 (hardscape), or Terrace Alternative 2 (softscape). Alternative 3 (Kensington Bridge Extension and Lookout) would improve pedestrian safety on Kensington Bridge, the bridge may be replaced under a separate city initiative.</p>

Boating Recreation	<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>. 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 alternative will have on the varying types of recreational activities.</p> <p>No change is anticipated to boating recreation at the Forks of the Thames for Ribbon Alternatives 2, 3, and 4. No change is anticipated to boating recreation for either of the Terrace alternatives. Ribbon Alternative 1 will impact boating recreation negatively as supports located in the riverbed will interfere with boating.</p>
Fishing Recreation	<p>Fishing recreation will continue to improve as the Thames River stabilizes with the free flowing system and native fish species continue to inhabit and migrate through the area from up and downstream. Fish sampling at the Forks in 2017 captured over 1200 fish and confirmed 16 species. Local fisherman also frequented the area and noted that larger sport fish are often caught.</p> <p>The Do Nothing alternative is anticipated to decrease recreational opportunities for fishing as the banks and dock will continue to degrade. There are no distinguishable differences between the four Ribbon Alternatives. Terrace Alternative 1 (Hardscape) is expected to increase opportunities for fishing recreation by providing more areas to fish from. Terrace Alternative 2 (softscape) will also improve fishing recreation opportunities at the Forks, however not to the same extent as Alternative 1 (hardscape).</p>
Land-based Recreation	<p>For the evaluation the land-based activities were defined as walking, biking, bird-watching, and other sports along the river corridor. Alternative 1 (Walkway Supported by Piers in the Thames) and Alternative 2 (Suspended Walkway) will both provide increased land-based recreation at the Forks, Alternative 3 (Kensington Bridge Extension and Lookout) and Alternative 4 (Land-based walkway) will provide some improvement to pedestrian and cycling access.</p>
Shoreline Accessibility	<p>The evaluation defined the shoreline accessibility criteria as the potential of the opportunity of the alternative to enhance public accessibility to the river. There is no discernable difference from the existing conditions are anticipated for the Ribbon Alternatives. Terrace Alternative 1 (hardscape) will increase shoreline access at the Forks, Terrace Alternative 2 (softscape) will also increase shoreline access but slightly less than the Terrace Alternative 1 (hardscape).</p>
Aesthetics	<p>Aesthetics are subjective and can be defined very differently by various groups. This was demonstrated through the public feedback received throughout Stages 1 and 2. As the Thames River is a designated heritage river, the aesthetics are evaluated based on its heritage river status.</p> <p>It is expected that the do nothing alternative will result in the deterioration of the shoreline and aesthetic quality. Ribbon Alternative 1 (Walkway Supported by Piers in the Thames) and Ribbon Alternative 2 (Suspended Walkway) involve the construction of a large structure that could become the center piece of the Forks of the Thames. Ribbon Alternative 3 (Kensington Bridge Extension and Lookout) will result in minor changes to the bridge visuals and Ribbon Alternative 4 (Land-based walkway) does not represent a significant change from the existing view. Terrace Alternative 1 (hardscape) will marginally improve visuals of the river at the Forks while Terrace Alternative 2 (softscape) will similarly improve visuals of the river while being consistent with the cultural heritage aesthetics of the shoreline.</p>
Urban Revitalization	<p>Urban revitalization is defined in the evaluation as the potential for the alternative to encourage investment in London’s downtown and support the urban regeneration of the City. Both Ribbon Alternative 1 (Walkway Supported by Piers in the Thames) and Ribbon Alternative 2 (Suspended Walkway) represent keynote structures that are anticipated to become a centerpiece at the Forks of the Thames, thereby attracting reinvestment in the urban center. Ribbon Alternative 4 (Land-based walkway) is anticipated to attract some attention although not to the same degree as other alternatives. Ribbon Alternative 3 (Kensington Bridge Extension and Lookout) is not anticipated to be viewed as a centerpiece structure and is less likely to attract as much investment as the other Ribbon Alternatives.</p> <p>Terrace Alternative 1 (hardscape) and Terrace Alternative 2 (softscape) will both similarly attract residents and tourists to the urban center, thereby attracting commercial interest in the area.</p>
Technical and Economic	
Flood Hazard	<p>Flood hazard is defined for this evaluation as the ability of an alternative to mitigate flood hazards. The goal is to maintain or reduce the risks of flooding and erosion damage to public infrastructure and private property.</p> <p>The do nothing alternative, Ribbon Alternative 2 (Suspended walkway), Ribbon Alternative 3 (Kensington Bridge extension and lookout), and Ribbon Alternative 4 (land-based walkway) are not anticipated to have any impact on flood hazard. Ribbon Alternative 1 (Walkway Supported by Piers in the Thames) could increase flood hazard with piers placed in river. Both Terrace Alternative 1 (hardscape) and Terrace Alternative 2 (softscape) will slightly improve flood hazard by regrading the confluence floodplain, potentially decreasing water levels.</p>

Carbon Footprint	For the purposes of this evaluation carbon footprint is defined as the ability of the alternative to minimize carbon footprint. The do-nothing alternative scores the highest. Ribbon Alternatives 1 through 4 are progressively ranked from having the most to least carbon footprint. This is largely reflecting the magnitude of construction activities required. Terrace Alternative 1 (hardscape) having a moderate impact and Terrace Alternative 2 (softscape) having slightly less impact largely due to fewer hardened surfaces and more greenspaces.
Constructability	Constructability is defined as the ease of implementation for each alternative. The do nothing and Ribbon Alternative 4 (land-based walkway) are generally the simplest alternatives to implement and therefore received the highest scores (with ribbon alternative 4 scoring slightly more difficult to construct). Ribbon Alternative 1 (Walkway Supported by Piers in the Thames) and Ribbon Alternative 3 (Kensington Bridge Extension and Lookout) scored the most difficult to implement with Ribbon Alternative 2 (Suspended Walkway) scoring slightly easier to implement. Terrace Alternative 1 (hardscape) scored moderately difficult to implement with Terrace Alternative 2 (softscape) scoring as fairly easy to implement.
Approvals & Permitting	This criterion is evaluated based on the relative ease to obtain the required permits and approvals. As the do nothing alternative requires no approvals or permits it scored the highest. Ribbon Alternative 1 (Walkway Supported by Piers in the Thames) and Ribbon Alternative 3 (Kensington Bridge Extension and Lookout) scoring very difficult to implement, this is due to the approvals required to place structures in the river and the approvals necessary for modifications to heritage structures. Ribbon Alternative 2 (Suspended Walkway) and Ribbon Alternative 4 (land-based walkway) will be moderately easy to obtain approvals. There is no discernable difference in the approvals required for Terrace Alternatives 1 (hardscape) and 2 (softscape), both are anticipated to be moderately easy to obtain the required approvals.
Operations & Maintenance	This criterion evaluates changes in operations and maintenance requirements compared to the existing conditions. All of the Ribbon and Terrace Alternatives will increase maintenance requirements above the current conditions with Ribbon Alternative 3 (Kensington Bridge extension and lookout) requiring more operations and maintenance than the other alternatives.
Compatibility with existing and planned infrastructure projects	This criterion evaluates the ability of the alternative to integrate with existing planned infrastructure projects. Both Ribbon Alternative 1 (Walkway Supported by Piers in the Thames), Ribbon Alternative 2 (Suspended Walkway), and Ribbon Alternative 3 (Kensington Bridge Extension and Lookout) are compatible with the planned Dundas place connection. Ribbon Alternative 4 (Land-based walkway) is inconsistent with planned infrastructure upgrades as Kensington Bridge is a heritage structure. Terrace Alternative 1 (hardscape) is inconsistent with infrastructure planning as it reduces access to the trunk sewer located at the Forks. Terrace Alternative 2 (softscape) is moderately consistent with infrastructure planning as unpaved surfaces will allow greater access to the trunk sewer.
Capital Cost	Quantitative capital costs have not been estimated for these alternatives. However, capital costs of each alternative have been compared on a relative basis. The do nothing alternative has the lowest relative capital cost. Ribbon Alternatives 1 (Walkway Supported by Piers in the Thames) and 2 (Suspended Walkway) have the highest relative costs. Followed by Ribbon Alternative 3 (Kensington Bridge Extension and Lookout) with Ribbon Alternative 4 (Land-based walkway) the least costly. Terrace Alternative 1 (hardscape) is more costly relative to Terrace Alternative 2 (softscape) due to the costs of paved surfaces.
Ability to Attract Alternative Funding	This criterion evaluates the ability of the alternative to attract alternate funding. Ribbon Alternatives 1 (Walkway Supported by Piers in the Thames) and 2 (Suspended Walkway) are the most likely to attract alternative funding. Ribbon Alternatives 3 (Kensington Bridge Extension and Lookout) and 4 (Land-based walkway) are slightly more likely to attract alternate funding than the do nothing alternative. Both Terrace Alternatives are similarly able to attract alternate funding.
Ability to Finance	This criterion evaluates the alignment of the alternative with the City's current financial plan and priority projects. Ribbon Alternatives 1 (Walkway Supported by Piers in the Thames) and 2 (Suspended Walkway) along with Terrace Alternative 1 (hardscape) are the least consistent with the City's financial plan and list of priority projects. Ribbon Alternative 4 (Land-based walkway) and Terrace Alternative 2 (softscape) are somewhat consistent with the City's financial plan, but not with the City's list of priority projects.

Note:

The Stage 2 Public Consultation process informed this information, the public consultation process is documented in Section 8 of this report.

5.4.3.4 The Forks Alternatives Scoring

The detailed alternatives matrix and descriptions of relative impacts for each detailed criterion can be found in Appendix A-9. This exercise documented the anticipated impacts for each of the alternatives in relation to the “existing conditions”, within the study area.

Comparison to the existing condition provided the required baseline for the comparative analysis (as represented by the Do Nothing alternative). Each criterion was scored based on the anticipated impacts of each of the alternatives. As indicated in the evaluation table, scores were normalized for each criteria category – natural, social/cultural and technical/economic – so that each category could be 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 alternative. The alternative with the highest score was ranked as the preferred alternative.

Table 5-6, below, presents a summary of the normalized score by criteria category. As indicated in Table 5-6, Ribbon Alternative 2 (Suspended walkway) and Terrace Alternative 2 (softscape) scored the highest and form the preferred alternative. Ribbon Alternative 1 (Walkway Supported by Piers in the Thames) scores behind the other Ribbon Alternatives on the Environmental category largely due to the placement of piers in the Thames riverbed.

Ribbon Alternative 4 (land-based walkway) was scored the same as Ribbon Alternative 2 in the Environment category and scored the second highest in the Social/Cultural environment category and highest in Technical and Economic environment category putting it just slightly behind Ribbon Alternative 2 (suspended walkway) in the overall scores.

Ribbon Alternative 3 (Kensington Bridge Extension and Lookout) scored in third position partly due to the Kensington Bridge status as a heritage structure. This impacted the social/cultural environment category and technical and economic environment scores. Terrace Alternative 2 (softscape) scored above Terrace Alternative 1 (hardscape) in both the natural environment and technical and economic environment categories. It scored marginally lower in the social/cultural environment category. These differences in scores are partly due to the environmental advantages of some shoreline naturalization and pervious surfaces which provide environmental benefits as well as technical advantages (ease of access to sewer infrastructure beneath the Forks of the Thames).

Table 5-6. Forks of the Thames Score Summary by Criteria Category

Criteria Category	Natural Environment	Social/Cultural Environment	Technical and Economic	Total Score
Do nothing	2.7	2.3	3.7	2.9
Ribbon Alternative 1 Walkway Support with Piers in the Thames	1.7	3.6	2.0	2.4
Ribbon Alternative 2 Suspended Walkway	2.7	4.0	2.7	3.1
Ribbon Alternative 3 Kensington Bridge Extension and Lookout	3.0	2.9	2.2	2.7
Ribbon Alternative 4 Land Based Walkway	2.7	3.1	2.8	2.9
Terrace Alternative 1 Hardscape	2.0	4.1	2.3	2.8
Terrace Alternative 2 Softscape	3.2	4.0	3.1	3.4

Note:

The detailed evaluation scores for each alternative by each criterion can be found in Appendix A-9

5.4.3.5 The Forks Selected Preferred Alternative

Based on the scoring exercise, Ribbon Alternative 2 (Suspended Walkway) and Terrace Alternative 2 (softscape) collectively form the preferred alternative for the Forks of the Thames. As presented in Table 5-6 this was largely due to the natural environment and social/cultural category scores.

Figure 5-12 illustrates the selected preferred alternative for the Forks of the Thames.

5.5 River Management Plan

The preferred River Management Plan was selected based on environmental, social/cultural, technical and cost criteria and was incorporated the river access alternatives and the environmental management components. This section describes the alternatives identified for the River Management Plan, evaluation process, and the selected preferred alternative.

5.5.1 River Management Plan Alternatives Development

The alternatives for the River Management Plan (RMP) were developed and refined through the public consultation process in Stage 2. Refer to Appendix B for the Stage 2 public consultation materials and summary of feedback received through the public consultation process. The various alternatives were defined by levels of access to the river and the environmental management components included in the alternative.

5.5.1.1 Alternative 1 – Existing Conditions

RMP Alternative 1 reflects the current existing conditions of the Thames River and included the existing Dykes, sensitive habitats, formal pathways, trails, fishing locations, boat access, and lookouts as well as the informal access points. In this alternative, areas of identified erosion and sedimentation would not be addressed.

RMP Alternative 1 is shown in Figure 5-13.

5.5.1.2 Alternative 2 – Naturalize River Corridor

RMP Alternative 2 would maintain and improve the quality and safety of the existing access locations. These locations include formal pathways, fishing and boat access, and lookouts. In addition, areas of erosion and bank instability would be improved and repaired. Under RMP Alternative 2 natural heritage features would be protected efforts for mitigation of non-native species carried out.

RMP Alternative 2 is shown in Figure 5-14.

5.5.1.3 Alternative 3 – Strategic River Corridor Active Use and Access

Similar to RMP Alternative 2, Alternative 3 would maintain and improve the quality and safety of the existing access locations. In addition, strategic access points were added that considered avoidance of sensitive habitat areas. These locations included formal pathways, fishing and boat access, and lookouts. In addition, areas of erosion and bank instability would be improved and repaired. Natural heritage features will be protected and mitigation of non-native species is carried out.

RMP Alternative 3 is shown in Figure 5-15.

5.5.1.4 Alternative 4 – Enhanced River Corridor Active Use and Access

Similar to RMP Alternative 3, Alternative 4 would maintain and improve the quality and safety of the existing access locations. In addition, multiple new access points would be constructed to promote additional river access and interaction. These locations included formal pathways, fishing and boat access, and lookouts. Areas of erosion and bank instability would be improved and repaired. Natural heritage features would be protected and mitigation of non-native species is carried out.

RMP Alternative 4 is shown in Figure 5-16.

5.5.2 Evaluation of the River Management Plan Alternatives

5.5.2.1 Approach

The essential nature of the evaluation process is that it captured a wide and inclusive range of criteria that provided the opportunity to examine the impact of each of the options on the issues identified through the Problem/Opportunity statement. The criteria developed in Stage 1 (Section 4) for the evaluation of the Springbank Dam options were used as a basis for the Stage 2 process. These criteria were customized for each Stage 2 component, including the River Management Plan. These criteria incorporate feedback received through the consultation process. The criteria cover the range of potential impacts or changes from what is considered the “Baseline Condition”. This baseline condition is represented by the existing conditions, at the time of the study, in the river within the boundaries of the study area.

5.5.2.2 Evaluation Criteria and Performance Measures

The evaluation of the alternatives 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 purposes of the evaluation were to identify a preferred option that best satisfied the objectives of the One River EA and to eliminate alternatives that did not meet the objectives from further consideration.

The criteria used to evaluate the RMP alternatives are presented in Table 5-7, along with descriptions of the rating scales for measuring impacts. The anticipated impact of the each of the RMP options on each of the criteria were evaluated based on the Measure/Indicator defined under each criterion. The rating scales ranged 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 5-7. River Management Plan Evaluation Criteria and Potential Ratings

Category & Criterion	Description	Measure/Indicator	Rating Scale for Measuring Impacts
<i>Natural Environment</i>			
Water Quality	The potential of the alternative 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 alternative to result in a dynamically 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)

Category & Criterion	Description	Measure/Indicator	Rating Scale for Measuring Impacts	
Species at Risk	The potential of the alternative 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 as risk compared to the existing conditions.	5 3 1	Improvement in the extent and quality of significant habitats for sensitive species and species at risk from existing conditions (positive effect) No change in the extent and quality of significant habitats for sensitive species and species at risk from existing conditions (neutral effect) 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 alternative to maintain or enhance terrestrial and riparian habitat for both native plants and animals.	Potential change in the terrestrial habitat function and production capacity compared to existing conditions	5 3 1	Improvement in the terrestrial habitat function and production capacity from existing conditions (positive effect) No change in the terrestrial habitat function and production capacity from existing conditions (neutral effect) Decrease in the terrestrial habitat function and production capacity from existing conditions (negative effect)
Aquatic Habitat	The potential for the alternative to maintain or enhance habitat for aquatic dependent species.	Potential change in the aquatic habitat function and production capacity compared to existing conditions.	5 3 1	Improvement in the aquatic habitat function and production capacity from existing conditions (positive effect) No change in the aquatic habitat function and production capacity from existing conditions (neutral effect) Decrease in the aquatic habitat function and production capacity from existing conditions (negative effect)
Groundwater and Surface Water interactions	The potential of the alternative to protect or improve groundwater and surface water interactions in order to maintain or improve water quality and quantity.	Potential changes in the groundwater and surface water interactions compared to existing conditions.	5 3 1	Improvement in groundwater and surface water interactions from existing conditions resulting in improvements to water quality and quantity (positive effect) No change in groundwater and surface water interactions from existing conditions resulting in no changes to water quality and quantity (neutral effect) Decrease in groundwater and surface water interactions from existing conditions resulting in degradation to water quality or decrease in water quantity (negative effect)
Social/Cultural				
Cultural Heritage	The potential of the alternative to align cultural/heritage resources with existing policies.	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 related to changes to the river regime No potential to degrade cultural/heritage resources related to changes to the river regime Potential to degrade cultural/heritage resources related to changes to the river regime

Category & Criterion	Description	Measure/Indicator	Rating Scale for Measuring Impacts	
Public Health & Safety	The potential of the alternative 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 (positive effect) No change in potential risk or liability to community health and safety (neutral effect) Potential to degrade potential risk or liability to community health and safety (negative effect)
Boating Recreation	The potential of the alternative 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 alternative to provide or enhance fishing recreational activities.	Potential change in recreational fishing from existing conditions.	5 3 1	Improvement in fishing recreational from existing conditions (positive effect) No change in fishing recreational from existing conditions (neutral effect) Decrease in fishing recreational from existing conditions (negative effect)
Land-Based Recreation	The potential of the alternative to provide or enhance land-based recreational activities such as walking, biking and bird watching along the shoreline and riverbank.	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)
Riverbank Accessibility	The potential of the alternative to enhance public accessibility to the river.	Potential change in sites and areas for riverbank access from existing conditions.	5 3 1	Improvement in sites and areas for riverbank access from existing conditions (positive effect) No change in sites and areas for riverbank access from existing conditions (neutral effect) Decrease in sites and areas for riverbank access from existing conditions (negative effect)
Aesthetics	The potential of the alternative to maintain or enhance the natural visual character of the river corridor.	Potential change in the natural 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	
Urban Revitalization	The potential of the alternative to support ongoing investment in London's downtown as part of the urban regeneration and revitalization outlined in the Official Plan.	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 alternative to mitigate flood hazards.	Potential change in risk of flood and erosion damage to public infrastructure and private property.	5 3 1	Positive change in potential risk of flooding No change in potential risk of flooding Negative impact in potential risk of flooding
Carbon Footprint	The ability of the alternative to minimize carbon footprint and increase active transportation.	Potential change in carbon footprint from existing conditions with an emphasis on encouraging active transportation opportunities.	5 3 1	Positive change in carbon footprint or active transport compared to existing system No change carbon footprint or active transportation compared to existing system High or negative change in carbon footprint or active transportation compared to existing system
Constructability	The ease of the alternative to be constructed and implemented on a technical basis.	Ease of constructing the alternative, 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; little or no short-term environmental impacts Moderately easy to implement; some challenges with construction such as land and equipment requirements, and timeframe for construction; some short-term environmental impacts, easily mitigated Very difficult to implement; major construction challenges such as land and equipment availability/requirements, long timeframe for construction, environmental impacts difficult to mitigate during construction
Approvals & Permitting	The ease of the alternative to obtain required permits and approvals from regulating agencies (e.g. UTRCA, MNRF, MECP, DFO).	Ease of obtaining approvals and permits, including timeframe for receipt	5 3 1	No or very few 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 alternative to be operated and maintained.	Degree of change in operations and maintenance requirements from existing conditions	5 3 1	Reduction in operation and maintenance requirements from existing conditions (positive effect) No change in operations and maintenance requirements from existing conditions (neutral effect) Increase in operation and maintenance requirements from existing conditions (negative effect)

Category & Criterion	Description	Measure/Indicator	Rating Scale for Measuring Impacts	
Compatibility with existing and planned infrastructure projects	The compatibility of the alternative with existing and planned public infrastructure projects.	Ability of an alternative 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 alternative relative to other alternatives	5 3 1	Lowest capital costs Moderate capital costs High capital costs

5.5.2.3 River Management Plan Alternative Evaluation

This section describes the impacts assessment on the natural, social/cultural, and technical/economic criteria. The detailed assessment can be found in Appendix A-9. Table 5-8 summarizes the impacts assessment for the alternatives on each criterion.

Table 5-8. River Management Alternatives Qualitative 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).</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). 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> <p>No change in water quality is anticipated with the Do Nothing (existing conditions) and RMP Alternative 3 (strategic use and access). Under RMP Alternative 2 (naturalized river corridor) water quality is anticipated to improve as the density of vegetation will increase along the river providing a buffer for runoff. RMP Alternative 4 (enhanced active use and access) will improve the riparian vegetation in some areas buffering runoff but will also bring more human activity and disturbance to the river, leading to a potential increase in litter and erosion.</p>
Geomorphology	<p>Over the past 12 years, the river upstream of Springbank Dam has narrowed, and developed more diverse bedforms including lateral and mid channel bars, vegetated islands, riffles and alcoves. In terms of the geometry, the low flow channel has narrowed and is showing signs of increasing sinuosity as bars develop. The process of narrowing and channel development (recovery) will continue as the River attempts to develop a new, dynamic equilibrium (i.e. balance between erosion and deposition, but not in a static position). During the 2018 field work, 16 erosion sites were documented, with a focus on risk to public safety (e.g. proximity to trails, infrastructure) which were observed due to failing bank treatments, or steep, elevated banks.</p> <p>RMP Alternative 1 (existing conditions) is anticipated to result in further extent and risk of streambank erosion and stream bottom scour as further bank erosion risking infrastructure and safety will occur at erosion sites, but the channel will continue to recover. RMP Alternative 3 (strategic use and access) and RMP Alternative 4 (enhanced active use and access) will stabilize the critical erosion sites and improve the overall dynamic stability of the river. Critical sites will be addressed with RMP Alternative 4 (enhanced active use and access) but the benefits will be reduced by the provision for greater access.</p> <p>Additional discussion on SAR in the study area can be found in Appendix A-1.</p>

<p>Species at Risk</p>	<p>SAR and their respective habitats in the study area have been identified through the Natural Heritage Summary report. The results of the assessment confirmed 10 SAR with observations and identified an additional 13 SAR that have the potential to occur within the study area. The confirm SAR include 3 flora, 4 birds, 1 turtle, and 2 fish species.</p> <p>RMP Alternative 1 (existing conditions) is anticipated to result in no change to the current SAR setting. RMP Alternative 2 (naturalized river corridor) and RMP Alternative 3 (strategic use and access) are likely to enhance the SAR habitat by providing more cover and protection along the banks and limit human activity in the study area, more so with Alternative 2. The bank improvements proposed in RMP Alternative 4 (enhanced active use and access) are offset by the provision for greater access all along the study area which will disturb the existing SAR.</p> <p>Additional discussion on SAR in the study area can be found in Appendix A-1.</p>
<p>Terrestrial Habitat</p>	<p>Terrestrial features present within and surrounding the study area include significant woodlands, environmentally significant areas, unevaluated wetlands and significant wildlife habitat. Mapping of high level ELC communities identified the most prevalent communities include parkland, single family residential and deciduous forest ecosites. Since the non-operation of Springbank Dam, the riparian areas along the river has re-established. Although many invasive species have repopulated the riparian areas, the overall impact has been an increase in the density and diversity of plant growth, (Upper Thames River Conservation Authority, 2015).</p> <p>Healthy forest corridors and 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>RMP Alternative 1 (existing conditions) is anticipated to result in negative impact to the terrestrial environment as invasive species continue to thrive without active management. RMP Alternative 2 (naturalized river corridor) and RMP Alternative 3 (strategic use and access) will likely enhance terrestrial habitat by providing more management of invasive species, and improvements to the riparian areas along the erosion inventory sites. RMP Alternative 3 (strategic use and access) scoring is slightly reduced as the benefits are offset by increased human access. The invasive management and riparian improvements proposed in RMP Alternative 4 (enhanced active use and access) are offset by the provision for greater access all along the study area which will disturb the connected terrestrial habitats.</p> <p>Additional discussion on terrestrial habitat in the study area can be found in Appendix A-1.</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 2006. The river has been flowing freely as a natural system and created more stability and diverse habitat features. The free flowing system has resulted in the growth of floodplain habitats that are important to many species, (UTRCA, 2015a). Although many changes to the aquatic habitat environment have already occurred, the changes will continue as the channel evolves and adjusts to the new hydraulic and sediment regime.</p> <p>The new variety of habitat features within study area fills a number of habitat requirements such as spawning, rearing, food supply, and refuge. The Thames River also provides an important migration corridor for a variety of species; therefore, it can be designated as high fish habitat potential for warm/cool water species. The Thames river hosts over 150 aquatic fish, mussel, and amphibian/reptile species in the aquatic environment (UTRCA 2017d). Sampling in 2017 and 2018 found a variety of fish and mussels, including some species that had only been historical found upstream and downstream of study area.</p> <p>RMP Alternative 1 (existing conditions), RMP Alternative 2 (naturalized river corridor) and RMP Alternative 3 (strategic use and access) are predicted to enhance aquatic habitat environment by allowing the natural adjustments continue with limited or strategic locations for human use. RMP Alternative 4 (enhanced active use and access) is predicted to have an overall neutral impact as the river will be still allowed to adjust to the free flowing systems, but the increased human access may limit some of the habitat function.</p> <p>Additional discussion on aquatic habitat in the study area can be found in Appendix A-2.</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 increased recharge to groundwater and lowering water levels resulted in increased discharge to surface water. Natural river beds and banks areas provide opportunities for these groundwater and surface water interactions to occur. Impermeable surfaces in the river bed and banks will impact interactions between groundwater and surface water.</p> <p>No changes to RMP Alternative 1 (existing conditions) and RMP Alternative 3 (strategic use and access) are predicted to enhance aquatic habitat environment by allowing the natural adjustments continue with limited or strategic locations for human use. RMP Alternative 2 (naturalized river corridor) is predicted to have a positive impact on groundwater surface water interaction but removing harden treatments along the banks and replacing with more natural materials. RMP Alternative 4 (enhanced active use and access) is predicted to have an overall negative impact on groundwater interactions due to the addition of hardened bank treatments which will reduce the potential for groundwater and surface water interactions.</p>
<p>Social/Cultural Environment</p>	
<p>Cultural Heritage</p>	<p>The cultural heritage review in Appendix A-3 indicated 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 CHRS.</p> <p>RMP Alternative 1 (existing conditions) will result in further bank erosion and will detract from the cultural heritage features of the River and may impact existing pathways. RMP Alternative 3 (strategic use and access) and RMP Alternative 4 (enhanced active use and access) will enhance the cultural heritage of the river, with some of the benefits of RMP Alternative 4 (enhanced active use and access) offset by the provision for greater access. RMP Alternative 2 (naturalized river corridor) its anticipated to maintain the cultural heritage of the river by repairing erosion and bank instability on an ongoing basis and limiting access.</p>
<p>Public Health & Safety</p>	<p>Community health and safety is a core component of the London Plan:</p> <p>“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.”</p> <p>RMP Alternative 1 (existing conditions), which represents the do nothing alternative, has the potential to increase risk to public health and safety while banks erode or become unstable. Under RMP Alternative 2 (naturalized river corridor), RMP Alternative 3 (strategic use and access), and RMP Alternative 4 (enhanced active use and access) will similarly manage the river and provide safe and secure opportunities to access the Thames River.</p>
<p>Boating Recreation</p>	<p>Recreation is an important consideration as indicated in the problem statement for this Master Plan EA which states “It is our collective responsibility to maintain and enhance the Thames River as a shared natural, cultural, recreational and aesthetic resource”. 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 alternative will have on the varying types of recreational activities.</p> <p>RMP Alternative 2 (naturalized river corridor) will maintain the current level of boating access along the Thames River corridor. RMP Alternatives 3 (strategic use and access) and 4 (enhanced active use and access) provide progressively more access. RMP Alternative 1 (existing conditions) anticipates a gradual decrease in opportunities for boating access as riverbank stability continues to deteriorate and banks become steeper and more elevated.</p>
<p>Fishing Recreation</p>	<p>Fishing recreation will continue to improve as the Thames River stabilizes with the free flowing system and native fish species continue to inhabit and migrate through the area from up and downstream. Most current fishing access locations are informal along the river. In a few places (such as the Greenway Park) the formal fishing access locations are perched away from the river due to the lowered water levels.</p> <p>RMP Alternative 2 (naturalized river corridor) will slightly increase the level of fishing access along the Thames River corridor. RMP Alternatives 3 (strategic use and access) and 4 (enhanced active use and access) improve fishing access. RMP Alternative 1 (existing conditions) anticipates a gradual decrease in opportunities for fishing access as riverbank stability continues to deteriorate and banks become steeper and more elevated.</p>

<p>Land-based Recreation</p>	<p>Land-based recreation is defined as activities such as walking, biking, bird-watching, and other sports along the river corridor.</p> <p>RMP Alternative 2 (naturalized river corridor) will maintain the current level of land-based recreation along the Thames River corridor. RMP Alternatives 3 (strategic use and access) and 4 (enhanced active use and access) provide progressively more land-based recreation. RMP Alternative 1 (existing conditions) anticipates a gradual decrease in opportunities for boating access as riverbank stability continues to deteriorate and banks become steeper and more elevated.</p>
<p>Riverbank Accessibility</p>	<p>Riverbank accessibility is defined as the potential of an alternative to enhance public access to the river shoreline.</p> <p>No change is anticipated to riverbank access RMP Alternative 1 (existing conditions), under this alternative vegetation growth and erosion will continue to limit riverbank accessibility. RMP Alternative 2 (naturalized river corridor) will limit access compared to the existing conditions as naturalized banks with additional vegetation will further limit riverbank access. RMP Alternative 3 (strategic use and access) will slightly improve riverbank access with naturalized bank with new strategic access locations. RMP Alternative 4 (enhanced active use and access) will improve riverbank access locations throughout the river corridor.</p>
<p>Aesthetics</p>	<p>Aesthetics are subjective and can be defined very differently by various groups. This was demonstrated through the public feedback received throughout Stages 1 and 2. As the Thames River is a designated heritage river, the aesthetics are evaluated based on its heritage river status.</p> <p>No change is anticipated to riverbank access RMP Alternative 1 (existing conditions), under this alternative riverbank character will be improved in some areas however deterioration of some treatments will continue (i.e. gabion baskets) in other areas. RMP Alternative 2 (naturalized river corridor) will improve the visual character of the river corridor through improvements to the riverbanks and existing access locations. Similarly, RMP Alternative 3 (strategic use and access) will improve the visual character of the river corridor. RMP Alternative 4 (enhanced active use and access) will also enhance the visual character of the river but the additional access will result in a net negative benefit for this alternative.</p>
<p>Urban Revitalization</p>	<p>Urban revitalization is defined for the purposes of this Master Plan EA as the potential of the alternative to encourage investment in London's downtown and support the urban regeneration of the City's downtown.</p> <p>RMP Alternatives 1 (existing conditions) and 2 (naturalized river corridor) are expected to have little to no potential to attract urban revitalization to London's downtown. RMP Alternative 4 (enhanced active use and access) is expected to have the largest potential to attract urban revitalization with RMP Alternative 3 (strategic use and access) will also improve the potential for urban revitalization but not to the same extent as RMP Alternative 4 (enhanced active use and access).</p>
<p>Technical and Economic</p>	
<p>Flood Hazard</p>	<p>Flood hazard is defined for the purposes of this Master Plan EA as the ability to mitigate flood hazards. The goal is to reduce the risks of flooding and erosion damage to public infrastructure and private property.</p> <p>No change to flood hazard is anticipated under RMP Alternative 1 (existing conditions). Flood hazard will be similarly improved for RMP Alternatives 2 (naturalized river corridor), 3 (strategic use and access), and 4 (enhanced active use and access).</p>
<p>Carbon Footprint</p>	<p>Carbon footprint is defined for the purposes of this Master Plan EA as the ability of the alternative to minimize carbon footprint.</p> <p>Impact on carbon footprint is similar for RMP Alternatives 1 (existing conditions) and 2 (naturalized river corridor), these alternatives are anticipated to have little impact on carbon footprint. RMP Alternatives 3 (strategic use and access) and 4 (enhanced active use and access) are anticipated to have a positive impact on carbon footprint by increasing connectivity to the downtown and providing opportunities for residents to cycle or walk to work.</p>
<p>Constructability</p>	<p>Constructability is defined as the ease of implementation for each alternative.</p> <p>RMP Alternative 1 (existing conditions) has no construction requirements. RMP Alternatives 2 (naturalized river corridor) and 3 (strategic use and access) have moderate construction requirements with RMP Alternative 4 (enhanced active use and access) requiring the most construction work.</p>

<p>Approvals & Permitting</p>	<p>Permits and approvals are anticipated for each alternative are identified for each alternative based on a review of regulations and past agency consultation. This criterion evaluates the relative ease of obtaining the required permits and approvals to implement each alternative.</p> <p>RMP Alternative 1 (existing conditions) has few approvals or permitting requirements, some approvals will be required for mitigating of river bank failures that will occur through continued degradation of the banks. RMP Alternative 2 (naturalized river corridor) will require some approvals but these are anticipated to be simple and straight forward to obtain. RMP Alternative 3 (strategic use and access) will be required for the additional strategic access points but are anticipated to be moderately easy to obtain. RMP Alternative 4 (enhanced active use and access) will require environmental work and shoreline alterations to accommodate additional access, these works are likely more difficult to obtain relative to the other alternatives.</p>
<p>Operations & Maintenance</p>	<p>This represents the ease at which an alternative can be operated and maintained.</p> <p>RMP Alternative 1 (existing conditions) is anticipated to require more operations and maintenance over time as the riverbank continues to degrade. RMP Alternative 2 (naturalized river corridor) is anticipated to reduce operations and maintenance requirements over time due to riverbank improvements. RMP Alternative 3 (strategic use and access) is anticipated to be similar to the current level of operations and maintenance required. RMP Alternative 4 (enhanced active use and access) will increase operations and maintenance requirements through the addition of more access points and the wear and tear from an increase use of the facilities.</p>
<p>Compatibility with existing and planned infrastructure projects</p>	<p>There are a number of planned infrastructure projects within the Thames River corridor, including those identified in the TVCP, London Plan, and Back to the River design.</p> <p>RMP Alternative 3 (strategic use and access) and RMP Alternative 4 (enhanced active use and access) are the most compatible with the existing and planned infrastructure projects the City's planning documents. RMP Alternative 1 (existing conditions) is the least compatible relative to the other alternatives. RMP Alternative 2 (naturalized river corridor) is moderately compatible with the planning documents and existing infrastructure but not does not entirely reflect the objectives laid out in the TVCP.</p>
<p>Capital Costs</p>	<p>Capital costs have not been estimated for these alternatives. However, capital costs for each alternative have been compared on a relative basis.</p> <p>RMP Alternatives 1 through 4 area progressively more expensive with RMP Alternative 1 (existing conditions) being the least costly and RMP Alternative 4 (enhanced active use and access) being the most costly.</p>

Note:

The Stage 2 Public Consultation process informed this information, the public consultation process is documented in Section 8 of this report.

5.5.2.4 River Management Plan Alternatives Scoring

The detailed alternatives matrix and descriptions of relative impact for each detailed criterion can be found in Appendix A-9. This exercise documented the anticipated impacts for each of the alternatives in relation to the “existing conditions”, as defined as the state of the current Thames River Corridor (RMP Alternative 1).

Comparison to the existing condition provided the required baseline for the comparative analysis (as represented by RMP Alternative 1). Each criterion was scored based on the anticipated impacts of each of the alternatives. As indicated in the evaluation table, scores were normalized for each criteria category – natural, social/cultural and technical/economic – so that each category could be 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 alternative. The alternative with the highest score was ranked as the preferred alternative.

Table 5-9, below, presents a summary of the normalized score by criteria category. As indicated in Table 5-9, RMP Alternative 3 (Strategic River Corridor Active Use and Access) scored the highest with RMP Alternative 2 (Naturalized River Corridor) scoring slightly behind. RMP Alternative 4 (Enhanced River Corridor Active Use and Access) scoring slightly behind in third. Alternative 1 (existing conditions), which represents the do nothing alternative, scored in the last position.

Although scoring the overall highest, RMP Alternative 3 did not score the highest in any particular category. This indicates that although other alternatives may have advantages in any single specific category, RMP Alternative 3 was the most well-rounded alternative.

RMP Alternative 4 scored highest in the Social/Cultural environment category partly due to the additional access to the river and opportunities for urban revitalization it provides. RMP Alternative 2 scored the highest on the Natural Environment category and received the same score as RMP Alternative 3 for the Technical and Economic environment category.

Table 5-9. River Management Score Summary by Criteria Category

Criteria Category	Alternative 1 Existing Conditions	Alternative 2 Naturalized River Corridor	Alternative 3 Strategic River Corridor Active Use and Access	Alternative 4 Enhanced River Corridor Active Use and Access
Natural Environment	2.7	4.5	3.8	2.2
Social/Cultural Environment	1.9	3.1	4.3	4.4
Technical and Economic	3.3	3.4	3.4	2.9
Total Score	2.6	3.7	3.8	3.1

Note:

The detailed evaluation scores for each alternative by each criterion can be found in Appendix A-9

5.5.2.5 River Management Plan Selected Preferred Alternative

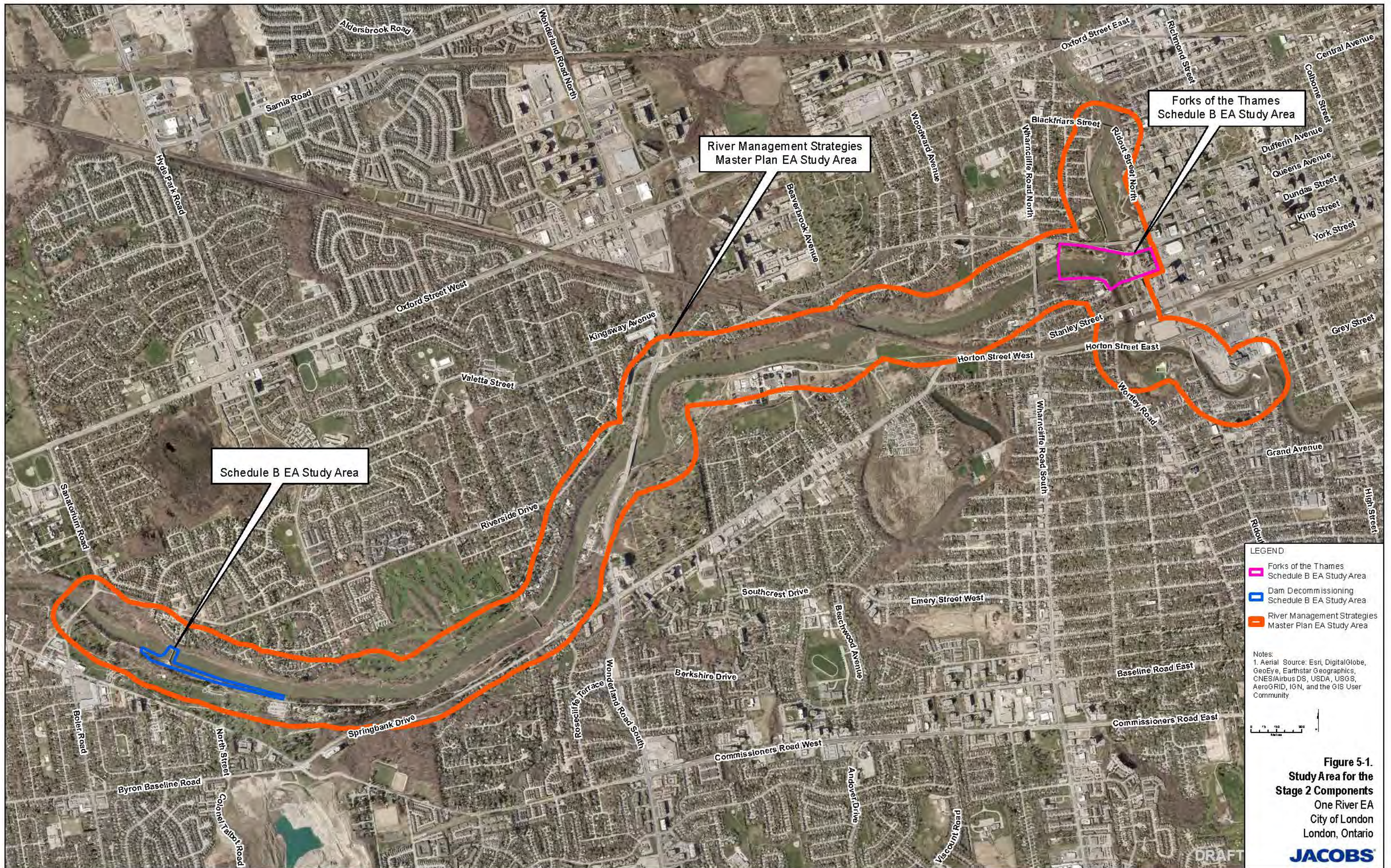
Based on the evaluation and scoring exercise RMP Alternative 3 (Strategic River Corridor Active Use and Access) was identified as the preferred River Management Plan alternative. As presented in Table 5-8 this was due to consistently receiving moderate to high scores in all criteria categories.

Figure 5-15 illustrates the selected preferred alternative for the RMP.

5.6 Stage 2 Preferred Alternatives Summary

In summary the Stage 2 evaluation process identified the following preferred alternatives for the Stage 2 components:

- **Springbank Dam:** Partial Dam Remove (Alternative 2) was the identified preferred alternative for the Springbank Dam. This alternative includes the removal of dam equipment including (but not limited to) hydraulics, gates, and control room electronics. Improvements to address dam structure stability, and an ongoing preventive maintenance and safety inspection program, remediation of the shoreline downstream of the dam structure, and habitat improvement areas are also included in this alternative.
- **Forks of the Thames:** The Suspended Walkway with Softscape Terraces was the identified preferred alternative for the Forks of the Thames. This alternative includes a walkway suspended over the Thames River at the Forks and looping back to the shore, providing a scenic view of all three branches of the Thames River. This alternative also includes terraces in Ivey Park down the slope toward the shoreline, consisting of both hard and soft surfaces with cut outs in the hard terrace surfaces for planters and other vegetated surfaces. This also includes some naturalization of a portion of the shoreline within Ivey Park. This alternative is shown in Figure 5-12.
- **River Management Plan:** The Strategic River Corridor Active Use and Access (Alternative 3) was identified as the preferred River Management Plan alternative. This alternative will maintain and improve the quality and safety of existing access locations. Existing access locations include formal pathways, fishing and boat access, and lookouts. Areas of erosion and bank instability will be improved and repaired. Natural heritage features will be protected with mitigation of non-native species. New strategic access points will be constructed while protecting sensitive habitat infringement, considering formalizing existing informal access points. This alternative is shown in Figure 5-15.



Schedule B EA Study Area

River Management Strategies
Master Plan EA Study Area

Forks of the Thames
Schedule B EA Study Area

- LEGEND**
- Forks of the Thames Schedule B EA Study Area
 - Dam Decommissioning Schedule B EA Study Area
 - River Management Strategies Master Plan EA Study Area

Notes:
1. Aerial Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Figure 5-1.
Study Area for the
Stage 2 Components
One River EA
City of London
London, Ontario

DRAFT



**Figure 5-2. Springbank Dam Don Nothing/
Current Conditions**
One River EA
City of London
London, Ontario



Figure 5-3. Partial Dam Removal Alternative
One River EA
City of London
London, Ontario



Figure 5-4. Full Dam Removal Alternative
One River EA
City of London
London, Ontario



1:500

Note:
1. Source: Civitas, 2018.

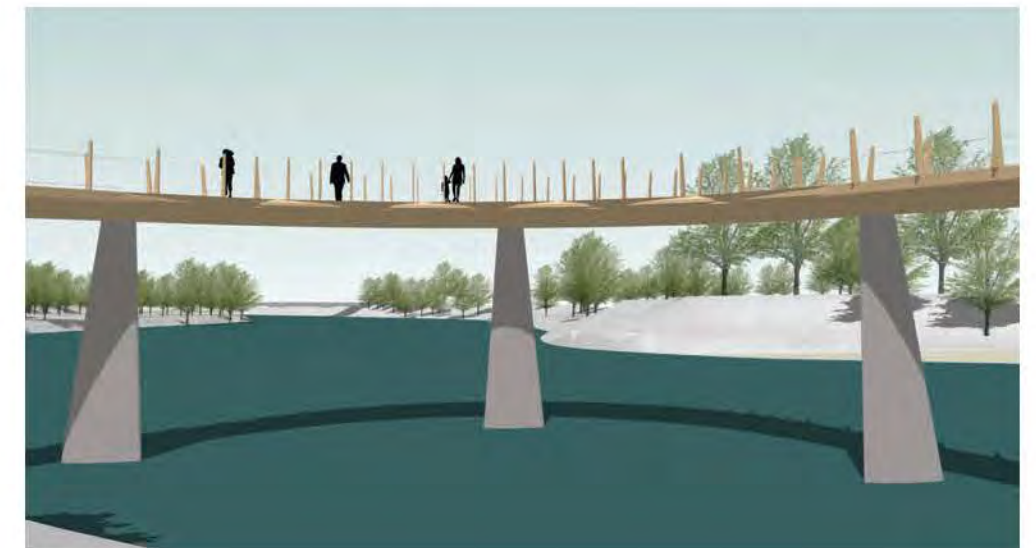


Figure 5-5. Ribbon Alternative 1 – Back to the River
Award-Winning Design
One River EA
City of London
London, Ontario



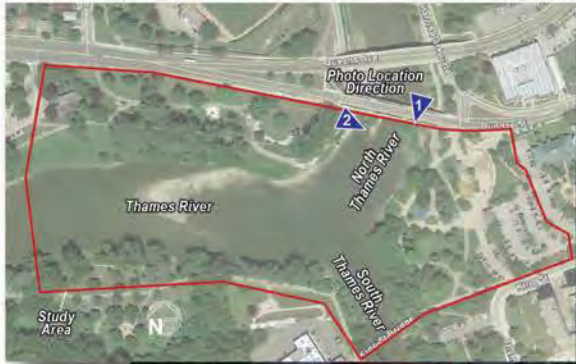


Photo 1

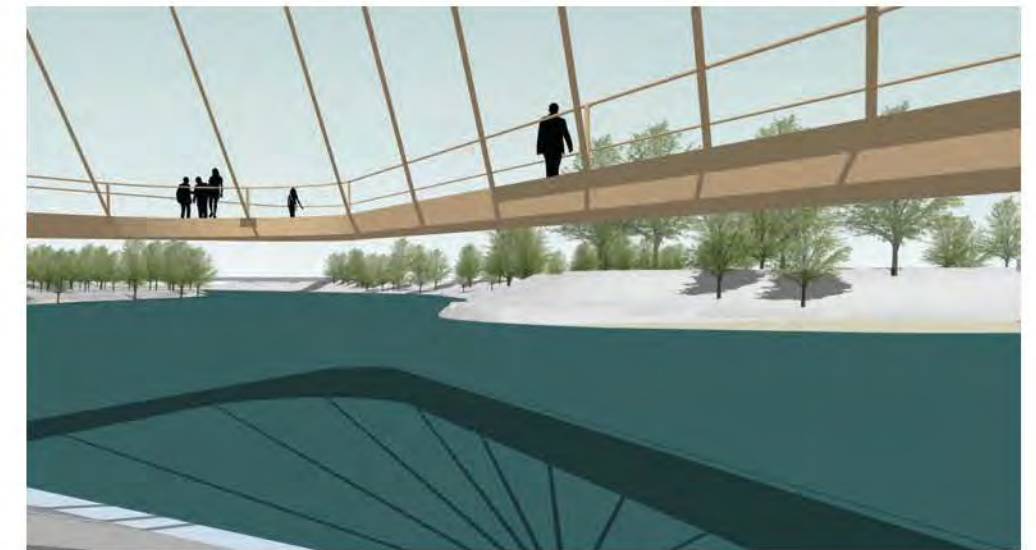


Photo 2

Figure 5-6. Existing Conditions at the Forks
One River EA
City of London
London, Ontario



1:500



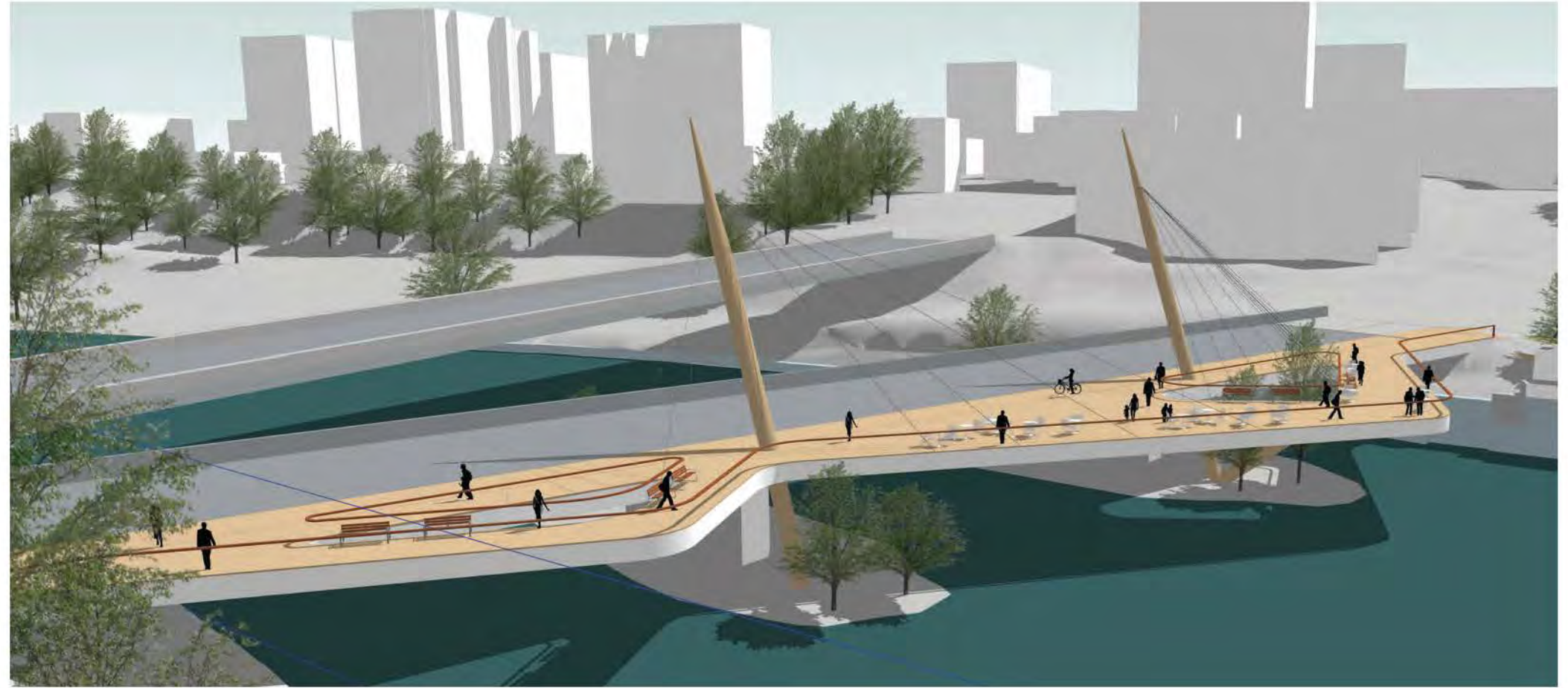
Note:
1. Source: Civitas, 2018.

Figure 5-7. Ribbon Alternative 2 – Suspended Walkway
One River EA
City of London
London, Ontario





1:500



Note:
1. Source: Civitas, 2018.

Figure 5-8. Ribbon Alternative 3 – Kensington
Bridge Extension
One River EA
City of London
London, Ontario





1:500



Note:
1. Source: Civitas, 2018.

Figure 5-9. Ribbon Alternative 4 – Land-Based Walkway
One River EA
City of London
London, Ontario





1:500



Note:
1. Source: Civitas, 2018.

Figure 5-10. Terrace Alternative 1 – Hardscape Terraces
One River EA
City of London
London, Ontario



1:500

Note:
1. Source: Civitas, 2018.



Figure 5-11. Terrace Alternative 2 – Softscape Terraces
One River EA
City of London
London, Ontario



CIVITAS



MontgomerySisam

Blackwell



Figure 5-12. Preferred Forks of the Thames Alternative
 One River EA
 City of London
 London, Ontario

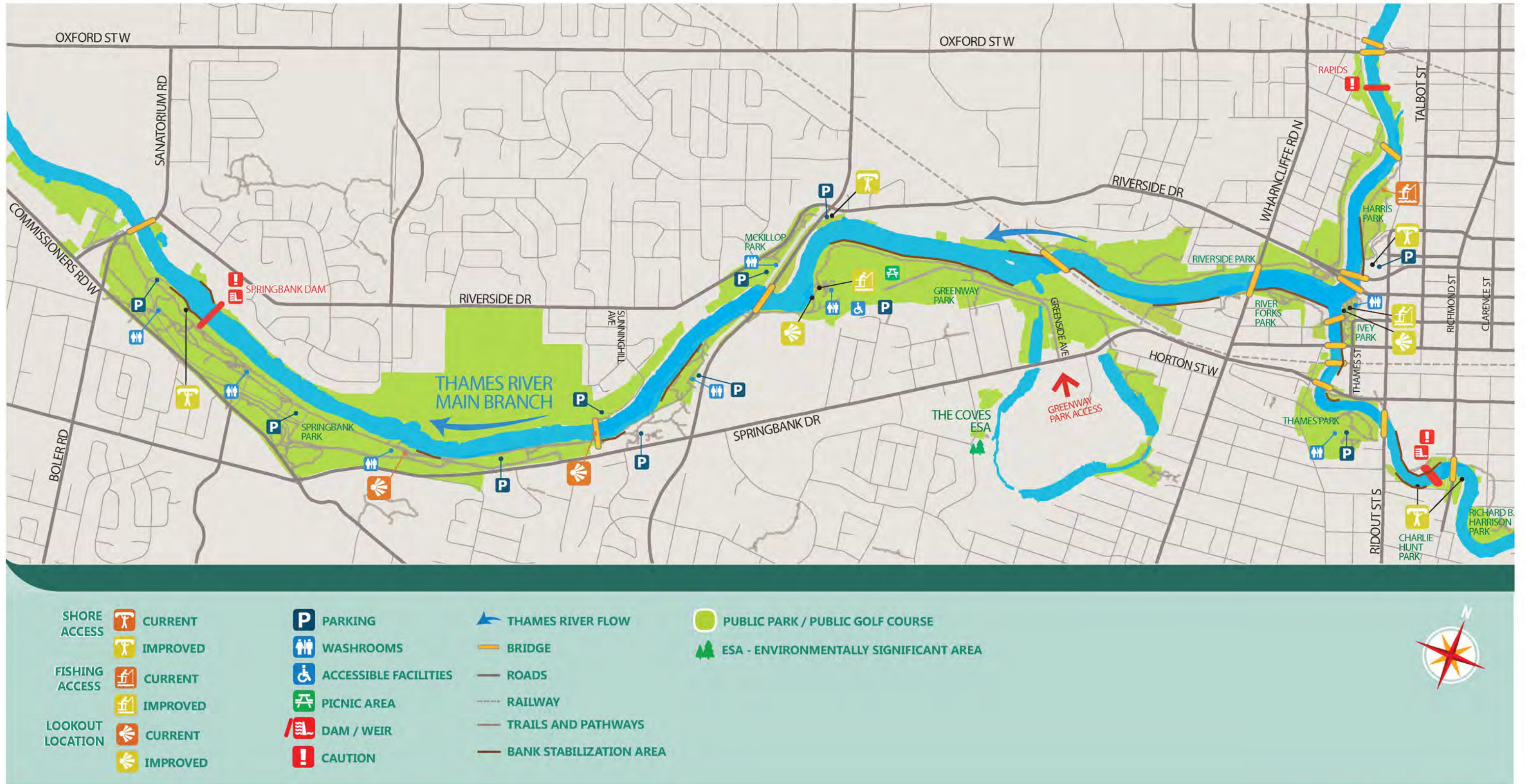


Note:
 1. Source: Civitas, 2018.



Notes:
 1. Source: Matrix Solutions Inc., 2018.
 2. Design and base data sourced from City of London Fish & Paddle Guide Map, November 2017.
 3. Accessed from the City of London's Open Data Catalogue in June 2018.
 *Access and lookout Locations are approximate.

Figure 5-13. River Management Plan
 Alternative 1 – Existing Conditions
 One River EA
 City of London
 London, Ontario



Notes:

1. Source: Matrix Solutions Inc., 2018.
 2. Design and base data sourced from City of London Fish & Paddle Guide Map, November 2017.
 3. Accessed from the City of London's Open Data Catalogue in June 2018.
- *Access and lookout Locations are approximate.

Figure 5-14. River Management Plan
 Alternative 2 – Naturalize River Corridor
 One River EA
 City of London
 London, Ontario



Notes:

1. Source: Matrix Solutions Inc., 2018.
2. Design and base data sourced from City of London Fish & Paddle Guide Map, November 2017.
3. Accessed from the City of London's Open Data Catalogue in June 2018.

*Access and lookout Locations are approximate.

Figure 5-15. River Management Plan
Alternative 3 – Strategic River Corridor
Active Use and Access

One River EA
City of London
London, Ontario



Notes:
 1. Source: Matrix Solutions Inc., 2018.
 2. Design and base data sourced from City of London Fish & Paddle Guide Map, November 2017.
 3. Accessed from the City of London's Open Data Catalogue in June 2018.
 *Access and lookout Locations are approximate.

Figure 5-16. River Management Plan
 Alternative 4 – Enhanced River Corridor
 Active Use and Access
 One River EA
 City of London
 London, Ontario