Evaluation Process

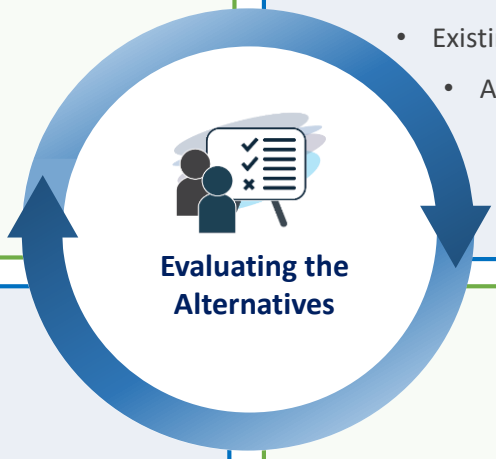
The short-listed alternative solutions were evaluated on four criteria categories: Environmental Impacts, Social & Cultural Impacts, Technical Considerations and Financial Considerations. Each criteria category is comprised of a number of specific evaluation criteria, and a rating system was used to evaluate each alternative solution based on the criteria.

Environmental

- Terrestrial species & habitats
- Aquatic species & habitats
- Environmental Sensitive Areas and Species at Risk
- Lake and surface water quality
- Groundwater quality/quantity
- Air Quality, including Greenhouse Gas Emissions
- Climate Change

Social and Cultural

- Long-term community impacts – odour, noise/vibrations, visual/aesthetics, truck traffic
- Disruption during construction
- Property acquisition and easement requirements
- Recreational use and users
- Human health and well being
- Existing and future land use compatibility
- Archaeology / natural heritage features



Technical

- Effectiveness
- Long-term flexibility
- Ease of operation and implementation
- Redundancy
- Long-term flexibility and treatment redundancy
- Compatibility with existing infrastructure
- Geotechnical and hydrogeological Impacts
- Contaminated Soils
- Energy use and recovery
- Climate change adaptability
- Permits and approvals requirements

Economic

- Capital costs
- Operating and maintenance costs
- Cash flows

The Rating System used to evaluate the alternatives is as follows:

Impact Description	Evaluation Colour
Positive to very minimal impact	
Minimal Impact	
Moderate Impact	
Moderate to Severe Impact	
Severe Impact	

Criteria	Evaluation Matrix						
	Alt. 1	Alt 2A	Alt 2B	Alt 3	Alt 4A	Alt 4B	Alt 5
Terrestrial System	• The G.E. Booth Wastewater Treatment Plant (WWTP) has significant woodlot habitats in the northwest and southwest portions of the site, as well as a stormwater wetland. Natural features adjacent to the G.E. Booth WWTP site include Applewood Creek, Serson Creek, the Significant Marie Curtis Park Woodlot Complex, and natural habitats being constructed as part of the Jim Tovey Lakeview Conservation Area (JTLCA). Consequently, alternatives with larger expansion of the G.E. Booth WWTP have more potential to impact terrestrial systems. • The Clarkson WWTP has limited significant natural features on and surrounding the site; impacts on terrestrial systems will be minor.						
Aquatic System	• Alternatives with the largest capacity expansions at the G.E. Booth WWTP have greater potential to impact the aquatic habitats and species in Applewood Creek, the on-site stormwater wetland, and the wetlands in JTLCA. • Alternatives with no new outfall at the G.E. Booth WWTP may have more potential to impact aquatic systems, because the existing outfall extents only about 1.4 km offshore, and as flows through the outfall increase the size and area of the effluent plume will increase. The plume may impinge on the nearshore, impacting water quality and associated aquatic habitats. • The Clarkson WWTP is outside the Lakeside Creek and Lake Ontario floodplain, and its outfall has sufficient capacity under all alternatives and extents over 2 kms into Lake Ontario. There is little risk to aquatic systems on site or in the nearshore of Lake Ontario.						
Lake Ontario Water Quality	• Alternatives with no new outfall at the G.E. Booth WWTP may have more potential to impact nearshore water quality, as the effluent plume may impinge on the nearshore as flows increase. • The Clarkson WWTP outfall has capacity under all alternatives and extends over 2 kms into Lake Ontario. There is little risk of nearshore water quality or water treatment plant intakes being impacted.						
Groundwater Water Quality and Quantity	• All alternatives are not expected to impact groundwater quality or quantity. Measures to mitigate impacts on groundwater quality and quantity during construction will be implemented.						
Air Quality	• Alternative solutions will be designed to include emission control and treatment such that emissions meet all air quality standards. • However, with the mid-to-high rise residential buildings being planned as part of the Lakeview Development, there may be challenges meeting the incinerator point-of-impingement requirements for the alternatives with higher treatment capacities at the G.E. Booth WWTP.						
Climate Change	• All alternatives will include energy recovery and reuse technologies to help reduce greenhouse gas (GHG) emissions. • Alternatives with the largest expansions will have less opportunities to reduce GHG emission from WWTP processes. • In addition, alternatives that include an effluent pumping station will have less opportunities for energy recovery/reuse given their need for large standby power equipment.						
Environmental Rating	**2nd**	**1st**	**4th**	**1st**	**2nd**	**5th**	**3rd**

Criteria	Evaluation Matrix						
	Alt. 1	Alt 2A	Alt 2B	Alt 3	Alt 4A	Alt 4B	Alt 5
Odour	• Odour from the operation of the G.E. Booth WWTP is a current concern. Odour concerns at the Clarkson WWTP are less, given its location in an industrial area. • Odour control measures will be implemented to manage odours from operations for all alternatives, resulting in a decrease in the risks of off-site odours. However, it is expected that alternatives with the largest capacity expansions at G.E. Booth WWTP will have the greatest potential for odour concerns.						
Noise/ Vibrations	• Noise from operations at the G.E. Booth WWTP is a current concern. Noise concerns at the Clarkson WWTP are less, given its location in an industrial area. • Noise attenuation measures will be implemented to manage noise from WWTP operation for all alternatives, resulting in a decrease in the risks of off-site noise. However, it is expected that alternatives with larger capacity expansions at the G.E. Booth WWTP will have the greatest potential for noise concerns. • Vibrations are not expected to be a concern of the WWTP operations.						
Visual Aesthetics	• The visual aesthetics of the G.E. Booth WWTP will be a concern of the local community, including the new Lakeview Community development adjacent to the plant site. • The larger the expansion of the G.E. Booth WWTP, the more visual aesthetics will be a concern. • With the Clarkson WWTP located in an industrial area, visual aesthetics of the facility are not expected to be as much of a concern.						
Truck Traffic	• Truck traffic during operation will be required at each site to transport treated biosolids to off-site utilization areas, as well as for operational and maintenance purposes • Truck traffic in and out of Clarkson WWTP avoids residential areas; while truck traffic to from the G.E. Booth WWTP has potential to impact businesses on Lakeshore and the proposed Lakeview Community Development. • The larger the G.E. Booth WWTP expansion, the more potential for increased truck traffic.						
Disruption During Construction	• The longer the construction period (i.e. larger the expansion) the longer the short-term construction related impacts to surrounding areas, landowners and users (e.g. truck traffic, noise and dust). • The local communities near the G.E. Booth WWTP will be disturbed during construction. Construction impacts at the Clarkson WWTP are expected to be less, given its location in an industrial area. • The construction of a new outfall at the G.E. Booth WWTP will also have short-term impacts on the newly constructed JTLCA • Alternatives with the highest capacity expansion and a new outfall will have the most disruption during construction.						
Property Acquisition and Easement Requirements	• There are no property acquisition requirements for any of the alternatives. • All expansions can be accommodated on the existing sites. • Easements will be required in Lake Ontario for alternatives that include a new outfall.						

Socio-Cultural Evaluation Process Continued

Criteria	Evaluation Matrix						
	Alt. 1	Alt 2A	Alt 2B	Alt 3	Alt 4A	Alt 4B	Alt 5
Recreational Use and Users	• Alternatives with no new outfall at the G.E. Booth WWTP may have more potential to impact water quality, and associated shoreline and nearshore recreational activities, because the existing outfall at the G.E. Booth WWTP extends only about 1.4 km offshore, and as flows through the outfall increase the size and area of the effluent plume will increase. The plume may impinge on the nearshore, impacting shoreline and water users. • The Clarkson WWTP outfall has capacity under all alternatives and extents over 2 kms into Lake Ontario. There is little risk of nearshore water quality of water treatment plant intakes being impacted.						
Human Health and Well Being	• All alternatives will be designed to ensure air emission and effluent quality requirements are met to protect human health and the environment. • Alternatives with no new outfall at the G.E. Booth WWTP may have some challenges at meeting Lake Ontario Provincial Water Quality Objectives (PWQO) in the nearshore and not interfering with Water Treatment Plant (WTP) intake protection zones (IPZs) as flows increase.						
Existing and Future Adjacent Land Use Compatibility	• The Clarkson WWTP is in an industrial area and is consistent with the existing and planned uses. • The G.E. Booth WWTP is located within an urban community, with the new Lakeview Village Development planned adjacent to the WWTP, and therefore is currently not compatible with existing and future land uses. • All alternatives allow Peel the opportunity to develop the G.E. Booth WWTP site so that it is more consistent with future land uses through implementation of enhanced odour and noise controls, and visual facility and site improvements • Alternatives with a new outfall also allow Peel to protect nearshore water quality to ensure compatibility with the JTLCA						
Archaeology/ Natural Heritage & Aboriginal Interest	• The G.E Booth WWTP site has been previously disturbed and only a small portion of the northwest area of the site has been identified as having archaeological potential; This area will be avoided during construction of all alternatives. • The Clarkson site has potential for archaeological resources in the areas of the site designated for facility expansions; The alternatives will the largest expansions at the Clarkson WWTP may have slightly more potential to impact archaeological resources on-site. (Stage 2 Archaeological Assessments are planned to ensure potential impacts are identified, and if so mitigated)						
Social-Cultural Rating	**1st**	**2nd**	**3rd**	**2nd**	**4th**	**4th**	**5th**

Technical Evaluation Process

Criteria	Evaluation Matrix						
	Alt. 1	Alt 2A	Alt 2B	Alt 3	Alt 4A	Alt 4B	Alt 5
Effectiveness	• The alternatives with a new outfall are the most effective at meeting stated project objectives - wastewater, biosolids and wet weather flow management (to 2041). • There is a risk of the existing outfall not meeting nearshore water quality objectives as flows to the G.E. Booth WWTP increase. • There is risk associated with relying on the East-to-West diversion to divert peak flows during wet weather events, given its location in the service area. Wet weather events occurring south of the diversion will not be able to be diverted and could be substantial.						
Long-term Flexibility	• Alternatives with the highest capacity expansions at the G.E. Booth WWTP may limit the ability to implement new technologies in the future, as an expansion of this size will extend into the lagoon area taking up much of the available site capacity. • Maintaining the G.E. Booth WWTP at its rated capacity of 518 MLD may limit the ability to expand the WWTP in the future once the community has fully developed, reducing Peel's treatment options and flexibility • Alternatives with peak flow diversion limit treatment flexibility at the Clarkson WWTP by utilizing the additional excess capacity in the Clarkson WWTP outfall.						
Ease of Operation	• Alternatives with peak flow diversion may present challenges in operating the east-to-west flow diversion chambers intermittently during wet weather events. • In addition, the alternatives with an effluent pumping station have more operation complexity than those with a new outfall.						
Redundancy	• All alternatives will be designed to provide treatment redundancy during emergency and maintenance conditions • However, there may be challenges to provide treatment redundancy during wet weather events at both the G.E. Booth WWTP and the Clarkson WWTP that rely on diversion of peak flows during wet weather flow events.						
Compatibility with Existing Infrastructure System	• Alternatives with lower plant capacity expansions at the Clarkson WWTP do not take full advantage of the east-west flow diversion strategy • Likewise, maintaining the G.E. Booth WWTP at is current rated capacity does not take full advantage of the east-west flow diversion strategy						
Geotechnical and Hydrogeology	• The on-site geotechnical and hydrogeological conditions at both the G.E. Booth WWTP and the Clarkson WWTP will not present significant challenges during construction, as site conditions and mitigation measures at both sites are well understood. • Alternatives with a new outfall at the G.E. Booth WWTP will present more geotechnical challenges. Additional off-shore geotechnical investigations will be required to confirm construction techniques and mitigation measures before construction of a new outfall.						
Contaminated Soils	• All alternatives will have potential to impact Areas of Potential Environment Concern (APECs) on both the G.E. Booth WWTP and Clarkson WWTP sites. Additional investigations and analysis may be required, and appropriate mitigation and remediation methods implemented. • The larger the expansion, the more potential to impact on-site APECs at both WWTP sites.						

Technical Evaluation Process Continued

Criteria	Evaluation Matrix						
	Alt. 1	Alt 2A	Alt 2B	Alt 3	Alt 4A	Alt 4B	Alt 5
Energy use and Recovery	• Expansion of both WWTPs will allow for opportunities to further promote energy use and recovery. In particular, opportunities exist to increase energy recovery associated with biosolids generation and treatment at Clarkson WWTP. • Alternatives with pumping will be somewhat less energy efficient						
Climate Change Adaptability	• All alternatives will be designed to be adaptable to climate change, by minimizing the risk of wet weather flows impacts on treatment processes • Alternatives with no new outfall at the G.E. Booth WWTP may not be as adaptable to rising lake levels as a consequence of climate change.						
Permits and Approvals	• Alternatives with peak flow diversion may take longer to approve, as there may be challenges in meeting MECP receiving water quality requirements using the existing outfall at the G.E. Booth WWTP • Alternatives with the greater capacity increases at G.E. Booth WWTP may also face approval challenges given the proximity of the new Lakeview Community development • Receiving approvals for expansion of the Clarkson WWTP are not expected to be as challenging as obtaining approvals for expansion of the G.E. Booth WWTP.						
Technical Rating	**6th**	**2nd**	**5th**	**1st**	**4th**	**7th**	**3rd**

Criteria	Evaluation Matrix						
	Alt. 1	Alt 2A	Alt 2B	Alt 3	Alt 4A	Alt 4B	Alt 5
Capital Cost	• All alternatives involve a significant capital investment, ranging from $850 to $1200 M; Alternatives without a new outfall are at the lower end of the range; while those with a new outfall are at the higher end of the range. • Alternative 5, which has an outfall and the largest WWTP expansion has the highest capital costs.						
Operating and Maintenance (O&M) Costs	• All alternatives will have comparable O&M costs, with the exception of alternatives with an effluent pumping station. • Operating costs of a pumping station are higher than those alternatives that include a new outfall at the G.E. Booth WWTP.						
Cash Flow	• All Alternatives have similar construction scheduling periods, with the exception of Alternative 4, which has both plants being constructed during similar time periods. Peel would have large capital expenditures during a shorter time period. • Alternatives which include an effluent pumping station at the G.E. Booth WWTP and diversion of peak flows, help Peel reduce capital expenditures during the planning period for this study (to 2041). However, an outfall at the G.E. Booth WWTP will still eventually be required to meet future peak flow requirements.						
Economic Rating	**2nd**	**1st**	**2nd**	**1st**	**3rd**	**3rd**	**2nd**

Criteria	Evaluation Matrix						
	Alt. 1	Alt 2A	Alt 2B	Alt 3	Alt 4A	Alt 4B	Alt 5
Total Score	56%	65%	52%	66%	54%	43%	55%
Alternative Ranking	3rd	2nd	6th	1st	5th	7th	4th

Alternative 3 was selected as the recommended alternative because it:

- ✓ Provides the greatest flexibility and reliability in wastewater and biosolids management.
- ✓ Reduces the risks of nearshore water quality impacts, and associated impacts on aquatic and recreational users
- ✓ Minimizes risks to natural areas on and surrounding the WWTPs
- ✓ Offers opportunities for improving odour control, noise management, visual aesthetics and climate change adaptivity
- ✓ Offers opportunities improve energy recovery and reuse.
- ✓ Allows for beneficial land use of biosolids, as well as new markets for incinerator ash.
- ✓ Allows Peel to consider a phasing approach to construction at both the WWTPs