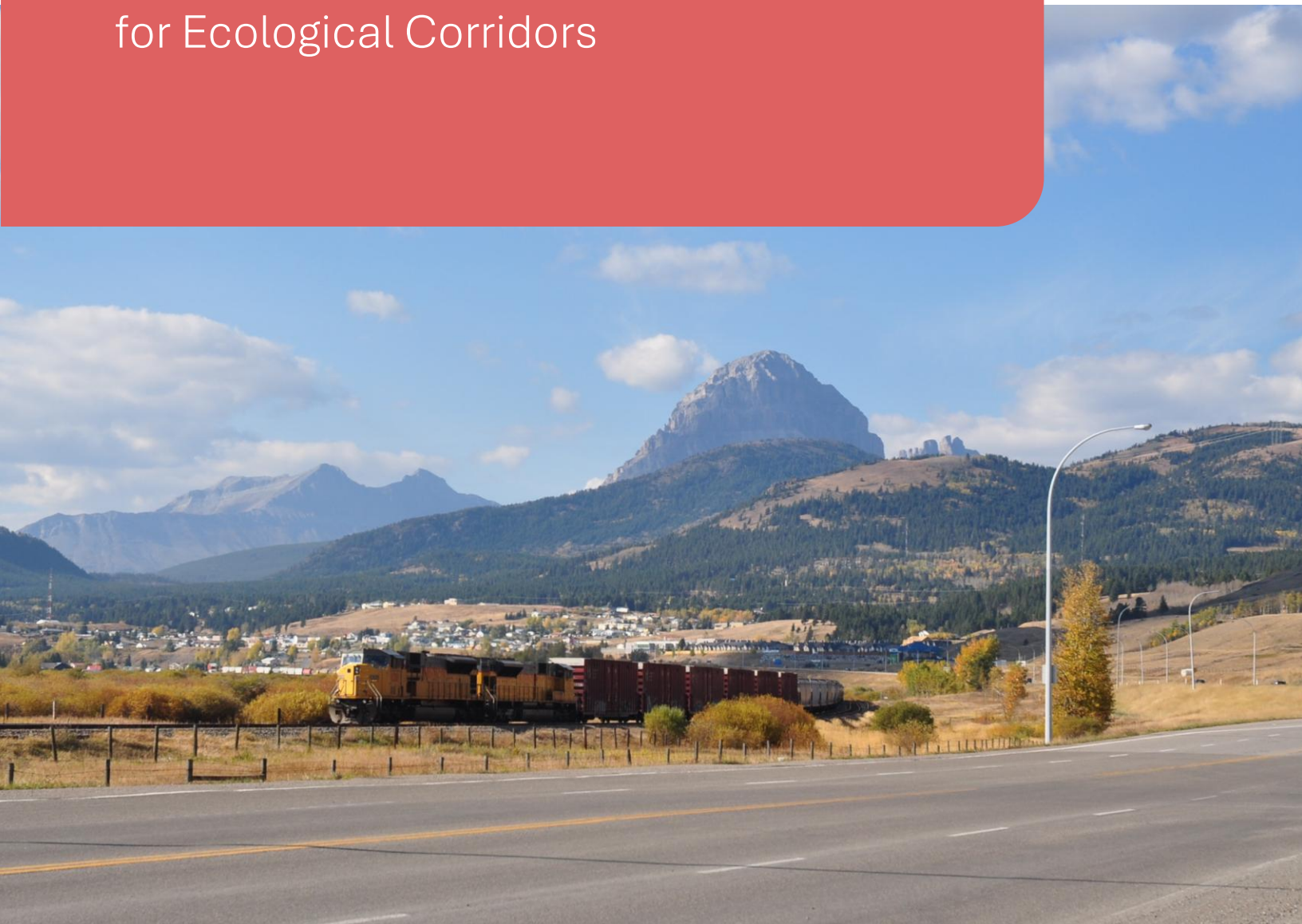




miistakis institute
APPLIED CONSERVATION RESEARCH

Development Mitigation Guidelines for Ecological Corridors



Nicole Kahal and Tracy S. Lee

Report Title

Prepared by Nicole Kahal and Tracy S. Lee
February 2025

Miistakis Institute
EB3013, Mount Royal University
4825 Mount Royal Gate SW
Calgary, Alberta T3E 6K6

Phone: (403) 440-8444
Email: institute@rockies.ca
Web: www.rockies.ca

Contents

Acknowledgements	4
Introduction	5
How to use these guidelines	5
Siting guidelines	6
Maintain a flat minimum width of ecological corridor	6
Situate development close to the ecological corridor edge	6
Shift Corridor Boundary	7
Offset losses	7
Design guidelines	7
Reduce linear disturbances	7
Placement of linear infrastructure	8
Road fencing and wildlife crossings	9
Road lighting	10
Manage human activity	11
Signage and education	11
Garbage management	11
Recreational trail management	12
Incorporate corridor-friendly infrastructure	12
Visual and noise barriers	12
Artificial lighting	13
Wildlife friendly fencing	14
Vegetation and landscaping	14
References	15
Appendix I: Background information	16
Minimum width of ecological corridor	16
Slope of ecological corridor	16
Appendix II: Additional resources	17
Provide and maintain riparian buffers	17
Bird friendly window design	17

Acknowledgements

The work presented in this report was guided with input from the following representatives during a workshop in October 2023:

Diane Horvath, Oldman River Regional Services Commission

Gavin Scott, Oldman River Regional Services Commission

Ryna Dyck, Oldman River Regional Services Commission

Steve Harty, Oldman River Regional Services Commission

Julie McLean, Foothills County

Laura McKinnon, M.D. Pincher Creek

Cindy Chisholm, M.D. Willow Creek

Erin Miller, Alberta Environment and Protected Areas

Maria Didkowsky, Alberta Environment and Protected Areas

Garrit Scheffel, Rocky View County

Andrew Chell, Rocky View County

We would like to thank our generous funders Alberta Real Estate Foundation, Wilburforce Foundation, and Woodcock Foundation.

Introduction

Ecological connectivity refers to the ability of an animal to move freely through the landscape. Animals need to be able to move around to access life requirements such as mates, food, water, and shelter. Some animals migrate seasonally, moving large distances each year to access resources, and some depend on dispersal movements of younger animals to settle in new areas. The distances animals need to move depends on their size and need for resources – regardless, all animals big and small run into barriers due to human activity or the human-built infrastructure.

Connectivity is impacted by human infrastructure (such as roads) or human activity (such as recreation) which alter the way animals move around the landscape. Sometimes these impacts stop animals from being able to move to parts of the landscape and accessing needed resources. When an animal can no longer access parts of the landscape (landscape fragmentation) there is an increased risk of localized extinction events and population level health impacts to wildlife. Ecological connectivity is important for humans as well because it helps to maintain natural processes and biodiversity which we rely on for services such as clean air, clean water, protection from flood and drought, and ability to adapt to a changing climate.

Ecological corridors are a geographical space that is governed and managed over the long term to maintain or restore ecological connectivity, or the unimpeded movement of animals. These are commonly called wildlife corridors or wildlife linkages. Ecological corridors are especially important in fragmented landscapes, where existing protected areas and high-quality habitat require connections to retain their natural processes and biodiversity.

As rural municipalities experience growth, development decisions have the potential to adversely impact ecological corridors, potentially reducing their effectiveness or removing them completely. These guidelines were developed to help municipalities and developers ensure we limit impacts from development, by providing guidelines that encourage development to occur in a way that allows ecological connectivity to be maintained.

How to use these guidelines

This document was developed to provide suggested mitigation strategies as a complement to the Wildlife Movement tool (https://miistakis.shinyapps.io/cra_app/), which assesses a proposed development's impact to delineated ecological corridor/s. The guidelines were not written to be overly prescriptive but are intended to allow flexibility to achieve a design unique to the development location, to benefit both human and ecological connectivity. The guidelines were written for use by developers and decision makers, including municipal planning staff, to guide development permit applications and decisions. The guidelines are organized into two main sections: siting guidelines and design guidelines. The siting guidelines are concerning how the development footprint will be situated on the landscape, and the design guidelines describe strategies that can be incorporated into the design details of the development, such as incorporating wildlife-friendly fencing and lighting. Note that not all mitigation strategies presented in this document will be relevant to every development. If using these guidelines in conjunction with the Wildlife Movement tool, the generated report will list the suggested siting and design guidelines contained in this document to consider. In addition, the siting guidelines may best be applied during planning processes such as development of Area Structure Plans or during zoning discussions.

Siting guidelines

It is important to consider how the development footprint is situated within the ecological corridor. First and foremost, all development should be avoided within the ecological corridor. When this is not possible, it is necessary to consider how that development may impact the ability of wildlife to move through. These guidelines were developed specifically to maintain large mammals on the landscape. The Wildlife Movement tool identifies the level of risk and may indicate a development will result in the corridor losing its functionality for large mammal species, specifically grizzly bear and elk. It should be noted that ecological connectivity occurs at many scales depending on the species and their life requirements, and some species may still be able to use a corridor that is not suitable for large mammals.

The Wildlife Movement tool criteria that are relevant to informing the need for considering siting guidelines include corridor width, corridor plasticity, slope, and important habitat for elk and grizzly bear.

Maintain a flat minimum width of ecological corridor

Ecological corridor width refers to the minimum spatial dimension from corridor edge to edge. Ecological corridors are intended to counter the impacts from human disturbance so that wildlife are able to move unimpeded through the landscape. If too narrow, the ecological corridor will not abate human influence from outside the corridor and wildlife will not regularly move through it. The minimum recommended ecological corridor width should be no less than 350m at any point in the ecological corridor. However, the wider the corridor, the better (Beier, 2018; A. T. Ford et al., 2020). Further, most wildlife prefers to travel on flat land, which limits wildlife travel on steep slopes (<30 degrees). The corridor width must maintain a less than 30-degree slope within at least 350m after development (Figure 1).

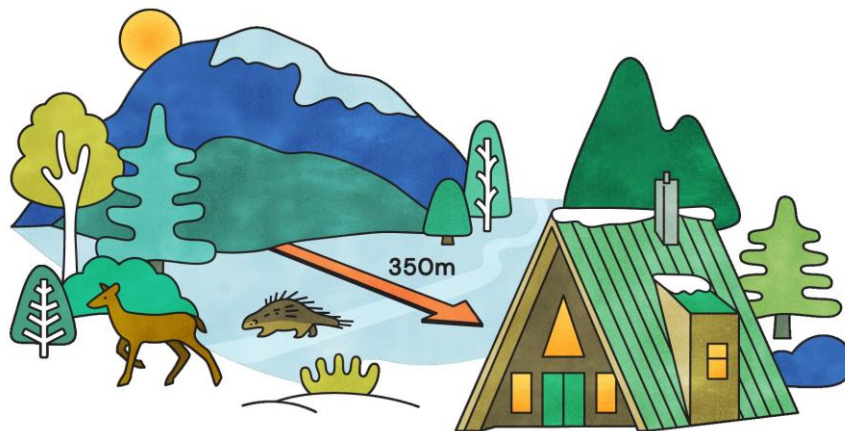


Figure 1: Ensure there is at least 350m of flat land available for wildlife movement within the ecological corridor.

If the development will reduce the minimum width of the ecological corridor, including the availability of flat land, consider the following options situate the development close to the ecological corridor edge or shift the corridor boundaries.

Situate development close to the ecological corridor edge

Adjust the location of the development within the corridor so it is situated as close to the edges of the corridor as possible and intrudes as minimally as possible into the corridor (Figure 2).

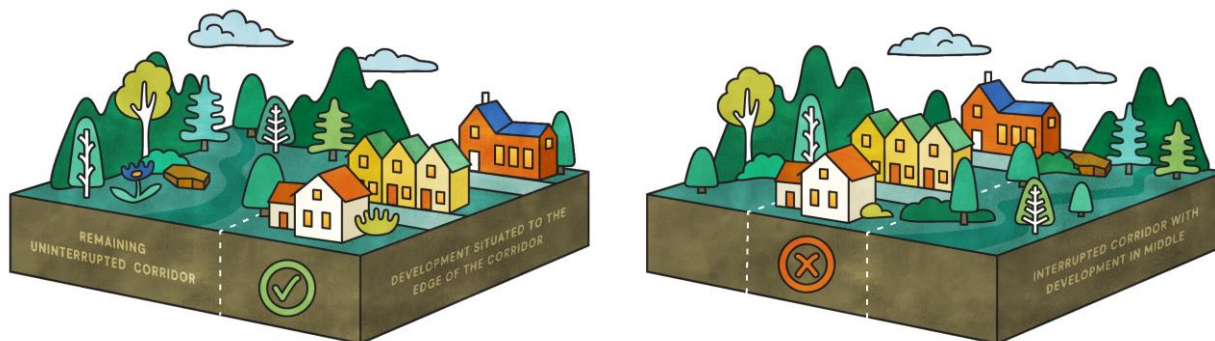


Figure 2: A new development situated at the edge will provide a wider corridor than one situated in the middle.

For developments that occur within high value carnivore (grizzly bear) and important Elk summer and winter ranges, consider shifting development location to avoid these areas.

Shift Corridor Boundary

Corridor plasticity refers to our ability to move the corridor boundary to accommodate new development without impacting minimum width. If the corridor has plasticity, it may be possible to shift the corridor boundary to accommodate a development, however, this is dependent on if the adjacent land is natural and able to support ecological connectivity and can be managed to maintain ecological connectivity. In many cases, the delineated ecological corridor is the only space left on the landscape to support connectivity, so shifting the boundary may not be possible at all sites. If attempting to shift the corridor boundary, consider offsetting (see Offset section below).

Offset losses

When loss of ecological corridor function (maintaining wildlife movement) is unavoidable, offset the loss through conservation opportunities including securement/protection of land to protect other corridors in the area.

Identify if the land is privately or publicly owned, then consider:

- If private ownership, use conservation easements or other conservation tools to promote appropriate practices and protection on lands adjacent to the corridor.
- If public ownership, work with appropriate government agency to place protective notation on parcels to ensure protection from future sale or development approval.

Design guidelines

Once the development footprint and site location are determined, the next step is to ensure that the design of the development reduces adverse impacts to the ecological corridor. Here, we describe strategies to mitigate the impact of linear disturbances, human activity, and infrastructure.

Reduce linear disturbances

Linear infrastructure refers to straight-line infrastructure such as roads, railways, transmission lines, pipelines, and recreational trails. While linear infrastructure is often necessary for certain types of developments, and may bring social and economic benefits, it poses a significant threat to natural ecosystems and biodiversity. Linear infrastructure can fragment habitat and increase human presence that reduces the likelihood of wildlife traveling through a corridor. There are strategies to reduce the impact of linear infrastructure, such as considerations on placement, installing wildlife friendly fencing, providing wildlife crossing opportunities, and installing low impact lighting.

Placement of linear infrastructure

The following guidelines should be adhered to when planning for linear infrastructure to minimize impacts:

- Align the linear infrastructure so it runs perpendicular to the direction of the ecological corridor (when possible avoid infrastructure that bisects the corridor)
- If bisects the corridor linear infrastructure should take the most direct route across the ecological corridor.
- Where possible, group linear corridors (i.e., powerlines, roads, trails) together to reduce the number of linear infrastructures crossing an ecological corridor (Figure 3) (The Bow Corridor Ecosystem Advisory Group, 2012)

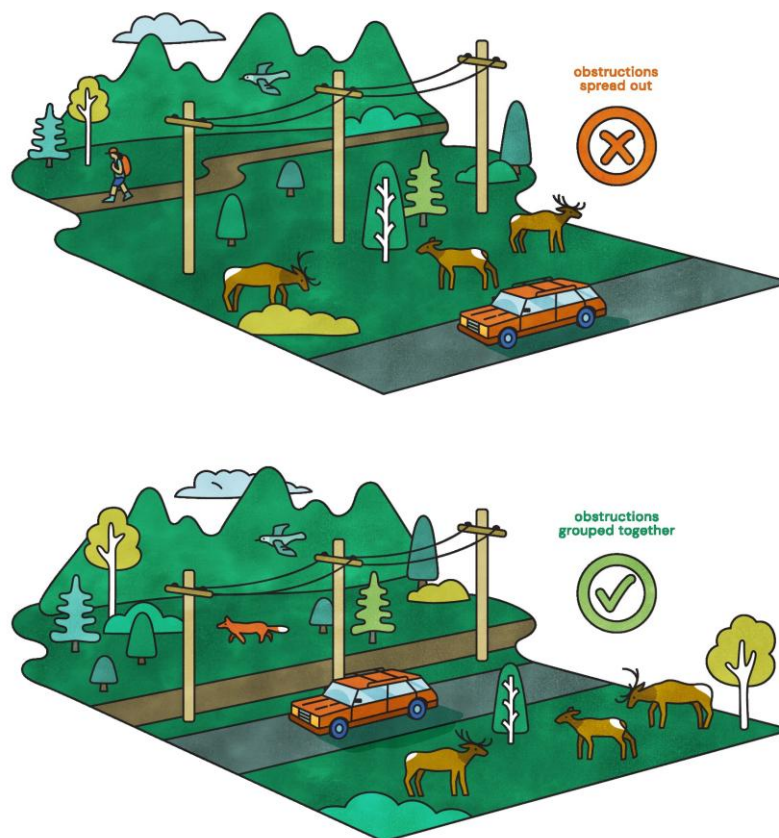


Figure 3: Linear infrastructure should be grouped together and run perpendicular to corridor. Linear infrastructure should take the most direct path across the corridor.

Road fencing and wildlife crossings

Roads can present a major barrier to wildlife movement, causing direct mortality from collisions, as well as avoidance behavior. Further, larger wildlife on roads is a cause for human safety concern. The impact of a road will depend on the traffic volume. See Figure 4 for how traffic volume impacts wildlife at different thresholds as an approximate starting point for when to consider the need for road mitigation (Charry & Jones, 2009). Figure 5

There are several well-used strategies to mitigate impacts of both low volume and high-volume roads. For low volume roads, mitigations such as signage, crosswalks and speed bumps can reduce driver speed and increase driver awareness. Additional options include diversionary methods to change animal direction of travel away from roads, such as raised roads, berms and use of vegetation. For high volume roads, wildlife crossing structures and associated fencing and jump-outs should be considered. Wildlife crossing structures can include culverts, bridges and overpasses, with fencing to guide wildlife toward them. Human activity should be limited at or near wildlife crossing structures (Beier et al., 2008; A. P. Clevenger et al., 2002; A. P. Clevenger & Waltho, 2000).

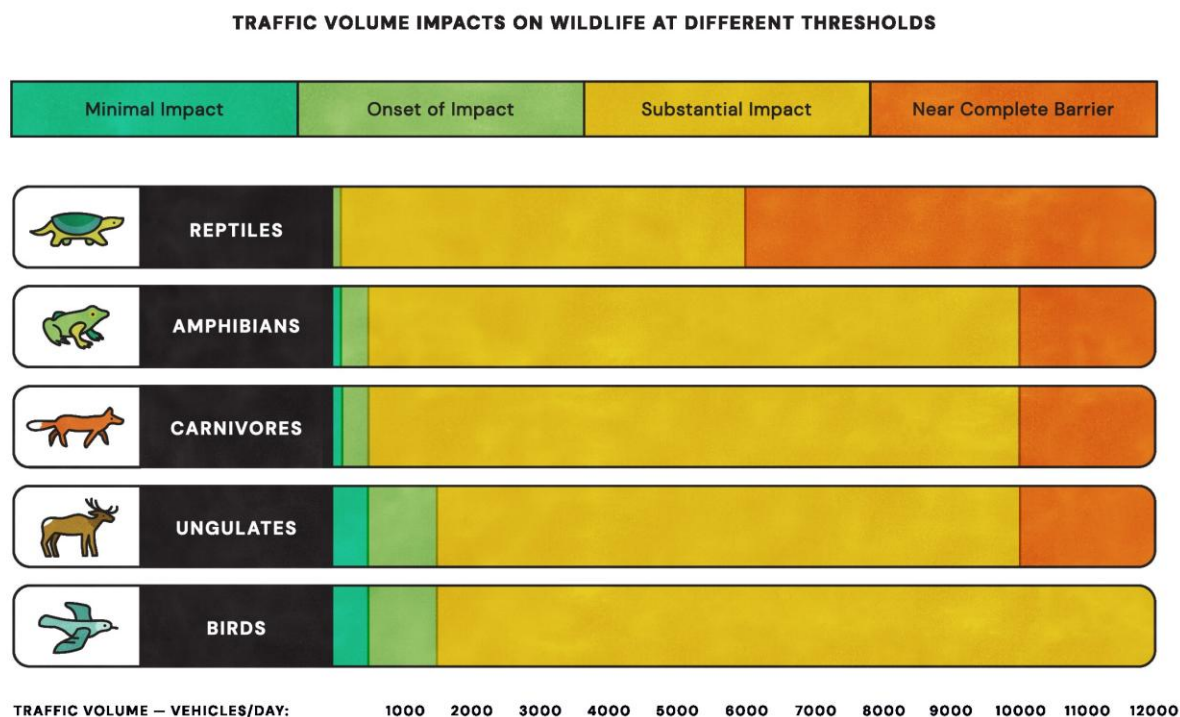


Figure 4: Figure and table from Charry & Jones, 2009 depicting the impacts to species groups based on traffic volumes.

The effectiveness of road mitigation has been widely studied, and there are many resources available to guide design. The following table includes example resources that can help determine the best road mitigation strategies to implement.

Table 1: Resources to inform wildlife road mitigation.

Name	Description	Available online
Alberta Transportation Guideline for planning wildlife crossing structures	While the purpose of this guideline is to promote the effective design of animal-vehicle collision (AVC) mitigation on provincial highways, the information provided may be applicable to smaller scale development projects that require the addition of roads.	https://open.alberta.ca/publications/guideline-for-planning-wildlife-crossing-structures#:~:text=The%20purpose%20of%20this%20guideline%20is%20to%20promote,crossing%20structure%20for%20Alberta%20Transportation%20and%20Economic%20Corridors.
City of Edmonton Wildlife Passage Engineering Design Guidelines	The purpose of this guideline is to provide transportation designers and decision makers with recommendations that will incorporate the needs of wildlife into transportation projects.	https://www.edmonton.ca/sites/default/files/public-files/assets/WPEDG_FINAL_Aug_2010.pdf?cb=1682988353
Surrey Biodiversity Design Guidelines Road Ecology	The document provides strategies to facilitate safe wildlife crossings within the City of Surrey, and are intended to mitigate some of the impacts to wildlife populations by providing general guidance to improve permeability and habitat connectivity across roads and by reducing wildlife-vehicle collisions.	https://www.surrey.ca/sites/default/files/media/documents/BiodiversityDesignGuidelines_RoadEcology.pdf
Wildlife Crossing Structure Handbook Design and Evaluation in North America	This handbook provides technical guidelines for the planning, design, and evaluation of wildlife crossing structures and their associated measures (fencing, gates) that facilitate the safe movement of wildlife across roads and increase motorist safety.	https://cdn2.assets-servd.host/material-civet/production/images/documents/Wildlife-Crossing-Structures-Handbook.pdf?dm=1742595355

Road lighting

Eliminate or reduce artificial lighting of roads within ecological corridors, as artificial night lighting can impair the ability of nocturnal animals to navigate (Gregory et al., 2021). If lighting cannot be eliminated on roads, the following guidelines can limit impact:

- Dim lighting (reduce intensity)
- Part-night lighting (motion activated, timing light to be off during low use)
- Avoid blue light emissions
- Minimize light trespass (direct light to only where it is required) (Gregory et al., 2021)

Manage human activity

The following sections provide strategies that will mitigate for the increased human activity that could occur within the ecological corridor after a development. These strategies include considerations for recreational management and education.

Signage and education

Incorporate signage and education to engage visitors and residents and encourage good stewardship. Topics to include:

- The location and purpose of the ecological corridor
- The importance of maintaining ecological connectivity
- Good stewardship and wildlife co-existence practices

Garbage management

Garbage can attract wildlife away from the ecological corridor, and into unwanted areas, such as development (Beier et al., 2008). This is particularly problematic for species such as bears, as garbage attracting bears to human areas present a safety issue. Measures should be taken to reduce the change wildlife is attracted to, and able to feed on trash. The following strategies should be implemented to reduce the impact of garbage:

- Ideally, no curbside collection of waste. Rather, incorporate centrally located wildlife-resistant dumpsters.
- Allow only wildlife-resistant and air-tight garbage containers.
- Store compost indoors.
- If curbside collection of waste is necessary, allow residents to set out wildlife-resistant waste containers on curb within a restricted time frame during collection day.
- Educate residents on how to store garbage containers and keep them clean to reduce odors.
- Keep barbecues clean.
- Keep landfills and waste transfer sites securely fenced and maintained.

Table 2 lists resources for more information on strategies to manage garbage such that it does not attract wildlife.

Table 2: Online resources to inform bear-safe waste management practices.

Resource	Description	Website
Alberta BearSmart, Government of Alberta	Bear safety information and how Alberta communities are reducing conflict between people and bears.	https://www.alberta.ca/deterrants-bear-resistant-garbage-disposal
Waste Management, Get Bear Smart	Bear safety information to prevent human-bear conflicts and how to become bear smart communities.	https://www.bearsmart.com/managing-communities/waste-management/

Bear Resistant Products List, Interagency Grizzly Bear Committee	Provides a list of bear-resistant products to store food, garbage, and other attractants on public and private lands. Includes information on appropriate fencing.	https://igbconline.org/programs/bear-resistant-products/
--	--	---

Recreational trail management

To allow for wildlife movement through the ecological corridor and reduce human-wildlife conflict, there should be limited recreational activity within the ecological corridor. Where development attracts people, it will be impossible and potentially undesirable to prohibit people from enjoying the natural spaces within the ecological corridor (Gregory et al., 2021). While many private developments occurring within the ecological corridor will not provide recreational trails or access to trails, there are likely to be situations where there is some control over recreational access. Examples include private developers of master-planned residential communities, homeowners associations, owners of privately conserved land, local jurisdictions, etc. (Gregory et al., 2021). The following considerations should be made when there is or may be recreational access to the ecological corridor:

- Limit access points to recreational trails from the development, incorporate signage and education (see Signage and Education section) at trailheads.
- Trails should not travel the entire length of the corridor and should cross perpendicular to the direction of the corridor.
- Spur trails off designated trails should be eliminated.
- Seasonal or temporal trail closures for public safety, or when wildlife are most sensitive to disturbance (i.e., early spring for emerging bears).
- Incorporate signage and education to inform users of the importance of staying on-trail, always keeping dogs on-leash, properly disposing of garbage, etc.
- Increase line of sight to minimize surprise encounters with wildlife.
- Trails should take the most direct route across the wildlife corridor.
- Consider only allowing recreational trails when the ecological corridor is over 1km wide.

Incorporate corridor-friendly infrastructure

There are strategies that can be applied to development infrastructure, including those associated with high-density and low density residential, factories, gravel mines, shopping centres, etc. However, if possible, urban development should be avoided from occurring at all within the ecological corridor. The following outlines simple strategies with respect to residential lot sizes, visual and noise barriers, artificial lighting, wildlife friendly fencing, and vegetation and landscaping.

Visual and noise barriers

Visual and noise barriers are commonly used to mitigate light and noise from roads, and to help direct wildlife use of wildlife crossing structures (Rosell et al., 2023). However, visual and noise barriers can be used to mitigate other types of human disturbances and can be installed at the edge of the development to reduce any noise and limit the visual disturbance for wildlife traveling through the ecological corridor (Figure 5). Common visual and noise barriers include:

- Soil berms

- Solid walls
- Densely vegetated strips

The height of the barrier will differ based on what is being mitigated, the intended purpose, and feasibility. For example, when mitigating the noise and visual of a road, the height of the berm should be taller than the height of the largest vehicle using the road (City of Edmonton, 2010). When determining type of visual and noise barrier to implement, use soil berms and vegetated strips when it is acceptable for wildlife to travel over the berm, and solid walls when wanting to preclude wildlife altogether. When using solid walls or other barriers impermeable to wildlife, ensure there are proper escape routes should an animal find themselves on the wrong side.



Figure 5: A vegetated soil berm located between wildlife corridor and development.

Artificial lighting

Eliminate or reduce artificial lighting of roads within ecological corridors, as artificial night lighting can impair the ability of nocturnal animals to navigate (Gregory et al., 2021). If lighting cannot be eliminated, the following guidelines can limit night lighting impact:

- Dim lighting (reduce intensity)
- Part-night lighting (motion activated, timing light to be off during low use)
- Avoid blue light emissions
- Minimize light trespass (direct light to only where it is required) (Gregory et al., 2021)

Table 3 includes a resource that can be consulted to determine the most appropriate types of lighting to use in an ecological corridor.

Table 3: Lighting products to reduce impact of artificial night lighting.

Resource	Description	Website
DarkSky Approved Program	The DarkSky Approved program provides objective, third-party certification for	https://darksky.org/what-we-do/darksky-approved/

	lighting products, lighting designs, and installed lighting projects that minimize glare, reduce light trespass, and reduce light pollution.	
--	--	--

Wildlife friendly fencing

Reduce or eliminate fencing when possible so wildlife are not precluded from moving through. However, there are many reasons fencing is necessary, such as keeping livestock on property. Encourage the use of wildlife-friendly fencing, or modification of existing fences, to allow for target species to easily pass through. Exclusion fencing may be necessary in certain circumstances, when it is necessary to keep wildlife areas from areas of potential wildlife attractants, such as garbage receptacles and gardens. Table 4 includes a resource on wildlife-friendly fencing as well as options for exclusion fencing.

Table 4: Resources for wildlife-friendly fencing.

Resource	Description	Website
Alberta Landowner's Guide to Wildlife Friendly Fencing	This guide will help you construct and modify fences and crossings that are friendlier to wildlife while still meeting fencing needs. It will also help you with sources for technical assistance and possible cost-share opportunities. Additionally, the guide presents information on exclusion fencing when it is necessary to keep wildlife out.	https://www.ab-conservation.com/downloads/educational_materials/brochures/ACA_Wildlife_Friendly_Fencing.pdf

Vegetation and landscaping

It is important to leave natural and native vegetation untouched within the ecological corridor, and to maintain natural and native vegetation within the development footprint. Native vegetation gives the additional advantage of requiring very little to no maintenance once established. Additional considerations for vegetation and landscaping within the development footprint:

- Prohibit planting of fruit trees and bird feeders, as these can attract wildlife away from ecological corridor and increase conflict with humans
- Prohibit gardens, or educate and require wildlife-proof gardens
- Reduce use of fertilizers and pesticides on urban lawns
- Manage fire risk with minimal alteration of natural vegetation
- When there is a need to re-vegetate, consult experts on local native vegetation

References

- Beier, P. (2018). A rule of thumb for widths of conservation corridors. *Conservation Biology*, December 2018. <https://doi.org/10.1111/cobi.13256>
- Beier, P., Majka, D., Newell, S., & Garding, E. (2008). Best Management Practices for Wildlife Corridors. *America*, 178(January), 1–14.
http://corridordesign.org/dl/docs/corridordesign.org_BMPs_for_Corridors.pdf
- Canadian Standards Association. (2019). *CSA A460:19 Bird-friendly building design*.
- Charry, B., & Jones, J. (2009). Traffic Volume as a Primary Road Characteristic Impacting Wildlife: A Tool for Land Use and Transportation Planning. *UC Davis: Road Ecology Center*.
- City of Edmonton. (2010). *Wildlife Passage Engineering Design Guidelines*.
- Clevenger, A. P. A. P. A. P. A. P., & Waltho, N. (2000). Factors influencing the effectiveness of wildlife underpasses in Banff National Park, Alberta, Canada. *Conservation Biology*, 14(1), 47–56. <https://doi.org/10.1046/j.1523-1739.2000.00099-085.x>
- Clevenger, A. P., Chruszcz, B., Gunson, K., & Wierzchowski, J. (2002). *Roads and wildlife in the Canadian Rocky Mountain Parks: movements, mortality and mitigation. Final report to Parks Canada*.
- Duke, D. L. (2001). *Wildlife use of corridors in the central Canadian Rockies: Multivariate use of habitat characteristics and trends in corridor use* [M.Sc. Thesis, University of Alberta]. <https://doi.org/10.1016/j.jorganchem.2010.09.058>
- Ford, A. (2018). Human impacts on the spatial ecology of large carnivores : implications for the design of effective wildlife corridors . *In Review*.
- Ford, A. T., Sunter, E. J., Fauvelle, C., Bradshaw, J. L., Ford, B., Hutchen, J., Phillipow, N., & Teichman, K. J. (2020). Effective corridor width: linking the spatial ecology of wildlife with land use policy. *European Journal of Wildlife Research*, 66(4), 69.
<https://doi.org/10.1007/s10344-020-01385-y>
- Gregory, A., Spence, E., Beier, P., & Garding, E. (2021). *Toward Best Management Practices for Ecological Corridors*. <https://www.mdpi.com/2073-445X/10/2/140>
- Hilty, J., Worboys, G., Keeley, A., Woodley, S., Lausche, B., Locke, H., Carr, M., Pulsford, I., Pittock, J., White, W., Theobald, D., Levine, J., Reuling, M., Watson, J., Ament, R., & Tabor, G. (2020). Guidelines for conserving connectivity through ecological networks and corridors. In *Best Practice Protected Area Guidelines Series No. 30* (Issue 30).
- Kahal, N., Lee, T., & Duke, D. (2020). *Rural Municipal Ecological Connectivity Guidelines for Terrestrial Mammals: Background Report*.
- Rosell, C., Seiler, A., Chrétien, L., Guinard, E., Hlaváč, V., Moulherat, S., Fernández, L. M., Georgiadis, L., Mot, R., Reck, H., Sangwine, T., Sjolund, A., Trocmé, M., Hahn, E., Bekker, H., Bíl, M., Böttcher, M., O'Malley, V., Autret, Y., & van der Grift, E. (2023). *IENE Biodiversity and infrastructure. A handbook for action*.
<https://www.biodiversityinfrastructure.org/>
- The Bow Corridor Ecosystem Advisory Group. (2012). *Wildlife Corridor and Habitat Patch Guidelines for the Bow Valley*.

Appendix I: Background information

To inform this report, a background literature review completed in December 2020 that gathered the current state of science on ecological corridor requirements (Kahal et al., 2020). Further, a workshop with experts in municipal planning and ecological connectivity was held in October 2023 to guide the report content.

Minimum width of ecological corridor

For a multi-species system, ecological corridor widths noted in available grey and scientific literature with similar target species were highly variable (50m – 4.4.km), with no available empirical studies determining requirements (Beier, 2018; A. Ford, 2018; Gregory et al., 2021; Hilty et al., 2020). There is some agreement that corridor width should increase as corridor length increases (The Bow Corridor Ecosystem Advisory Group, 2012). This wide range underscores the lack of consistency for width recommendations and highlights the importance of location specific considerations, such as land security and adjacent land uses. Information on species-specific ecological corridor width requirements were even further limited.

In Alberta, the BCEAG guidelines is commonly referred to, which lists a 350m minimum ecological corridor requirement. However, one study concluded that the 350m corridor width recommended in the BCEAG guidelines is not effective for large carnivores (black bear, grizzly bear, cougar, wolf (The Bow Corridor Ecosystem Advisory Group, 2012). Further, (A. T. Ford et al., 2020) concluded that for large carnivores, the effective corridor width (the minimum width necessary to abate human influence) is 4.4km when adjacent to residential development, and 465m when adjacent to recreational trails, highlighting the importance of land use considerations when determining an appropriate width. With limited empirical evidence to guide decisions, (Beier, 2018) recommends a 2km corridor width as a “rule of thumb,” except at unavoidable bottlenecks (e.g., wildlife road crossings), which should be mitigated by widening other areas of the corridor.

Under consultation of an advisory group for the Wildlife Movement tool, it was determined to suggest the 350m minimum ecological corridor width as a best practice (reference Wildlife Movement technical report). This allows for flexibility as kilometers-wide corridors are not possible in areas of already intense land use. As well, it adheres to a minimum standard commonly referred to in Alberta, as included in the Bow Valley Ecosystem Advisory Group guidelines.

Slope of ecological corridor

Steep slopes can impede wildlife movement, making slope an especially important consideration for ecological corridors. Through the literature reviewed, we found that slopes less than 30 degrees are best for grizzly bear movement, moderate slopes for cougar movement, flat to gentle slopes for wolf movement, and for a multi-species system, corridors with a flat topography are best (Duke, 2001; The Bow Corridor Ecosystem Advisory Group, 2012).

Appendix II: Additional resources

Provide and maintain riparian buffers

Many wildlife movement corridors are associated with riparian systems that provide wildlife with hiding cover and resources needed to move safely through a landscape, particularly in areas of high human use. Riparian buffers are protected from disturbance which can benefit wildlife and may be relevant if your corridor is associated with a riparian system. Refer to [*Stepping Back from the Water: A beneficial management practices guide for new development near water bodies in Alberta's settled region*](#). This document, published by the Government of Alberta, provides recommendations for development setbacks and riparian buffer management.

Bird friendly window design

Glass is a serious barrier for birds and other aerial wildlife that see either a reflection or transparency resulting in window collisions. To prevent collisions, install bird friendly windows during construction or mark windows post construction according to CSA Bird-Friendly building design standards (Canadian Standards Association, 2019). Manufactured bird friendly windows are:

- Not mirrored
- Have acid etching or ceramic frit directly on the glass

Post construction markings of glass must:

- Be spaced no more than 10cm apart vertically and 5cm horizontally
- Cover the entire window surface
- Be installed on the exterior surface of the window
- Have high contrast in colour compared to the background
- Cover glass at least to the height of the tallest nearby trees or a minimum of 16m from the ground if no trees are present

CSA A460:19 can be consulted for more information.