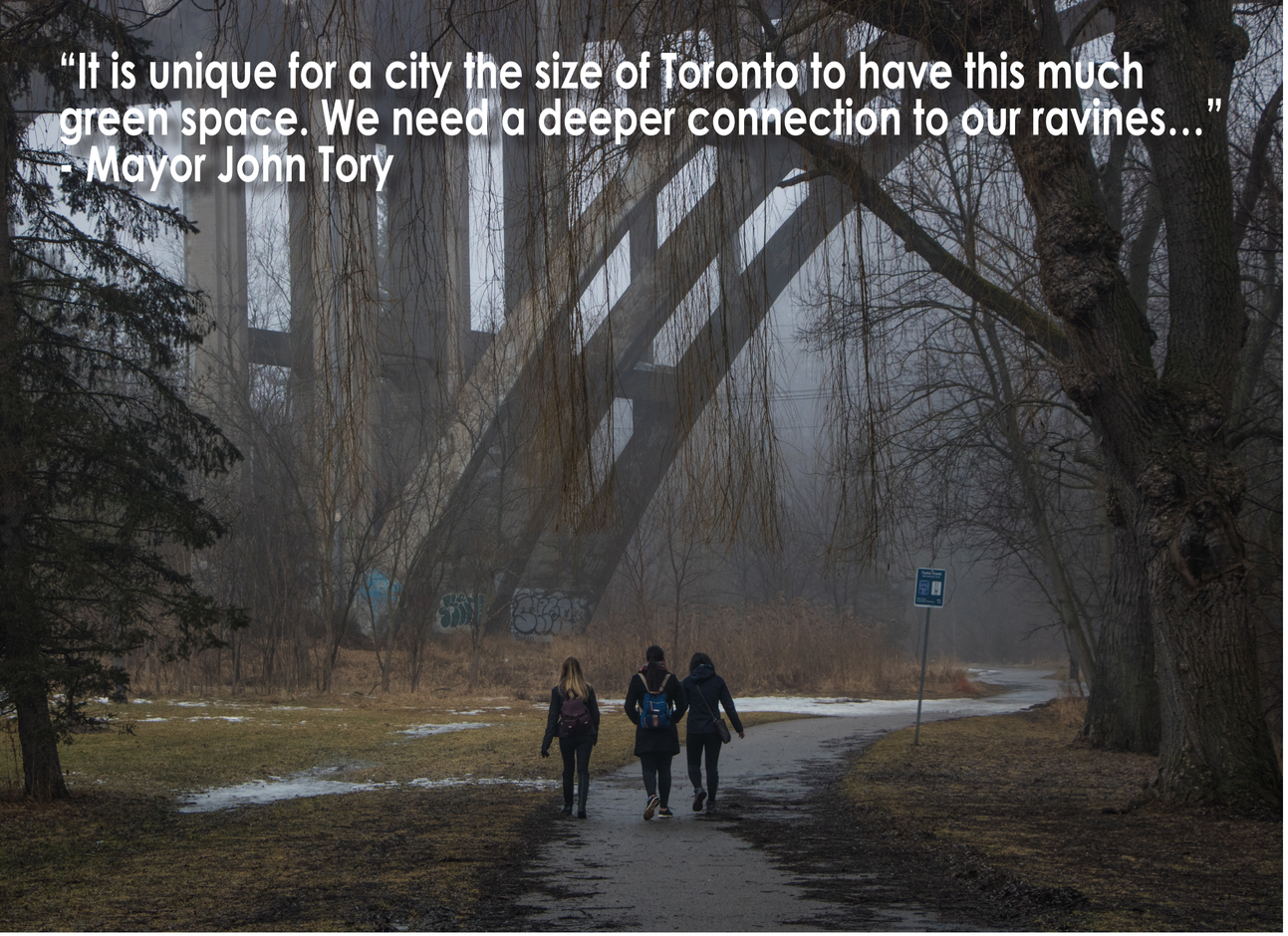
RAVINE XING:

A LANDSCAPE CONNECTIVITY PLAN FOR TORONTO'S RAVINE SYSTEM

Taylor Massey Creek (Apple, 2012)



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A LANDSCAPE CONNECTIVITY PLAN FOR TORONTO’S RAVINE SYSTEM

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1.0 INTRODUCTION

Largely undiscovered and underappreciated, ravines are the physical soul of the city and define our landscape. Toronto's ravines are truly unique. There is no other city in the world with an extensive and integrated network of ravines like Toronto, which boasts over 10,500 hectares of green space and wilderness (D'Aliesio, 2011). Erosion has carved out the ravines like serpentine canyons through the landscape, and this process continues. Toronto is built on the sediment left from a retreating glacier at the end of the last ice age. The combination of soft soils and high-volume runoff from glaciers allowed for rapid erosion, leaving behind a network of ravines with wide valleys and small rivers. Geologically speaking, the ravines are a relatively new creation, a fact confirmed by ongoing erosion and mudslides. It is this instability and function as water conveyors that leave them comparatively underdeveloped.

However, Toronto is experiencing unprecedented growth, and space is increasingly limited and costly. There is an opportunity to connect the City to the ravines in a manner that protects the ecological and hydrological services of the ravines. The purpose of this studio is to present opportunities for connection into the ravines for people, and between the ravines and other natural spaces for species. People can connect in more ways than just by physically descending into the ravines, which is why this studio will look for opportunities to reveal the ravines. There is an opportunity for the ravines to define Toronto and its people, like they have done for millennia.

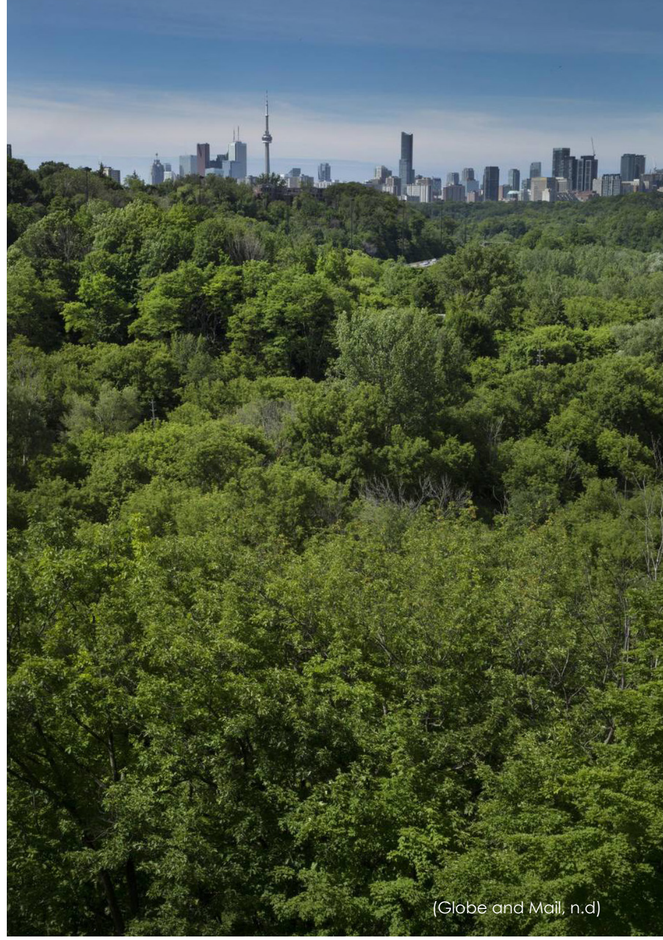
1.1 Ravine Strategy

The proposed Ravine Strategy is recognition of the roles that ravines play in the City's natural and human-made metabolism, articulating a vision for the system in Toronto. It synthesizes the City's various interests in the ravines including parks and recreation, environment, stormwater management, and infrastructure. The Strategy looks into the future at the growing population, with its needs for places to relax, play, and congregate; bringing together these various and sometimes contradictory interests to create an overarching vision for Toronto's ravine system. It contains 21 actions under 5 guiding principles. These principles are:

- **Protect** the natural areas and their ecological functions;
- **Invest** in opportunities to enhance the ravines;
- **Connect** people to nature and the City's history;
- **Partner** with communities and stakeholders; and
- **Celebrate** Toronto as a Ravine City.

1.2 Objective of the Project

We aim to recommend connections for the ravines, taking into account both the natural and recreational aspects of the system. The goal is for the City to function as one holistic ecosystem where the natural and built up landscapes are not in competition with each other. We explore ways to connect both the human and non-human residents of the City through the use of hubs, corridors, and gateways.



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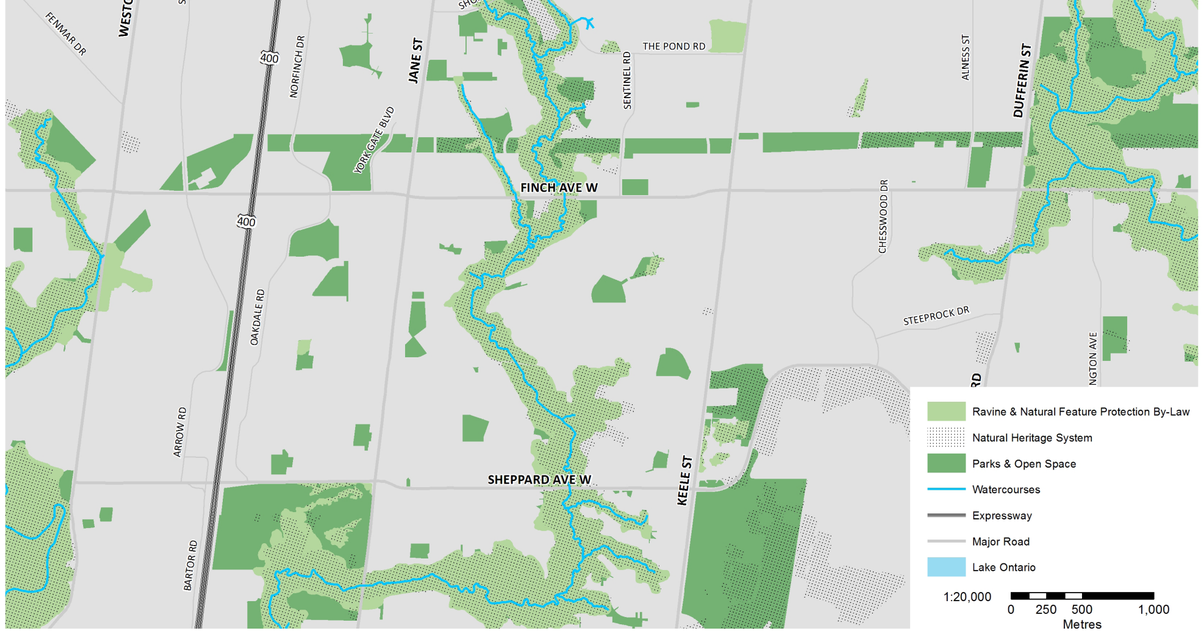
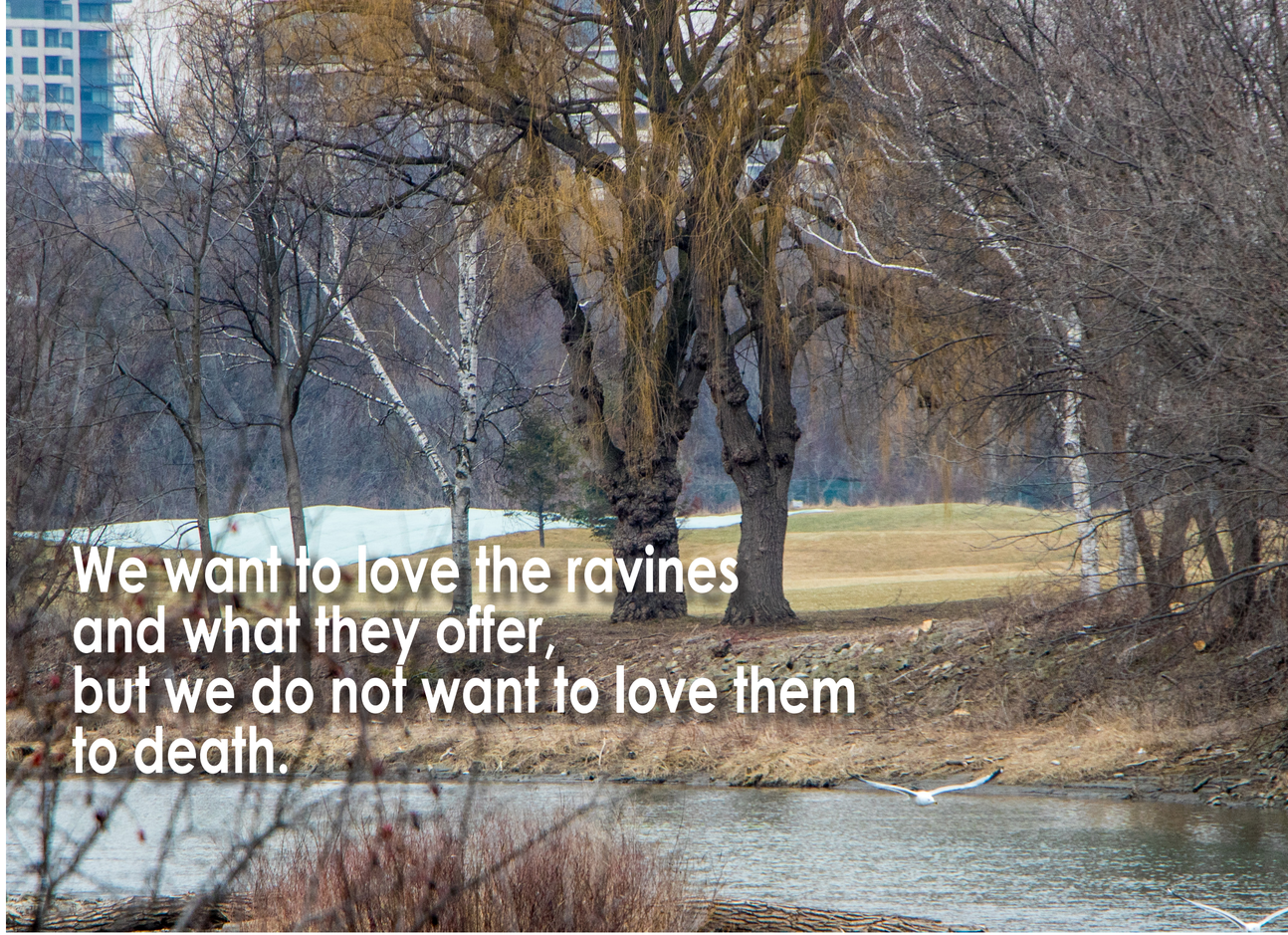


1.3 Case Study

The Keele Finch Plus Project is an ideal case study to explore small scale connections to the ravines which will have a significant impact to the wider system and the immediate community. The area is expecting exponential growth in the coming years as well as benefiting from new transit infrastructure. With the timely nature of this project, there is an opportunity to leverage the investment already occurring to also include features for enhanced ecological and human connections.

In the subsequent sections of this report, we will provide background information on the Keele Finch Plus Project as well as the current transit projects under way, introduce the demographics of the area, and provide an ecological snapshot of the Black Creek ravine system. The goal of this case study is to propose thoughtful short-, medium-, and long-term recommendations for connections that consider commuting, recreation, sightlines, and ecology. Moreover, we suggest an engagement strategy to assist in the validation of our recommendations to better account for local values and aspirations.

This case study is a useful model to take advantage of other capital projects occurring in the city, it is a process that City staff can apply to other communities in need of greener connections.



2.0 CONTEXT

In order to understand the possibilities for the ravines, we need to trace their origins to frame the present form in its future context.

As the continental glaciers retreated, compacted soils uplifted and high volumes of water eroded the land at a surprising rate. Carved by glacial meltwaters at the end of the last ice age, the ravines represent natural hydrological channels. The ravines have existed long before the first signs of human settlement over 8000 years ago. Today, these rivers are but an echo of their former power, being described as misfits, specifically underfit, as the size of the river valleys are much deeper and wider than their tenant rivers would suggest. Underfit rivers meander through large valleys, with little semblance to their former vigour. But just like a volcano that has lied dormant for centuries these streams can erupt in a flash, paying no mind to those who have settled in their course.

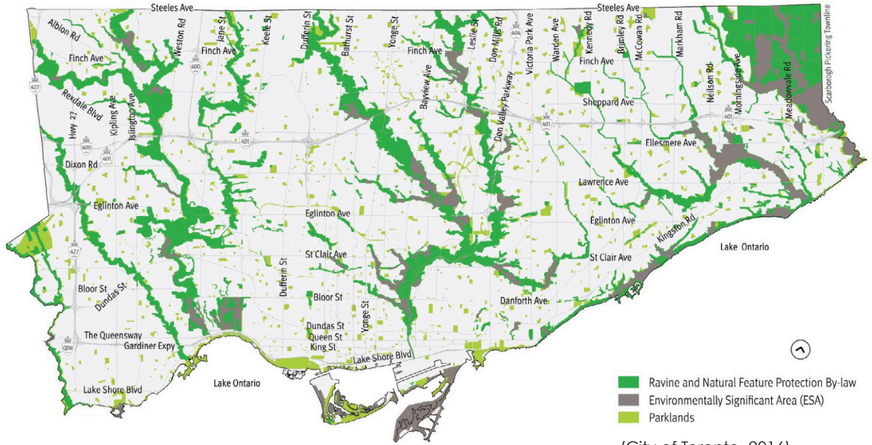
Following the flooding events of Hurricane Hazel in 1954 the Toronto Region Conservation Authority (TRCA) was formed. Extreme rain fell on saturated soils and ran into the natural stormwater system that had been settled during industrialization. Entire neighbourhoods were underwater, thousands of homes were destroyed, and 81 people lost their lives. The city learned that the ravines continued to play a major role in the region's hydrology, and no amount of planning and infrastructure could prevent that. Where the ravines were filled in, the greatest impact was experienced, as culverts could not keep up with the volume of water surging during the storm, leading to overtopped ravines, and catastrophic flooding. This violent history is still experienced today, as the City learned in 2005 when major storms washed out roads where the ravines had been replaced with hard infrastructure. This is why the ravines exist as they do today; largely undeveloped compared to the lands above their banks. Flooding will continue, and will likely get worse under climate change. Embankments are vulnerable to erosion, and interventions may risk expediting this process.

(Environment Canada, 1954)

Today the ravines are comprised of 60 percent private, and 40 percent public space, are home to 87 percent of the City's environmental significant areas, and make up 17 percent of the City's total land area, which is protected (City of Toronto, 2016).

2.1 Policy

The ravine system is nested within a web of policies, plans and projects by all levels of government as well as their partners. It is important to recognize that Toronto's ravines are a part of a regional hydrological system, and that collaboration with other municipalities and levels of government is needed for the maintenance and enhancement of a healthy ravine system.



(City of Toronto, 2016)

2.1.1 Regional Protections

At the regional level, the ravines are under the jurisdiction of the TRCA, which has the authority to regulate uses that would take water from or interfere with the watershed, or affect the control of flooding, erosion or pollution (Conservation Authorities Act, 1990). While it is not strictly in their mandate, the TRCA is also involved in other initiatives in the ravines including species monitoring, management of areas of recreation, and public education (TRCA, 2017). Additionally, the Rouge, Don, and Humber Rivers and Etobicoke Creek are part of the Urban River Valleys designation proposed in the revised Greenbelt Plan, 2016. This designation acknowledges the connections that ravines provide between the headwaters and the lake, and provides an additional layer of provincial protection.

2.1.2 Toronto Policies

In the City of Toronto, the ravines are protected from development and other incompatible activities by the Official Plan, zoning by-laws, and the Ravine and Natural Feature By-Law. The Official Plan acknowledges the integral role of the ravines in creating a livable city, and promotes their protection, connectivity, and accessibility to residents. The City of Toronto has also identified 86 Environmentally Significant Areas (ESAs), most of which are in the ravine system, based on their significance for wildlife, geological processes and/ or ecological functions.

The development and operation of the ravine system is directed by the Parks Plan, Recreation Service Plan, and Strategic Forest Management Plan. These plans highlight the need to invest and protect natural and recreational infrastructure, promote multiple uses, provide equitable access that is inclusive of all residents, and increase public outreach including community stewardship opportunities.

The Natural Environment Trail Strategy contains recommendations for the management of unpaved natural-surface trails in the ravines and other natural areas. It considers the balance between the ecological needs of natural areas and the human recreational uses that could potentially disrupt them.

3.0 LANDSCAPE CONNECTIVITY AND HUBS

The Greater Toronto Area is expected to see its population grow from 6.4 million people to 9.5 million people by 2041 (Government of Ontario, 2016). This growth in the urban region has a direct impact upon the functionality of the natural heritage landscape. Habitat isolation, changes in species composition, fragmentation, habitat loss, and lack of accessibility are just a few of the threats that urban growth can cause to the natural heritage landscape (Bierwagen, 2006). In order to lessen the impacts of these threats it is essential that a connected landscape is the focus. Landscape connectivity is defined as 'the degree to which the landscape facilitates or impedes movements among resource patches' (Belisle, 2005). Thus, a connected landscape is one where the city is functioning as one holistic ecosystem and the natural and built up landscape are not seen in competition to one another. Improving the connectivity of Toronto's ravines is critical to the sustainability of the City.

4.0 THEMES

The ecological needs of wildlife and the recreational needs of people represent an interdisciplinary meeting point that requires thoughtful processes to balance the health and well-being of the city. While natural and human interests may sometimes be at odds, there is also opportunity for them to come together to create a sustainable environment for all of the City's inhabitants.

The ravines are not wilderness, and never will be. Today, a walk through any ravine trail will reveal signs of human intervention. Logging, milling, straightening, filling, driving, and digging, the ravines have experienced their fair share of urbanization. The City has put down its own concrete and metal roots into the ravines, using them to carry infrastructure such as roads, hydro lines, water pipes, and recreational trails and facilities. At the same time, nature exists in the ravines unlike typical parks found elsewhere in the city. The ravines continue to play host to over 1,700 species of flora and fauna. This ecological treasure trove has adapted to the flash flooding conditions, and is symbiotic in the maintenance of the ravines. However, these same species have not had time to adapt to the pressures of urbanization and increased competition from invasive species they are subject to now. Many species are resilient to this process, but equally many are not.

Any plans and projects that seek to bring people into the ravines must recognize both the dramatic creation of the ravines, and the place they inhabit in the ecological functions of the region. We want to love the ravines and what they offer, but we do not want to love them to death. In recent decades, there has been recognition of the risk of flooding and the ravines' role in stormwater management. Most modern interventions work to restore habitat and protect the ravines from ongoing erosion. Connections should ideally harmonize the tensions of people and wildlife in ways that are contextual and equitable.

4.1 Wildlife: Structural, Functional, Habitat

The protection of ecology is critical to the criterion that informs the selection of new hubs within the ravine system. As sprawl and development continue to expand the boundaries of the urban fabric, the natural landscape becomes fragmented, impacting the natural habitat available for wildlife and plants at both the terrestrial and aquatic levels. These natural habitat areas often become identified as environmentally significant areas (ESA's) (Schaefer & College, 1998). Moreover, 87 % of Toronto's ESA's are found in the ravine system (City of Toronto, 2017). Within Toronto's ESA's there are 369 significant plant species, 175 species of birds and 16 species of reptiles and amphibians (City of Toronto, 2017). Thus, these natural spaces are critical to the success of ecosystems and the biological services that these ecosystems provide such as air and water filtration by plants, flood prevention through runoff absorption, and provision of stopover locations for migratory wildlife (City of Toronto, 2017). Restoring the connections and hubs throughout the ravines is critical to the ecological sustainability of the City.

4.1.1 Structural Connectivity

The characteristics of the landscape play a key role in its ability to foster or hinder ecological connectivity. Structural connectivity refers to the physical linkage between locations. The urban area size and the level of clustering of patches within the landscape is one of the most important factors in determining structural connectivity (Bierwagen, 2006). Fragmentation causes a decrease in patch size for remaining habitats. These patches then become isolated through the destruction of connecting corridors. Thus, landscapes with many patches of habitat see a higher percentage of decrease in connectivity as wildlife are clustered together in one area impacting their ability to move throughout the landscape, limiting their gene pool and ultimately their ability to survive (Bierwagen, 2006). On the other hand, landscapes that are less aggregated see fewer isolated patches meaning wildlife are better connected and their ability to survive is improved (Bierwagen, 2006). Species differ in their sensitivity to changes, yet wide ranging wildlife are impacted

the most by fragmentation as small patches do not provide ample food sources. This leads to increases in mortality rates as wildlife try to cross road networks to reach other patches.

4.1.2 Functional Connectivity

Taking into account not only the characteristics of the physical landscape but also the behavioural responses of wildlife is important. This is referred to as functional connectivity- the movement of wildlife based on behavioural responses in relation to the landscape (Esbah et al, 2009). With increases in fragmentation, there is increased potential for wildlife dispersal and migration, impacting the natural ecosystem (Bierwagen, 2006). With fewer options for movement paths within the structural landscape, certain wildlife populations are more vulnerable (Bierwagen, 2006). Few studies have been done that look at the movement of wildlife however, tracking animals over large landscapes and during extended periods of time can be very difficult (Bélisle, 2005). Information on species movement specifically movement rates, dispersal ranges, mortality during dispersal and boundary interactions are all necessary information in order to successfully track migration patterns (Taylor, Fahrig & With, 2006).

4.1.3 Habitat

Natural landscapes are the most successful when they reflect the remnants of the original landscape (City of Toronto, 2017). When the landscape begins to no longer reflect the natural landscape such as through the channelizing of ravines it becomes very problematic (Toronto Star, 2016a). Built as a means for flood protection, the channelization of ravines puts aquatic wildlife at risk. The channelization means that water will often flow much more rapidly than if the ravines were left in their natural state which means it is much more likely to pick up contaminants which can harm aquatic species. This highlights the importance of natural landscapes remaining in their natural state.

Also, the replacement of a habitat or land cover with another type changes the environment and the manner in which species move (McKinney, 2002). Invasive species have been associated with damage to the physical landscape (City of Toronto). For example, certain non-native tree species such as the Manitoba Maple tree and Norway Maple tree are too heavy for the slope causing destabilization. This destabilization leads to slope failure and excess soil being carried into the ravines through rainwater which can degrade aquatic habitat and obstruct water flow (City of Toronto). Only forty years ago these types of non-native species made up 10% of the ravine system and now they are found up to 40% in some areas, thus the restoration of native tree species is vital (Toronto Star, 2016b).

As well, maintaining native species diversity is vital to the preservation of biodiversity. Native plant species have adapted to local environmental conditions meaning they will require far less upkeep. As well, they provide the necessary habitat for the native wildlife species. Over time each patch within the landscape will continue to grow and will work together to sustain the larger ecosystem for wildlife. Protecting the natural landscape from disruptions will allow the landscape to recover and lead to the enhancement of the native biodiversity of plants and wildlife and the reduction of non-native species (McKinney, 2002).

(Torontoist, 2013)

4.2 People: Characteristics, Inclusiveness, Location

An individual's natural and built environment strongly shapes physical activity and health outcomes (Tzoulas et al., 2007). The City has been making a targeted effort to improve the quality of life for its diverse communities "by providing safe, beautiful parks, a healthy, expanding urban forest, and high quality, community-focused recreational experiences." (City of Toronto, 2013). Today more than ever, there is an opportunity to expand recreational opportunities into the ravine system, to encourage a more equitable distribution of green space access for all community members.

4.2.1 Trail Characteristics

Trails play an important role in both increasing and decreasing human use of the ravine system. The presence of public and private facilities such as fountains, washrooms, cafes or other trailside amenities are found to have positive associations with use (Reynolds et al., 2007). Further affecting an individual's choice to use trails is the presence of outdoor lighting, trail condition or materiality, path type, and length (Gobster, 1995).

Increased green connections such as higher vegetation density, natural areas adjacent to the trail, as well as the presence of tunnels lead to human deterrence. (Reynolds et al., 2007). The argument has also been made that perceived overgrown or unmanaged trails lead to fear and increasing anxiety, causing avoidance of certain spaces (Tzoulas et al., 2007).

Trail development should aim to guarantee an assortment of trail types that meet a diverse set of needs, abilities, and preferences. This is heavily influenced by trail length and features found within the path. The needs of individuals may be better met using small loop trails that link to existing parks and neighbourhoods, as opposed to long linear pathways (Gobster, 1995). Surfaces such as crushed aggregate surfacing may slow cyclists while paving can encourage wheelchair users and stroller use (Gobster, 1995).

4.2.2 Inclusivity

The design or absence of certain trail characteristics may result in differentiated experiences for user groups that represent a spectrum of abilities and ages. Balancing the delicate needs of the ravine system does not always obviously lend itself to barrier-free principles, but requires thoughtful design choices. For those who are older or face mobility challenges, the length of trail plays a significant factor in an individual's ability to enjoy a trail. Short pathways attract more frequent utilization by various user groups (Gobster, 1995). Moreover, shorter path systems are more easily manipulated in diverting from ecologically sensitive areas. Where trails are longer and/or linear, it is important to provide restroom facilities, drinking water and seating at reasonable intervals. Where feasible and appropriate, universal design principles should be incorporated into the trail systems within a radius around tableland connections that is sensitive to the range of mobility that individuals may have.

4.2.3 Location

The ravine system plays a key role in equitable distribution of public green space access in urban areas through the careful locating of trails. For some residents the ravines are the only available connections for experiencing nature and providing a space for personal or cultural expression.

The location of trails relative to residences and existing public or private recreational facilities strongly affects use and user type (Gobster, 1995). Trails that are conveniently located in mixed use corridors that are already pedestrian friendly will be more likely to attract higher, spontaneous usage or act as connectors to other neighbourhoods, usually in the afternoons and on weekends (Arnberger, 2006). On the other hand, trails that are located away from these areas are more likely to attract recreational use (cycling or walking) or act as commuting corridors (Arnberger, 2006). Use patterns in these areas are greatly influenced by school and work hours (Arnberger, 2006).

4.3 Tension: Permeability, Formal vs Informal, Recreation

With the City's population continuing to grow, the ravines will see even more visitors within the future. Unfortunately, human activity and natural processes are not always compatible. What may seem like a favourite time for people to want to visit the ravines, may also be a more vulnerable time for wildlife, such as during the spring bloom, or amphibian mating season. We want to get residents engaged with the system but also need to recognize that the ravines must be protected. Finding the balance between recreational usage and ecological health is key.

4.3.1 Permeability

The tablelands are the places above the ravines, which is highly developed and characteristically flat by comparison to the ravines. The tablelands sit above the ravines, and it is this elevated form that allows the ravines to be hidden from view. Moving between the tablelands and the ravines can be a difficult task as connections are not often identified or intuitive. There is a challenge in blending the grid pattern of the tablelands with the naturally defined course of the ravine trails. When the ravines are visible but connections are not, it can give the sensation of being simultaneously close to, and far from nature. This compares to regular parks and open spaces where boundaries are much more permeable, and pathways exist to demarcate effective travel routes. Unless an area is fenced off, there is nothing stopping passers-by from entering a park through the grass. Parks blend into the fabric of the city, becoming part of the daily commute for tens of thousands of pedestrians every day. The ravines, however, do not offer the same permeability due to steep banks, dense undergrowth, unstable terrain, and private properties along their banks. Informal connections do exist, but are not advisable to those without proper footwear and physical ability.

4.3.2 Formal vs Informal

Connections between the tablelands to the ravines exist in many forms, from fully paved, vehicle width access roads, to rocky steep informal paths, and everything in between. These connections offer varying levels of access to users, and varying levels of impact on the ecology of the ravines. Many trailheads are numbered and maintained, while others are of dubious legality and only offer access when conditions permit. Many residential properties abut the ravines and in some places residents have established their own trails, which others have noticed and used as well. Development in the ravines and encroachment are monitored and controlled by the TRCA, but this has not stopped the adventurous types from taking the not-so-beaten paths down.

4.3.3 Recreation

Location further affects the ecological integrity of the trail systems. Where there are areas of significant urbanization and intensification, the risk of ecological decline is high. Particularly intensification adjacent to ESAs will more likely result in edge effects or biological isolation, "reducing the habitat value of interior or core habitat area" (Esbah, Cook and Ewan, 2009). Edge effects has the potential to degrade or isolate sensitive areas, and may be concerning for certain wildlife. When expanding the network, trails should be located away from ESAs, and near densely populated areas which act as a buffer between them.

Alternatively, providing appropriate recreational activities close to habitats could lead to public education opportunities, allowing people to be more connected to nature and to encourage community stewardship. Public engagement efforts have the potential to introduce the ravine system into the collective daily narrative of the City's human residents, making them more aware of their non-human neighbours. Sharing stories help grow public respect for the value of preserving natural areas for future generations.

4.4 Compromise: Storytelling, Stewardship, Sightlines

The ravine system evokes a plethora of emotions that are deeply entrenched in various cultural, historical and artistic narratives. The ravines have played an essential role in the formation of trading routes and settlement patterns. Today, they continue to provide cultural and social meaning that foster poignant connections for the City's many communities. There is an opportunity to showcase these connections within and outside of the ravines.

4.4.1 Storytelling and Community Stewardship

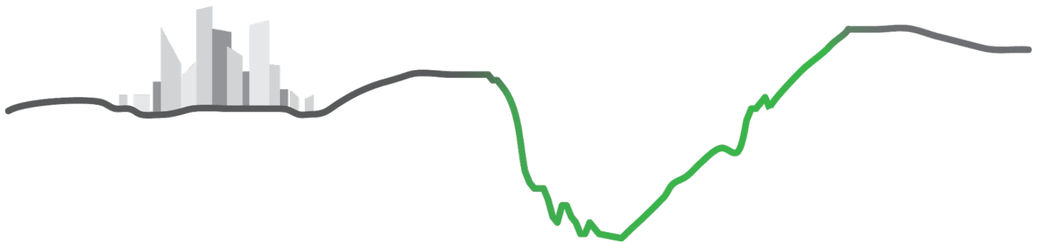
The ravine system evokes a plethora of emotions that are deeply entrenched in various cultural, historical and artistic narratives. They are a backdrop to human settlement in the region's history. This includes the ravines' Indigenous heritage with trails and settlements, as well as its roles in industry and recreation over the past two hundred years.

Reflecting on the layered narratives, allows citizens to take accountability for the City's natural space. Interacting with history raises one's focus from the present to being aware of the past influences and in turn become more forward thinking. The cultural and social meaning tied to the ecological systems foster a poignant connection for the community (Tzoulas et al., 2007; Thompson, 2002). Creating connections to historical events grounds the current ravine system in its temporal context, which allows citizens to acknowledge the impacts of their actions on the future, promoting community stewardship.

Where possible, opportunities for storytelling and stewardship should be explored in the ravines through the use of art and programming that supports placemaking efforts in the community.

4.4.2 Sightlines

Sightlines play a major role in the cultural component of connectivity as the Rocky Mountains are impossible to miss on a clear day, but the ravines hide below sightlines, or under the table. What can be done to open up these views, to bring the ravines closer? They hide in plain sight despite being the veritable backyard of the city. There are dozens of bridges that span the ravines, and some offer view decks to pause and appreciate the views. Where are there other places to open up the sightlines to allow people to love the ravines from afar? Riverdale Park is an excellent example of a view where the city can be seen rising sharply off the tablelands, and just below are the steep banks of the Don valley. The two pieces of the view combine in a way that is striking. Combination views such as this help define the identity of the city as one in which the ravines play a key role in understanding who we are as a city.



5.0 SYSTEM-WIDE CONNECTIVITY ANALYSIS

Please refer to the accompanying mapping booklet.

5.1 Methods

Within the City of Toronto, latent trail demand (expected trail usage) was estimated using methods identified in several studies conducted in the United States. Through the use of infrared-sensor based trail count data, studies explored the influence of surrounding neighbourhood characteristics on local trail usage (Lindsey, Wilson, Rubchinskaya, Yang, & Han, 2007; Wang, Lindsey, Hankey & Hoff, 2014). It was found that socio-demographic and built form characteristics of the local neighbourhood accounted for nearly 80% of the variance in trail usage (Lindsey et al., 2007). Notably, if all built form measures except population density were removed from the model, effectiveness decreased by 1% (Lindsey et al., 2007). New, more appropriate modelling techniques better suited for count data were developed in subsequent studies on trail usage to address the issue of statistical overdispersion. These studies provided regression equations in support of model results (Wang et al., 2014). To estimate the latent trail demand for trails and multi-use pathways in the City, the equations developed by Wang et al. (2014) were adapted.

Publically available open data was used alongside manual digitization of georeferenced ortho-photography to obtain trail location and headway data for the City of Toronto (City of Toronto, 2017). Regional road and street data from DMTI Spatial was integrated with the trail data to serve as the base for the network dataset, and census data from Statistics Canada (2011) provided information on socio-demographic and built form characteristics. Census data and adjusted census estimates by Environics Analytics were obtained at the dissemination area (DA) level of analysis. To complete digitization, network analysis, and statistical calculations, ESRI's ArcGIS software was used (ESRI, 2017).

To determine the study area for analysis, points were created at 200m intervals along all trails within the City of Toronto. For each trail section, a 1 km network distance service area was defined to better reflect the DAs within a walkable distance. Network distance service areas, unlike a standard buffer, represent areas that are accessible through the use of existing street infrastructure, and take into account the distances required to traverse such networks. The use of network distance is essential to connectivity analysis, as it ensures that only neighbourhoods that can actually access trail infrastructure are included in the analysis. Latent trail demand was then estimated through regression equations developed by Wang et al. (2014). For trail sections with more than one point along their length, a mean estimate is reported.

Once the study area was established, the regression equation of Wang et al., (2014) used to estimate latent trail demand was adapted for the City of Toronto. The equation involved several demographic inputs, including: population density, the number of children under age 5 and seniors, household income, and education levels. The output of the regression analysis provided an estimate latent trail demand for trails and multi-use pathways across the entire City of Toronto.

5.2 Findings

Once latent trail demand estimates were calculated at the system wide scale, priority areas for investment could be identified. Two separate analyses were conducted for connection recommendations: human and ecology. In total, each analysis identified twelve broad areas.

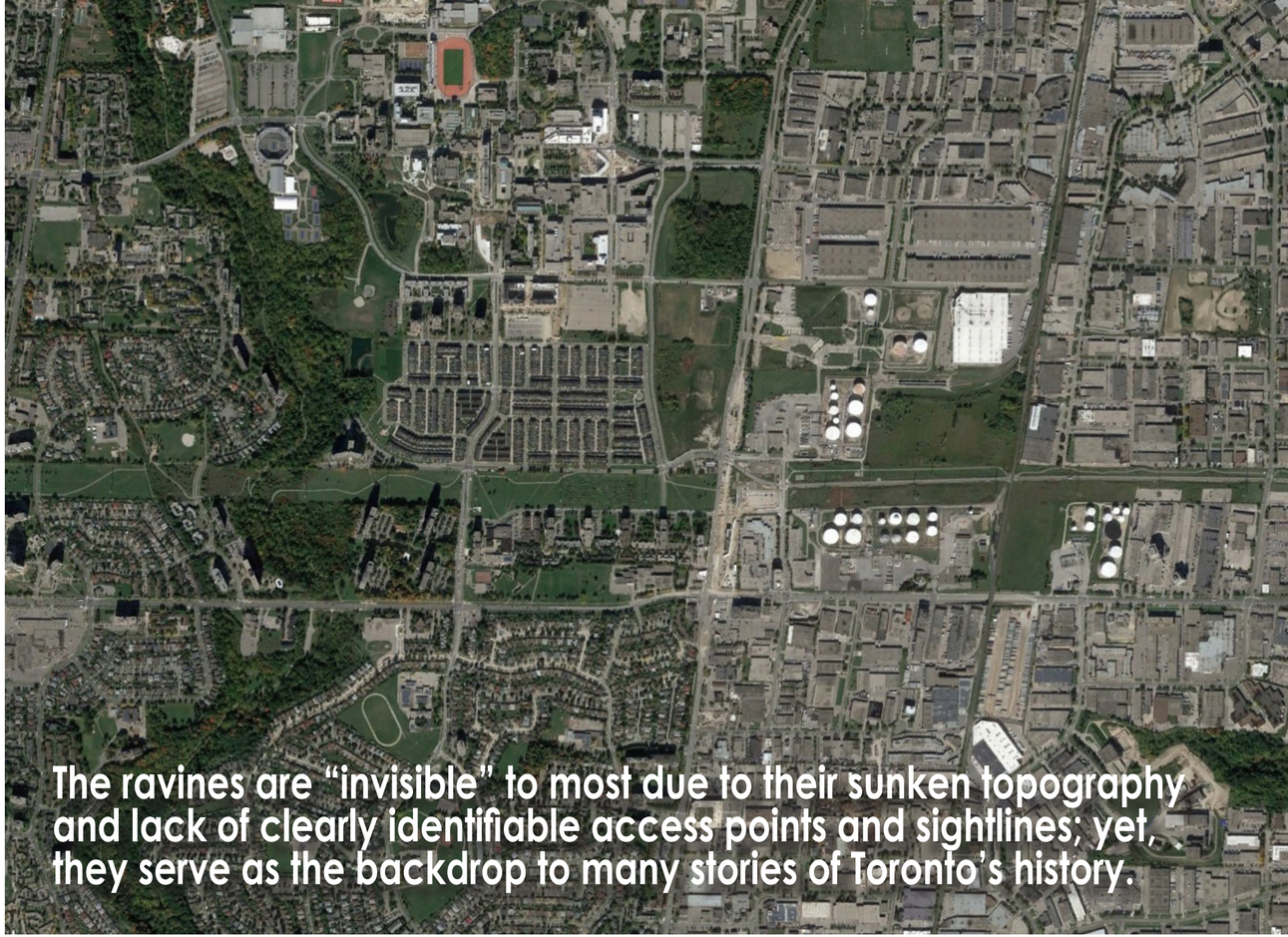
For human connections, areas with a high population density but low trail usage were identified as potential priority areas for investment. The potential improved connection areas for human connections are fairly evenly dispersed across the entire City, with a slightly higher than average concentration in the north-west. With more investment in hubs, pathways, and gateways in these areas, better recreational connections can be created and usage of trails can be improved.

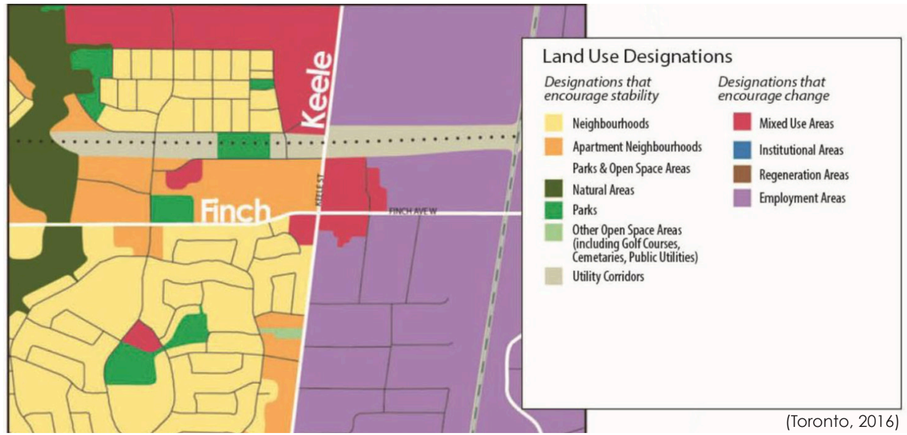
For ecology connections, areas of high trail usage located within or near to an environmentally significant area were identified as potential wildlife tension areas. These areas include some of the most sensitive habitats in the City, and need to be protected as they are critical to species survival. With more data on wildlife migratory routes, health, and populations, stronger and more focused ecological connection recommendations can be made. Nonetheless, it is up to the City of Toronto to decide if they prefer to deter or encourage usage of trails in these areas.

6.0 CASE STUDY: KEELE STREET AND FINCH AVENUE WEST

Since early 2016, City Planning has been conducting a comprehensive planning study of the neighbourhood around the Keele Street and Finch Avenue West intersection (City of Toronto, 2016). With two major transit lines passing through the area and expected to begin operations in the next few years, the neighbourhood is anticipated to experience significant growth and change. The purpose of the Keele Finch Plus Study is to leverage these investments while engaging with the community to create a new planning framework for the neighbourhood. Phase I of the study, which examined the existing conditions of the area, was completed in October 2016. Phase II was recently launched to conduct analysis and develop plans.

Through the methodology, a system-wide analysis of the ravines identified the Black Creek trails from Steeles Avenue West to Sheppard Avenue West as potential recreational hotspots that could benefit from greater connectivity and investment. In exploring this area as a case study, there is potential to create synergies with the community planning process to demonstrate how ecological and recreational connections can lead to a healthier environment for the human and non-human community.





(Toronto, 2016)

6.1 Background

The Keele Street and Finch Avenue West area currently has a mix of land uses. Three of the four corners of the immediate area surrounding the intersection have Mixed Use designations under the Official Plan. The area southwest of the intersection is primarily single-family residences, while there are apartment neighbourhoods in the northwest with high rise buildings and townhouses.

A significant employment area exists to the east of Keele Street with manufacturing, warehousing, distribution and office uses, including some heavy industries (City of Toronto, 2016). In particular, the area is important for Toronto's aerospace industry, with Downsview Airport located to the southeast and its flight path passing over the Keele Street and Finch Avenue West intersection (City of Toronto, 2016). A consultant report studied the environmental impacts of these industrial uses. It identified potential influence areas of up to 1000 metres related to air quality, odour, dust, noise, and nuisance concerns, as well as additional impacts of increased traffic caused by frequent freight activity (GHD, 2016).

The larger area surrounding Keele Street and Finch Avenue West contains several natural heritage features and open spaces. In addition to the north-south Black Creek corridor, a hydro corridor runs east-west to the north of Finch Avenue West. Four woodlots exist between Finch Avenue West and Steele Avenue, as identified in the York University Secondary Plan, which also outlines the need for ecological and recreational connections between these natural features (City of Toronto, 2009).

The institutional land uses of York University further adds to the diversity of users and needs in the area, with potentially different movement patterns and behaviours. It also provides opportunities through additional resources that may be leveraged through partnerships with the University.

(Toronto, 2017)

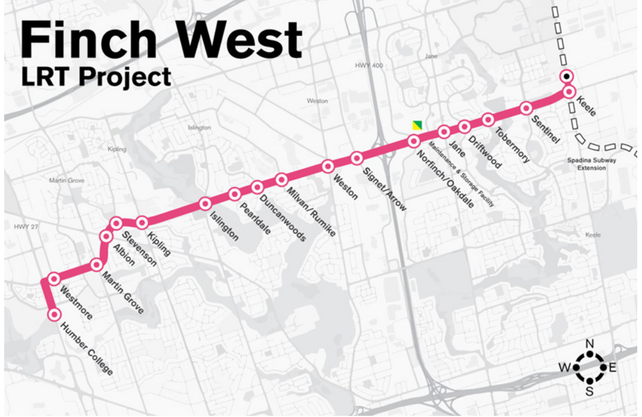
(Toronto, 2016)

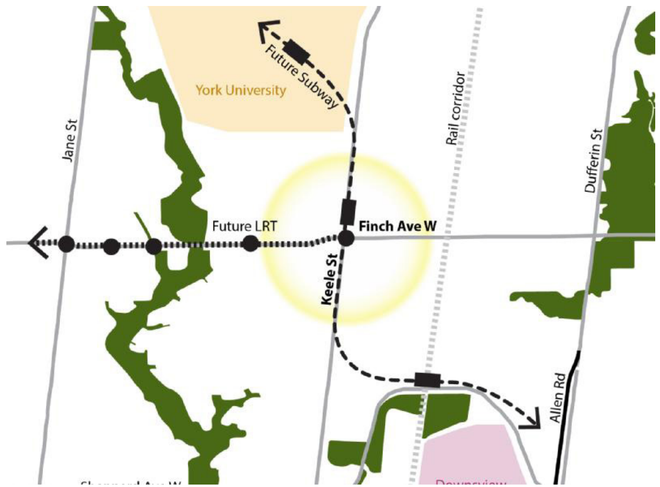
6.1.1 Demographics

The study area is nestled within Ward 8 York West; it is of a modest size of 50,340 residents with low density, approximately 3.04 thousand people per km2 (Statistics Canada, 2011). The area is also close to York University and is the home to many students. The median age is 33 years, particularly younger than the city average of 39 years; notably, 77.1% of the population is made up of couples with children or single parents (Statistics Canada, 2011). This information may suggest that the neighbourhood presents a young family oriented dynamic. With regards to housing, 55.3% of the population is housed in apartment buildings of 5 or more storeys, significantly higher than the city average of 41% (Statistics Canada, 2011). Households earned roughly $52,280 yearly and the average monthly rent is quite low at $862, suggesting an overall lower-income and affordable neighbourhood (Statistics Canada, 2011).

The area is also quite diverse, with 64% of residents born outside of Canada, 76.3% are a visible minority, and nearly half the ward's population speak a language other than English within the home (Statistics Canada, 2011).

Based on the above-described demographics, it is easy to conclude that the young community of families living in towers can benefit from access to green space through increased connections. There is also an opportunity to celebrate the diversity represented through exploring place making and storytelling.



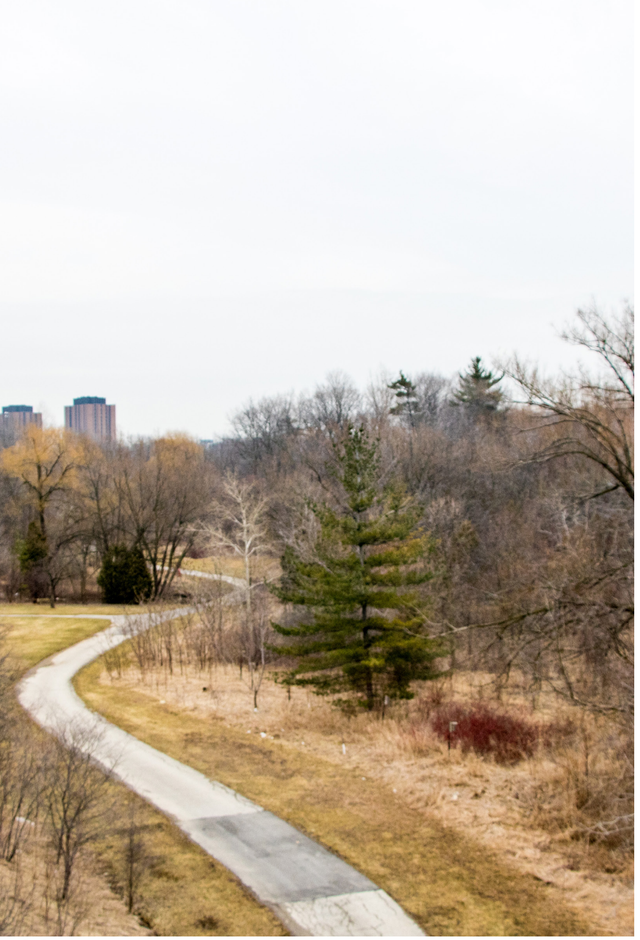


6.1.2 Current Transportation Investments

The Keele Finch Plus Study is being prepared in advance of the opening of new transit infrastructure. The extension of the TTC Line 1 (Spadina) subway, scheduled to open in late 2017, will pass through the area with Finch West station located at the intersection with Keele Street. The route of the extension line will be in close proximity to the path of the Black Creek ravine, with Downsview Park Station in the south and York University and Pioneer Village Stations in the north. Therefore, the opening of this line will likely bring more people to the area including into the Black Creek ravine. It is imperative for the City to look at the potential to provide recreational opportunities in the system in anticipation of this increased traffic, and to take mitigation measures to avoid unnecessary ecological impact.

The Finch West LRT is another rapid transit line that will pass through the Keele Street and Finch Avenue West neighbourhood. The route will begin at the Finch West subway station and continue along towards the west, with two stops in close proximity to the Black Creek ravine at Sentinel Road and Tobermory Drive. Construction is planned to begin in mid-2017, and the line is scheduled to begin operations in 2021 (Metrolinx, 2017).

As part of Phase I of the Keele Finch Plus Study, City Planning studied the existing transportation conditions in the area. They found that despite the automobile-oriented transportation network and built form, a high proportion of residents and visitors in the area used public or active transportation, with approximately 40% using public transit, walking or cycling (City of Toronto, 2016). This finding demonstrates the further need for creating connections in the neighbourhood to facilitate movement and provide safer, more accessible and enjoyable experiences for pedestrians and cyclists.

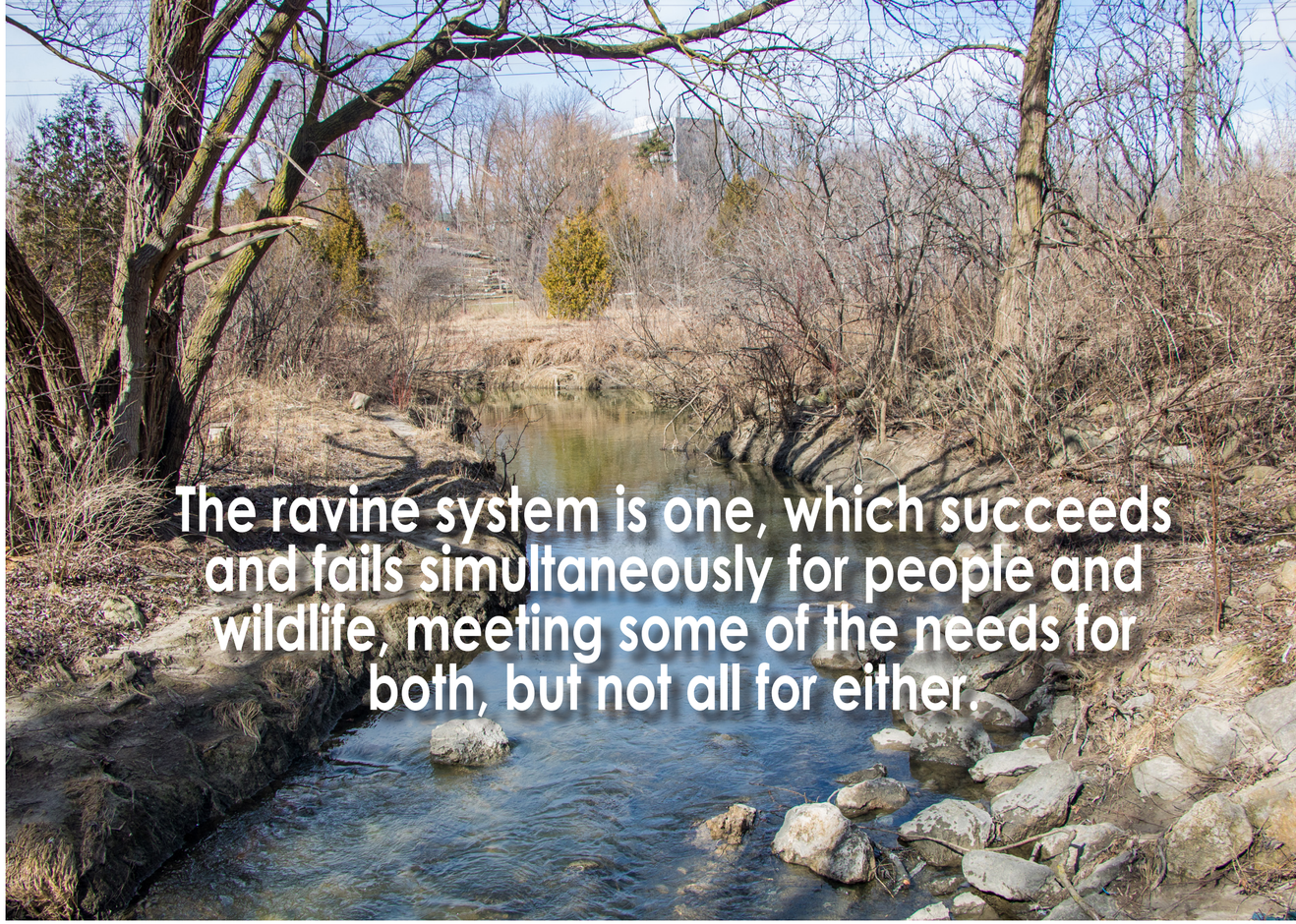


6.1.3 Ecological Snapshot

Black Creek begins in Vaughan as an outflow from a retention basin, and it terminates near Jane Street and Dundas West at the Humber. As a result of its close proximity to heavy industry, it has become significantly polluted. Almost 5 km was channelized after Hurricane Hazel in an attempt to prevent flooding by straightening the course. Wetlands were paved and native plant species were removed. This effectively destroyed the chain of connected habitats from the Humber valley up to the headwaters.

Another issue of note is the ratio of hard surfaces on roads and rooftops in the surrounding neighbourhoods along the creek. This exacerbates flooding events as stormwater is not absorbed by the land on which it falls. This also contributes to the volume of heavy metals and other toxic chemicals entering the creek as storm drains overflow during major storms. This issue is prevalent across the City, but is noteworthy in this watershed as only 7.1% of the area contains stormwater quantity and quality controls, which is less than half the average for the Humber watershed (TRCA, 2008). Currently, re-naturalization efforts exist in the ravine and surrounding areas to return Black Creek to a greener and softer state.

Litter is an issue as many properties along the ravines locate their waste bins and collection site adjacent to the ravines. High winds and improper collection has resulted in high volumes of inorganic materials which can pose a threat to wildlife. Annual cleanup events have been effective at mitigating the issue in the short term, but this remains a significant issue that will require ongoing efforts to resolve.



6.2 Mapping Analysis

From the system-wide analysis, the Black Creek trails between Steeles Avenue West to Sheppard Avenue West were identified as potential priority areas for investment for recreational opportunities, and areas of tension for ecological connections. To further investigate the connectivity potential in the area, the following was completed. Please refer to the accompanying mapping booklet.

6.2.1 Human Connections

In order to identify which DAs would benefit most from improved connections, and thus determine which areas should receive investment to maximize trail usage and recreational opportunities, a second step to the regression analysis was added.

In our first system-wide analysis, 1 km service areas from each trail segment were identified utilizing the available street network for the City of Toronto. These service areas represented areas accessible by individuals willing to walk a maximum of 1km for trail access. The demographics of DAs which intersected these service areas (hereafter referred to as the original service area) informed the initial trail usage estimation for the trail segment.

For our second step analysis, we compared the results of our original service areas to the ideally connected system to estimate which trail segments have the greatest potential for connectivity. To achieve this, a second set of service areas (hereafter referred to as the ideal service area) were determined utilizing the minimum bounding geometry of existing service areas. Minimum bounding geometry analysis produces a circular area that perfectly encapsulates the existing service area, and unlike the original service areas, is not bound by the existing street network. As such, the ideal service areas will reach additional dissemination areas that may not have been accessible to the original service area due to connectivity. These DAs represent the areas which would be reached if connectivity was perfect. The estimated trail usage of these additional DAs was then calculated to determine the overall potential for connectivity improvement for a trail segment. The higher the number of added users, the greater the overall potential for connectivity a neighbourhood presents. Finally, the contribution of trail users for each DA was calculated to determine the degree with which each area was contributing to trail usage. These results provide information regarding the direction of focus for interventions, and thus represent priority areas for investment in human connections, should the goal be to increase maximum overall trail usage.

6.2.2 Ecological Connections

Priority areas for investment in ecological connections were determined through a visual analysis due to data limitations. Recorded observation data for species in the study area was provided by the TRCA. In total, there were 21 aquatic species observations, 61 terrestrial species observations, and 478 bird species observations collected between 1982 and 2015. Through considering species observation data, TRCA local concern scores, natural heritage areas and cover, and parks and open spaces, recommendations to improve ecological connections were made. The recommendations were made under the pretense that an interconnected system of natural spaces in which wildlife are free to traverse, barrier-free, needs to be created and protected to ensure long-term sustainability and maintain ecological health.

Importantly, it must be noted that it is challenging to provide firm ecological connection recommendations due to data availability. There are very few aquatic and terrestrial wildlife observations, limited information about habitat sensitivity, and unknowns in regards to how data was originally collected.

6.3 Developing Recommendations

Through the completion of the mapping analysis described in the previous section, priority areas of investment for human and ecological connections were identified, and are shown in the attached mapping booklet.

This theoretical understanding of the area based on background research and mapping analysis was ground-truthed to identify specific opportunities for connections, and to create recommendations for action. This process included multiple site visits to the Black Creek system and the Keele Street and Finch Avenue West neighbourhood. While conducting comprehensive public consultation and engagement was out of the scope of the project, some information about the lived experiences of community members and stakeholders were gathered from conversations with City planners familiar with the area, and through observation of the March 7 community meeting for Keele Finch Plus. Synthesis of findings from these methods led to the development of final recommendations for connectivity for humans, wildlife, or a combination of both.

6.4 Proposed Connections

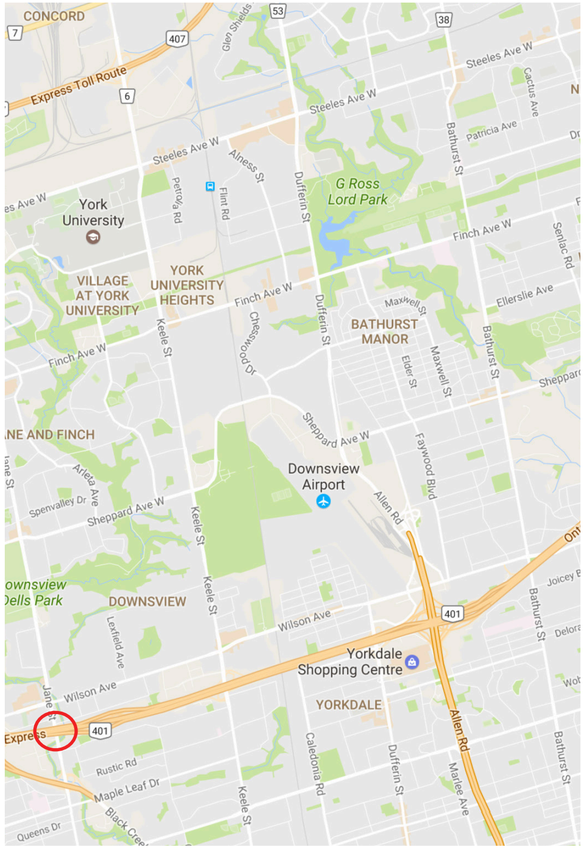
In total nine connections are proposed to the City of Toronto on behalf of the Ryerson University Ravine Xing Studio Group. The connections aim to reveal the ravines and improve human and ecological accessibility and connectivity in the Keele Street and Finch Avenue West neighbourhood. The connections are informed by the results of the mapping analysis, attendance at the Keele Finch Plus public meeting, consultations with urban planners working on the project and the TRCA, and site visits.

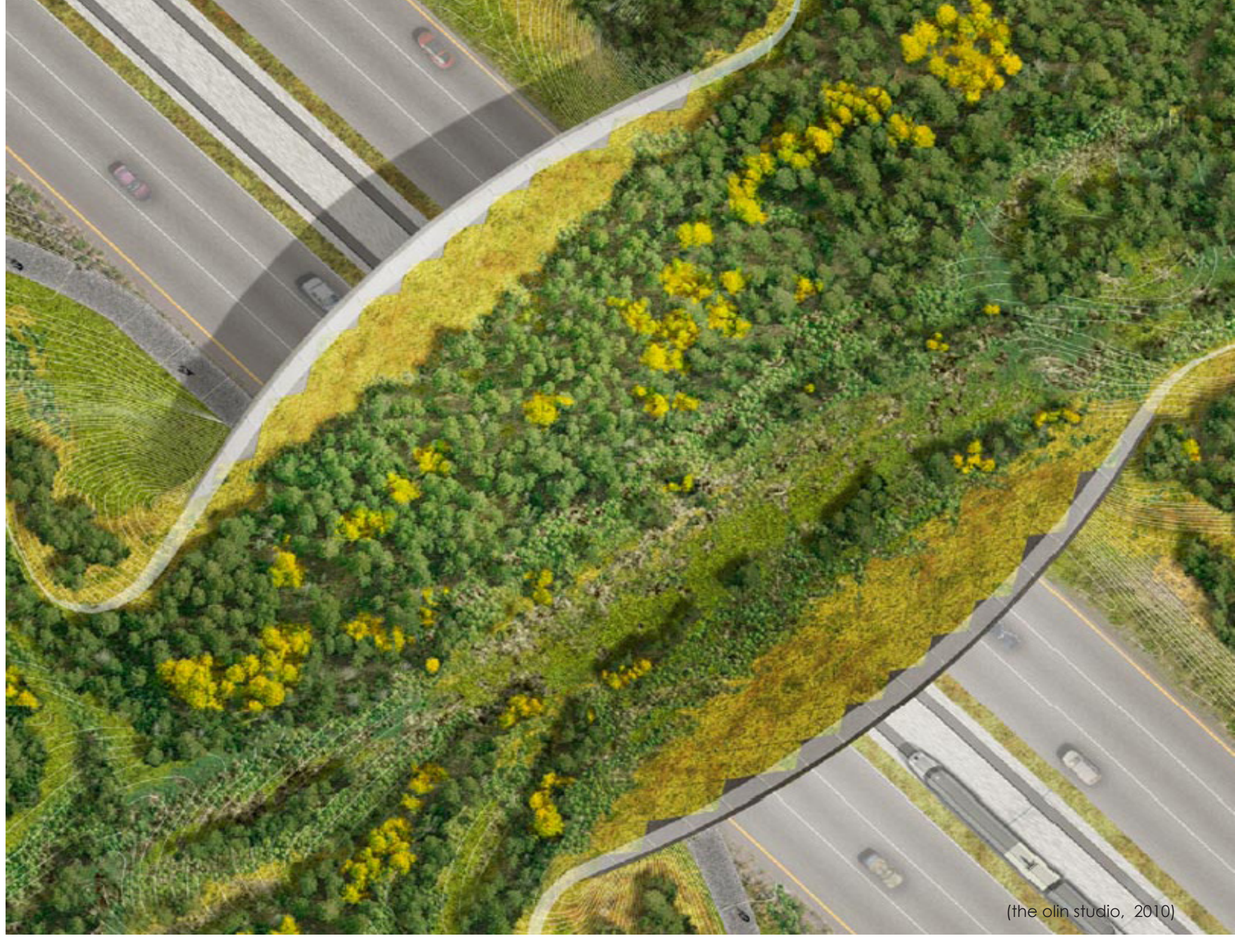
401 Highway Wildlife Crossing

Connection type: Ecological
Priority: High
Level of Investment: High
Impact: Significant enhancement to wildlife movement and protection

The local ravine system's connectivity is adversely impacted by the presence of the 401 Highway. Roadways in general affect ecosystems through heavy metal pollution, disruptions to soils structures and hydrological pathways altering plant and animal habitats, and interferences to migration patterns, not to mention the disheartening effects on animal mortality or avoidance behaviour (National Research Council et al., 2005). The 401 Highway is a major pinch point affecting the movement of flora, fauna and water, which are vital for creating balanced ecosystems. Moreover, ecosystem services provide a benefit to people in contributing to our local resiliency. Therefore, the highway represents an opportunity for quality development to produce a wildlife crossing and rectify the habitat fragmentation that has occurred.

Through this investment there is also the potential to create an iconic and globally admired piece of green infrastructure that promotes ecological health through enhanced wildlife connections. A wildlife corridor over the 401 Highway, will reduce wildlife-vehicle collisions as well as restore migration patterns, habitat connectivity, and provide for a more united system.





(the olin studio, 2010)

Humber Boulevard

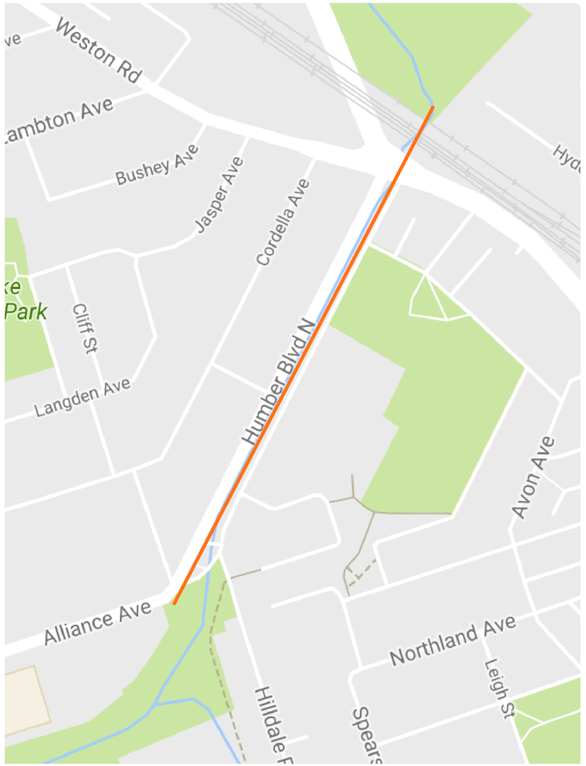
Connection type: Ecological
Priority: High
Level of Investment: High
Impact: Public realm and wildlife movement enhanced

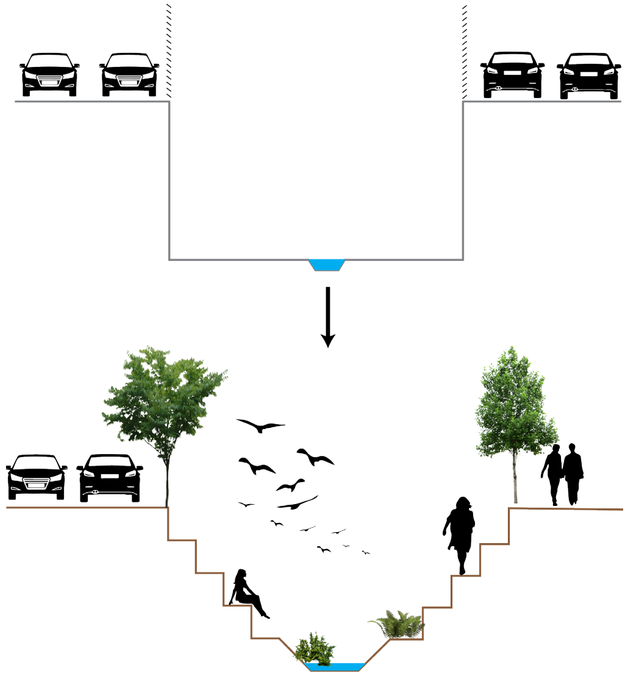
While the scope of the case study focuses on the ravine in proximity to Keele Street and Finch Avenue West, there are other sections farther south that are worth considering for their impact on wildlife connectivity. One section of particular note is the section of Black Creek along Humber Boulevard between Weston Road and Alliance Avenue. This half kilometre section is fully channelized with vertical faces and a chain-link fence at street level. On either side of the channel is a double lane paved road. These roads are fronted by low-rise development. The only adjacent open space is a heavily trampled school yard.

The form of this section restricts wildlife from moving through, in or out of the creek; this edge is so severe that virtually no wildlife can traverse it, and there are no alternative routes. Therefore, it is necessary that this pinch point is resolved. The biological health of the upper sections of Black Creek depends on greater connectivity to the wider ravine system. Long term plans for Black Creek must include interventions for this section if the health of the system is to be improved. Any plan that introduces wildlife to the upper sections of Black Creek will not be successful in the long term until this barrier is resolved.

Improvements in this section can be staged so that connections can be developed with minimal cost. For example, substrate can be distributed along the edges and seeded with native plant species to hold it in place during flood events. This will add cover and habitat for ground wildlife as they move through the channel. Medium scale interventions can include removing the fences, replacing the vertical walls with a sloped staircase basin, and creating public space along the creek. Long term solutions could include removing vehicles from one side of the channel, and re-naturalizing the banks with trees, shrubs and grasses. This is illustrated in the adjacent cross section.

The outcome of these interventions can be symbiotic for the community and wildlife. It is essential for the health of the entire Black Creek ravine system above this point that this barrier be resolved as soon as possible.





Trail and Trailhead Improvements

Connection Type: Human
Priority: High
Level of Investment: Low to Medium
Impact: Improved management, accessibility and appeal of trail system

Based on feedback from local City planners and community residents, there is currently low usage of the trail in Black Creek Ravine in the Keele Street and Finch Avenue West area, partly due to concerns of safety. Amongst the range of factors contributing to this perception, the physical condition of the trails likely plays a significant role and is a variable that can addressed by the City and its partners.

Beginning with the trailhead on Shoreham Drive between York University and Jane Street, the trail infrastructure is in poor condition. The cracked pavement of the walkway and a rusted bollard at the midpoint, limit accessibility of the sloped entrance, and give an impression of disrepair. It also does not present an inviting atmosphere, as the trailhead is located behind several utility boxes. Outside of the Black Creek Parkland sign, the trailhead itself is not very visible to the surrounding area. For residents and visitors passing by, this presents the image of a forgotten, unused and unwelcoming space.

Moving on into the ravine, some trail sections are also in poor condition. The section from Shoreham Drive to Finch Avenue appears to have been recently repaved, but the section from Finch to Sheppard Avenues shows many cracks and bumps on an otherwise accessible trail. Additionally, large amounts of litter is scattered throughout the ravine. To anyone using the trails, the lack of cleanup and attention from the City frames the ravine as a place without value, or a place for locating undesirable materials. The message here is "the City doesn't seem to care about the ravines, so why should I?" This litter not only impacts perceptions of safety and attractiveness to human users, the inorganic material including many plastics is also a threat to wildlife.

Finally, outside of its intersection with the Finch Hydro Corridor Recreational Trail, there is a lack of signage along the Black Creek Trail including at trailheads. It is suggested that wayfinding as well as "upfinding" measures be implemented to help trail users locate themselves within the trail and the City. This part of the Black Creek Recreational Trail could be an excellent demonstration of the principles of the Toronto Parks & Trails Wayfinding Strategy.

It is suggested that the City and TRCA take action to repair, clean up, and proactively manage the trail and ravine. These efforts can be done with the help of community members, such as by reaching out to community and school groups, in order to create greater connections, stewardship, and public education. There is also value to incorporating public art into these initiatives to celebrate the ravines, reflect the cultures and stories of the community, and increase visual appeal.

(Steer Davies Gleave, 2016)

Community Connections (Shoreham Drive to Hyrdo Corridor)

Connection Type: Human
Priority: High
Level of Investment: Low to Medium
Impact: Enhanced connection between Black Creek and surrounding neighbourhood

The immediate area to either side of the ravine from north of Shoreham Drive to south of Finch Avenue West consist of many high rise buildings and townhouse communities backing into the ravine particularly on the west bank, as seen in the adjacent figure ground. On the east side of the ravine is York University through Dan Iannuzzi Park, which also contains community gardens. There are, however, no formal trailheads along this route between Shoreham Drive entrance in the north and the hydro corridor in the south, a distance of 1.2 km on the trail and further through the neighbourhood as a result of circuitous streets.

Our regression estimates indicate that these are high demand areas, and combined with visible ground evidence in the form of informal trails/desire lines visible on orthophotography demonstrate that there is indeed demand for trail access in the neighbourhood and residents are creating their own informal access routes into the ravine system. Furthermore, a relatively shallow access slope and significant amounts of available space on properties abutting the ravines on Driftwood Avenue indicate that these interventions can be completed quickly, easily, and with very little overall cost.

It is proposed that two or more of the paths to the west bank be established, as well as a connection to York University. For trails that pass through Toronto Community Housing Corporation (TCHC) properties and private property of apartment complexes, it is suggested that the City explore opportunities for partnerships to allow for improved movement. Moreover, some of these trails already exist informally, and working with the City would increase management, safety, and beautification. Additionally, the formalization of trails as well as connections on the west side of the Creek would allow for easier crossing of the ravine, reducing feelings of isolation between the neighbourhoods and improving walkability.

Please refer to the adjacent map for the following corresponding connections.

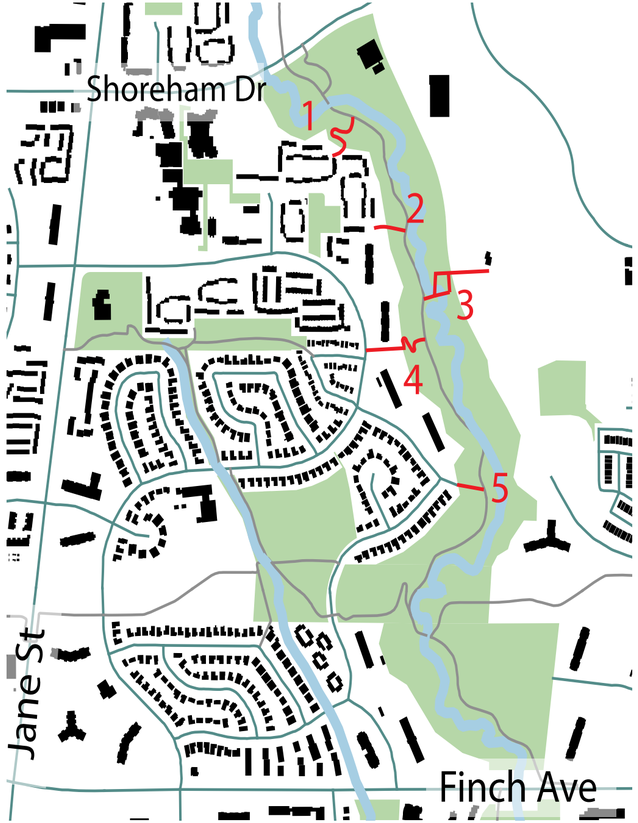
Connection 1: Located on Jane Street north of Finch Avenue, Driftwood Avenue is a residential neighbourhood located on the west bank of the Black Creek. The neighbourhood is a mix of apartment complexes and 393 affordable housing units owned by the TCHC. Connection 1 is located within the TCHC's Driftwood Avenue townhome complex. The northeast section of the complex abuts the western bank of the Black Creek ravine and represents an ideal location for connectivity improvements. Here, we propose a paved pathway that will connect the Driftwood TCHC complex to the existing ravine trail network.

Connection 2: This connection is an existing informal trail that links to the TCHC complex as well as another apartment complex.

Connection 3: This connection represents an existing informal trail that passes across the Creek and up onto the eastern side of the ravine, connecting with Hoover Road and Dan Iannuzzi Park beside York University. Creation of a formal path would serve the York University community and link recreational green spaces.

Connection 4: On Driftwood Avenue near Cobbler Crescent, we propose a paved pathway which will pass through the property of the apartment complexes on the western edge of the ravine system, which is currently already an informal trail.

Connection 5: This connection is currently an informal trail that has created a steep slope, which can be slippery and dangerous during wet conditions. Formalization with a new staircase would improve public safety, and has the advantage of connecting to Niska Road in the neighbourhood. This connection can be considered in conjunction with the next recommendation that would allow for east-west connectivity across the ravine.

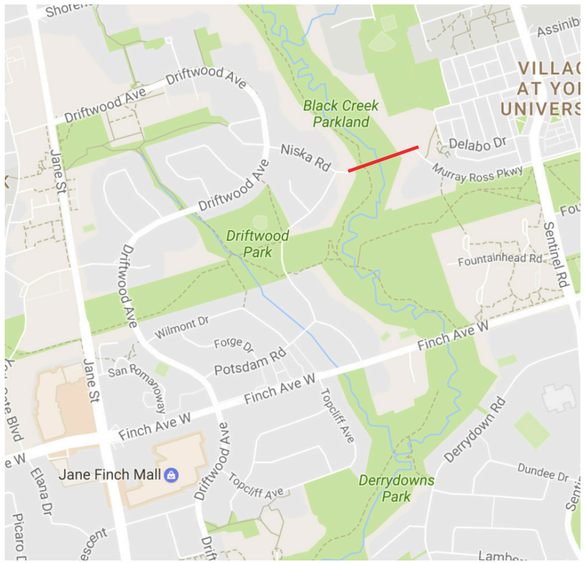


Bridge Between Murray Ross Parkway and Niska Road

Connection Type: Human
Priority: Low
Level of Investment: High
Impact: Enhanced east-west connectivity through the neighbourhood and improved accessibility to the ravines

Residents perceive Black Creek to be a barrier which bisects the eastern and western residential communities in the north of the Keele Street and Finch Avenue West study area, particularly when travelling by automobile. Presently, vehicular crossings over the ravine are restricted to Finch Avenue West and Shoreham Drive, which have a Euclidean distance of nearly 1.5 km between them. As a result, connectivity between the Village at York University and the large residential community east of Jane Street, between Finch Avenue West and Shoreham Drive, is poor and needs improvement. A bridge spanning the ravine from Murray Ross Parkway to Niska Road is proposed to strengthen human connections within the neighbourhood and progress east-west connectivity and accessibility. This proposed connection is of "low" priority as residents did not voice a need for the bridge at the Keele Finch Plus public meeting; however, the mapping analysis estimated that the trail adjacent to the proposed bridge site to be of low usage. With the construction of the bridge and new access to the ravine system built-in, trail usage is anticipated to improve substantially. Furthermore, with the expansion of the subway and opening of Finch West Station and a station at York University, more residents will be traveling to, through, and from the neighbourhood, resulting in an increased demand for east-west connections to improve higher order transit access.

The proposed bridge envisions a vehicular structure on top with a separate, suspended pedestrian and bicycle deck below. To meet the needs of the local community for improved connectivity throughout the neighbourhood and to support recreational use of the ravine system, access to the Black Creek trails should be provided at the end of the bridge. In separating pedestrians and cyclists from vehicular traffic, the bridge can improve safety and remain relatively narrow to suitably connect to the local roads of the western residential community. The bridge would span a distance of approximately 750 ft. and offer an alluring lookout of Black Creek below, which would encourage an appreciation of nature and remind residents of the important ecological and hydrological services the ravines offer. In all, the bridge would dually connect neighbourhoods to one another and to the ravines. With improved connectivity, the ravine trail can act as a community connector, wherein improved accessibility to the ravines expands recreational opportunities and transforms the ravine into a commuting corridor. Black Creek is currently an unrealized north-south connection through the community which has been neglected for too long.




Elwha River Bridge Replacement (Berger/ABAM, 2017)

Hydro Corridor

Connection Type: Human and Ecology
Priority: Medium
Level of Investment: Medium
Impact: Restoration and protection of the hydro corridor to increase accessible connections and sightlines

The hydro corridor runs parallel to Finch Avenue West and is approximately 100 metres in width. Our mapping analysis identified the hydro corridor as a potential east-west connection for wildlife between ravines. The space is also highlighted by the 3km Finch Hydro Corridor Recreational Trail which is an important cycling route in the City as well as a pedestrian pathway for surrounding neighbourhoods.

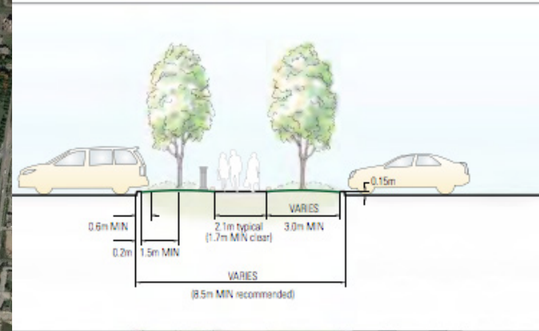
While a recreational trail currently passes through the hydro corridor, most of the remainder of the land is currently a manicured lawn maintained by Hydro One, interrupting the natural progression of the Black Creek Ravine where they intersect. TRCA's wildlife observations data shows that the Black Creek and West Don Ravines are used by terrestrial and avian species at their junctures with the hydro corridor, therefore renaturalization with native plant species has the potential to allow for greater wildlife mobility.

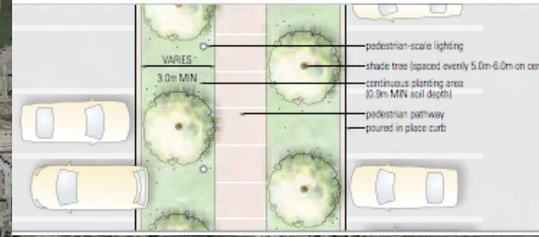
As a pilot project for TRCA's Naturalizing Hydro Corridors initiative, the Gatineau Hydro Corridor in Scarborough was restored to a native meadow to promote bird, pollinator, and insect biodiversity (TRCA, 2012). This project was implemented with the help of the community, including local residents, schoolchildren and the City Councillor (TRCA, 2016). This section of the Finch Hydro Corridor already contains community gardens, and there are opportunities to take this multi-use initiative further. In addition to ecological benefits, renaturalization of the hydro corridor would increase its visual appeal to residents. Along with additional programming including playgrounds or sports facilities in selected areas, this would allow for a blurring of the traditional separations between natural, recreational and utility spaces, leading to a more connected community.

This ecological and recreational connection meets physical barriers when it reaches both Keele Street and Sentinel Road. The hydro corridor and trail, end suddenly on the west of Keele Street, then begin again on Tangiers Road to the east. The site in between will be used as a commuter parking lot for the new Finch West subway station. To minimize the ecological and public safety impacts of this barrier, it is proposed that City Divisions and the TTC work together to create a green pathway through the parking lot to connect the two sides of the corridor with appropriate road crossings on either side. An example of a possible conceptual drawing is shown here from the City of Toronto's Design Guidelines for Greening Surface Parking Lots. This intervention would assist with the improvement of structural and functional connectivity for wildlife by increasing patch sizes, providing more options for movement, and decreasing isolation. For human users, a connected pathway would increase appeal and use, and eliminate the need for pedestrians and cyclists to detour onto busy streets.

Sentinel Road is a 4 lane major road; it is the only major north-south corridor connecting the residential community south of Finch Avenue to York University in the North. As a result of this, the road receives high levels of traffic and is a physical barrier to those utilizing the Finch hydro corridor trail. While there is a street light at the trail crossing for human users, this presents a barrier for other species. Along with the vision of a renaturalized hydro corridor, it is proposed that further investment take place in the form of building an overpass or an underpass to ensure that human and non-human users of the hydro corridor can safely reach the other side of the road without having to be in competition with cars.

The final proposed intervention for the hydro corridor and surrounding ravines is improving upon the overall sightlines of the system. There are several 'towers in the park' that overlook the ravines along the hydro corridor. However, the ravines are below sightlines in many instances, making them difficult for these communities to enjoy. Opening up the ravines to these communities so that they feel closer to the system is necessary. This can be done through the improvement of the pedestrian realm through a focus on desire lines. Having visible, long sight lights with a clear direction are important for bringing communities closer to the ravines.





Finch Crossing

Connection Type: Human and Ecological
Priority: High
Level of Investment: Low to High
Impact: Enhanced north-south connectivity through the neighbourhood and maintaining of ecological connectivity between Black Creek Parkland and Derrydowns Park

The connection between Black Creek Parkland and Derrydowns Park is not a seamless one. Black Creek flows under Finch Avenue, while the path climbs up to the road bridge before descending down on the other side of the road. This would not be a major issue, except the crossing signal is a ways up from the trailhead. Pedestrians are encouraged to cross mid-block which puts them at risk. Additionally, Finch Avenue was washed out in 2005 when Black Creek flooded and eroded away the support structure. It was not rebuilt in a way that prevents this from happening again in the future as the archway still creates a pinch point for water. If the archway under Finch Avenue were wider, or if Finch Avenue were replaced with a bridge, there would be more space for wildlife, people, and water to move underneath. This triple benefit provides the basis for a potential long-term vision for the area.

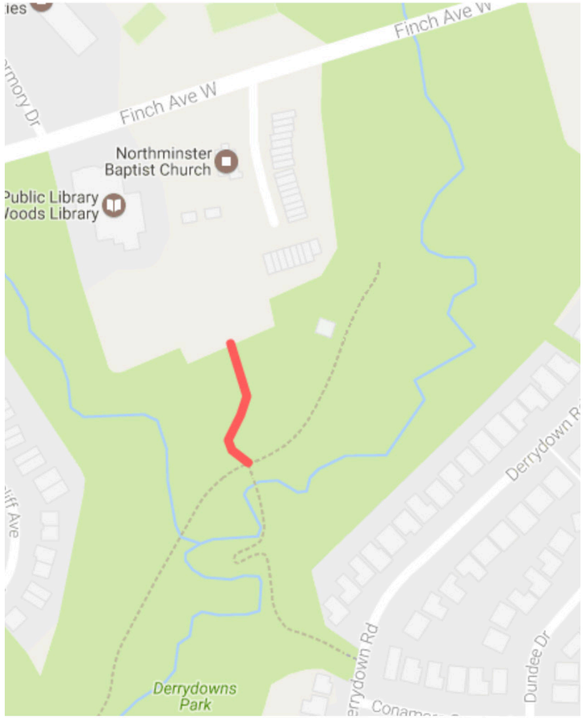
Because of the small difference in elevation between the road surface and the bottom of the ravine, the City will have to decide if the cost is appropriate. An advantage of the current condition is the greater integration of the recreational trail into the community. There are measures the City can take in the short term to preserve this benefit and create better connections for human users. Currently, the connection of the Black Creek Trail is not obvious between the north and south sides of Finch Avenue, with the northern trail ending on the east of the river and the southern portion beginning on the west side. Better signage and an additional pedestrian and cycling crossing can improve the connection for recreational use. Ecologically, there may be opportunities to provide better wildlife crossings underneath the street for terrestrial species.

York Woods Public Library Access

Connection Type: Human
Priority: Medium
Level of Investment: Low
Impact: Enhanced human connections into Derrydowns and closer psychological connection for the community

The York Woods Public Library is nestled between two branches of Black Creek but has no formal access to the ravines. There is no public access of the western branch of the Creek, but the library is in close proximity to the recreational trail along the eastern branch. A visit to the site found that there is indeed an old connection from the edge of the library's parking lot down into the ravine, but this trail has fallen into disrepair and use of the trail is no longer being promoted. From the parking lot, this trail is mostly hidden until one steps up close to it, as the entrance is blocked by a continuous row of parking bumpers.

It is suggested that this connection be repaired and reopened. Connecting the ravine to a public community space would more closely integrate it into the neighbourhood, creating a feeling of accessibility and trust. Working with the library, existing programs and events can be leveraged to celebrate the roles of the ravines in the community and to allow residents to learn more about the natural system. Additionally, this entrance meets the Black Creek trail at its intersection with a trailhead leading from Derrydown Road. Therefore, this recommendation would lead to better connections between the two sides of the ravine and improve walkability.



Jane Street and Shoreham Drive Wildlife Corridor

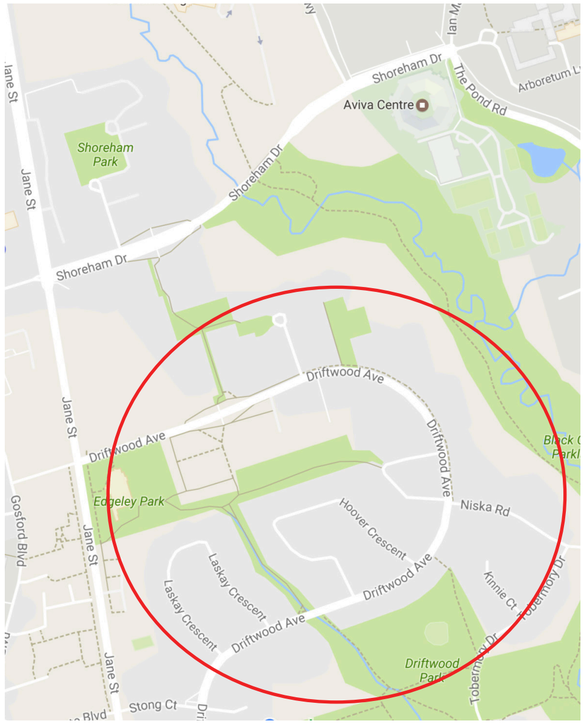
Connection type: Ecological
Priority: Medium
Level of Investment: High
Impact: Corridor creation resulting in enhanced mobility

There is an opportunity to create a wildlife corridor between the open areas near Jane Street and Shoreham Drive to result in a completed "natural space loop" linking to Black Creek consequently improving wildlife mobility with a more holistic natural system.

Referring to the adjacent map, one can see there is a large concentration of observed terrestrial, aquatic and bird wildlife within the ravine system, the data suggests there is a need in this area. Moreover, a branch of the ravine ends between Laskay Crescent and Hoover Crescent. The historical cutting into the ravine system and encroaching residential neighbourhood has largely restricted movement to a north-south pattern and fragmented any east-west movement.

The area east of Jane Street, south of Shoreham Drive has existing parks and open space owned by both the City and Toronto District School Board in addition to some residential areas. Through the creation of green space corridors that link the various existing habitat structures, wildlife movement can be more easily facilitated as well as improving the functioning of our environments. Through the provision of corridors, wildlife can more easily traverse through the residential neighbourhood and between the two ravine parkland areas from Jane Street and Shoreham Drive to Black Creek in this natural space loop.

Defragmentation will be a long-term process, involving various stages of development. The City and/ or the TRCA will need to identify and acquire lands to close the loop. Sections of the existing open space will also need to be segmented for the purpose of wildlife movement, particularly in high foot traffic areas, to allow for ecological protection from human trampling. Once the land has been acquired, it will be a delicate process of gradually introducing natural plant species and wildlife resources to the corridors. It requires a continuous effort and time to ensure the development and succession of ecological communities where living organisms can re-establish themselves in the area.



(Greenway Partners, 2013)

6.5 Next Steps: Validation and Engagement

The following section proposes a public engagement framework that can be explored by the City or future studio groups as a form of validation, prior to implementing the connections outlined in the above sections.

Ecological connections can be rigorously researched, modeled and captured through studies. The human based connections, however, are more nuanced and an integrated community approach is needed to reflect opinions that are not easily captured in the literature. Therefore this public engagement framework is intended to advise the City on how to validate this studio group's observations and analysis. In order to validate the proposals set out in this studio project, the community will need to be consulted in ways beyond a typical public meeting, to ensure that the connections reflect the opinions held by the community who stands to directly benefit.

There is an exciting opportunity to involve the residents in the decision-making process as it relates to the quality of their recreational experience as well as begin efforts for placemaking, storytelling and celebrating the ecological system.

6.5.1 How and Where to Engage

The City may consider hosting a community festival or collaborating with organizers of an existing festival in the area. Festivals are a successful mechanism for progressive engagement that attracts a more diverse sample of the public thus reflecting the broader opinions, interests and values of the community.

Festival-based engagement garners more attendance through effective marketing at the community level through posted flyers or advertisements, and through the use of social media campaigns. Families can more easily attend, youth are encouraged to participate, and conflicts in schedules are reduced particularly if the event occurs during a holiday. Furthermore, when carefully planned, festivals are inviting environments for most people, usually located in a place that is welcoming and accessible. The jovial atmosphere supports participation that is respectful and facilitates creative collaboration.

When considering the strong emphasis of ecology within this case study, the festival could make use of available green space and be committed to producing an event that is sustainable and waste free. Local places that could be explored include York University or Downsview Park, both of which have ties to the Keele Finch Plus project.

6.5.2 Role of the Participants

Engagement represents a mutually beneficial collaboration with the City to identify solutions and produce a healthy space that is desirable to all parties involved. At the community level, it makes use of the local knowledge and talents of users of the space while presenting a collective opinion. Through this process, participants can offer genuine and thoughtful reflection on the vision proposed for the ravine system and the surrounding connections. They should be encouraged to share ideas and provide feedback on the connections. Participants should be properly informed regarding their role and the tangible outcomes associated with this form of engagement. This will allow them to decide on the kind of spaces they want and support its execution.

6.5.3 Role of the Facilitators

The City staff and facilitators who are responsible for managing the engagement should breed a sense of ownership for the green spaces associated with the Keele Street and Finch Avenue West area and the ravine system. Facilitators should also be educators to allow for residents to understand the significance of the ravine system, to better be able to make recommendations. Engagement efforts should always be pursued through a lens of enthusiasm and passion, demonstrating to citizens that their feedback is important and is being heard (Lake, 2014). This leads to public engagement that is more impactful to those involved and creates a willingness to participate in the process.

6.5.4 Presenting the Facts

It is also important for staff and facilitators to clearly inform residents of all the facts as it relates to the project in a method that is understandable to those present. How the information is presented also helps residents understand the issues better, in this case, it is important to educate the community regarding the ecological importance of the ravine system, discussing the methods already in place for its protection and the continued efforts that should be undertaken. Moreover, the major themes discussed in this paper should also be captured particularly as it related to storytelling, inclusivity, recreation and safety to ensure that the perceptions of residents on these topics are captured. Informed residents are more able to identify issues and make considerate suggestions.

6.5.5 Forms of Engagement

The engagement can and should take many forms. There is potential to use tried and true tools such as intercept surveys, dot-mocracies, the presentation of options in the form of renderings, as well as other interactive exhibits. As well, there are many organizations that specialize in interactive engagement activities such as Play the City or 8 80 Cities which are organizations that are making efforts to engage in unique and collaborative ways. Moreover, there are also opportunities to engage in more spontaneous and creative forms through using building blocks, having children and youth draw, providing papers for participants to share their visions for the space or creating an outdoor gallery of resident sourced images. The goal is to empower the residents by placing decision making in their hands while still maintaining opportunities for collaborations. This can only be achieved by looking at different methods and creating an atmosphere that is unconstrained.

7.0 Final Thoughts

Toronto is a modern city with a modern layout. The grid system crosses the city from its farthest reaches, which hides the natural system of channels that were carved over millennia. These channels, or ravines as they are more commonly referred, are immediately visible in satellite imagery and relief maps. In many ways the ravines and grid system are at odds - the ravines were carved naturally as rivers and streams eroded their paths through the softest soils, which take them in all directions; the grid was laid out by planners who forced their vision onto and through the landscape with little concern for nature. Between the two are green spaces separated by roads that follow the ravines while seeking to conform to the grid.

The result is a system that succeeds and fails simultaneously. It succeeds by linking people to other people quickly and effectively, while failing to connect people to the nature that surrounds them. It succeeds by preserving land for wildlife where flood risks are high, and fails by removing space for wildlife where flood risks have been 'addressed' through hard infrastructure. It succeeds by elevating traffic where they cross the ravines, and fails by introducing wide roads where they follow the ravines. It succeeds by maintaining floodways where floods have been experienced, and fails, sometimes catastrophically, where flood risks had not been considered. It succeeds or fails depending on the perspective of the user.

The purpose of this studio was to consider the perspectives of people and wildlife together in order to build connections where they are needed. Connections have been considered physically for wildlife and people, and mentally for people as well. Connections include new trailheads, bridges, greenways, and wayfinding projects. Initially, this studio project was tasked with considering the city region as a whole. After interim, this group focused their recommendations on Black Creek in order to align with the Keele and Finch Plus study underway. This serves as a case study for interventions that could apply to the city system as a whole. For this reason, recommendations include two long-term, high-impact, high-investment, and high-priority connections that may not initially appear to relate to Black Creek near Keele Street and Finch Avenue West. Yet they are included as they act as pinch points that restrict the movement of wildlife from Lake Ontario to the environmentally significant areas in the upper sections of Black Creek. In order for higher-order rehabilitation to occur, a system wide scope must be adopted. As it stands, the hybrid of ravines and roadways serves some, but not enough of the needs of people and wildlife. It is time for this to change by building new connections for human and non-human residents in the city.

(accidentalparkland.tv, n.d.)

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