



**Weaselhead/Glenmore Park  
Southwest Calgary Ring Road Environmental Impact Study 2016-2022**

**Final Report**

**Environmental Impacts from the Southwest Calgary Ring Road Project on  
the Weaselhead Special Protection Natural Area:  
Field Studies from 2016 through 2022 with Interpretations and Recommendations**

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**EXECUTIVE SUMMARY**

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Situated in southwest Calgary, Alberta, Canada, the Weaselhead Natural Environment Area is designated as a Special Protection Natural Area by the City of Calgary. The City Park is widely used extending over a delta where the Elbow River flows into Glenmore Reservoir. The delta development followed the reservoir completion in 1933 and includes a braided network of active and abandoned channels, with both oxbow ponds and wetlands. The Weaselhead includes a rich mosaic of aquatic, riparian, and upland habitats including willow shrub lands, balsam poplar, white spruce, and trembling aspen woodlands, which support abundant and diverse birds and other wildlife. The Weaselhead/Glenmore Park Preservation Society (Society) was established in 1994 to preserve and enhance biodiversity, protect the integrity of the Elbow River and to provide conservation education.



Areas of concern highlighted in the photos above include water quality degradation from multiple sediment and erosion mitigation failures; barriers to wildlife movement during construction; and an increase in noise pollution.

In 2013 the Province of Alberta purchased land from the Tsuut'ina Nation to the west of the park for construction of the Southwest Calgary Ring Road (SWCRR), an 8-lane highway with potential for future expansion to 16 lanes. Environmental Impact Assessments (EIA) are required by the province for such projects. The economic, social, and anticipated environmental impacts of the project (as completed with the proposed mitigation measures) are considered in this decision-making process. To assess the actual impacts and effectiveness of the mitigation measures adopted by the construction company, the Society conducted a seven-year environmental impact study (Study), collecting data on selected environmental components from the start of construction in 2016, to 2022 after the road's completion. Studies such as this - which include baseline data, cover the construction period, and continue into the operational period - allow for direct comparison between conditions before and after.

The main findings of the Study:

- Sediment and erosion mitigation measures failed repeatedly despite meeting policy standards.
- Statistically significant increases in conductivity, nitrate, and phosphate occurred over the study period in a wetland next to the SWCRR construction zone. (These changes were not observed in an upstream 'reference' wetland.)
- Noise levels in the park increased from 40 dB before construction and now reach an average of 65 dB. This meets the Provincial requirement for sound wall installation in urban areas, but not natural areas. Despite the observed impact of noise on breeding birds during the Study current policies do not require any measures to be taken to protect natural areas such as the Weaselhead from traffic noise.
- Including wildlife underpasses in the design of the SWCRR has successfully prevented the Weaselhead becoming 'island' habitat – disconnected from the larger landscape. Monitoring with camera traps has shown large mammals such as cougar, moose and deer using these underpasses to move in and out of the park in the roads operational phase. However, the fencing intended to direct wildlife to these underpasses does not meet the requirements of the EIA and the revegetation of the underpasses intended to promote their use appeared incomplete in 2024.
- Mitigation measures detailed in the contract between Alberta Transport and the construction company were not always implemented to specifications.

**The Society recommends the Province of Alberta develop and implement improved policy, accountability and enforcement measures regarding mitigation requirements and ensures these policies are environmentally sufficient and are being met by contractors for all infrastructure projects.**



Construction and sediment spill timeline (timeline not to scale). The dates of sediment slides are highlighted with a red dot.



Satellite image of the Weaselhead on September 8, 2016, before major construction of the SWCRR began. (Weaselhead boundary: yellow line; scale: red line = 500m, Google Earth)



Satellite image of the Weaselhead on July 22, 2022, with the SWCRR project complete. (Weaselhead boundary: orange line; scale: red line = 500m, Google Earth)



Satellite image of the Weaselhead showing key Study locations by name. The upstream reference wetland sampling location used in the Study is outside the region shown in this map. (Google Earth; August 6, 2022)



# IMPACT ON TERRESTRIAL HABITATS



Vegetation transect plot survey



The wildlife movement underpass along the Elbow River does not appear to have met revegetation requirements, but does contain prohibited noxious weeds.



Black bear utilizing the Park



Western Tanager  
Tanager (Western) Bernard Tremblay



Noise monitoring sites in 2022 averaging at 65dB

**Vegetation:** The Society's monitoring of riparian vegetation by the side of a wetland impacted by construction of the SWCRR showed a trend towards more upland generalist species preferring drier conditions.

**Revegetation:** Ecological restoration through revegetation is important in mitigating numerous consequences of disturbance. Revegetation helps with erosion control, protecting water quality in adjacent riparian habitats, increasing site suitability for desired species, preventing colonization by invasive species, initiating successional restoration. It appears that revegetation efforts have not met the requirements for the project.

**Invasive Plant Management:** Multiple species of noxious and prohibited noxious weeds have been identified and can be visible in the transportation and wildlife corridors including most prominently Spotted Knapweed and Black Henbane. Impacts of the soil fill introducing invasive species should be examined.

**Mammal Movement:** A significant component in the success of maintaining wildlife movement in and out of the park was the lengthening of the SWCRR bridges across the Elbow River. This allowed room for wildlife corridors along each bank. However, both revegetation of these corridors and the fencing installed to guide wildlife to these underpasses do not appear to meet the conditions outlined in the construction contract. Animals accessing the SWCRR to cross the highway rather than using the underpasses have resulted in over 75 wildlife vehicle collisions.

**Breeding Birds:** Annual monitoring showed no significant change in species richness during the study period though the number of bird species with 'sensitive' or 'may be at risk' provincial status decreased during the construction phase. Some of these were observed again in 2021 and 2022 following completion of this phase. Whether the habitat of the Weaselhead is favourable to long-term re-establishment or population support is at present unknown. Long term monitoring is recommended.

**Noise Pollution:** As predicted in the EIA, noise was significantly increased by construction of the SWCRR and its opening to traffic in 2020. Prior to construction the average noise level across the park was around 40dB. By 2022 it had risen to around 65dB, (i.e. 100 times louder than before). Sensory disturbance from anthropogenic noise is a serious form of environmental change as it affects both aquatic and terrestrial species in all taxonomic groups including humans.

# IMPACT ON AQUATIC HABITATS



Sediment mitigation failure with coarse infill slide into the Beaver Pond, August 2019



Caddisfly larvae, sensitive to pollution, were not detected in the Beaver Pond during construction from 2017-2020, returning in 2021.



Forage fish minnow species, Stickleback, found in the Beaver Pond.



Beaver Pond September 2017



Beaver Pond October 2022

**Water Quality & Wetlands:** Wetlands in the Weaselhead were impacted repeatedly by failures in sediment and erosion control during heavy rain events. These events resulted in large amounts of soil and infill being washed into the wetland closest to the construction zone on five different occasions, with associated extremes of water turbidity. In the Beaver Pond, conductivity, chloride, nitrate and phosphorus all showed statistically significant changes over the study period, with chloride returning to acceptable levels by the end of 2022.

**Aquatic Macroinvertebrates:** The Study found a shift in the type of species present, with new species noted as well as prominent species that had previously been recorded, absent in the 2021 and 2022 samples, likely due to the water fluctuations in the wetlands. Sensitive to pollution, Caddisfly larvae were absent in the Beaver Pond during the construction period, returning in 2021.

**Amphibians:** AMEC's EIA noted Boreal Chorus Frogs were the most common amphibian when surveyed in 2014 and were present in both wetlands later selected for monitoring. Boreal Chorus Frogs were not detected in these wetlands from 2018-2021, with data confirming their return in 2022. Amphibians are a bioindicator species as they are very sensitive to human disturbance and pollution.

**Fish:** The wetlands studied are home to fish classified in the category of forage fish, small minnows important in the food chain. The Elbow River is home to several species such as Bull, Rainbow and Cutthroat Trout, Mountain Whitefish and Northern Pike. Repeated sediment and erosion control mitigation failures impacts fish habitat.

**Hydrology:** Significant changes to the hydrology of the two wetlands monitored in the Weaselhead were observed during the study period. The wetland closest to the SWCRR (the Beaver Pond) became progressively drier. The contribution of the construction of the SWCRR to these changes is uncertain, though the roadway system reduced the catchment areas for the two creeks that feed into the Beaver Pond and may also have changed groundwater subsurface recharge. The hydrology of the wetland further from the SWCRR also changed dramatically. In September 2020 changes in the management of the nearby Glenmore Reservoir resulted in an increase of approximately 1.5m in the wetland's water level from early summer to late fall compared to previous levels.



# RECOMMENDATIONS



The Society recommends the Province of Alberta:

- Update Alberta Transportation's '*Erosion and Sediment and Control Manual*'. Mitigation efforts that appeared to be designed and implemented to provincial standards, were observed failing on multiple occasions during very heavy rain events. Such events (more than 25mm in 24hrs) are predicted to increase dramatically in Alberta in the future due to climate change.
- Include sound mitigation measures for areas recognised by the province as 'Key Wildlife and Biodiversity Zones' in Alberta Transportation's '*Noise Attenuation Guidelines for Provincial Highways*'.
- Further consideration to be given to installation of a sound barrier along the SWCRR in the Elbow Valley.
- Improve the functioning of the wildlife underpasses and reduce vehicle collisions on the SWCRR by ensuring (as detailed in the contract to build the SWCRR)
  - vegetation is planted along the underpasses to provide rest and cover habitat.
  - wildlife fencing that guides wildlife to these underpasses and prevents animals accessing the highway is brought up to contractual specification.
- Work with wildlife organizations such as Western Transportation Institute, the Biodiversity Research Centre, and Miistakis Institute to develop effective mitigation measures to address wildlife movement during road construction (before more permanent measures are functional).
- Implement weed management plans including frequent early detection sweeps.
- Upgrade the stormwater pond to align with the specifications for naturalization enhancements found on page 89-92 of the DBFO Agreement.
- Evaluate the changing hydrological regime and impact on groundwater and continue to investigate sources of the observed hydrological changes to the Beaver Pond. Monitor groundwater with piezometers.
- Develop and implement improved policy and procedures to ensure environmental mitigation requirements are met by contractors for all infrastructure projects.

## CONCLUSION

The Society has several recommendations to reduce the environmental impact of large infrastructure projects. In construction of the SWCRR the Contractor and Alberta Transportation agreed to impressive mitigation measures, however these were not always successfully implemented. In some cases, the standards were not sufficient to mitigate impacts on the environment and in other cases they were not carried out to specification. In acknowledgement of the Province of Alberta's vision statement "*Proudly working together to build a stronger province for current and future generations.*" improvements must be made to ensure that protecting water quality and biodiversity is a top priority. Current and future generations of Albertans are inextricably dependent on these. To align with the Provincial values of "*Respect, Accountability, Integrity and Excellence*", improvements must be made.



**Figures A, B, and C.** Photographs of the Beaver Pond in the Weaselhead, showing progressive water loss from 2017-2022. (A) is taken by Yves Dansereau on May 27, 2017, (B) is taken on September 23, 2017, and (C) is taken on October 21, 2022. All taken from the paved regional pathway where the path crosses a culvert, facing east.



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## SUMMARY TABLE

**Report summary.** Bolded ecosystem components were directly studied in the Society's Study, while bolded italicized components are additional areas of concern. Environmental Impact Assessments (EIA) are required by the province for such projects. Technical Requirements come from the Design, Build, Finance, and Operate (DBFO) agreement between Alberta Transportation and the contractor.

EIA Prediction	Technical Requirements	Study Outcome Assessment	Study Recommendation
<b>Ecosystem Component: Vegetation</b>			
Negative effects on vegetation to be minor, local, and isolated with some uncertainty regarding loss of rare plants.  Although the total footprint of permanent land disturbance is 1,135 ha, disturbance related to road construction will be minor and localized.	Vegetation clearing at selected timing to avoid breeding birds and amphibian disturbance.  Rare plant surveys conducted prior to removal of vegetation.	Complete loss of vegetation is isolated to the Transportation Utility Corridor (TUC).  Hydrological changes in the Beaver Pond impacting vegetation may have resulted from the SWCRR and KGL is already committed to investigating this. Species diversity increased over time with the drying soil.	Continued evaluation of the Beaver Ponds riparian vegetation to assess whether successional change towards upland habitat is occurring and determine the long-term viability of this wetland in response to hydrology changes.
<b>Additional Considerations: Revegetation</b>			
Low native shrubs and native grassland restoration to be undertaken between Anderson road and Elbow River Valley to mitigate effects of vegetation loss and aid in wildlife movement.	To be revegetated as soon as possible mimicking natural species profile and monitoring for 1 year for 85 – 90 % survival rate.	Revegetation does not appear to have been successful with limited woody plants visible in the wildlife corridor and around the stormwater ponds.	Improve revegetation policies to ensure success of revegetation efforts as well as wildlife management goals.
<b>Additional Considerations: Invasive Plant Management</b>			
Minor negative effects in terms of weed establishment with some uncertainty.	Develop a Weed Management Plan and control weeds to ensure compliance with the Alberta Weed Control Act.	Major negative effects have occurred with weed establishment including prohibited noxious weeds.	More aggressive weed management with frequent early detection, rapid response sweeps.
<b>Ecosystem Component: Noise Pollution</b>			
Predicted increase in noise resulting from both construction activities and traffic on the SWCRR once in operation. Population reductions in songbird abundance and densities expected from highway noise disturbance. Noise levels predicted to exceed 65 dB.	Use noise reduction equipment to muffle and reduce sensory disturbance to wildlife. No pedestrian pathways to be included in wildlife corridors. Noise attenuation barriers installed adjacent to residential areas.	Noise level recordings over the Study revealed a statistically significant increase in noise. The average noise level detected in 2016 was 40 dB and in 2022 was 65 dB.	Province to reconsider the sound mitigation requirement guidelines and update its policy to include Key Wildlife and Biodiversity Zones. Further consideration to install noise attenuation barriers in the Elbow Valley should be undertaken.
<b>Ecosystem Component: Breeding Birds</b>			
Concern over birds avoiding the area with increased disturbance and traffic noise with significant reductions in songbird abundance and densities around highway sources of noise	Vegetation clearing not to occur between April 12 and August 30 of any given year to avoid breeding season for birds.	Vegetation clearing was done in the restricted time frame and nest boxes of migratory birds were removed during the nesting period. Fines were given for both violations.	Continued long term monitoring of bird species to take place with improved methodologies to also include surveying nocturnal species, and bird species with differing temporal behaviour and migratory patterns as well as



pollution. Concluding that enough habitat remains to support bird population.	The nests of migratory birds are protected under the Migratory Birds Convention Act.	Our Study found a dip in species during the construction period that recovered.	comparing populations to noise pollution levels.
<b>Ecosystem Component: Wildlife - Mammal Movement</b>			
Habitat fragmentation and reduced connectivity with barriers to movement were predicted to be negative with minor to moderate, long-term impacts. Species predicted to be most prone to the effects of movement obstruction are cougar, lynx, bobcat, black bear and moose.	To establish wildlife movement corridors under the Elbow River and Fish Creek bridges that would maintain movement from construction to the operational phase, revegetated as soon as possible to provide rest and cover.	Mitigation efforts appeared to have limited efficacy during the construction phase of the Project compared to during the operational phase.	Reevaluate revegetation needs to provide rest and cover opportunities to facilitate wildlife movement and connectivity. Alberta Transportation to work with wildlife organizations such as Western Transportation Institute, the Biodiversity Research Centre, and Miistakis Institute to better develop and implement effective mitigation efforts addressing wildlife movement during road construction.
<b>Additional Considerations: Wildlife Fencing</b>			
Effects of fragmentation will be highest in the Fish Creek and Elbow River valleys, realized primarily in barriers to movement. Wildlife fencing to be constructed to direct wildlife to riparian wildlife passage areas thereby preventing wildlife vehicle collisions.	Fencing should incorporate a small mesh component directly above and below the ground surface. Maximum ground to fence gap and clearance between gate posts to be 75mm. Designed to discourage animals from accessing the roadway and to funnel movement to underpass.	Fencing does not meet the Technical Requirements with a 3-foot gap in fencing observed to facilitate wildlife accessing the roadway and multiple collisions documented adjacent to that gap. Fence to ground gaps exceed 75mm, in some areas up to 254 mm. Does not functionally direct wildlife to underpass as majority of collisions occurred where fencing ends just north of underpass.	Further investigation should be undertaken to determine the shortcomings in the wildlife fencing that was installed with improvements made to meet the requirements to ensure the safety of drivers using the SWCRR and animals that cross into and out of the Park.
<b>Ecosystem Component: Water Quality</b>			
No residual effects to surface water quality from the construction or operation of the SWCRR as these impacts can be mitigated against with the Project design and ECOPlan. Assessed impacts to be minor and negligible.	Design to not negatively impact watercourses. Maintain appropriate sediment and erosion controls such as silt fencing and align to Best Management Practices (BMP).	Significant increases in phosphate, nitrate and conductivity in the Beaver Pond over time observed. Elevated concentrations of zinc, chromium, nickel, selenium, arsenic and uranium. Continued exploration of water quality will be conducted by Ausenco Sustainability Inc., Prepared for KGL Constructors.	Improve policies and standards regarding sediment and erosion control and road design concerns impacting water quality. Our recommendation regarding ongoing monitoring is already being met as water quality concerns have arisen by KGL resulting from the Project monitoring.
<b>Ecosystem Component: Wetlands</b>			
Decreased wetland area and alteration of hydrological function.	Continued exploration of water quantity and quality in the Beaver Pond will be conducted by Ausenco Sustainability Inc., Prepared for KGL Constructors. Investigations of flow will be addressed to determine if the SWCRR Project contributed to the water decline.		
<b>Additional Considerations: Sediment and Erosion Control</b>			
Moderate concerns over soil erosion due to wind with soil and water erosion concerns rated as high within river	To prevent sediment from entering water bodies.	Repeated sediment and coarse infill slides into water bodies occurred resulting from failing mitigation efforts.	Policies and standards currently in place require updating. Alberta Transportations Best Management Practices failed

valleys and slopes. Minor, negative, subregional, short-term impacts from erosion and sedimentation during construction.			during heavy rain events, thus need improvement.
<b>Additional Considerations: Hydrology</b>			
Minor negative long-term effects impacting the hydrological regime of wetlands with an alteration of wetland hydrological functions.	Spill management plans, implement standard erosion control techniques, maintain existing hydrological connections, and maintain surface flow. If disrupted, develop wetland replacement plan.	Major hydrological changes. The Beaver Pond experienced significant water loss during and following construction. The rest of the Weaselhead flats experienced significant water inundation with the Glenmore dam improvement.	Continued monitoring of flow into the Beaver Pond will be conducted by Ausenco Sustainability Inc. on behalf of KGL. Recommended to monitor groundwater with piezometers.
<b>Ecosystem Component: Aquatic Invertebrates</b>			
Potential Project related impacts from construction and operation exist related to watercourses which can impact water quality, hydrology, and benthic invertebrates.	Efforts of BMPs to maintain water quality preventing sediment and deleterious substances from entering waterbodies.	Temporary loss of caddisfly larvae in the Beaver Pond, a bio indicator species intolerant of pollution during construction, returning in 2021.	Improved policies and BMPs related to controlling sediment and erosion. Alberta Transportations Best Management Practices failed during heavy rain events, thus need improvement to better protect aquatic invertebrate populations.
<b>Ecosystem Component: Fish</b>			
Potential Project related impacts from construction and operation exist related to watercourses which can impact fish and fish habitat, water quality and hydrology.	Realignment design and general design instructed to maintain fish habitat and movement while reducing sediment and deleterious substances from entering waterbodies.	The WGPPS Study did not adequately evaluate impacts to fish populations. However, sediment and erosion mitigation failures were observed on multiple occasions.	Improved policies and BMPs related to controlling sediment and erosion. Alberta Transportations Best Management Practices failed during heavy rain events, thus need improvement to better protect fish and fish habitat.
<b>Ecosystem Component: Amphibians</b>			
Decreased physical habitat for amphibians will be negative and long term.	Vegetation clearing will not occur between April 12 and August 30 of any given year to prevent disturbance to breeding amphibians.	Temporary absence of Boreal chorus frogs noted during construction activities as these are bioindicator species not tolerant of water pollution. Presence returned when the road became operational.	Improved policies and BMPs related to controlling sediment and erosion. Alberta Transportations Best Management Practices failed during heavy rain events, thus need improvement to better protect amphibians and their habitat.