Telford Lake Setbacks & Buffers; Balancing Conservation and Development Priorities

Background Report

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Telford Lake has been identified as the City's number one environmentally significant area, and as an important wildlife corridor between Telford Lake and Saunders Lake. It offers naturalized and pristine recreational opportunities within the City which is unique to the region and attracts visitors that contribute to the economic prosperity of Leduc. Telford Lake and surrounding areas also offer important ecosystem services to citizens; for example, wetlands store water, improve water quality, and moderate climate through carbon storage, while vegetation is integral to various services such as helping to control erosion and supporting wildlife, waterfowl, and healthy populations of pollinator species.

The Leduc Wildlife Conservation Society (LWCS) presented to the Leduc Environmental Advisory Board (LEAB) in 2021 to discuss pending development adjacent to Telford Lake and how this might adversely impact vegetation, wildlife, and water quality etc. LEAB shares these concerns and identified the need to conduct further research to support their recommendations before approaching Council. Representatives from the City's Planning department met with the LWCS and LEAB to discuss the Telford Lake Master Plan, clarify current Land Use Bylaw regulations, and address any questions or concerns held by both parties. With this information the LWCS presented to Council on November 28, 2022, with the following concerns:

- Insufficient buffers between the Industrial Park and Telford Lake,
- Insufficient guidelines with respect to noise, light and garbage pollution, and
- Insufficient trees resulting in noise and light pollution.

When LEAB last presented to Council in May 2023, they committed to work with the City, the LWCS, businesses, developers and residents to preserve the natural area around Telford Lake. With the MDP update and associated public engagement currently underway the Board has identified an emergent opportunity to further the discussion.

In Fall 2023, LEAB met with the City's Planning Department to further their understanding of the proposed development around Telford Lake and provide feedback on the current MDP update. Following this meeting, LEAB also met with the North Saskatchewan Watershed Alliance (NSWA) to get expert insight on calculating scientifically defensible development setbacks from riparian areas, and natural asset considerations.

LEAB wants to be a champion for our city, and how it grows with respect for nature, wildlife, and future generations. That includes protecting our natural spaces in their current state, as well as working to improve them to ensure that local wildlife and ecosystems thrive for years to come. Let us set a precedent with policies we put in place now so our children (and beyond) can also grow and thrive in our beautiful city.

LEAB is particularly interested in, in order of importance:

1. Retaining and protecting what we have with scientifically informed development setbacks that protect the watershed, biodiversity, ecosystem services and natural integrity of Telford Lake, for the enjoyment of current and future generations.

2. Enhanced guidelines to create a buffer/transition zone between natural areas and development (i.e. tree planting, dark sky lighting, noise restrictions)
3. Restoring disturbed areas to improve their ecological condition (i.e. tree planting, weed management, naturalization)

Concerns with Current Scenario:

Based on the existing Area Structure Plans (Sawridge Business Park ASP, Harvest Industrial Park ASP, Lakeside Industrial ASP, and East Telford Lake ASP), the City has protected a minimum of 60 m around the perimeter of the lake with 10 m of environmental reserve (ER) and 50 m of municipal reserve (MR) pre-dedicated for the multi-way trail. Although this is an excellent step in the right direction, LEAB has true concerns that this may not be enough, and that all environmental factors have not been considered.

"We cannot take care of what we cannot see. Being able to identify a riparian area and what it does for us is the first step. Then appreciating the complexity of connections between riparian areas and water bodies will help us make better choices for attaining conservation objectives while meeting human needs" (Stepping Back from the Water, 2012).

Although it is understood that there are constraints to adding more ER/MR around the lake, and that much has been dedicated already, LEAB has committed to researching available information and tools to support the City in informed decision making when it comes to balancing conservation and development objectives. This includes opportunities to better understand the ecosystem services that Telford Lake provides and the economic and environmental trade-offs of land development.

Scientifically Informed Development Setbacks

The Alberta Government *Stepping Back from the Water* Guide provides information for determining setback widths and designing effective buffers for riparian areas. A riparian area refers to any land that adjoins or directly influences a water body. They are the place where water and land meet and interact and provide crucial ecosystem services to all Albertans.

Setbacks adjacent to water bodies perform a variety of ecological functions; some of the most recognized include improving water quality, providing wildlife habitat and allowing for wildlife movement. By keeping permanent developments an appropriate distance from the water and maintaining riparian areas in a healthy state, the ecosystem services they provide can be enjoyed for generations to come.

Setbacks are calculated using site specific information to determine buffers which should maintain the ecosystem services provided by the riparian areas and reduce the risk of negative impacts of development. Site specific information should include:

- Topography and slope of the site
- Soil profile
- Groundwater connectivity
- Floodway and flood fringe levels
- Erosion prone lands, sloping and unstable ground, and
- Environmentally significant area

Examples of Recommended Setbacks

Research shows that in order to protect water quality a buffer of **20 – 50 m** is typically recommended; however, in order to also protect wildlife habitat and connectivity a buffer of **100 – 400 m** is recommended. Below are some existing examples for reference.

Alberta Environment and Parks recommended guidelines for minimum environmentalreserve/easement widths varies from **6 to 30 m** based on the water feature type (data provided by NSWA).

Table 1. Standard recommended minimum widths for Environmental Reserves or Environmental Reserve Easements based on type of water feature.

Water Feature	Minimum ER Width[2]	Notes
Reservoirs & Regulated Lakes	30 m from right of way or easement boundary	A regulated lake is a lake where water levels are established to a predetermined elevation and actively managed through use of a licensing requirement (e.g. to pump water into the water body).
Lake (natural & controlled)	30 m from natural boundary	On controlled lakes, 30 m from sill elevation of licensed control structure.
Swamp/wetland[1]	Variable, include wet meadow zone	Wet meadow zone can be extensive in some situations, and in these instances the ER should be wide enough to preserve ecological function.
Large River (≥ 15m width)	30+ m	See additional requirements for hazardous lands.
Small River/Large Steam (6-15 m)	15 m	See additional requirements for hazardous lands.
Medium Stream (3 - 6 m)	10 m	See additional requirements for hazardous lands.
Small Stream (≤ 3 m)	6 m	See additional requirements for hazardous lands.
Ephemeral watercourse (no defined channel)	0 m	Use bylaw to regulate tree cutting within a defined distance from feature to maintain riparian vegetation and drainage.
Braided Stream	10 m from outside boundary of active floodway	

[1] Alberta Environment and Parks views the term "swamp" to mean any area with hydrological conditions of sufficient duration to have developed saturated soils and hydrophobic vegetation (i.e. wetlands or peat lands).

[2] In addition to the recommended ER width for the water feature itself, associated landscape features may require the ER width to be modified to factor in additional inherent hazards to development.

Strathcona County's *Assessment of Environmental Sensitivity and Sustainability in Support of the Strathcona County MDP Review* (2005) recommneds a **30 m** buffer for water quality and a **200 m** buffer for sufficient wildlife habitat and habitat connectivity.

Table 1. Comparison of Recommended Riparian Buffer Widths to Achieve Different Ecological Functions

Ecological Function	Buffer Width*	Description	Reference
Water Quality	30 m	Protect water quality in wetlands by filtering sediment, contaminants, nutrients and pesticides	Fischer et al 2000, Connecticut River Joint Commissions 2000
	36 m	Reduces the concentration of nutrients and microorganisms to acceptable levels in feed lot runoff from summer storms	Young et al 1980
Wildlife Habitat	100 m	Accommodate resident populations of all three locally common amphibian species	Spencer Environmental 2004
	100 m	Provide for increased avian diversity in natural vegetation surrounding wetlands	Fischer et al 2001
	100 m	Provides habitat for wetland and riparian species	Fischer and Fischenich 2000, Alberta Sustainable Resource Development 2001
	10-200 m	Provide habitat for all life stages of wildlife dependent on wetlands or watercourses	Connecticut River Joint Commissions 2000
Wildlife Connectivity	600 m	Minimum corridor width for white-tailed deer	Nelson and Mech 1987 *in* Meffe and Carroll1994
	1000 m+	Corridors several kilometers in width may be necessary for use by large mammal species	Paquet et al 1994

* buffer widths listed are *minimums*; it is widely accepted that wider buffers are more effective

The Leduc Wildlife Corridor Study recommends a width of **300 – 350 m** for a wildlife corridor to support sufficient wildlife habitat and connectivity.

The Alberta *Stepping Back from the Water* guide recommends a width of **60 to 400 m** depending on the species of interest, and all of which are present in the Telford Lake natural area.

Corridor Widths for Conservation of Wildlife Habitat in Alberta Lakes, Rivers, Streams and Wetlands

Species of Interest	Width (m)	References
Foraging and loafing water birds	100	Rodgers and Smith 1997
Raptors	400-150	Richardson and Miller 1997
Amphibians and reptiles	177-340	Semlitsch and Bodie 2003
Amphibians, small mammals and songbirds	100-200	Hannon et al 2002
Small mammals	60-100	Lehmkuhl et al 2008
Winter habitat for ungulates in large river valleys	400 m from water body or top of valley break + 100	Alberta Energy Resources Conservation Board

The Agroforestry and Woodlot Extension Society developed a Practical Guide to Establishing an Eco-Buffer. For water quality protection they recommend a buffer of **20 – 50 m** for permanent water bodies. For wildlife habitat they recommend a buffer that connects to existing natural habitat and that has a variety of native tree, shrub and herbaceous species, and structural diversity by interspersing species of different shapes and sizes together in different ways.

Table 1. Examples of Eco-Buffer functions and their corresponding design recommendation

Function	Recommended Location	Recommended Composition	Recommended Layout
Shelter for livestock or yard sites	Main zone of shelter will be 10-15X the height downwind. Main zone of snow trapping will be 2X the height downwind – do not locate important infrastructure (e.g. roads, buildings) in this zone if the windspeed is high prior to hitting the buffer.	Deciduous and coniferous trees and shrubs.	Plant species to achieve 40-60% porosity evenly distributed throughout height (typically 3-5 rows). Plant smaller shrubs on windward side. Orient perpendicular to prevailing winds.
Soil conservation and snow distribution on downwind fields	Main zone of shelter will be 10-20X the height downwind. Main zone of snow trapping will be 2X the height downwind.	Deciduous and coniferous trees and shrubs.	Plant species to achieve 40% porosity evenly distributed throughout height (typically 2-3 rows). Orient perpendicular to prevailing winds. Plant smaller shrubs on windward side.
Water quality protection	Downslope of land-use activities with potential to contribute pollutants/nutrients	Plants with deep binding roots (e.g. trees, shrubs, as well as sedges, cattails, and bulrushes if area is riparian). Include salt tolerant species if pollutants have a high salt content (e.g. road salts).	Orient perpendicular to the slope. Recommended buffer widths from activities with high potential to contribute nutrients are 20m (65') for permanent water bodies with glacial till substrate, 50m (165') for permanent water bodies with alluvial substrate, and 6m (20') for ephemeral water bodies.
Flood risk reduction and groundwater recharge	Within riparian areas, or in areas of spring runoff.	Riparian plants with deep binding roots (e.g. trees, shrubs, sedges, cattails, and bulrushes).	Buffer should ideally be as wide as the 100-year floodplain.
Beneficial insect habitat	Connect to or locate near existing habitat. Locate near benefitting crops (<150m).	Native flowering species with high pollen/nectar resources and diverse shapes, sizes, colours, and bloom periods. Hollow-stemmed plants, decadent trees and shrubs, and bunch grasses for nesting and overwintering sites.	If possible, plant individuals of the same species together in small clumps (3-8 individuals per clump). Orient to maximize morning sun exposure – i.e. taller species on north or west side.
Wildlife habitat	Connect to or locate near existing natural habitat	A variety of native tree, shrub and herbaceous species that are diverse in terms of size, shape, age, coniferous/deciduous, and blooming/fruiting period.	Create structural diversity by interspersing species of different shapes and sizes together in different ways.
Nutrient cycling	Locate near benefiting crops (<20m).	Diverse native trees and shrubs. Favour those that associate with mycorrhizal fungi, and/or fix nitrogen.	Plant so that nitrogen fixing species are nearest to the benefitting crop.
Food, forage and fuel provision	Select a location where provisioning species can be easily accessed for harvest or forage.	Species with desired provisioning value. Nitrogen fixing species. Fast-growing species to provide wind shelter.	Plant provisioning species in a way that they can easily be harvested or foraged (e.g. rows are often used). Plant nitrogen fixing species near to provisioning species (<20m). Place sheltering species on windward side of provisioning species.

Opportunities to Improve Understanding & Protect the Telford Lake Natural Area

LEAB has identified the following potential opportunities to ensure the City has a complete understanding and appreciation of the Telford Lake natural area and to support informed decision making regarding future development, setbacks and conservation objectives.

Preserving the natural area around Telford Lake is expected to require a multi-prong approach. LEAB recommends that Council direct Administration to investigate the following opportunities prior to finalizing development decisions around Telford Lake. Although the current MDP update (2023/2024) offered an emergent opportunity to raise these concerns, based on initial conversations with the City's Planning department, there is still time to consider these ideas for another MDP update in the near future. Development around Telford Lake is projected to be 5-10 years out, but the time to start taking action to ensure we have the information and processes in place, is now.

- Municipal Development Plan - Articulating the value of riparian areas and natural assets to a municipality and the municipal objective for these areas can be done in a Municipal Development Plan. Provisions could be added to Leduc's MDP to articulate the value of Telford Lake (and other environmentally significant areas) to the City and the municipal objectives for the protection of these areas. For example, the North Saskatchewan Watershed Alliance document, "Legal Foundations for Municipal Riparian Management," notes that a MDP could:
    - Ask that development proposals that impact natural areas consider and integrate these landscape features as part of development projects, and
    - Outline requirements for technical studies and reports to be undertaken when developments are proposed within or adjacent to the City's environmentally significant areas

- Developing Scientific Setbacks – As per the Alberta Government *Stepping Back From the Water* report, municipalities have the power to protect their water bodies by adopting policies and utilizing scientific setbacks. One potential option is the Riparian Matrix Model which is a scientifically-based, legally defensible model that allows municipalities to establish environmental reserve (ER) setbacks to waterbodies during the development process under the authority of Part 17 of the Municipal Government Act, to sustain watershed and/or watercourses in balance with developmental pressure.
    - The model can be customized for each municipality and creates unique, scientifically defensible environmental reserve (ER) setbacks based on slope, height of bank, groundwater table level and vegetation cover specific to the area
    - Many municipalities are developing this model with a supporting policy that puts the onus on the Developers to follow the Riparian Setback Matrix, and gather required site specific data to determine the correct ER setback required prior to submission of the subdivision application.
    - This model can be customized to also consider a Natural Asset Inventory and Ecosystem Service Assessment, which is recommended for Telford Lake, and discussed further in the next section below

  Currently the City of Leduc has allocated 10 m of ER around the lake; it is possible that scientifically informed setbacks could recommend more and be defensible to developers under the MGA. This could be an opportunity to increase the ER setback distance around Telford Lake; however, it is

recognized that this may also require redesignation of adjacent MR which we would not want to lose as an additional buffer area.

The estimated cost of developing this tool is $5,000 to $20,000 depending on the City's needs. Leduc County has developed their own Model and based on proximity there may be an opportunity to inquire if their tool would be a good fit. Once the tool is developed, the onus to use the tool can be put on the developer at the ASP and subdivision level.

- Regional Opportunities to Align on Development Setbacks - The North Saskatchewan Watershed Alliance (NSWA) developed a Riparian Conservation and Restoration Strategy in 2021. In this strategy, the NSWA worked with the committees to set an interim Riparian Health Target of a minimum of 65% High Intactness and no more than 25% low intactness. These targets are scalable and apply at multiple levels: watershed, subwatershed, waterbody and political jurisdiction (e.g. municipal boundary). In 2021, they also partnered with other Alberta Watershed Planning and Advisory Councils to develop Riparian Condition Municipal Summaries, which integrate data from multiple subwatersheds to deliver municipal-specific report cards. The NSWA is currently working on a few tools that can be used to guide riparian management and support the work around Telford Lake:
    - Recommendations for riparian policy and by-laws for municipalities
    - Guidance on appropriate setbacks from water bodies to protect riparian areas based on the Government of Alberta's Stepping Back from the Water: A beneficial management practices guide for new development near water bodies in Alberta's settled regions (2012)
    - Riparian restoration scenarios through modelling

  It is recommended that City participate in regional opportunities (such as these with the NSWA) to align on riparian development setback recommendations and best management practices.

- Natural Asset Inventory and Ecosystem Service Assessment – While engineered assets are essential to the safe and efficient operation of a municipality, there is increasing awareness and recognition that municipal assets extend beyond engineered structures to also include natural assets such as trees, soil, and wetlands. Like engineered assets, natural assets provide important services to citizens; for example, wetlands store water, improve water quality, and moderate climate through carbon storage, while vegetation is integral to various services such as helping to control erosion and supporting healthy populations of pollinator species.

  Unlike engineered assets, however, very few municipalities have a comprehensive inventory of their natural assets, nor do they calculate the economic value of the services that flow from these natural resources. As a result, the true cost of removing versus maintaining these natural assets in terms of their value is rarely factored into land development decisions, and consequently, these assets are at risk of being lost or converted in favor of other land uses. Municipalities are beginning to acknowledge that accounting for and actively managing natural assets as critical components of municipal infrastructure will create more livable and resilient communities and will assist them to fulfill their environmental duties under the Municipal Government Act.

The Town of Okotoks for example, conducted a Natural Inventory Report to better understand the economic and environmental trade-offs of land development, leading to more informed decision making. A Natural Asset Inventory and Ecosystem Service Assessment can help build recognition of the value in protecting natural assets around Telford Lake and could possibly provide negotiating power with developers at the subdivision stage, to further protect a buffer area around Telford Lake, and support the integration and preservation of natural features that offer key ecosystem services into development areas.

The estimated cost of developing this tool for Telford Lake is $10,000 - $30,000. This tool could also have significant benefits for land use planning if implemented City wide with the estimated cost closer to $50,000.

- Updated Biophysical and/or a Biodiversity expert review – Although it appears that a Biophysical report was done for several of the ASP areas around Telford Lake, the Leduc Wildlife Corridor study notes that further studies such as a formal biophysical at subdivision stage is recommended to ensure conditions have not changed dramatically between desktop studies and future development. An updated Biophysical Report and/or Biodiversity expert review could inform site specific setback distances to protect local biodiversity and wildlife habitat, as well as help improve upon the proposed development requirements in the Land Use Bylaw Telford Lake Overlay to "*protect the integrity of Telford Lake and respect the park-like nature of the lands adjacent to the lake*".

Enhanced Guidelines for a Buffer/Transition Zone Between Natural Areas & Development

There is an understanding that some of the setback distances recommended for wildlife habitat and connectivity (i.e. 200 – 400 m) may be unattainable in an urban environment. The Telford Overlay is a great tool to create a transition area between the naturalized areas and development; however, many of the design considerations currently outlined in the LUB Telford Overlay are high level. A biodiversity expert review could inform the development of a best management practices document to support development officers and imposed requirements at the time of development (i.e. specific lighting, noise and tree/shrub planting recommendations). For example, the City could adopt a Light Efficient Community Policy, like Strathcona County, which reduces light pollution, and increases access to dark nighttime skies by promoting the use of light only where it is needed, when it is needed and at levels suited to the task.

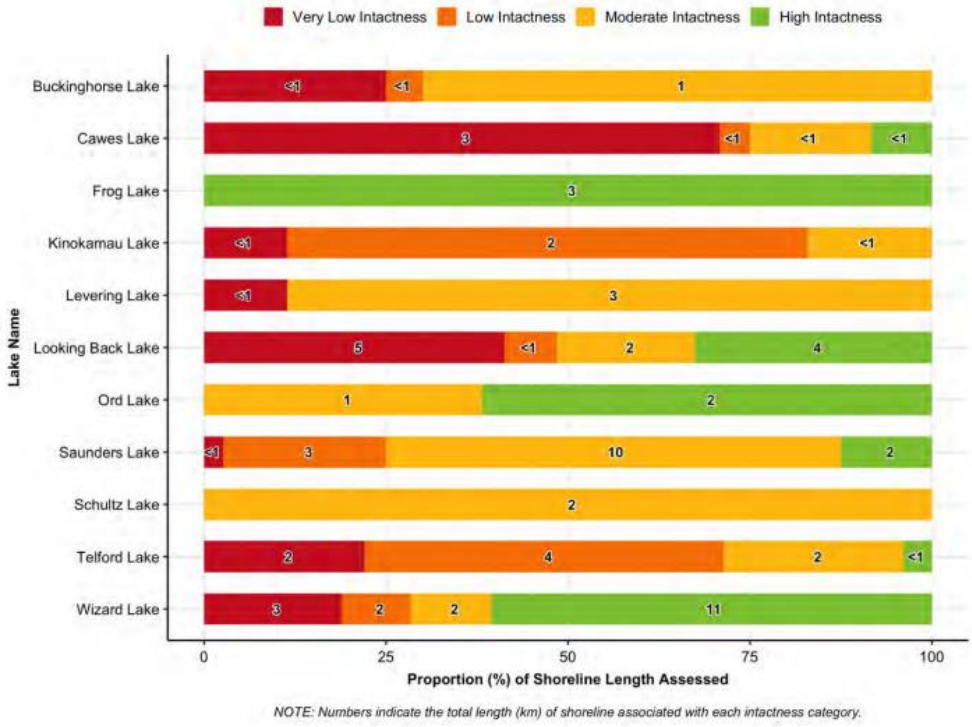
The City could enlist the support of a biodiversity expert to review the existing Telford Overlay requirements and provide more specific recommendations; or perhaps the onus could be put on the developer at the time of the area structure plan or subdivision plan.

Restoring existing areas

LEAB recognizes the great work the City has already done to manage and restore existing natural areas around Telford Lake. It is recommended that the City continue with this work to improve the ecological condition and resilience of the Telford Lake natural area.

The North Saskatchewan Watershed Alliance did a review of riparian health in the watershed and gave Telford lake a score of only approximately 4% for areas of High Intactness. The NSWA set a goal to achieve a minimum of 65% Hugh Intactness and to minimize the amount of intactness in the Low and

Very Low categories to no more than 25% (combined). Currently Telford Lake is hovering around 71% for areas of Low and Very Low Intactness.



The following tools could be considered to further support restoration efforts around Telford Lake:

Naturalized Area Management - The development of a City wide and/or natural area specific management plan is important to provide broad guidance for management objectives and strategies that should be implemented by operational staff to ensure consistent and effective management. These plans should outline objectives and strategies for the management of vegetation, wildlife and their habitats, hydrology and aquatic ecosystems, human use and safety, and public education, engagement, and stewardship.

Tree Planting – City tree plantings around the lake have been beneficial (i.e. Arbor day plantings, North Telford Commemorative Forest, Ten Billion Trees Initiative). It is recommended that these initiatives continue with on-going monitoring and maintenance plans, and further grant opportunities for tree plantings be pursued to improve ecological conditions around the lake.

Wetland Restoration – Wetland restoration around the lake has also been beneficial for habitat, and flood control, and it is recommended that future opportunities continue to be pursued where possible.

Weed Management - Given the threat that invasive species pose to biodiversity in natural areas, site-specific natural area weed management plans can ensure that areas of highest concern are targeted, and that the methods used to remove weedy species are appropriate and reflective of the ecological sensitivity of the site.

Naturalization – Continue naturalization efforts to transform maintained land back to a more natural state (i.e. reducing pesticides, reduced mowing, tree planting, native species). Naturalized, ecologically valuable areas, in combination with the City's existing parks network, create unique spaces that are part of the high quality of life experienced by the City's residents.