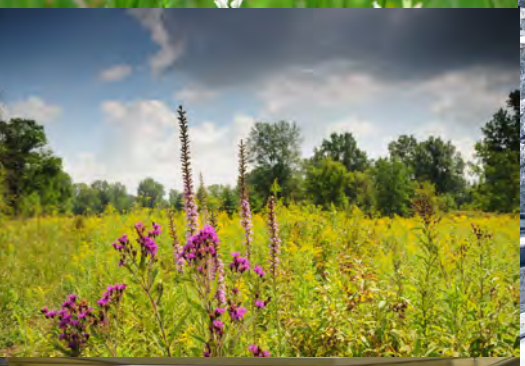
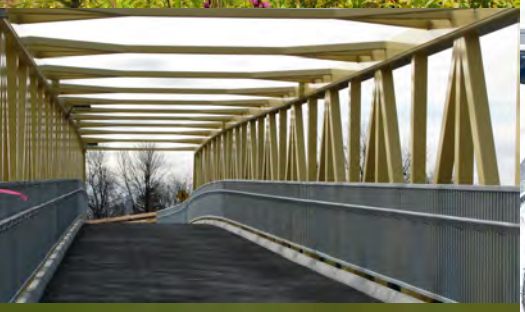
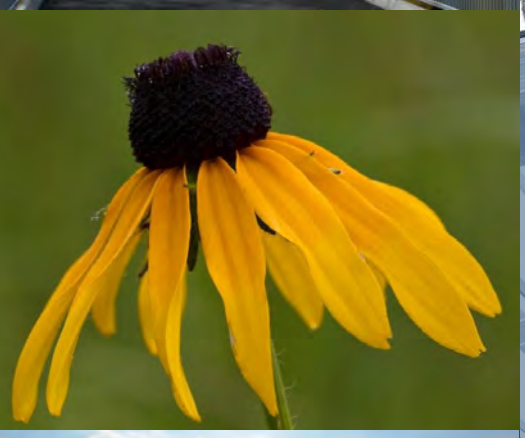






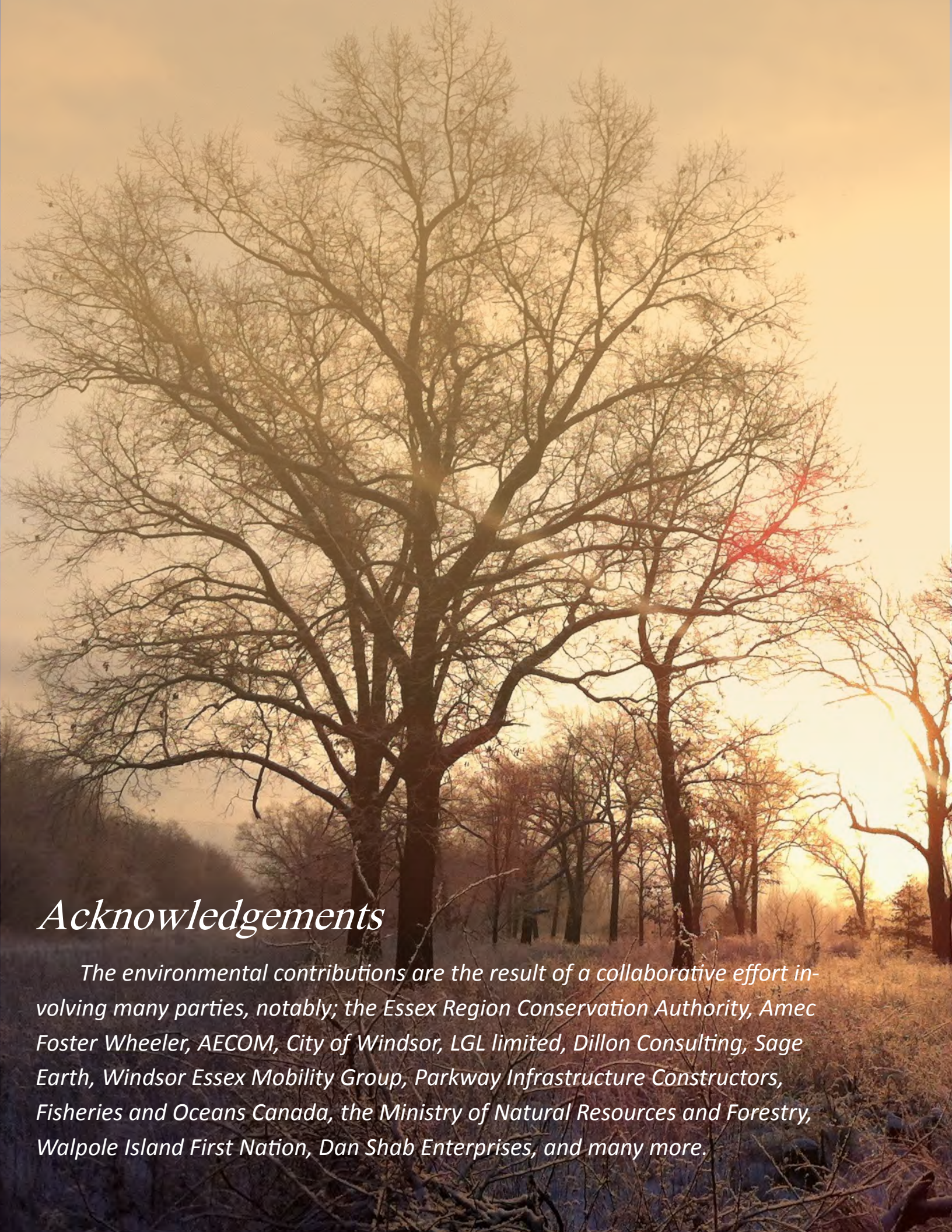
Ministry of Transportation

The Rt. Hon. Herb Gray Parkway

‘A Parkway in a Prairie’

Promenade RT. HON. HERB GRAY Parkway

Ontario



Acknowledgements

The environmental contributions are the result of a collaborative effort involving many parties, notably; the Essex Region Conservation Authority, Amec Foster Wheeler, AECOM, City of Windsor, LGL limited, Dillon Consulting, Sage Earth, Windsor Essex Mobility Group, Parkway Infrastructure Constructors, Fisheries and Oceans Canada, the Ministry of Natural Resources and Forestry, Walpole Island First Nation, Dan Shab Enterprises, and many more.

Contents

List of Appendices

1.0 INTRODUCTION

The Rt. Hon. Herb Gray Parkway (the Parkway) is the access road portion of a new end-to-end border transportation system between Windsor, Ontario and Detroit, Michigan; Canada's busiest land border crossing, which carries nearly one third of the trade between Canada and the United States. Identified under the Detroit River International Crossing (DRIC) Environmental Assessment (EA), the project is one of the largest infrastructure undertakings in Ontario to date, and was approved under both the *Ontario Environmental Assessment Act* and the *Canadian Environmental Assessment Act*. Located in the municipalities of Tecumseh, LaSalle and Windsor, the Parkway is a once-in-a-generation undertaking.

The Provincial EA determined that much of the Parkway would need to remain in the existing highly urbanized corridor. The existing highway corridor which included 17 traffic signals, was congested with a mix of local and international traffic. The congestion resulted in localized air quality impacts, diversion of trucks to local streets, and had a negative economic impact due to border delays.

The $1.4 billion Parkway includes an 11 km extension of the six lane Highway 401 and a parallel service road for local traffic. The Parkway includes 11 tunnels covering 1.8 km which provide linkages to adjacent communities and a wildlife crossing, 20 km of recreational trails that provide new community connections and more than 120 ha of greenspace. The Parkway is the first Ontario transportation project to be delivered by the Ministry of Transportation (MTO) and Infrastructure Ontario using an alternative financing and procurement approach. Appendix A portrays a photographic progression of the Parkway's construction.

1.1 Ecological Context

The Ojibway Prairie Complex, which is adjacent to the Parkway, is the largest protected prairie in Ontario. Very little Tallgrass Prairie remains in North America with estimates ranging from 5% to less than 0.1%. Tallgrass Prairie ecosystems are the most endangered vegetation communities on Earth, and are home to many rare and endangered plant and animal species.

The Parkway's ecological approach has resulted in an increase of over 100 ha of Tallgrass Prairie habitat in Windsor. In essence, we have created a "Parkway in a Prairie".

The Parkway also crosses, displaces or abuts 12 municipal drains that provide fish habitat. The objective during design was to achieve an overall net gain in fish habitat through replacement, restoration or enhancement.

A Provincially Significant Wetland located along the southern boundary of the Parkway had to be considered relative to impact avoidance and the need to offset impacts.

2.0 ENVIRONMENTAL CONTRIBUTIONS

An ecosystem approach involves understanding how the biological, human and physical components interact with nature and promote conservation and a sustainable design.

The Parkway project demonstrates how to implement an ecosystem approach to the planning, design, construction, operation and maintenance of a highway. An integrated design team was fundamental to the successful implementation of an ecosystem approach. This team considered not only impacts but also opportunities afforded by every aspect of the work; from

opportunities to incorporate First Nation culture and tradition into the urban design of the Parkway, to using building demolition sites and materials to create snake habitat features.

The robust natural heritage investigations conducted as part of the DRIC EA study were the foundation of the ecosystem approach. Another driver was the *Endangered Species Act, 2007* (ESA), and the permits that were issued to the project as a consequence of impacts to Species at Risk (SAR).

The environmental contributions outlined below are direct outcomes of the ecosystem approach.

2.1 Preservation and Restoration of Tallgrass Prairie

Within the landscaped portions of the Parkway, 44.3 of the 120 ha of greenspace are created Tallgrass Prairie communities.

Beyond the limits of the Parkway, 35.1 ha of Tallgrass Prairie are being restored to provide new and higher quality habitat for several SAR, in accordance with permits issued under the ESA. MTO is required not only to manage these sites until the expiry of the Permits in 2021, but also to ensure protection of these sites in perpetuity.

A one-time effort involving the restoration of approximately 60 ha of the Spring Garden Natural Area is also being undertaken in partnership with the City of Windsor and the Essex Region Conservation Authority.

Overall, the final design of the Parkway limited impacts to 0.4 ha of high quality ecological habitat.

2.2 Reducing Impacts to the Ojibway Prairie Complex Through Design

A portion of the new highway was combined with a section of the E.C. Row Expressway with a resulting 25% reduction in impacts to sensitive habitat features for SAR snakes and to the Tallgrass Prairie ecosystem. In addition, refinement during design and construction resulted in further protection of landscape fragments that were incorporated into the overall landscape plan.

2.3 Integrated Landscape Plan

In recognition of the global, national and provincial significance of the rare Tallgrass Prairie remnants in the Windsor Essex region, special measures were taken to ensure the protection, enhancement and restoration of ecosystems and associated habitats. An Ecological Landscape Plan covering over 75 ha was implemented that established an extensive habitat network consisting of existing, new and rehabilitated terrestrial and aquatic communities which are integrated with, and add to the biodiversity of existing ecosystems.

Exclusively native seed and vegetation were planted that promote connectivity with adjacent prairie habitat. The scale of the planting effort was unprecedented for an MTO project as it included 120,000 trees, shrubs, and forbs representing 130 native species and 15 non-standard seed mixes containing 106 different native species of prairie grasses, wildflowers, and sedges.

Early planning efforts included seed bank salvage, and the development of a soil management plan. The development of an edge management plan minimized impacts to adjacent sensitive habitats. A comprehensive invasive species management plan was also

developed as invasives will pose an ongoing threat to the successful establishment of the ecologically based prairie landscape.

A number of lessons learned and best management practices that have application to other large infrastructure projects have come from the implementation of the landscape plan.

2.4 Species at Risk

The ESA permits included comprehensive mitigation, monitoring and long-term habitat protection for six plant and two snake SAR, and their critical habitats. To date, the results of the various mitigation and monitoring programs have revealed some significant findings, including previously unknown populations of these and other SAR; important species behaviours and habitat use; and the most successful methodologies for transplantation and propagation. Most significantly, through scientific trials, a method was found for propagating and transplanting Colicroot (*Aletris farinosa*), which was a requirement of the ESA permits because the project threatened the largest known population of Colicroot in Ontario. See Appendix F for photos of the transplanting process.

The scale of the SAR program associated with the Parkway is summarized in Appendix B. An estimated 200,000 SAR plants have been successfully transplanted to protected restoration areas outside the corridor along with many rare associate plants. Traditional Knowledge was integrated into the transplanting efforts through the direct participation of Dan Shab Enterprises, a Walpole Island First Nation (WIFN) ecological business.

Between 2008 and 2014, 504 Eastern Foxsnakes (*Pantherophis gloydi*) and Butler's Gartersnakes (*Thamnophis butleri*) were relocated from the construction footprint to protected Tallgrass Prairie areas. Relocated snakes have successfully selected new places to hibernate, lay eggs, and give birth to live young, exhibiting adaptability to new environments.

2.5 Fish Habitat Creation

Overall, 35,000 m^2 of new fish habitat was created equating to a greater than 3:1 compensation ratio. The ecosystem approach was followed in targeting the creation of habitat that supported lifecycle requirements of the fish species involved. The drains crossing the original highway corridor were highly urbanized consisting of straight channels with an absence of key functional habitat features. Good quality spawning areas were also absent in upstream reaches of the drains.

The new expanded highway right-of-way now includes for naturalized, meandering channels with new riparian cover. Refuge pools have been constructed that provide increased depth for fish during low flow periods. A new pond constructed on the Lennon Drain provides habitat for spawning, rearing, foraging and refuge for all of the resident species, including Northern Pike, a significant recreational fish within the Detroit River and some of its tributaries. The new pond has an area of approximately 2 ha and incorporates a permanent low flow channel.

Stormwater runoff from the original at-grade highway surface flowed directly into drains with no quality controls in place. New stormwater controls provide overall benefits to water quality for aquatic life through the removal of sediment that would have previously been deposited in the drains from road surface runoff. Stormwater ponds adjacent to constructed

pond habitats have outlets that provide extended flows to refuge habitat in otherwise characteristically low flowing systems.

2.6 Wetland Preservation and Restoration

The direct loss of 5.4 ha of provincially significant wetland has been offset by the preservation of over 45 ha of provincially significant wetland and associated buffer lands. These lands will provide habitat for many species, improve water quality and add natural capacity for flood storage. These ecosystem services add resiliency to the effects of climate change.

In keeping with the ecosystem approach applied to the project, wetland and fisheries habitat creation areas have been integrated with SAR habitat restoration areas to provide enhanced habitat connections. The landscape design includes a 1,356 m^2 buffer and pin oak/deciduous tree swamp treatment surrounding the open water areas of the permanent fish habitat, which will benefit the overall wetland restoration efforts.

As the 45 ha of land are owned by MTO, we have committed to providing the same long term protection to wetland preservation lands that will be provided to SAR restoration areas.

2.7 Chappus Street Restoration

A former residential street was decommissioned and returned to its former natural state. Today the species diversity in this area rivals that of the nearby Provincial Nature Reserve.

Appendix D shows a before and after photo series of the Chappus St. restoration area, today an integrated wetland/SAR restoration area.

2.8 Invasive Species Management

Next to habitat loss, the largest threat to Tallgrass Prairie is invasive species. Since 2009, invasive species have been systematically tackled using a variety of methods such as prescribed burns, brush cutting, selective use of herbicides and hand pulling. The Essex Region Conservation Authority has recognized the Parkway's invasive species work as the most progressive and comprehensive program in the region. The target species include european reed (*Phragmites australis*), autumn olive (*Elaeagnus umbellate*) and purple loosestrife (*Lythrum salicaria*). Ongoing monitoring will measure the effectiveness of management techniques.

2.9 Community Protection and Connection

Urban communities and ecological areas bisected by the original corridor have been re-connected by placing Highway 401 below existing ground level and constructing a series of 11 tunnels, with one tunnel dedicated as an ecopassage.

Noise attenuation was provided by building the highway below grade. Noise barriers, berms, and combinations of the two, were constructed wherever they were effective in further reducing noise levels.

A new multi-use trail, approximately 20 km in length, allows residents and visitors to Windsor to travel the length of the trail without having to interact with vehicular traffic, thanks to a series of seven pedestrian bridges and two pedestrian tunnels. The trail provides new

linkages to municipal trails and facilities, and provides users with a closer connection to nature. The trail system is also part of the Trans Canada Trail.

The trail will be an important regional asset supporting active transportation. An integrated landscape plan, together with aesthetic enhancements to structural (bridges and walls) elements and a series of interpretive panels and wayfinding signage will serve to attract users.

2.10 Ecopassages

Three ecopassages have been designed for the Parkway project. The largest ecopassage is a tunnel top stretching over Highway 401 and Highway 3. This ecopassage measures approximately 14,500 m^2 (approximately the size of nine NHL hockey rinks) making it the largest ecopassage in the province. The ecopassage allows SAR snakes and other wildlife to cross between the Spring Garden Natural Area and Oakwood Prairie; two natural areas that have been separated since Huron Church Rd. was constructed in the 1920s. There is also an ecopassage beneath the trail crossing on the tunnel top to allow snakes to cross the trail unharmed. See Appendix C for photographs of these two ecopassages.

A third ecopassage under Matchette Rd. (still to be constructed), will provide snake habitat connectivity between the Chappus St. restoration area and newly restored habitats to the west.

2.11 Excess Earth Management

An estimated 1.5 million m^3 of the 3.5 million m^3 of excavated earth generated from the Parkway was re-used for construction and landscaping. The balance of the material was managed following current provincial best management practices directing that all earth be treated as a resource when considering appropriate uses. For example, 320,000 m^3 of earth was used to cap a closed landfill (Puce landfill), which will result in a significant reduction in leachate generated at the site requiring treatment and disposal, and capping the landfill 20 years earlier than originally planned.

3.0 INNOVATION

Knowledge gained from the SAR program was the source of a number of environmental innovations. In addition, there were a number of engineering innovations that cumulatively provide net benefits by reducing energy consumption and greenhouse gas emissions. These innovations are summarized in Appendix E.

4.0 VALUING THE CONTRIBUTION

At the time of construction, the Parkway was the single largest highway investment per kilometre in Ontario's history. The Parkway carries $300 million of goods daily between Canada and the United States. In addition, to meeting long term capacity needs for the crossing, this project addresses long-term community and environmental impacts associated with high volumes of commercial traffic traversing a local roadway.

There are a number of other benefits that will accrue from the Parkway's investment in the protection and enhancement of environmental assets that extend well beyond the boundaries of the Parkway.

4.1 Ecosystem Services & Climate Change Resiliency

The environmental work conducted in association with the Parkway is at a scale which provides broader regional environmental benefits. The ecosystem approach applied to the project led to an understanding of the interconnectedness of the Tallgrass Prairie and wetland area functions beyond the Parkway footprint. Land acquisition to meet regulatory requirements targeted areas which would help preserve this interconnected functionality. The Parkway's ecologically supportive landscape design further augments overall ecosystem health and associated regional ecosystem service benefits including the following:

- Improved water quality outflow
- Carbon sequestration through the extensive landscaping and protected vegetation
- Increased habitat for flora and fauna
- Natural flood storage/stormwater retention
- Improved soil quality

4.2 Application to Science

All of the innovative research has a broader application to the scientific community. The SAR program has resulted in several significant advances in furthering the understanding of the biological and ecological requirements that will aid conservation and recovery initiatives for these species. These results are being integrated into species recovery strategies and long-term conservation planning. Perhaps the biggest contribution to the recovery of SAR will be the new science that has been revealed as a result of the monitoring which is an ongoing and long-term commitment.

Appendix G summarizes contributions to the scientific community.

4.3 Contributions to Biodiversity

MTO is listed as a supporting Ministry for many activities in the *Ontario Biodiversity Strategy, 2011.* The Strategy aims to protect, restore and recover Ontario's genetic, species, and ecosystem diversity, and related ecosystem functions and process.

The design of the Parkway has helped support the Ontario Biodiversity Strategy by increasing habitat, planting native species and creating a variety of ecosystem communities.

4.4 First Nation Consultation and Engagement Model

The project has benefited in many ways from over ten years of Walpole Island First Nation's (WIFN) engagement and offers lessons learned as a consultation model. The growth of Dan Shab Enterprises, a WIFN based ecological business, as a result of procurement opportunities on the project is just one of the tangible outcomes of having a First Nation relationship policy.

4.5 Stewardship & Education

Trail signage and other interpretive features including seven coloured pedestrian bridges with First Nations based thematic treatments, will serve to educate trail users about the sensitivity and significance of the surrounding natural environment as well as First Nations culture.

Project team members have undertaken stewardship initiatives including sponsoring World Snake Day (now a yearly event at Ojibway Nature Centre), other children's events at the Ojibway Nature Centre, Elder College presentations and the creation of Environmental Newsletters for Windsor-Essex residents.

4.6 Species at Risk Training

Great care was taken to ensure that all staff, contractors and sub-contractors working on the project were aware of the project's unique environmental setting. Every person who worked on site was required to take SAR training, which involved learning about the species on the project, what to do if a species was encountered and why it was important to care.

Over 7,000 personnel working on the Parkway have completed SAR Training to date. Associated with the training program is a SAR Hotline. This is a number that workers on site can use to call a Parkway biologist, day or night. The information about SAR has carried over into the community, to family and friends, and onto other projects.

5.0 APPLICATION TO TRANSPORTATION

The Parkway was necessary to improve border crossing capacity. The multi-jurisdictional planning process has improved traffic flow, while also addressing community and environmental needs through one of the largest individual EAs ever undertaken in Ontario. By following an integrated, ecosystem based approach to planning, transportation needs can be addressed within ecologically sensitive areas without jeopardizing overall environmental health and integrity. Early planning and consistency of application through the design and construction process, can also identify opportunities that add value with benefits beyond the immediate project area, including support of broader regional scale objectives.

6.0 CONCLUSION

Methods and approaches to environmental management that have been used on the Parkway have application to other transportation infrastructure projects. Environmental contract specifications have subsequently been applied to other P3 projects, and the extensive environmental team that was involved in this project are now applying this knowledge and experience to effectively manage environmental design and construction projects across Ontario.

While this submission has focussed on a number of the important environmental aspects of the project, there are also significant community, economic and transportation benefits at the local and regional levels that will accrue for generations.

Appendix A: Aerial photo progression of Parkway construction

Figure 1: Howard Avenue, 2006

Figure 2: Howard Avenue, 2013

Figure 3: Howard Avenue, 2015

Appendix B: Species at Risk by the numbers

Species at Risk	2004	2008	2014
Butler's Gartersnake	**4** found south of the E.C. Row	**109** found in MTO site on Chappus St. alone	**339** captured in the study area
Eastern Foxsnake	**3** observed	**2** found in the Parkway foot-print	**87** captured in the study area
Colicroot	**7** populations in Southern Ontario; ranging from 10 to 1000 - NHIC	**922** plants found in the Park-way footprint	Population estimate is **8,303** individuals
Dense Blazing Star	Less than **100** in Windsor-Essex County - NHIC	**537** plants found in the Park-way footprint	Population estimate is **76,525** individuals
Willowleaf Aster	Less than **150** in Ojibway Prairie Complex - NHIC	**8,234** plants found in the Parkway footprint	Population estimate is **416,205** individuals

Appendix C: Ecopassage tunnel top and ecopassage trail culvert

Appendix D: Chappus St. hibernacula creation and restoration

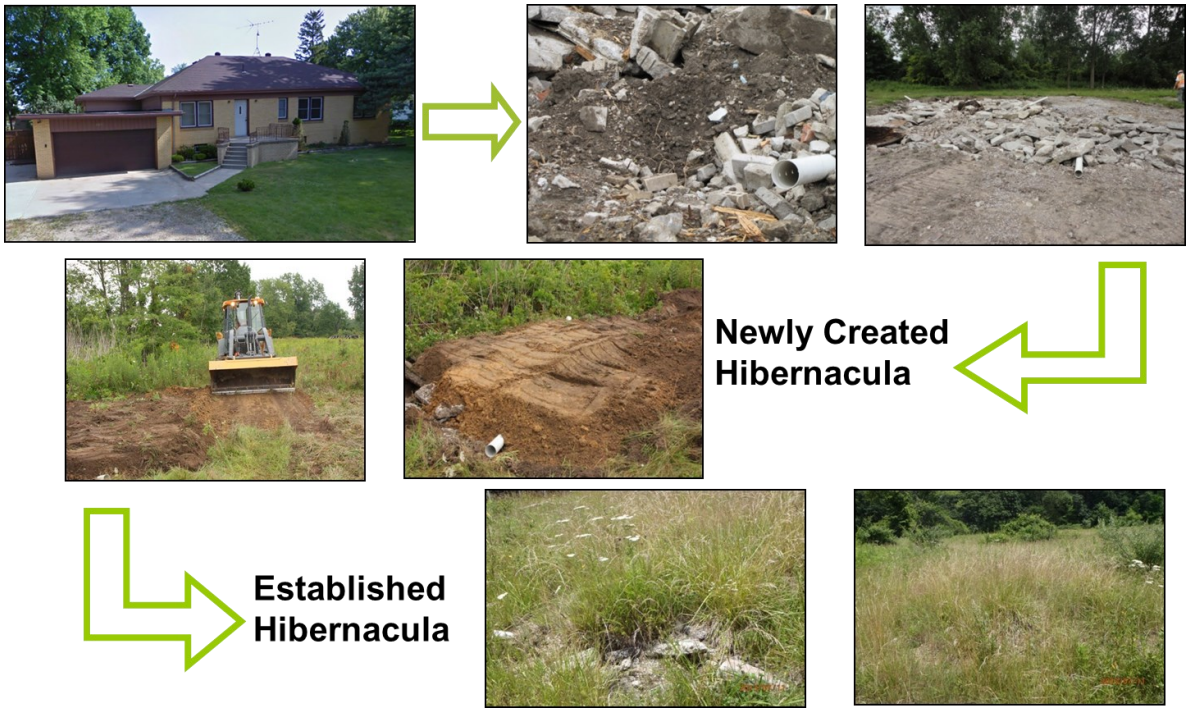


Figure 2: Chappus Street—Pre-demolition, 2012

Figure 3: Chappus Street—Post demolition, 2013

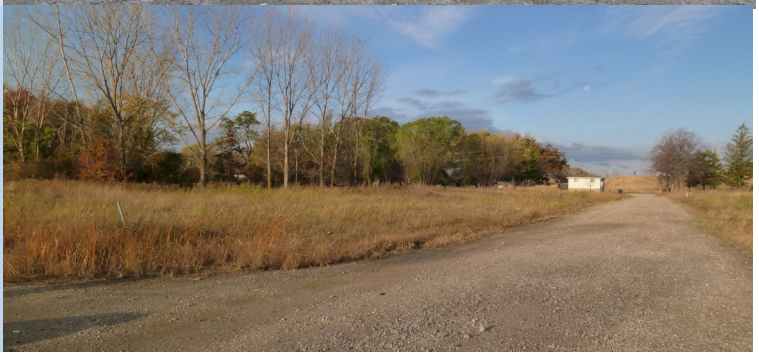


Figure 4: Chappus Street—Established vegetation, 2015

Appendix E: Innovations

Activity	The Innovation
Propagation of Colic-root	Through 10 scientific trials the Parkway team developed a successful method for growing Colicroot from seed. The successful method was used to meet the ESA permit compensation requirements and will have application to other restoration projects and will assist in the recovery of the species.
Snake Habitat Features	Residential buildings were demolished on two residential streets and re-naturalized in areas of known SAR snake habitat. The demolitions provided an opportunity to create live birthing areas and hibernacula using the foundations and debris. This maintained site fidelity for snakes which had previously overwin-tered in these locations. The Parkway's customization of the Toronto Zoo hibernacula design has been successfully shared with others, including Point Pelee National Park, where the Parkway design was used on their last remaining cottage in 2014. In 2015, Point Pelee was able to confirm that the hibernaculum created from the base-ment of the cottage was successfully used by Eastern Foxsnakes that winter.
Sod Mat Transplant Method	A sod mat method was developed to efficiently and effectively relocate SAR plants and associative vege-tation in 1m by 1m sections. 850 tonnes of Prairie soil with native seed bank was salvaged through this method. Transplants are thriving. See Appendix F for photographs of the process.
Snake Fence Designs	A new barrier fence was developed specifically for the Parkway to keep snakes out of the highway corri-dor. Due to their known ability to climb, Eastern Foxsnakes were used to test different fence designs/ heights leading to a new permanent snake barrier design. 13 km of permanent snake barrier fence is in-stalled.
Snake Radio Telemetry	Development of new radio transmitter for implanting in the SAR snakes for radio tracking and monitoring of snake movements which has led to several scientific discoveries.
SAR Critical Path Sched-uling	The timing and scale of effort for SAR transplants and snake salvage posed a risk to the project schedule. A critical path was developed with leading construction specialists to demonstrate the feasibility of the construction staging.
Aboriginal Procurement Pilot Project	MTO was the first ministry to use the aboriginal procurement pilot project to procure the services of a First Nation business. The pilot was an initiative of the Ministry of Aboriginal Affairs intended to provide economic opportunities for First Nations.
Human Health Risk As-sessment	The EA required that the first MTO highway construction based Human Health Risk Assessment (HHRA) be conducted for the Parkway. As a result, the first HHRA modelling of its kind was undertaken and the outcome led to an innovative approach involving mitigating against risk through limiting equipment oper-ation in higher risk locations during bad air days. This approach was undertaken without impact to the construction schedule.
W.E. pay it forward	In a "first of its kind" pilot project, MTO partnered with local not-for-profit organizations to reclaim mate-rials from buildings slated for demolition. The reclaimed materials were recycled back into the community through charitable housing and improvement initiatives. Remaining materials went to the Habitat for Hu-manity Re-store in Windsor. Between 2010-2011, 250 tonnes of material was redirected from landfills and the Re-store saw a quadrupling of profits from resold materials.
LED Lighting	The use of LED lighting in the tunnels, on the roadway and along the trails to reduce energy consumption.
Stormwater Pumps	Use of special electronic starting mechanisms for the stormwater pumps to reduce energy consumption.
Multi-lane Roundabout	Studies have shown the reduction of GHG emissions associated with the implementation of these facili-ties.
Traffic Management System (ITS/ATMS)	Provide real time traffic info allowing drivers to make informed decisions about their routes to avoid de-lays, congestion and excessive idling. The construction of the project also employed stringent traffic man-agement requirements to ensure that traffic delays and congestion were minimized.
AFP Delivery Model	Provides incentives for the private sector to deliver under an accelerated schedule thereby reducing con-struction impacts and disruption for the travelling public and community.

Appendix F: Sod mat transplanting process

Appendix G: Contributions to new science

Scientific Discovery	Value added to the scientific community
Butler's Gartersnake (BGS) Hibernation	Radio-telemetry led to confirmation of BGS hibernation in chimney crayfish burrows.
BGS Food Source	Research funded by the Parkway concluded that BGS eat invasive earthworms. Their food source was previously unknown.
BGS Live Birthing Areas	Discovery of communal live birthing areas.
Snake Home Ranges	Eastern Foxsnake and BGS relocation distances- exploratory behaviour, the fact that they re-establish home ranges after relocation.
Snake Movement Patterns	Monitoring through radio telemetry shows adaptation to new habitats.
Willowleaf Aster (WLA) (*Symphynotrichum praealtum*) Genetic Testing	Genetic testing by the University of Guelph Herbarium confirmed that there was genetic diversity within the populations of WLA found in Windsor. This validated the approach of transplanting all individuals from the construction footprint.

Promenade RT. HON. HERB GRAY Parkway

Ontario